DESIGN AND DEVELOPMENT OF AN OPTIMAL FORMULATION OF JUGLANS REGIA FOR THYROID FUNCTION

डिजाइन एंड डेवलपमेंट ऑफ एन ऑप्टिमल फॉर्मूलेशन ऑफ जुगलांस रेजिया फॉर थाइरॉएड फंक्शन

A

Thesis

Submitted for the Award of the Ph.D. degree of

PACIFIC ACADEMY OF HIGHER EDUCATION AND RESEARCH UNIVERSITY

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DATE: - **HAJERA HAFEEZ**

DEDICATED TO
MY FAMILY, FRIENDS
AND WELL-WISHERS

PREFACE

In this study, we investigated the septum of walnut kernel (Jugulans regiaL.) by conducting several tests in vitro to know the properties of septum which is rich in polyphenolic compounds. As Iranian, in their ancient times uses this septum for diabetic patients especially the mellitus, against several disorders like thyroid, skin, colon, cancer as it works against inflammations, microbes, viruses.

Walnut septum fights against inflammation by decreasing the cytokines (interlukin-6 (IL-6), interlukin-8 (IL-8), interlukin-1 (IL-1β).

In vitro, after selecting the walnuts of fairly good size, checked if it's making any noise, and if it does not make a lot of noise upon rattle, it means that the septum system is mature and is protecting the walnut fruit/meat. Then checked the upper pole along the secondary seam so that the septum can be remove smoothly when wooden hammer was used upon pole of the walnut to crack open. Once it's open the septum has been removed cautiously and dried for 7 days away from sunlight, in order to remove moisture content which presents on natural basis in it.

The collected septum has divided into two methods to carry further processes. In the first method, walnut septum membrane was soaked directly into ethanol and distilled water mixture. In the second method septum was powdered by electric grinder, which then soak into ethanol and distilled water solvents of different ratios. Afterwards, by using whatmans filter paper, the mixture was filtered and collected the concentrated extract/ walnut septum solution WSS for further evaluations.

Evaluation parameters includes moisture content, Total Ash values, Boiling points, specific gravity, Density, viscosity, pH, HPTLC Analysis/HPLC Analysis. In vitro, Drug release profile of extracted solution and stability studies shows all solutions were under the range. The solution F1 give excellent drug release among F1-F10 tests range. The formulation made by distilled water gives less drug release compare to ethanol content formulation. Walnut septum membranes solution with ethanol would be a novel approach.

With the help of HPLC method, we found that the walnut septum membrane solution consists of flavonoids, catechins, rutein, myricetin, luteolin, quercetin, apigenin and kaemferol.

Keywords., Walnut, Juglans regia L. Kernel, Septum, thyroid

ABBREVIATIONS

SYMBOL	DESCRIPTION
%	Percentage
µg	Micro gram
kHz	Kilohertz
pKa	Dissociation rate constant
HPTLC	High-performance thin-layer chromatography
λmax	Maximum wavelength
%CDR	Percentage cumulative drug release
Conc.	Concentration
Abs	Absorbance
BCS	Biopharmaceutical classification system
Alc Ext	Alcoholic Extract
Aqu Ext	Aqueous Extract
ext	Extract
fig	Figure
g	Gram
°C	Degree centigrade
AUC	Area under curve
Cm	Centimeter
Cmax	Maximum plasma concentration of the drug
FTIR	Fourier transform infrared radiation
NMR	Nuclear magnetic resonance
Gm	Gram

Hrs	Hours
DSC	Differential scanning calorimetry
IP	Indian Pharmacopoeia
Kg	Kilogram
Mg	Milligram
Min	Minute
Ml	Millilitre
Nm	Nanometre
pH	Negative logarithm of hydrogenion concentration
RH	Relative humidity
RPM	Revolution per minute
UV	Ultraviolet
w/v	Weight by volume
w/w	Weight by weight
Vs	Versus
SEM	Scanning Electron Microscopy
KV	kilovolt
ICH	International Conference of Harmonization
>	Is greater than
<	Is less than

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INTRODUCTION

Today world is conscious for development. Number of country in the world can afford in development of its people. Every country is attempting to increase its production with the help of research, teaching and extension. Developed research must pass on the society, extension should bring the genuine problems to the scientist and return the appropriate solution of the problems to the society.

Amazing advances in agricultural research have contributed to the rapid strides of agricultural technology. Modern technology is sophisticated, precise and highly specialized rendering the task of those involved in agriculture, horticulture and animal husbandry highly challenging.

To increase the agricultural production of a country is a difficult task and it is more difficult in a developing country like India where there are different religions, customs, traditions and different climatic conditions.

Indian scientist working hard on technology. They are using intelligence, imagination, experimentation and continuing hard work for the development. Now India become world leader in Pharma Industry, Matter of pride that Every Third Tablet or Every fourth capsule consumed in world is Manufactured in India.

But in spite of all these drawbacks there has been a rapid increase in output of agriculture in India due to the adoption of technical knowledge by the farmers. Better technical know-how, better crop raising methods, better power and machinery, improved seeds, pesticides, weedicides and fungicides. More irrigation facilities, fair prices of the produce, better marketing facilities and institutional financial aid to the farmers etc. has increased to the agricultural produce considerably.

However, there still exists lot of scope for increasing and diversifying agricultural production.

Nature continuously serves as a brilliant symbol for illustrating the unresolved development of mutualism. The organic miracle and abiotic factors of environment square measure all mutualist. The shops square measure necessary to man for his life. The 3 necessary wants of life food, covering and sanctum and a number of different helpful products handed to him via the area. Nature takes handed a whole storage of

medications to treatment all affections of the humans. The information of medication consumes accumulated ended thousands of years due to the curiosity of humans, Thus, we generally have a number of efficient ways to ensure health care these days.1Indian medication has been returning all the way down to America in many strands, four of that stand out rather prominently. The primary strand consists of skilled physicians, referred to as Vaidyas or Bhishaks originally happiness to a category of individuals called the ambashtas. The second consists of wandering pedlars, largely of social group origin, World Health Organization collect herbs and medicines from forests and mountains and sell them in villages. The third cluster includes temple clergymen, particularly of the Vaikhanasa peruasion, World Health Organization also are needed to operate as physicians. The fourth strands were illustrated by what is also referred to as the 'Home Remedies' the medical knowledge and practices that were till recently current among the domestic set-up as "Grandmother's prescription" everywhere the country.[2]

Ever since the dawn of human civilization, people have become accustomed to using sophisticated healthcare facilities for their medical needs. For thousands of years, the green stores have given mankind and other animals all the treatments they need, other from food, clothing, and sanctuary. For humanity, sauces are a priceless treasure. Shops create large compounds that are used to treat a variability of ailments. Many of those are used for an extended period of time to treat chronic fatal illnesses. Phytotherapy, another name for herbal drugs, describes the use of a plant's seed, fruit, root, leaf, bark, or flowers that have medicinal significance. Following the discovery of chemical analysis, scientists began altering and rebooting active composites from stores in the early nineteenth century.[3]

According to WHO estimates, 80 percent of global population uses sauces for primary healthcare. There is an extended past of using herbs for purposes other than pharmaceuticals. The increasing usage of botanicals requires the development of manufacturing and quality standards. According to current WHO criteria, each herbal product must first undergo rigorous safety testing before being submitted. Because walnuts are so beneficial to human health, they are a preferred medicine for research.

Uses of Ethnobotanical and Traditional

The plant has occasionally been used in tropical medicine to alleviate cutaneous vexation and excessive hand and foot sweating. The leaves are traditionally used to cure sinusitis and stomachaches, but they are also widely used as an antibacterial, anthelmintic, antidiarrheal, hypoglycemic, alcohol, and decorative treatment globally. In traditional Turkish medicine, new leaves are applied to the bare body or forepart to reduce fever or to blown joints to treat rheumatic discomfort. The wood is robust and perfect for cabinets, and it possesses all the necessary attributes for delicious substance. This factory's leaves are used directly as an extra ointment to cure a variety of skin ailments, including sunburn, dandruff, superficial becks, and crown itching. In addition to helping older men's vascular and prostate health, the factory has been used in Palestine to treat heart disease, diabetes, and hereditary disorders. In addition to callow and dingy fruit for pesticides effects, the Sumi lineages of Kohima and Lotha, Angami (Nagaland) active leaves of J. regia used treatments for Dermatitis as Astringents and Anthelmintics.[4]

Medicinal plants play a very important role within the lifetime of the agricultural population, particularly within the remote or developing countries like Asian nation parties. Different drugs systems like medical care, Siddha and aroma remedy additionally use plants for therapeutic functions. Currently at some point it's an undeniable fact that herbs give raw materials for the isolation or synthesis of typical medication.

In piece of writing, it's believed that concerning a pair of, 100 species of plants have healthful values, while 5,800 ancient medicines square measure listed within the Chinese assemblage, most of that square measure still in use in typical drugs, even whole plants square measure seldom used. In India, healthful plants have created sensible contributions to the event of ancient Indian medical instrumentality. One in all the primary Indian drug treatments, Charaka Veda (1000 BC) records the employment of over 340 flavoring medicines. Most of those collected from wild sources to satisfy the demand of the health profession.

Large number of medication from healthful plants were discovered and introduced in trendy Pharmacopeias throughout 1860-1960. Therefore, currently days there's have

to be compelled to notice the new healthful plants that square measure pharmaceutically active. Therefore, during this work, efforts are created to search out out such new medicinally active plant with identification of its chemical constituents accountable for medicine or biological activity.

Salient options of United Nations agency tips (WHO, 1993) are,

- **Quality assessment**
- **Stability**
- **Safety assessment**
- **Assessment of effectiveness**

Control of commonness of rough materials, finished belongings & strategy should keep in worldwide market. These regulation methodologies square measure furthermore needed for authentic understanding of use of home developed prescribed drugs. Making robust, simply broken & precise ways for internal control of unrefined resources & terminated things would have home developed remedies of dependable probe for excellence and adequacy. Security, reasonableness and quality studies would decide right species, right estimations routine and dimensions repeat. Affirmation of your time traverse of simple use of unrefined materials would layout program of event rough instrumentality and their reaching to build previous things. These surveys need to be contacted bioavailability in sound human volunteers and scientific trials inpatients (Sane, 2002). Information therefore created can facilitate USA to propel home developed meds & reestablished excitement for characteristic medication can be up control.

India has prosperous combine of supporting plants scattered in numerous land and trademark conditions in spite of what you seem like at it in nation. Plants are used since out of date conditions for treatment of various weights. Customary structures of cure beside previous stories frameworks keep serving expansive piece of occupants, particularly in country and social group scene paying very little identity to start of trauma edge course of action. Out of plant science, materia medica and general thriving and totally different teaches as needed.

From its inception, Indian Traditional Medicine, the cornerstone of the world's ancient medical practice, has been vital to the provision of life-sustaining healthcare and welfare. Similarly, every traditional medicine has its own native products and is widely used in East Asian countries like China, South and North Korea, Japan, Vietnam, and so on, as well as in Africa, South and Central America, and West Asian countries like India, Pakistan, Tibet, and so on. Based on ongoing, routine assessments, this arrangement goals to provide bright on the importance of traditional Indian medicinal facilities. Outcomes A long-running argument exists between individualities who rely on modern medicine to treat their ailments, and others who employ Indian old-style medicines for a variety of sicknesses and ailments. The basic truth that underlies the polite debate between contemporary and traditional medicine is that everyone, regardless of background or state of health, should be informed about the facts surrounding their condition and the potential negative effects of medication. Remedial knowledge of Indian traditional medicine has fueled the growth of numerous traditional methods with indigenous importance that share or differ in their propositions and techniques. The present review will support traditional medicine scholars in their endeavors to broaden the discourse on Indian traditional medication in the near upcoming and explore phytochemicals.

1.1 **Traditional medicine of INDIA:** refers to the practice of using medications that are supposed to have Indian origins or that were brought from abroad to INDIA and assimilated into INDIAN culture; Fig. 1.2 provides an example of this. The only country with officially acknowledged traditional medicine is India, home to Ayurveda, Siddha, Unani, Yoga, Naturopathy, and Homoeopathy. Even though homoeopathy inwards in INDIA in the 18th century, it was completely assimilated into the country's philosophy and established alongside other traditional organizations, becoming an essential part of Indian traditional medication.[5]

1.1.1 AYURVEDA

Ayurveda, a nonfiction term derived from the Sanskrit words "ayur" (life) and "veda" (wisdom or knowledge), means "The Science of Life." The Rigveda and Atharva vedas provides evidence from history for the logical principle of harmonious life that underpins Ayurveda. Though the roots of Ayurveda are lost in antiquated artifacts, its

concepts and practices were idealized in India about 2500–500 BCE. The use of natural resources for progress via giving experiments and gestures of daily existence has been a customary practice of Indian Ayurveda.

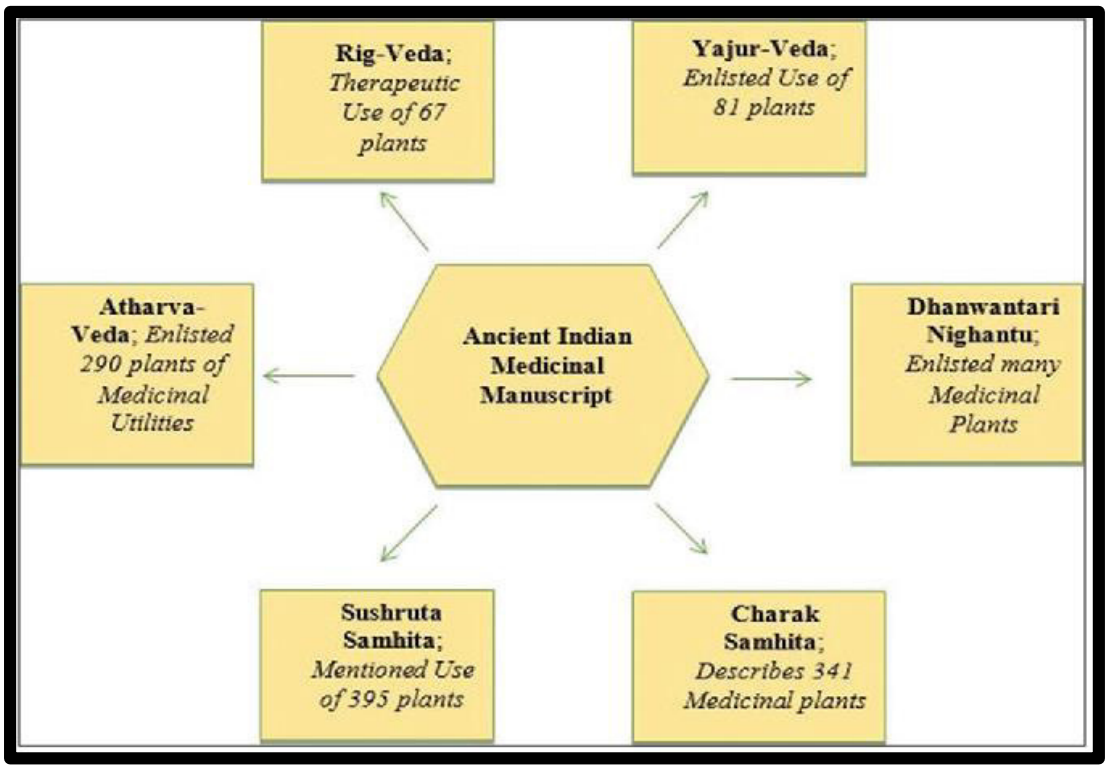

Fig. No.1.1 Enlisted plants of the ancient Indian medicinal manuscript

The unprofessional regulation of Ayurveda treatment comprises two preliminary corridors. These are to retain the motive for illness and to brand the case additional aware around the reason for the sickness. The dominant ideal of Ayurveda treatment is "Ayurveda deals with happy and unhappy life. It explains what's applicable and what's unfortunate in relation to the life, as well as it measures the life expectation and the quality of life." It is a comprehensive medical service plan based on the theory that the human body is made up of seven abecedarian apkins called Asthi, Majja, Mansa, Meda, Rasa, Rakta, and Shukra and waste products by excretion for example urine, and sweat, all of which are inferred from the five abecedarian factors Air, Earth, Fire, Water, and as well as the three dynamic powers, or functional doctrines Kapha, Pitta, and Vata, (Tridosha). Complaining arises from any imbalance or unsettling impact in these abecedarian standards of the body. Ayurveda addresses the whole person rather than just the ailment. This medical system emphasizes the interconnectedness of all beings with regard to social conservative status, bio-

personality, biosynthetic, and physiological factors that may give rise to a particular type of disease. Additionally, this makes it easier to discuss modern, logical approaches to treating various problems related to mortal services.[6-14] Ayurvedic drugs are becoming less and less available worldwide as a result of conventional receiving, helpful backing, socioeconomic benefit, and easy adequacy. With extensive research, Ayurvedic drug quality, safety, stability, and efficacy are now guaranteed. The ongoing search for novel pharmaceutical agents—most notably, bioactive composites—is having a significant impact on how health care is developed and delivered in India. Ayurvedic drugs are invariably poly-herbal combinations of extracted goods, essences, and minerals from factories and/or beasts. Even so, the ancient script, which includes the contemporary Ayurvedic Pharmacopoeia, demonstrates the superiority of NPS above other derived drugs. Over the course of several decades, Ayurvedic research conducted on diverse platforms has led to sophisticated endeavors in this sector. Lead compounds with color in medicine are emerging.

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1.1.2 SIDDHA

The medical system known as Siddha has existed in India since the early stages of its mortal civilization, which dates back to between 10,000 and 4000 BCE. It was developed by common people using their natural resources to maintain good health, much like Ayurveda, and it is the oldest kind of medicine in South India. This

pharmaceutical usage is based on the Saiva gospel, one of the six sects of Hinduism. The word "Siddha" refers to "holy harmony," "attaining excellence," or "honored fact," and the "Siddhars" were mythical beings with superhuman intelligence and frequently abusing related substances. The following names are Thirumoolar, Ahappe, Agathiyar, Sunthara ananthar, Bogar, Machchamuni, Konganar, Korakkar, Therayar, Karuvoorar, Nandi Devar, Idaikkadar, Iraamathevar, Sattamuni, Kuthampai, Paampaatti, Aluhanna, and Kahapusundar. are said to be the "Siddhars" who developed the Siddha system of medicine.

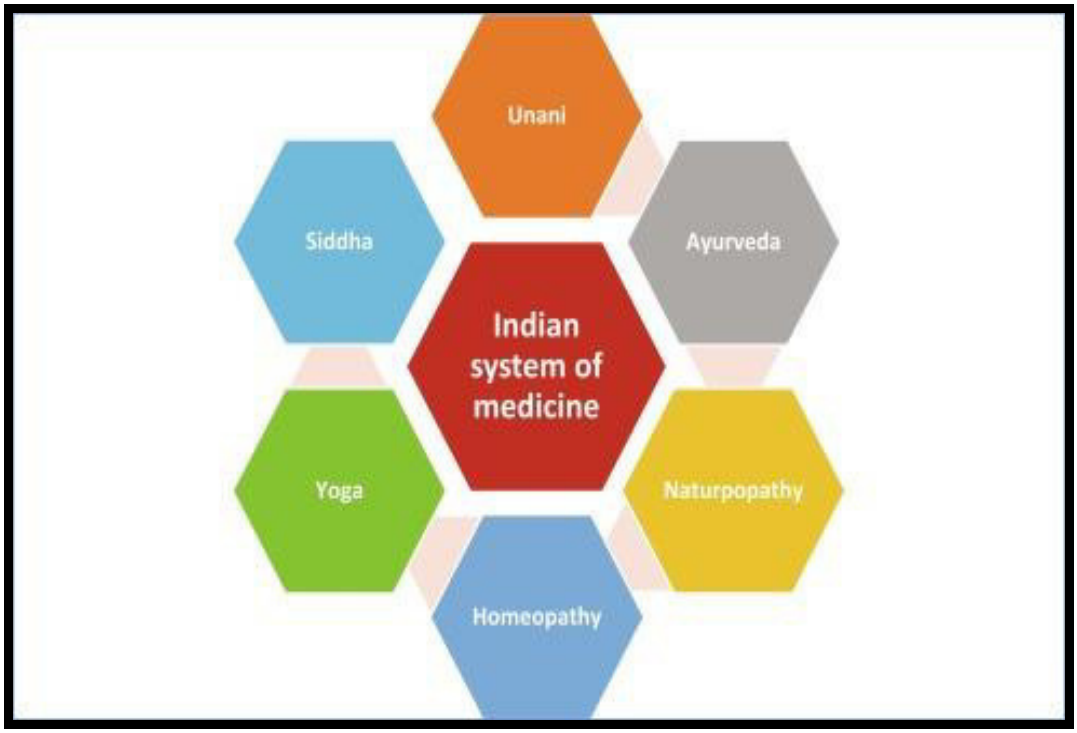

Fig. No.1. 2 Medicinal practice systems recognized in Indian

This medical approach holds that maintaining mortal well-being is essential to achieving everlasting joy. Its guiding principles include the notions that "sound mind makes a sound body" and "food is drug, drug is food." The ideas of this classification are comparable to those of Ayurveda Medicine. The Siddha drug system depicts the mortal body as a collection of three hilarities, seven introduction accessories, & abandoned goods. A balanced sense of humor indicates good health, while an unbalanced sense results in complaints or illness. Thirty-six essential components of a mortal being are described by the physical, physiological, moral, and intellectual characteristics. Revision causes the 96 principles to be handled incorrectly, which also

causes complaints. The eight-fold opinion includes a check-up on speech, palpitations, complexion, lingo, and other areas. Pain and pleasure, the intellect, yoga, and sensitive organs are all tools for developing sensitive purposes and their refining. The psychological system can be reinstated with the use of NPs, presiding essence, and minerals. Given that much of the literature isn't translated from the Tamil linguistic but somewhat is revered by way of an essential form of biomedicine amongst Tamil publics, siddha medications aren't as widely available in the west. In contrast to ayurvedic medications, the Siddha gospel was developed from a remedial, thoughtful, and academic stand point. It places equal emphasis on the internal personality and the external figure, particularly when it comes to practices like urine testing, practice materia medica, and witchcraft (which is the process of turning base essence into gold). Currently, it is accepted that siddha medications are reasonable for treating all conditions except extreme instances. Similarly, drugs called herbo essence or herbo mineral that are known to contain nanoparticles work better for chronic illnesses.[15-23]

1.1.3 UNANI

The Unani medicinal system was developed in Greece and then evolved into a highly developed medical knowledge by Arabs using the teachings of two Greek physicians and champions, Hippocrates (Buqrat) and Galen (Jalinoos), who lived from 460 to 377 BCE. GREC-Arab medicine is the result of the method's continued refinement by Greek and Arab philosophers including Avicenna (980–1037 CE), Raazes (850–925 CE), and Galen (131–212 CE). The basis of Unani medicine practice is the four stages of life, which are comparable to hot, humid, cold, and dry, as well as the four humors of the Hippocratic thesis: mucus, black corrosives, and blood's unheroic corrosives. Under the Mughal Emperors, the unani result of medicine was blended with Indian culture, and a sizable section of the populace now works in India. Seven standards—Mizaj (grains), Anza (organs), Quo (coffers), Arkan (factors), Arawh (spirits), Aklath (humors), and Afal (capacities) are said to make up the mortal body in Unani philosophy. These ethics monitor both the content and the complaint state. Before making a diagnosis and suggesting a course of action, a croaker takes each of these variables into account. The nonprescription medications used in this framework are free of side effects and are indicative of life. Similar details are defined and refined

before to application, as they are lethal in their raw form. The Unani drug system recommends three different types of specifics: pharmacotherapy, regimental treatment, and food remedy. [24-25]

1) Dietary treatment includes prescribing specific ailments, enforcing society-mandated diet regimens, or controlling the quantity and composition of food on a regular basis.

2) Knead washing, Turkish showers, diaphoresis, and other procedures are part of the regional treatment.

3) NPs are utilized by pharmacotherapy.

The UNANI medicinal scheme is all-inclusive, with an preference for sole or expressed drugs in their raw form that work wonders for a wide range of health issues. This technique offers excellent outcomes for neurological disorders, cardiovascular complaints, and gastrointestinal issues.

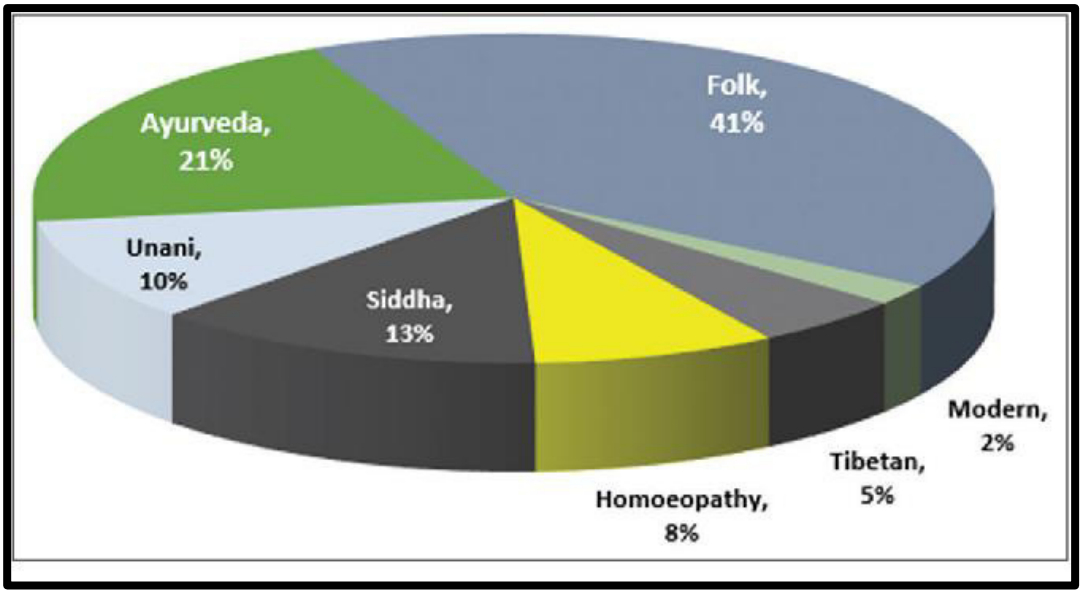

Fig. No. 1.3:Percentage of plants used in different systems of medicines in India

1.1.4 NATUROPATHY AND YOGA

Sanskrit is the source of the word "yoga," which is mainly spoken in India. Strangely enough, mainstream Indian religious systems such as Buddhism, Jainism, and Hinduism are fond of Sanskrit. Although there are many different ways to define the

word yoga, most people understand it to mean togetherness. As a training practice to improve awareness, yoga investigates restorative and preventative skills. Dialectical behavior therapy is built upon the principles of cognitive behavior therapy. Cognitive remedy methods are supported by a unique kind of awareness known as care grounded private therapy. Naturopathy is a specific class of complementary medicine that harmonizes traditional healing practices with modern research and reason. Naturopathy is founded on a fascinating system of law that recognizes the body's innate ability to heal, places an emphasis on preventing complaints, and promotes individual accountability to obtain optimal good. According to naturopathic theory, the complaint is interpreted as a process of disruption to wellbeing and ensuing recovery in terms of natural healing mechanisms.[26-28].

1.1.5 HOMEOPATHY

One of the most controversial healing philosophies is homoeopathy, which dates back to Hippocrates of Greece in 450 BCE. Dr. Samuel Hahnemann, a German clerical physician (1755–1843)CE, is a notable representative of the current homoeopathic science. The English word "homoeopathy" comes from the Greek words "pathos," which means suffering, and "homomois," which means comparable. In homeopathy, various substances are combined to create a remedy whose effects, when balanced in healthy individuals, match the symptoms of the sickness in that specific patient.

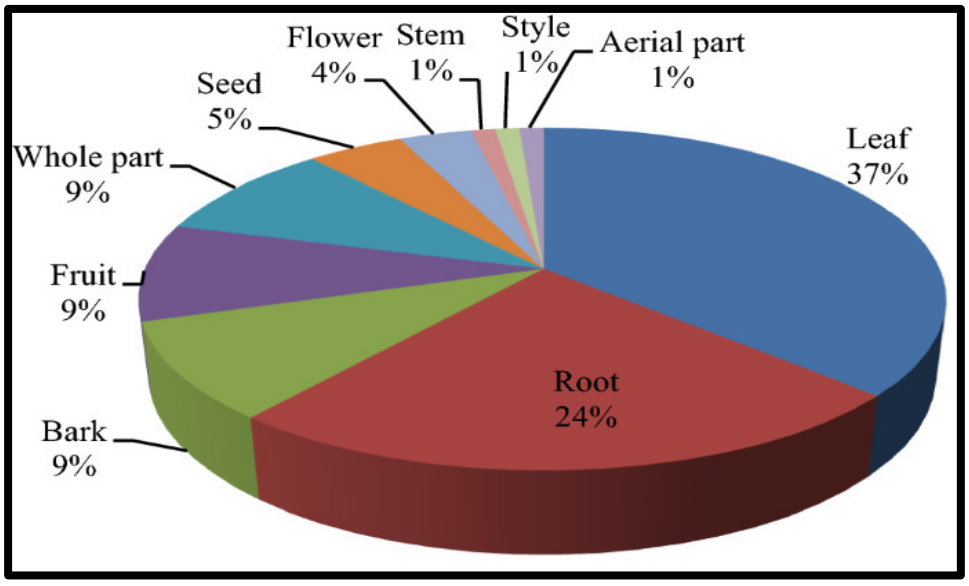

Fig. No. 1.4: Percentage of plant parts used for preparation of herbal medicines

It is thought that the approach operates on two key tenets. "Like cures like" means that if a healthy person took the medication and experienced the same symptom, then the medication would be the cure for that condition. "Horizon less dilution" means that restorative effort is strengthened by repeated dilution and that race would be contaminated when it exceeds Avogadro's number. In spirit, homeopathy is the repetition of treating illnesses using medications that, when taken, might cause indications that are exact replicas of the original complaint. For example, if a healthy person were to take a small extract from Cinchona officials, which contains quinine, they would likewise have exactly the same symptoms as those of malaria.

Homeopathic remedies have been used worldwide for more than 200 years after being developed in India. It is recognized as one of the most esteemed drug delivery systems in the medical sector and has adapted well to India's customs and heritage. Indian traditional drugs originated there and underwent constant transformation after the Vedic era, favoring single medicines or blends in unrefined forms over multiple fold formulations. Despite the fact that the origins and development periods of these conventional drug processes vary, they all share a foundation that includes their initial norms and practices for using store-bought and factory-produced drugs in the medical services. Fig. 1.3 shows the extent to which shops are applied in a separate system of particular. Additionally, 85–90% of Indians rely on the traditional system for basic medical care.[29-32].

1.2 THYROID GLAND

The thyroid is a small gland that lives in the center of the lower neck and has a butterfly-like appearance. Its major duty is to regulate the body's metabolism, or the speed at which cells carry out important tasks for survival. The thyroid creates the hormones T4 and T3, which advise the body's cells on how much energy is important to use, in order to control metabolism. A healthy thyroid will continue to produce the right number of hormones needed to maintain the body's metabolism functioning at a healthy speed. The thyroid stores hormones as they are used.[33-38]

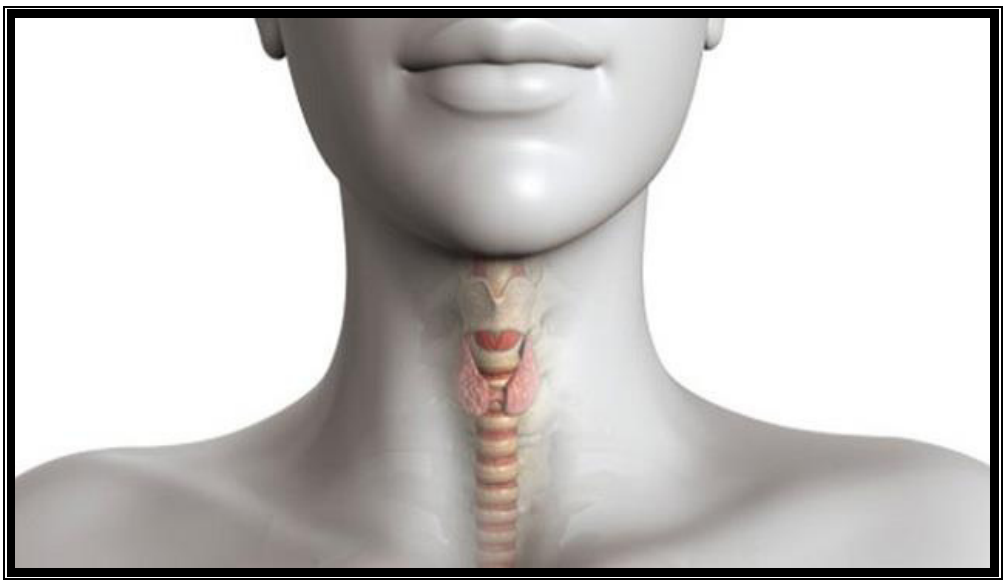

Fig. No. 1.2.1: Thyroid Gland

The pituitary gland covers and regulates the amount of thyroid hormones in the circulation. The pituitary gland, which is placed in the middle of the skull behind the head, will modify its individual hormone (TSH) and direct it to the thyroid to teach it what toward do if it detects either a high or low level of thyroid hormones.[33-38]

1.2.1 Thyroid disease

The body utilizes energy more quickly than it should when the thyroid generates too much of a vital hormone. Hyperthyroidism is the term for this condition. The body consumes energy more slowly than it should when the thyroid does not create enough hormone. We refer to this disease as hypothyroidism. There exist multiple explanations for the development of either of these disorders.[33-38]

1.2.2 (TSH) Thyroid Stimulating Hormones

(TRH) Thyrotropin release Hormones is a hormone released through the brain's hypothalamus. With the assistance of the pituitary gland, TRH is in charge of the TSH product. The body's amount of T3 and T4 hormones regulates the TSH product. In addition, TSH production is impacted piecemeal by thyroid gland inflammation, excess or deficiency of iodine in the body, malignancies related to the thyroid, and certain medications such as steroids, cholesterol-lowering drugs, chemotherapy, and mood-altering drugs.

1.2.3 Hypothyroidism (Underactive Thyroid)

When the thyroid gland is unable to generate a sufficient amount of hormones for the body. Increased cholesterol, memory loss, hair loss, constipation, and skin issues are some of the symptoms. Typically, the medication has a lifelong effect, and blood tests are performed to verify the anomaly.

1.2.4 Hyperthyroidism (Overactive Thyroid)

The state in which the body produces more thyroid hormone (T3 and T4) than is necessary. Lack of sleep, weakness, weight loss, and irregular heartbeat are some of the symptoms. An extreme case of hyperthyroidism causes Grave's syndrome.

1.2.5 Triiodothyronine (T3) Hormone

A hormone secreted through the thyroid gland. The anterior pituitary gland, which produces T3 hormone, is the source of thyroid-stimulating hormone (TSH). The T3 hormone regulates a number of bodily physiological processes, such as growth, development, metabolism, and heart rate.

1.2.6 Thyroxine (T4) Hormone

Thyroid Stimulating Hormone (TSH) also produces this hormone. Buried deep into the blood flow, close to the thyroid gland. Hormones indicate critical bodily functions like digestion, brain growth, bone preservation, muscle and heart function. The majority of the inactive type of thyroid hormone, called thyroxine, is transformed into the active hormone triiodothyronine (T3).

1.2.7 Thyroid Cancers

The thyroid gland is positioned below Adam's apple and at the base of the neck, resembling a butterfly. That condition is categorized under thyroid cancer, yet, if an aberrant cell grows inside or close to the thyroid gland, it may interfere with the gland's normal ability to function. The symptoms include a lump that develops in the neck region, voice changes, difficulty breathing due to the excrescence causing the wind pipe to break, and neck pain. The primary cause of malignant cells is, like other cancers, an abnormality in DNA.

1.2.8 Hashimoto's Thyroiditis

This autoimmune condition causes our thyroid gland to be destroyed by the body on its own, which leads to hypothyroidism because the body isn't producing any thyroid hormone. This anomaly may result from radiation exposure, insufficient iodine, hormonal imbalance, inherited complaints, etc. Because of the prolonged inflammation in the thyroid gland, Hashimoto's thyroiditis is sometimes referred to as habitual lymphocytic thyroiditis.

1.2.9 Grave's Disease

Grave's complaint, like Hashimoto's, remains an autoimmune disorder in which the thyroid gland produces considerably more hormone than the body needed. The thyroid gland enlarges with this complaint, which causes the production of more hormones. This is caused by certain antibodies known as Thyroid Stimulating Immunoglobulins (TSIs), which were produced by a susceptible system.

1.2.10 Thyroid Stimulating Immunoglobulin's (TSI's)

Thyroid Stimulating Immunoglobulins, or TSH-enhancing antibodies, are produced by susceptible systems and stimulate the thyroid gland. Thyroid Stimulating Hormone (TSH) receptors are occupied by antibodies that bind to them. However, these antibodies exhibit a competitive advantage over TSH and bind to the receptor in order to signal excessive thyroid development and hormone production.

1.2.11 Grave's Orbitopathy

Grave's complaint when sight affects optical complaint is what the name implies. Thyroid Associated Ophthalmology, or thyroid eye ailment, is another term for this

issue. This ailment affects the eyes as well as the orbital and periorbital apkins. Chemosis, altered optical motility, periorbital oedema, and eyelid retraction are some of its symptoms.

1.3 Thyroid Dysfunction

Thyroid Dysfunction is the condition where Thyroid gland isn't producing separate hormones duly due to numerous reasons includes tumour, hyperthyroidism, and hypothyroidism.

1.3.1 Thyroid Carcinoma

It's a single, easily detectable thyroid lump. Astronomically speaking, melanoma is classified as follows: primary thyroid carcinoma, anaplastic melanoma, follicular melanoma, medullary melanoma, primary thyroid sarcoma, and thyroid cancers.

1.3.2 The Thyrotoxicosis

Thyrotoxicosis is a disorder in which the body produces toxins due to an excess of thyroid hormone. Neoplasms that develop into thyrotoxicosis will also result in poisonous multinodular goiters (TMNGs) and poisonous autonomously functioning nodes.

1.3.3 Thyroid Nodule

These are the usual thyroid gland lumps; nevertheless, if these nodes exhibit any symptoms, it could be because of the aberrant position of the thyroid gland or the abnormal size of the bump. Thyroid nodes are visible in X-ray scans as well as regular checks by a croaker.

1.3.4 Translational Thyroidology

The study of identifying novel prognostic biomarkers and approved rectifiers for the treatment of metastatic or resistant thyroid malignancies is known as translational thyroidology. additionally, to honor the master angiogenic/metastasis with metabolic pathways in the BRAFV600E-positive media. Tracing the epigenetic markers identifies the lymphatic and blood arteries implicated in thyroid cancer. Advances in thyroid research are made possible by translational thyroidology.

1.3.5 Clinical Thyroidology

Treatment of conditions pertaining to the thyroid that are significant is the focus of clinical thyroidology. Examples of these conditions include ultrasonography, ultrasound-guided vivisection, thyroid blister treatment with interventional thyroid ultrasonography, tum Triiodothyronine (T3) hormone or lymph nodes with ethanol, percutaneous ethanol infusions (PEI), and very small thyroid examinations, such as I 123,131 takes-up, reaches, and treatment measures of I/131 for thyroid cancer, Graves' illness, poisonous nodular goitres, and large obstructive Nontoxic Nodular Goitres.

- ***3. Thyroid disease causes***

Thyroid disease still has a number of distinct causes. Hypothyroidism can be caused by the following conditions:

I. When thyroid hormone produces less amount, they causes **Thyroiditis** is an inflammation of the thyroid gland.

II. A genetic disorder **Hashimoto's thyroiditis**, the illness is painless immune system.

III. **Postpartum thyroiditis** Five to nine percent of females experience postpartum thyroiditis following childbirth. Usually, it's a transient state.

IV. **Iodine deficiency** A condition that affects about 100 million people worldwide is iodine insufficiency. The thyroid uses iodine to synthesize hormones. The usage of iodized salt has all but eliminated iodine shortage, despite the fact that it was common in the US prior to the 1950s.

V. One in four neonates is affected by a non-functioning thyroid gland. The youngster will be both mentally and physically retarded if the issue isn't resolved. In the hospital, a screening blood test is performed on every infant to assess thyroid function, predominant earlier the 1950s in the United States, iodine shortage has been almost eliminated by applying iodized salt.

VI. A non-functioning thyroid gland affects one in 4,000 babies. The youngster will be both mentally and physically retarded if the issue isn't resolved. In the

hospital, a screening blood test is performed on every infant to assess thyroid function.

Hyperthyroidism causes: following are the conditions.

I. The entire gland of thyroid may become overactive and overproduce hormones in persons with Graves' sickness. Another name for this condition is diffuse poisonous goiter, or distended thyroid gland

II. May be the thyroid gland hyperactive. A toxic multi-nodular goiter refers to a group of nodules together, whereas a single lesion is referred to as a poisonous autonomously functioning thyroid nodule.

III. Thyroiditis is a disease that can cause hyperthyroidism for a few weeks or months by releasing hormones that were stored in the thyroid gland. The condition can also be painless. Following childbirth, women are more likely to experience the painless variety.

IV. A lot of medications, including amiodarone, iodine-containing Lugol's solution, and several cough syrups, contain excessive iodine, the thyroid producing hormones can lead to either too much or too little hormone in some individuals.

1.4 Nuts and seeds

1. Great sources of protein, fiber, healthy fats, vitamins, and minerals are from Seeds and Nuts.
2. Seeds and Nuts are control appetite and body weight, because their lipids are not completely absorbed.
3. Seeds and Nuts are offer protection against diabetes and heart disease, because of unsaturated fats and other nutrients found in nuts and seeds.
4. As part of an adult's healthy diet, the Australian Dietary Guidelines suggest consuming 30 grams of nuts most days of the week.[39]

1.4.1 Varieties of seeds and nuts

Research indicates that include nuts on a regular basis in a balanced diet can help control weight and protect against chronic illnesses (such diabetes and heart problems).

Due to their similar nutrient content to nuts, seeds are thought to have health advantages that are comparable to those of nuts despite the fact that little research has been done on them.[39]

I Categories of nuts

Commonly eaten nuts include

- **a.** Almonds
- **b.** Brazil Nuts
- **c.** Hazelnuts
- **d.** Cashew Nuts
- **e.** Pecans
- **f.** Macadamias
- **g.** Pistachios
- **h.** Pine Nuts
- **i.** walnuts

- Peanuts: Although they are essentially legumes, their similar qualities to other tree nuts lead to their classification as nuts.[39]

II Forms of seeds

Nutrient profiles of seeds are remarkably similar to those of nuts, despite the fact that seeds often contain a higher percentage of polyunsaturated fats. Typical seeds consist of

a) Flax Seeds
b) Pumpkin Seeds
c) Poppy Seeds
d) Sesame Seeds
e) Chia Seeds
f) Sunflower Seeds
g) Psyllium Seeds

III Aids of nuts

The macronutrient profiles of protein, carbohydrates, and fat are remarkably similar in all nuts; however, the micronutrient profiles of various species of nuts may differ slightly in terms of vitamins and minerals.[39]

Nuts are high in energy, containing roughly 29 kJ per gram.

i. Nuts are high in "good fats"—monounsaturated fats, which are found in most nut varieties, and polyunsaturated fats, which are mostly found in walnuts.

ii. Deficient in fats impregnated.

iii. Healthy protein sources: a sensible choice for animal protein.

iv. The amino acid arginine, which maintains the health of blood vessels, is also abundant in several nuts.

v. Lacking beneficial cholesterol

vi. Rich in fiber that is beneficial.

vii. Packed with phytochemicals that function as antioxidants. • Packed with vitamins and minerals: magnesium, zinc, factory iron, calcium, phosphorus, selenium, and vitamins E, B6, niacin, and folate

IV Advantages of seeds Like nuts

Highest seeds are rich in

a) The majority of seeds are high in fiber, healthy fats (a higher percentage of polyunsaturated fats), and protein.

b) Calcium, Iron, Magnesium, Potassium and Zinc as a minerals found in Nuts and Seeds.

c) Vitamins E, B1, B2, and B3.

Antioxidants included in oily seeds also prevent fats from becoming rancid too quickly. The mortal body can also benefit from these antioxidants in a number of ways.

Owing to its high nutrient content, nuts and seeds are recognized to provide a number of health advantages, including,

i. Aiding in weight maintenance

ii. Diminishing the risk of cardiac problems

iii. Lowering the risk of diabetes

V. Seeds, nuts, and weight measurement

Nuts and seeds are rich in energy and lipids, but eating them doesn't cause weight gain. In fact, expanded nut intake has been linked to lower body weight based on extensive population studies.

Nuts have been demonstrated to improve weight loss and fat loss in the abdomen area when incorporated into a meal plan for weight loss.

Reduced belly fat indicates a decreased risk of chronic illnesses including diabetes and heart problems. nuts ought to be a component of a balanced diet.

The majority of the week, 30 grams of nuts are advised by the Australian Dietary Guidelines.

Nuts facilitate the action of weight through.

a. **Lower than anticipated fat immersion**: The body doesn't fully digest and absorb the fats in nuts. Reduced absorption of lipids indicates reduced absorption of energy from nuts as well.
b. **Hunger and wholeness**: Nuts aid in stifling our appetite. Consequently, less food is consumed to make up for the energy from nuts. Nuts' high protein, fat, and fiber content is the cause of this impact.

Although the impact of seeds on body weight has not been thoroughly studied, given their high protein, good fat content, and fiber content, it is likely similar to that of nuts.[39]

VI. Seeds, nuts, and the risk of cardiac problems

The disease associated with cardiovascular disease has been decreased if a person is consuming seeds and Nuts.

Seeds and Nuts are heavy in fats, but they are also rich in monounsaturated and polyunsaturated fats, which are desirable forms of healthy fats, and low in unsaturated fats.

Because of their combination of "good fats," nuts are considered heart-healthy because they lower the body's levels of "bad" cholesterol, or low viscosity lipoprotein (LDL).

Adipose deposits, or shrines, can accumulate in your arterial system due to low-density lipoprotein (LDL) cholesterol, raising your risk of coronary heart disease.

Additionally, due in part to their high arginine level, nuts and seeds support normal blood pressure and blood vessels.[39]

VII. Suggested daily intake of nuts

For adults, the Australian Dietary Guidelines suggest 30 grams of nuts most days of the week.

A healthy diet can include a wide variety of nuts because all nuts have an equivalent amount of nutrients. Roughly 30 grams, or one-third of a mug, make up one serving (or one sprinkle). This is equivalent to around

a. 30 Almonds

b. 10 Brazil Nuts

c. 15 Cashews

d. 20 Hazelnuts

e. 15 Macadamias

f. 15 Pecans

g. 2 Soupspoons Pine Nuts

h. 30 Pistachios

i. 10 Whole Walnuts OR 20 Walnuts Halves

j. A small Sprinkle of Peanuts or Mixed Nuts.[39]

1.5 PLANT PROFILE

Walnuts

The history and current range of the walnut (Juglans regia L.), the world's most popular tree nut. There are several names for this tree, including English, Persian, white, and mutual walnut. Its systematic name is Juglans regia, and it belongs to the family Juglandaceae. The Old World is home to the walnut tree species. It is native to a region that extends eastward from the western Himalayan chain to the Balkans.In Europe, 40 were farmed as early as 1000 BC. Nowadays, the USA, western South America, northern Africa, eastern Asia, and southern Europe are the countries where walnut is cultivated for commercial use. Around 1.5 x 106 t of whole walnuts were produced worldwide in 2008. China is the most famous consumer in the world, trailed by the France, India, Iran, Romania, Turkey and United State of Amarica; nevertheless, other countries, like as Chile and Argentina, have recently seen a brief spike in the product.[42]

Fig. No. 1.5.1. Walnut (Juglans regia L.)

Black walnuts are an excellent way to get selenium. Five micrograms of selenium, or roughly 7% of the daily recommended requirement for this important trace mineral, can be found in one ounce of dry black walnuts. There is ongoing debate on the

connection between thyroid function and selenium. However, the Agency of Dietary Additions states that little selenium conditions have been related to hypothyroidism and might be an unhelpful issue for this illness, especially when mutual with little iodine situations. Adequate levels of selenium might also lessen your danger of goiter, or enlargement of the thyroid.

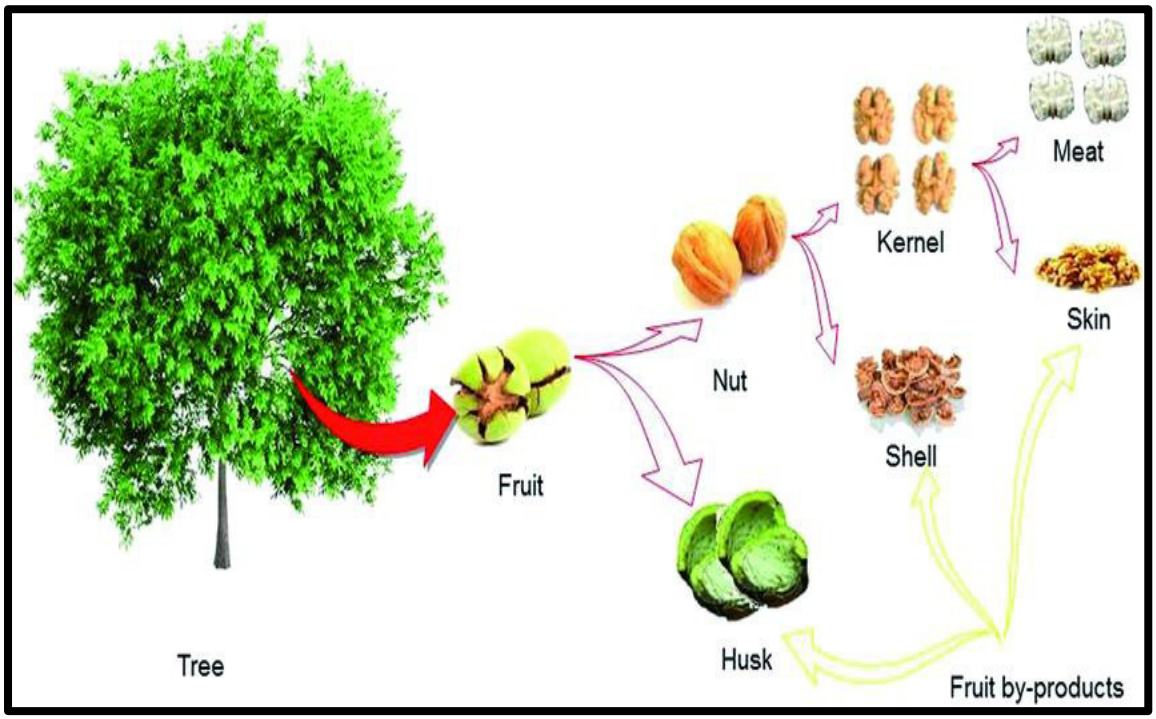

Fig. No. 1.5.2. Various walnut fruit components and their associated byproducts

Separate section with walnut fruit and its derivatives. The septum, skin, cocoon, and kernel comprise the majority of the walnut fruit. The main agricultural waste products are the walnut fruit's cocoon, shell, and skin.

Fig. No. 1.5.3. Walnut membrane / Septum

The walnut fruit is the greatest significant component of the tree from a nutritious perspective since humans typically eat the seed inside the fruit. This is a single-seeded, circular tombstone fruit with four unique corridors. The walnut fruit's outside thick subcaste is what gives the green cocoon or housing its characteristic thickness. When the fruit on the tree reaches full ripeness, this section is cracked. The outstanding portion of the fruit afterward it has separated is referred to as the Nut. The term "shell" refers to the solid, wooded substance that forms the fruit midsection. For the majority of walnut cultivars, the meat needs to be extracted mechanically from the shell. The kernel or seed, which is eaten as the fruit's nutritive component, is the inside of the fruit portion.

Alike to other sapling nuts like Almonds, the walnut's kernel is protected from the elements by a thin, resistant layer known as the covering, seed fleece, or pellicle. This layer is light brown in color. Compared to other tree nuts, this portion of the walnut fruit has not been thoroughly investigated. The most significant and varied antioxidants, which act as defenses against harmful UV rays and microbial, fungal, and viral contaminants, are concentrated in this area of the fruit.

The Juglandaceae family includes the sweet flash tree, Juglans regia Linn., which grows in the North-Western Himalayas of Kashmir. It produces roughly 88% of the

world's total walnut production, which makes it the world's primary producer. The leaves of the tree are longitudinally fissured and can be elliptic, sessile, imparipinnate, interspersing, or oblong-lanceolate. It has argentine bark. The androgynous flower family consists of roughly fifteen species and two rubrics. The leaves have an unequal pinnate structure made up of five to nine circulars, are placed irregularly, and have a length of 25 to 40 cm. Traditional medicine has made considerable use of the pharmaceutical plant Juglans regia Linn. to treat a variety of conditions, including scrofula, helminthiasis, diarrhea, sinusitis, stomach aches, arthritis, asthma, eczema, and skin problems. Additionally, it has been utilized to treat a variety of various endocrine problems, including cancer, infectious infections, diabetes mellitus, anorexia, and thyroid dysfunction. The green fruit ripens when the entire fruit, including the cocoon, falls from the tree in the afterlife. The large seed has a thin, edible shell and a delicious flavor. The tree's phytochemistry has been extensively researched, and many significant phytochemical conditionings have been taken advantage of. However, the amount of rudiments might range between species in a given location based on a variety of circumstances, including time, temperature, location, genetic makeup, and others. Numerous research has been conducted on the phytochemical analysis of the vibrant components of the tree that offer numerous health advantages. These studies indicate that the chemical composition of walnuts varies with climate. Tocopherols, phytosterols, and polyunsaturated adipose acids abound in the oil painting. The most prevalent chemicals in the tasty and valuable walnut leaves include Aesculin, Epicatechin, Kaempferol Rhamnoside, Myricetin-3-O-Glucoside, Myricetin-3-O-Pantocid, Taxifolin Pantocid, Syringetin-O-Hexoside, and Quercetin Glucronide.

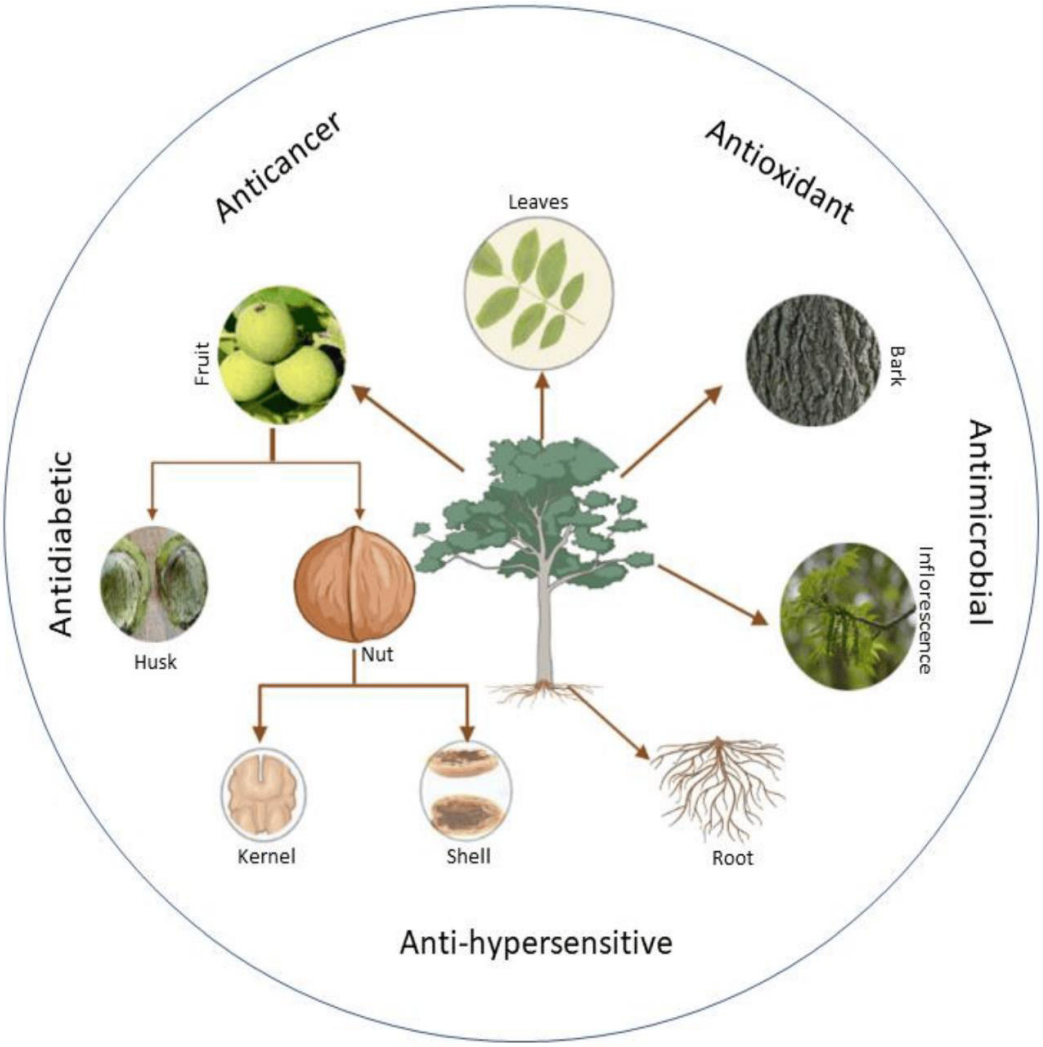

Figure No. 1.5.4. Various Juglans regia components with therapeutic qualities

Indian requests might obtain walnuts in two different ways. These are shelled walnuts (which obtain their kernels by shelling entire walnuts) and in-shell walnuts (which have their kernel inside the shell). Since the kernel is the edible part, it ultimately determines the profitable returns. A necessary scenario for long-term storage is walnuts. However, the bodily qualities of the in-shell Nuts, the humidity level of the kernels, and the microbiological state of the kernels upon shelling all affect how long the nuts last on the shelf. The morphology of the shell in terms of its face (rough/pervious), fissure (tight/corky), and seal (split/tight) are also significant factors that impact the possibility of a shelf life. A storehouse's pervious fissure and moveable closure provide microorganisms informal access and serve as infection attentions.[43]

Table. No. 1.1 A Common Name in Different Regions of INDIA for Juglans regia L..[44]

Sl. No.	Country	Language	Common Name
1	INDIA	BENGALI	BOSNIAN
2		GUJARATI	AKHAROT
3		HINDI	AKHROT
4		KASHMIRI	DOON
5		MARATHI	AKROD
6		SANSKRIT	AKSCHOTA
7		TAMIL	AKHROTTU
8		TELAGU	AKROOT KAYA
9		UNANI	GARDGANI
10		URDU	AKHHROOT

Table. No. 1.2 Different parts of Juglans regia L contains Chemical Constiuents.[44]

Part of plant	Chemical Components
Bark	Polyphenils
Flower.	Vitamins, minerals, fat, protein, coumarin, quercetin, polyphenols, flavonoids, and gallic acid
Green walnut shell.	Juglone, Polyphenols, Napthols, Tannins
Leaves.	Alkaloid, Saponin, Flavonids, Napthaquinones
Seeds.	Protein
Stem.	Juglone, Sitosterol, Ascorbic Acid, Flavonids, Phenols, Quecetin-3-Larabinoside, and Naphquinones
Walnut oil.	Oleic and linalic acid, poly unsaturated fatty acids, monoacylglycerol, diacylglycerol, and triacylglycerol

Table. No. 1.3 Marketed formulation of Juglans regia L. with their Indications.

Sl. No.	Product Name	Manufacturer	Indication
1.	ADEL J. regia L. Dilutions 200 CH	Adel Pekana Germany	Acne, Brain Tonic, Headache, Eczema, Flatulence and Bloating of Abdomen
2.	Baby Language face wash	The Elite	Cleansing Skin and Remove Impurities
3.	Exfoliating walnut face scrub	Biph Ayurveda, Bajaj Nomarks, Biocare, Himalaya, Biotique, Sri Sri Tattya	Skin Cleaner, Remove Impurities and improve skin tone, remove dead skin cells.
4.	Gemmotherapy G75 J. regia	Herbal Gem	Supplement for Dietary
5.	Herbal Hair Color walnut red brown	Logana Naturkosmetik	Brown Hair, Radiant color, and Shine
6.	Herbal Walnut and Goat Milk Soap	Old Tree	Remove Impurities and Purify the Skin
7.	J regia L. Globules 3X	Bjain Pharmaceutical Pvt. Limited	Acne, Jaundice, Gall Bladder Stone, Skin Inflammation, Acidity, Back Pain
8.	J regia L. Liquid dilutions	Bjain Pharmaceutical Pvt. Limited	Constipation., Epigastric Pain., Useful in Menstruation.
9.	J regia L. Gemmae bud	Unda Gemmo	Supplement for Dietary
10.	SBL J regia L. Mother Tincture Q	SBL Pvt. Limited	Jaundice, Gall Bladder Stone., Skin Eruption., Headache and Acidity
11.	Walnut	KS essential, Park Danel	As hair oil., Paint thinner., wood oil., Skin care and Emollient.
12.	Walnut 1:20 (Concentrated embryonic plant extract)	Plant Stem Cells (PSC)	Supplement for Dietary

13.	Walnut bark Volumizing Shampoo	Bitique	For Thinning and Fine Hair
14.	Walnut Herbal Extract	Shudhanta Herbal Product	Memory booster, Dietary Supplement, Improve Prain function, makes bone stronger
15.	Walnut Shell Powder	Herbal Ingredient Experts	Skin Care Products for Manufacturing

Table. No. 1.4 The Medicinal Use of Several parts of Juglans regia L.[44+]

Sl. No.	Parts	Medicinal Uses
1.	Bark	Anti-Inflammatory, Blood Purifier, Cleaning of teeth, Diuretic, Dental plaque, Gingivitis, Laxative, Oral cavity hygiene, as color for staining or coloring the lips.
2.	Fruit and Green Husk	Burns, Diabetics., Hepatic and Renal disease., Myocardial infraction., burns., Psychological retardation., Galactogogue., oral contraceptives and Textile or Dyeing Industry.
3.	Flower	Antiulcer, Antidiarrheal, Antiseptic, Astringent and Skin Inflammation
4.	Leaves	Antioxidant, Anti-ulcer, Anthelmintic, Antibacterial, Diabetes, Eczema, Hemorrhoids, Hyperglycemia, Hyper cholestromia
5.	Pellicle	Antidiabetic, Antioxidant, Anti-inflammatory, Anti-atherogenic, Antimicrobial and liver protective
6.	Seed	Anti-atherogenic, Anti-mutagenic, Breast and Colon Cancer
7.	Walnut oil	Diabetes., Diabetic neuropathy., Cardiovascular disease., Inflammation, and Immunomodulatory.

Table. No. 1.5 Various parts of Juglans regia L having Therapeutic Activitys.[44]

Sl. No.	Beneficial. Activity.	Type of Extract Used	Used Part. of Walnut Tree
1	Anthelmintic	Aqueous., Methanolic., Petroleum Ether Extract	Leaves.
2	Activity of Anti-Ageing	Aqueous	Leaves
3	Anti-Cancer	Peptide	Seed
4	Antidepressant, Anti-hypoxic and Anti-Inflammatory	Methanol	Flower
5	Antidiabetic Activity	Ethanol / Aqueous	Leaves, Septum
6	Antifungal Activity	Alcohol	Stem Bark, Leaves
7	Antimicrobial Activity	Aqueous or Ethanol	Bark
8	Anti-mycobacterial Activity	Hexane/Methanol/ Aqueous or Ethanol	Bark, Leaves
9	Anti-nociceptive and anti-inflammatory Activity	Ethyl Acetate	Walnut oil, Kernal
10	Activity of Antioxidant	Methanol / Aqueous	Pericarp (Green Husk) Bark
11	Activity of Gastro-Protective	Aqueous.	Leaves.
12	Activity of Hepato-Protective	Ethanol : Water	Leaves
13	Hypocholesteremia Activity	Powder	Leaves.
14	Platelet aggregation, bleeding time and Plasma Coagulation	Aqueous	Root Bark
15	Thyroid hormone enhancing Activity	Aqueous / Alcohol	Fruits

1.5.1 Applications of Pharmacology

The usage of therapeutic sauces has grown primarily in the last few years, contributing to the growth of additional potent medications and nutraceuticals through smaller lateral effects, as well as the use of both conventional treatments and medicinal shops for new medical discoveries. This review's primary goal is to investigate the pharmacological processes, phytochemistry., and beneficial advantages of the factory extracts on a variety of conditions., including Antimicrobial., Antioxidant., Anticancer., and Anti-Inflammatory conditioning.[45]

1.5.2. Antibacterial Activity

The antibacterial exertion of Juglans regia housing excerpts was identified and examined using the slice prolixity system (zone of inhibition). It was set up that these extracts held a sensible antibacterial exertion against a variety of bacterial species, including E. coli, B. subtilis, K. aerogene, and S. aureus. Because J. regia green house excerpt has anti-inflammatory parcels, the results also suggested that it might be helpful in treating acne. Certain J. regia flake excerpts were suitable to inhibit the growth of K. pneumonia at a minimal inhibitory attention (MIC) of 100 mg/ mL; other excerpts from the casing produced in colorful cleansers were effective in precluding the growth of E. Coli and P. aeruginosa at MICs of 50 and100 mg/ mL, on its own. Several antimicrobial substances deduced from the pellicle of Juglans regia are shown.[45]

1.5.3 Antioxidant Activity

Juglans regia leaves have an extraordinary concentration of flavonoids, which have remained associated with modulating immune response and enhancing anticancer activity—a problem that is currently affecting the entire world. Numerous methods have been used to measure the anti-oxidant prospective of walnut kernels, cocoons, and splint extracts that were produced in various detergents, such as Ethyl Acetate, Butanol, Methanol, Ether, and Waterless Methanol. The DPPH radical scavenging exertion, lipid oxidation inhibition system, and reducing power system are a few popular and widely used types. Additionally, several investigations have confirmed the flavonoids in J. regia's fruit and leaves exerting an antioxidant effect, and it has been shown that almost all of the extracts made with various detergents had this characteristic. Petroleum Ether bit (PEF), Ethyl Acetate bit, N-Butanol bit, and others were the Anti-Oxidant Phenolic factors from J. regia walnut kernels that were uprooted and fraction based on the opinion of opposition and relations with the solvent scheme used (Petroleum Ether, n-butanol, Ethyl Acetate, & waterless detergent). To separate the most active fragments, Column Chromatography ended Silica Gel eluted through adding opposition was employed (EEF and BUF). [45]

1.5.4 Analgesic and Anti Inflammatory Properties

In a hot plate test, regia extracts from waterless (02.87 and 01.64 g/kg) and Ethanolic (02.044 and 01.17 g/kg) findings showed antinoceptive efficacy. Eight groups of mice, one for men and one for women, were used for the hot-plate test. At 55 ◦ C, the essence facial temperature was maintained consistently. The amount of quiescence to a pain reaction (jumping or shellacking paws) was recorded both before and after the medication was administered. Groups of eight manly and womanly mice were given the excerpts, and 30 minutes later, they received an intraperitoneal injection of 0.7 v/v acetic acid (0.1 mL/ 10.0 g body weight). After the acid inoculation, the quantity of squirming movements made by these animals was tallied for thirty minutes. The xylene-convinced observance edema system was used to measure the Anti Inflammatory exertion in contradiction of severe inflammation in mice. There were eight groups created from the mice. 30 minutes following the intravenous fitting of various excerpt boluses, 0.03 ML of Xylene and Diclofenac remained administered to the frontal and subsequent shells of the correct observer. As a control, the left observation was employed. Two hours after the xylene surgery, the mice were given, and both of their minds were erased. To count and gut indirect portions, a cork tool with a 9 MM perimeter was used. By deducting the mass of the naked left observance section from the mass of the treated correct observance region, the weight gain resulting from the annoyance was computed. Using the cotton bullet granuloma technique, the Anti Inflammatory effort against habitual Inflammation in mice was assessed. The 30.0 MG dental cotton bullets remained saturated with 0.4 mL of an ampicillin waterless result after being castrated for 20 minutes at 121 °C in an air roaster. Mice were anesthetized with xylazine (6.5 MG/KG Body Weight) and ketamine (65 MG/KG Body Weight) before having binary cotton bullets one on each side subcutaneously inserted into their shoulders. Previously, the extract and diclofenac were given every day for seven days. Day 8 saw the death of the rats, and the bullets and girding granulation cloth were dried for a full day at 60 °C. The intraperitoneal LD50 values of ethanolic and waterless leaves of J. regia in mice contained, respectively, 5.5 G/KG (4.1 – 6.5) and 3.3 G/KG (3.1 – 3.5), with the highest non-fatal doses being 4.1 G/KG and 2.93 G/KG. Though, it must be mentioned that at lower pill counts, both extracts displayed an Anti-Inflammatory movement in xylene. In the Writhing test, the extracts displayed antinociceptive

activity that wasn't blocked by naloxone (a life-saving drug). In the event of chronic inflammation, the extracts remained designed to have Anti-Inflammatory possessions. J. regia leaves are a useful medication with Analgesic and Anti-Inflammatory possessions against Rheumatoid Arthritis since studies have demonstrated their anti-nociceptive activity via Non-Opioid receptors as well as their Anti-Inflammatory effect against acute and Chronic Inflammation. [45]

1.5.5 Anti-depressant Activity

Depression is categorized as a attitude complaint and is characterized as a depressive, hopeless, or vindictive sensation. Depression has been known to respond well to therapies resulting from the Juglans regia L. blossom and its splint extracts. The results of the tail suspense test (TST) and forced swimming test (FST) on mice were comparatively clear.[45]

1.5.5.1 Forced Swimming Test

Rats submerged in a pool of water had their muscular movements monitored in order to quantify the immobility time. Water was poured into a glass cylinder of 25 cm in diameter by 23 cm in height, up to a height of 12 CM. It was 23° C in the water. The extract was injected once into each rat. Thirty seconds later, the animals remained put to the test. Each beast remained given two twinkles to acclimate to the novel conditions before their motionlessness time was noted. Ages of immobility were interspersed with conditions of enhanced muscle control for the next six twinkles. A sandglass was used to time immobility for the next four twinkles.[45]

1.5.5.2 Tail Suspense Test

An alternative technique for estimating the Antidepressant result of the extract was the tail suspense test. Thirty rats were evaluated following a single injection of medication or vehicle. The rats were taped by their tails to a cord that was approximately 50 centimeters in length and positioned between two metallic stands at a tallness of 70 cm. After a period of intense motor exertion, the rats were immobile, and the total amount of time recorded using a sandglass was 4 minutes. Rats were regarded as immovable when they hung still and passively. In the fluoxetine group, the mean period of motionlessness was 151.16, 2.56 seconds, while in the control group it was 188.33, 2.16 seconds. It was intended for the decrease in immobility to

be statistically important (p< 0.05). For all boluses, the decrease in motionlessness in the excerpt collections was likewise statistically significant (p<0.05). The total period of motionlessness was set up to be 160.66., 3.76 s and 154.83., 4.32 s, respectively, for 100 mg/kg and 150 mg/kg body weight. With regard to the effect on immovability in the tail suspense test, the mean period of immovability in the fluoxetine group was 147.16., 2.48 s, while in the control group it was 193.33., 1.96 s. It was intended for the decrease in immobility to be statistically significant (p<0.05). For 100 mg/kg body weight, the total immobility time was set at 168.39. s, and for 150 mg/kg body mass, it was 148.66., 1.75 s. For all boluses, the decrease in immovability in the excerpt clusters was likewise statistically significant (p <0.05). The notable antidepressant effect was ascribed to the presence of flavonoids and phenols, particularly quercetin. Furthermore, the inclusion of omega three adipose acids in fruit extracts from Juglans regia may have depressing effects. To fully comprehend the medium of antidepressant exertion, more research is required.[45]

1.5.6 Antiviral Activates

Examined the effort put out by Juglans regia methanol extracts., The 2 Mg/Ml attention was examined in contradiction of the poliovirus, herpes simplex virus., and Sindbis contagion (SINV) at non cytotoxic attention. Moreover, Vardhini employed a computer approach to investigate juglone's antiviral conditioning; molecular docking studies provided strong support for the findings. With a wharf score of 114.967 against ASP 29., ASP 30., and ASP 30., the ligand with the highest list affinity in our study was able to break hydrogen bonds with the protein patch. Other investigators inspected the effects of Anti-HIV exertion in-vitro by separating factors from J. regia using phytochemical and chromatographic methods. MT4 cells and HIV-III B infection were used to evaluate the effects of Anti-HIV action in vitro. The BIACORE 3000 motes coupled outfit was used to explore the target. After analyzing the walnut pellicle extracts, a considerable number of antiviral combinations were identified that exhibited inhibitory activity against the replication of HSV-1 and HSV-2. For HSV-1 and HSV-2, the ID50 (con. which blocked 50 contagion conformation) was set up to be 10 and 8 µg/ML., correspondingly. However, the walnut pellicle extract presented no action against Adenovirus (Adenovirus), Poliovirus 1 (Polovirus 1), Coxsackievirus B1 (Coxsackie B1), or Echovirus 9 (ECHO- 9). The extracts from

walnut pellicle composites were configured to be effective against viral complaints. The global COVID-19 outbreak was brought on by the positive-sense single-stranded RNA coronavirus known as SARS-CoV-2. Drug discovery could benefit from targeting the major protease (Mpro) of the infection, which is accountable for hydrolyzing viral polyproteins and has been linked to the replication and recapitulation of SARS-CoV-2 in host cells. A series of 1,4- naphthoquinones with juglone (emulsion insulated from walnut leaves) configurations were seen in Figure 5 emulsion derivations from walnut pellicle extract. The positive-sense single stranded RNA coronavirus known as SARS-CoV-2 was the cause of the global COVID-19 outbreak. The primary enzyme that breaks down viral polyproteins in the infection, known as Mpro, has been connected to the repetition and recapitulation of SARS-Co V-2 in crowd cells and is a promising target for medication discovery. A number of 1,4- naphthoquinones with configurations juglone (emulsion inaccessible from walnut leaves) were produced and evaluated for their ability to inhibit SARS-Co V-2 MPRO. More than partial of the verified naphthoquinones successfully inhibited the target enzyme at a concentration of 10 μM, with an inhibition rate of more than 90. In the structure-exertion connections (SARs) investigation, substituent properties and their location on the juglone core altar were linked as essential components for enzyme inhibitory exertion. The most potent emulsion, 2 Acetyl, significantly outperformed shikonin as the positive control, with an IC50 value of 72.07 – 4.84 nM against Mpro- intermediated hydrolysis of the fluorescently branded peptide. Through the formation of hydrogen bonds with head-to-head amino acid remainders, it fit nicely into the active point depression of the enzyme in molecular docking studies. The most effective MPRO asset could significantly inhibit SARS-CoV -2 replication in Vero E6 cells at low micro molar attention, according to the results of in vitro antiviral exertion testing, with an EC50 value of roughly 4.55 μM. It was non-toxic to the host Vero E6 cells underneath the studied circumstances. According to the current study, the juglone shell may act as a major model for the creation of strong Mpro barriers.

1.5.7 Anti-Diabetic Activity

Since ancient times, J. regia splint excerpt has been used profitably to treat diabetes mellitus; this practice has been scientifically confirmed to be successful. Alcoholic

extracts from the factory's leaves were used to lower Blood Glucose, glycosylated hemoglobin., LDL., fat, and cholesterol heights. For 28 days, 200 and 400 mg/kg., splint extracts of J. regia were given to rats treated with streptozotocin; this alleviated hyperglycemia by lowering glycosylated hemoglobin and improving insulin compassion. They examined the impact of the J. regia splint extract on hyperglycemia in individuals with type 2 diabetes. J. regia leaves were recently harvested, cleaned, and dried in the shade at a temperature of 25 °C before being ground into a powder. and 70 waterless ethanol and the percolation method were used to remove the greasepaint at room temperature. The basic excerpt remained formalized by including the total phenol attention later sinking at a temperature of no more than 40^0 C under decreased pressure. The detergent was excluded utilizing Whatman paper pollution. More recently, pills containing Juglans regia and a placebo bearing the similar look were developed. There was 100 mg of splint excerpt greasepaint in each J. regia capsule. Toast greasepaint was used as the excipient and as a placebo in the production of the splint excerpt greasepaint. Individuals who had entered J. regia and those who had entered a placebo were the two groups of individuals used in the exploration. When the heights of the components that control blood glucose (FBG)., HbA1c., total cholesterol., and triglycerides were assessed in cases treated with J. regia, the results were expected to be lower than those in the placebo group, with no side effects. After three months of action with 100 mg of Juglans regia splint excerpt twice daily, type 2 diabetes was finally better controlled with no noticeable adverse effects. The findings demonstrated that the cases receiving Juglans regia treatment had significantly reduced FBG., HbA1c., total cholesterol., and triglyceride levels than the birth and placebo groups. The cases in the Juglans regia group expressed considerably higher levels of satisfaction with their treatment in comparison to the placebo group. There were no liver, order, or other adjacent effects noted in any of the clusters at the beginning of the study, with the exception of more GI problems (particularly mild diarrhea) linked to NSAID therapy. Diabetes can lead to complications such as testicular dysfunction. An excerpt from the leaves of Juglans regia L. splint includes phenolic compounds that have hypoglycemic and anti-oxidative properties. The potential protective effects of J. regia splint extract against the detrimental belongings of diabetes on oxidative stress., testis histology., and

testosterone hormone product. Four collections of masculine rats were employed in their investigation: a diabetic group, a diabetic control group., a diabetic J. regia collection that entered a J. regia splint excerpt, and a non-diabetic J. regia collection that entered a J. regia splint excerpt exclusively. To determine how the J. regia L. splint extract exaggerated testicular functioning in diabetic creatures, they examined histological and histomorphometric modifications., serum testosterone., malondialdehyde (MDA)., glutathione (GSH)., superoxide dismutase (SOD)., and catalase (CAT) situations. Diabetic rats' testicles showed elevated antioxidant status and decreased MDA levels; the J. regia splint significantly attenuated these abnormalities. It was set up in diabetic rats so that heights of testosterone, GSH, SOD, and additional antioxidant indicators were much lower; following the J. regia splint implantation, these levels were restored. The MDA position and enhanced antioxidant status in the testis of diabetic rats were established following the administration of the J. regia splint extract. The results suggest that J. regia splint extract may have caring properties against diabetes dysfunction in the testis because to its antioxidant., Anti Inflammatory, and Anti Apoptotic properties.

1.5.8 Anti-Cancer Activity

Medical knowledge has long struggled with the treatment of cancer, but research into various pharmaceutical stores has resulted in an unspoken remedy for the disease's early phases. Although cancer has remained associated with a problem on human society, a complete cure has not yet been found. Juglone may be an implicit chemotherapy preventative medication for neoplasia in the mortal bowel, as it has been shown to reduce intestinal carcinogenesis in animals. Juglone's potent cytotoxin properties have been established by the doxorubicin-resistant HL-60R cells, HL-60 cells, and HCT-15 cells, three lines of deadly melanoma cells. Walnut methanolic extract from the seeds., greenish cocoons., and leaves of Juglans regia suppressed the colon excrescence cell lines Caco-2, as well as the fatal carcinoma renal cell lines A 498 and 769 P , in an attention-dependent manner. While all extracts (IC50 values of 0.352. and 0.229. mg/mL, independently; variety, 0.226. to 0.29. mg/mL) inhibited the growth of 769-P renal and Caco-2 colon cancer cells, the walnut leaf extract was more successful in preventing cell proliferation than the green cocoon and seed extract (IC 50 values of 0.352. and 0.229. mg/mL, independently). Using oral

excrescence (BHY) and mortal bone (MCF-7) cell lines, the Anti Proliferative and Apoptotic properties of the J. regia chloroform splint extract was evaluated. The mechanisms were extracted from the leaves of the shrubs, air dried., ground, and then immersed in N-Hexane for a whole day. All excerpts were filtered and dried using a rotatory evaporator after three days of birth. The detergent, n-hexane, was uprooted at a lower pressure. To obtain the chloroform portion, the residual greasepaint was also suspended and uprooted. Chromatography was then used to further purify the mixture. We examined the composites' apoptotic and proliferative conditioning. derivatives were designed to remain highly Cytotoxic to MCF-7 cell lines, while composites dramatically slowed the growth of BHY cells. The MCF-7 cell lines were also the most susceptible to almost all complexes, based on the IC50 values. The composites (21) and (22) had IC50 values of 50.98 μM and 21.30 μM, respectively, and had broad activity against the cancer cell lines MCF-7 and BHY., but shown much lesser efficacy against normal cells. Using the MIT test at 24, 48, and 72 hours, the composites (16–22) inhibited the growth of the cell population in the mouse fibroblast cell lines and the lethal excrescence cell lines MCF-7 and BHY (NIH– 3T3). However, after 72 hours, the fashionable proliferation conditioning was achieved. It is noteworthy to emphasize that factory flavonoid composites 21 and 22, and a factory naphthoquinone can be thoroughly investigated to investigate their novel natural conditioning, which is comparable to antibacterial and antidiabetic conditioning. Additionally, these composites demonstrated MCF 7 cell lines using the widely recognized media caspase 3 separate pathways.

1.5.9 Antifungal Activity

Waterless and solvent extracts from splint and dinghy have antifungal properties that are useful in medicine because they demonstrate a variety of antifungal strategies employing vibrant styles that are comparable to agar dilution, slice prolixity, agar band thinning, and the Radish system. The Antifungal efficacy remained exhibited by vivid investigation, encompassing the significant breakthrough made. through a contrast of the Antifungal efficacy of several segments of Juglans regia cultivars and the main emulsion juglone. The antifungal properties of juglone and excerpts from walnut green cocoons of the cultivars Lake., Koszycki., UO1., UO2., and Non grafted are compared in this study against fungi that cause factory pathogenicity, such as

Ascosphaera apis., Rhizoctonia solani., Botrytis cinerea., Fusarium culmorum., Phytophthora infestans., and Alternaria alternata. The obtained information demonstration that the antifungal conditioning of the excerpts is not continuously dependent on the Antifungal activity of juglone, but can be influenced by additional constituents as well. This permits us to conclude that other substances included in walnut green cocoon extracts also impede mycelial growth, in addition to juglone. It was found that phenolic composites may alter the antifungal properties of juglone and were responsible for the extracts' exertion. Additionally, the work was shown by evaluating the Antifungal efficacy of 4 extract fragments methanolic., ethyl acetate., alkaloid., and hydrolyzed methanolic resulting from the leaves of Juglans regia (L.) in contradiction of strains of pathogenic Candida albicans. The provocations were tested using 140 isolates from colorful natural sources, such as skin lesions, froth, urine, and feces, and one reference strain (C. albicans ATCC 900et 29). The walnut leaf methanolic extract had the strongest anti-candidal activity, while the alkaloid extract shown a somewhat reduced antifungal efficacy. For the fungal infections under investigation, ethyl acetate and hydrolyzed methanolic extract exhibited the least amount of progress rate suppression. Similar antifungal effort was measured with the regular ketoconazole (40 g/ mL/ slice) and the slice prolixity method with excerpt attention of 100, 200, and 300 g/ mL/ slice. The excerpts against certain species indicated picky fungi static effort. Every segment included a different scenario of inhibitory exertion against every kind of fungus. The results of the investigation showed that, separately, acetone and chloroform excerpts considerably slowed the development of Trichoderma virens and Alternaria alternata. Furthermore, the methanolic extract showed notable effort in combating Aspergillus Niger. The other studies that assayed various extracts of Juglans regia and the antifungal exertion have shown that juglone is the main component of walnut green cocoon excerpts that showed the maximum antifungal exertion, regardless of the type of excerpt estimated for the antifungal exertion. However, the amount of effort differed based on the type of fungal infection being treated as well as the makeup of other essential extract components.[45]

1.5.10 Cardiovascular Activity

High concentrations of omega 3 and omega 6 polyunsaturated adipose acids (PUFA) have been linked to walnuts. Although some research has linked omega-6 polyunsaturated fatty acids to an increased pro-inflammatory vascular reply, the majority of studies have shown that these parameters have no detrimental effects on mortality-related circulatory health. It has also remained found that frequent walnut consumption (30 –100 g/day) reduces circulatory risk factors in non-hyperlipidemic individuals. Regular nut consumption has been related with a decreased risk of myocardial infarctions, together fatal and non-fatal. Epidemiological educations have shown that persons who ate nuts five or more periods a week had a 50% percent lower risk of coronary heart illness than those who did not consume nuts at all. In an in vitro study, an extract from green walnut housing reduced protein stashing and thrombin induced platelet combination by 50., with no harmful effects on platelets at a dose of 50. mg/mL. The antiplatelet effect of walnut greenhouse extract is most likely a result of its antioxidant and polyphenolic components. It can therefore also be considered a thrombotic complaint seeking.[45]

1.5.11 Brain Enhancing Activity

For optimal and enhanced functioning, a healthy brain needs enough aquatic, vitamins (such as thiamine., lipoic acid, lutein, and vitamins B6, B12), and omega-3 adipose acids. Along with phenolic acid (ellagic acid)., gamma tocopherol (vitamin E)., flavonoids, melatonin., phenolic acid (n-3-linolenic acid)., and a factory-ground omega-3 adipose acid, walnuts are rich in these possibly neuro-regenerative compounds. It is noteworthy that out of 1113 foods examined for antioxidant situations, walnuts came in second and third place, respectively. The practice of preserving a literacy experience across time is called memory. It is possible to recover a single memory by administering the appropriate stimulants. It has been shown that polyphenols exhibit portions that influence the critical neural signaling pathways involved in memory and literacy. Extracted polyphenolic extracts from walnuts improved memory and literacy by 42 in hyperactive cholesterolemic rats, based on oxidative stress, rotundity, and hypercholesterolemia. Another study found that a

walnut diet that included six walnut oil paintings endangered male rats from the neurotoxicity of the chemotherapy drug cisplatin.[45]

The findings showed that the administration of walnuts improved cognitive and motor skills, suggesting that consuming walnuts may be beneficial in the fight against chemotherapy induced motorized and cognitive impairment. Additionally, it remained shown that walnuts improved motor cooperation, memory, anxiety, literacy skills, and locomotor exertion in the transgenic mouse typical against Alzheimer's disease by 6% to 9% percent. The in vivo research listed below have readily opened a new line of inquiry to show the same result on humans while ensuring that the subject's safety is supplied in tandem with a timely conclusion and an adequate number of pills.

The benefits of walnut intake on serum lipids and blood burden in Japanese participants were examined in order to verify and confirm the significant and promising study about the toxin induced by the excess diet of walnuts. This was done in order to ascertain whether walnut consumption would be advantageous as a component of the Japanese diet. They randomly allocated 20 men and 20 women, using a crossover design, to one of two mixed normal diets for a duration of 4 weeks each. With the exclusion of the walnut diet, which derived 12.5 of its calories from walnuts (43 –57 g/d) and neutralized it with fewer amounts of meat, adipose meals, and visible fat, together diets adhered to the standard Japanese food (reference food) and had the similar nutrients and macronutrients. Total cholesterol values were 0.21 mmol/L lower for women ($p < 0.01$) and 0.16 mmol/L lower for males ($p = 0.05$) when the walnut food was compared to the reference diet. The LDL cholesterol levels were 0.18 mmol/L lower in the men ($p = 0.13$) and 0.22 mmol/L lower in the women ($p<0.01$) when they adhered to the walnut diet. Additionally, apolipo protein B and the proportion of LDL cholesterol to HDL cholesterol were significantly reduced ($p < 0.05$) by the walnut food. benefits of an 8-week walnut diet on the motor and cognitive abilities of older rats. The results of the three treated collections (2., 6., and 9) showed that the two walnut food improved rod walking presentation. The 9-walnut diet's advanced cure severely impairs reference memory, even though the 6 walnut food improved presentation on the medium plank walk. The study attributes this to the abundance of polyphenolic mixtures that may be adversely affecting reference memory at an advanced cure. According to a 2004 study conducted by the NYS

Institute for Basic Research in Developmental Disabilities (OMRDD)., walnut methanolic extract proved effective in inhibiting and defibrillating fibrillar amyloid β-protein, which is the top component of amyloid pillars in Alzheimer's individuals' cognitive capacities. It has been suggested that walnuts' polyphenolic mixtures may be the cause of their anti-amyloidogenic effects. Additionally, it was established that the two main components of walnuts., gallic and ellagic acid., function as "double impediments" to the enzyme acetylcholinesterase., which, when combined with amyloid., constrains protein aggregation and blocks the enzyme's place of acetylcholinesterase failure. These findings imply that walnuts may help prevent or postpone the start of Alzheimer's disease by assisting in the breakdown of acetylcholine and preserving amyloid protein in its responsible form.[46]

The source and distribution of the walnut (Juglans regia L.), the most widely distributed tree nut worldwide. The sapling is commonly mentioned to as the English., Persian., white., or common walnut. Juglans regia is its scientific term, and it is a fellow of the juglandaceae family. The species of walnut tree is indigenous to the Ancient World. It originated in an area that bounces from the Balkans eastward to the western Himalayan chain, and as early as 1000 BC, it was grown in Europe. Presently, walnut is cultivated for commercial purposes in the USA., western South America., northern Africa., eastern Asia., and southern Europe. In 2008, the global output of whole walnuts was around 1.5 x 106 t. China is the commanding world patron, followed by the USA, Iran, Turkey, Ukraine, Romania, France and India, but produce in other countries similar as Chile and Argentina has increased swiftly in current times.[46]

1.5.12 Nutritive Value and Composition of Walnut

Since antique times, walnut has been employed extensively in human diet. The seed of Juglans regia L. (Juglandacea) is essential for life due to its high protein and oil painting oil content. Consequently, the FAO has put walnuts in its list of priority items and has designated them as a crucial species for mortal nutrition. The fruit's kernel, or seed portion, can be eaten raw, warmed up, or combined with other treats.[46]

Walnuts are used either by itself or in combination with dates, almonds, and raisins to make a unique sweetmeat known as Ma'moul in the Middle East. Because they

contain significant levels of lipids, proteins, vitamins, and minerals, walnuts are a nutrient-rich diet. They are likewise a good foundation of related polyphenols, phenolic acids, pectic compounds, sterols, and flavonoids. Differential soil, farmer, genotype, and ecology can all be used to determine how different a cultivar's nutritional makeup is. The primary components of walnut oil painting oil are triacylglycerols (980 g/kg oil painting oil), which are mostly composed of polyunsaturated FAs (linoleic and α-linolenic acids) and monounsaturated FAs (oleic acid), which are present in high concentrations in all genotypes. The reported oil painting oil levels (78.83 to 82.4) were advanced than those of other researches. While walnut oil painting oil has a smaller concentration of linolenic acid than soybean oil painting oil, its FA composition is generally similar. Indeed, walnut oil painting oil has one of the highest concentrations of polyunsaturated fatty acids (PUFAs) of any vegetable oil (up to 78 of the total FA content).[46]

Table. No. 1.6 Nutrition Value of Juglans regia. L

Sl. No.	Principal Vitamins	Value Per 100 g
1	Folates	98 mcg
2	Niacin	1.125 mg
3	Pantothenic acid	0.750 mg
4	Pyridoxine	0.537 mg
5	Riboflavin	0.150 mg
6	Thiamin	0.541 mg
7	Vitamin A	20 IU
8	Vitamin C	1.3 mg
9	Vitamin E-y	20.83
10	Vitamin K	207 mcg
11	Minerals Potassium	441 mg
12	Phosphorus	346 mg
13	Calcium	98 mg

14	Magnesium	158 mg
15	Sodium	2 mg
16	Iron	2.9 mg
17	Copper	1.5 mg
18	Manganese	3.8 mg
19	Zinc	3.09 mg
20	Aluminum	0.58
Fatty Acid		
Unsaturated fatty Acid		
21	Palmitoleic acid C16:1	0.77
22	Oleic Acid C18:1	25.26
23	Gadoleic Acid C18:1	25.26
24	Total MUFA	22.10
25	Linoliec Acid C18:2	57.10
26	Lineliec Acid C18.30	10.34
27	Total PUFA	4.29
28	Saturated fatty Acid Myristic Acid C15:0	0.24
29	PalmiticAcid C16:0	4.28
30	Stearic Acid C18:0	1.85
31	Archidic Acid C20:0	0.19
32	Total SFA	7.21
33	PUFA/SFA	9.91

Omega-6 and omega-3 polyunsaturated fatty acids (PUFA), which are vital protective adipose acids, are abundant in walnuts. According to clinical research, omega-3 polyunsaturated fats may have a major role in preventing coronary heart disease. Oleic acid-rich oil painting oil has a lower oxidative stability, making it a good choice for frying oil painting oil. A study carried out by multiple researchers revealed that

the average protein value was 18.1. The seed proteins are mostly made up of glutelins, which make up approximately 70% of the overall protein content, with lesser levels of globulins (18)., albumins (7)., and prolamins (5). The predominant amino acid content of walnut flour is comprised of the acidic remains of aspartate and glutamate, along with relatively elevated heights of arginine. All of the important amino acids compulsory for a mortal adult's circumstances are present in walnut proteins. Walnut proteins have a lower lysine/arginine ratio than other common vegetable proteins, which has been associated with a decreased risk of atherosclerosis formation. The rich mineral makeup of the examined walnut cultivars includes potassium, magnesium, and calcium in particular. The table shows the minimum and maximum amounts of macro and micronutrients in walnuts. Walnuts have lower salt content and higher levels of potassium, phosphorus, and magnesium. These building blocks are crucial for the activity of numerous enzymes, particularly as cofactors.[46]

Given that humans typically swallow the seed inside the fruit, the walnut fruit is the most important component of the tree in terms of nutrition. This spherical, single-seeded monument fruit features four unique passageways. A thick outside film of walnut fruit is what defines the green cocoon or casing. When the fruit on the tree reaches full ripeness, this section is cracked. The outstanding portion of the fruit afterward it has separated is referred to as the nut. The central part of the fruit is called the shell, and it is made of a hard, woody substance. For the majority of walnut cultivars, the meat needs to be extracted mechanically from the shell. The kernel or seed, which is eaten as the fruit's nutritional component, is the inside section of the fruit. The walnut kernel is coated in a thin, resistant layer of light brown pigment known as the skin, seed coat, or pellicle, which is comparable to that seen in other tree nuts that are related to almonds. Compared to other tree nuts, this portion of the walnut fruit has not been thoroughly researched. This portion of the fruit has a attentiveness of the most important and diverse Anti-oxidants, which serve as defenses against harmful U-V rays as well as bacterial, fungal, and viral contamination.[47]

Juglans regia was referred to as "Jupiter's royal acorn" by the Romans in 7000 B.C. because of its huge shell and distinct dark to light tint, which earned it the moniker "royal nut." Considering that they were usually only used by those who lacked

authority. They were exchanged between Asia and the Middle East over the Silk Road. The "English Walnut" became well-known throughout the world when the English set up these delicate nuts and traded them through anchorages all over the world. The earliest walnuts are thought to have been grown in California in the late 1700s by Franciscan Fathers. The walnuts prospered at that time because California's environment is similar to that of the Mediterranean and the Middle East. Joseph Sexton planted the first commercially viable vines in the Goleta city of Southern California in the 1870s. The walnut product thrived in the southern portion of the state for a long time before moving north. In the hopes of finding better growing circumstances due to the abundance of water, improved pest control methods, and a perfect environment, the walnut assiduity moved into the central valley.[48]

Farmers received higher yields and more product as a result than in the Southern California region. Right now, the main growing region for walnuts is the San Joaquin Central Valley. The state supplies two thirds of the global supply of walnuts and accounts for 99 percent of the US force. According to Med LinePlus, millions of Americans suffer from thyroid complaints. However, if your thyroid produces too much or too little hormone, it can cause a variety of problems, from changes in weight and temperature perception to cardiovascular difficulties. Although medical therapy is usually required for thyroid issues, increasing the amount of walnuts in your diet may occasionally also improve thyroid function.

It's an increasingly sedentary habit with substantial revenue potential for those involved. After World War II, the number of family estates fell by more than 2 million ranches over time. Scattered across the eight estate numbers are fruit and nut harvests, with about 100,000 ranches and counting. The US Agricultural Census indicates that there are more walnut gardens nationwide and that crop yields are also increasing. As the number of walnut gardens increases, so does the need for precise and effective husbandry to meet the expanding demand for walnuts. The California Walnut Commission has continued to advocate for walnuts and emphasize all of its health benefits. Thus, in the period of sedulousness, a walnut farmer cannot pass up the chance to have a robust producing estate. It is anticipated that walnut gardens and their weight will rise, but demand will also rise as a result of this increase in force. A farmer has even more incentive to improve his stations because of this.[49]

CHAPTER – II

REVIEW OF LITERATURE

2.1 Specific Plant Components

Plant medicinal packages, including as leaves., flowers., fruit., buds., seeds., and roots, can be inferred from the factory's vibrant hallways. various sections of the same manufacturing may have various active compounds. Consequently, a factory may have poisonous areas in some areas while having safe areas in others (Medicinal Botany Plant Parts Used, N. D.). The factory's most selective hallway used for medical purposes is seen below.

i. **Seed:** Seeds are utilized for their therapeutic possessions, which may be found in fruits or on their own.

ii. **The Root:** Woody and fleshy roots, which might be stringy or solid, are used medicinally.

iii. **Bark:** The majority of the active ingredients are located in the bark, which is a tree's outer layer of protection.

iv. **Flower:** Similar to saffron 20, it has extended remained used in traditional medicine.

v. **Leaf:** The leaves of trees, shrubs, and plants are employed for their therapeutic qualities. It can be utilized alone or in conjunction with other pieces, though.

vi. **Tuber:** A fleshy, swelling structure that originates from below the surface, tuber might have a partially source and partially stem origin.

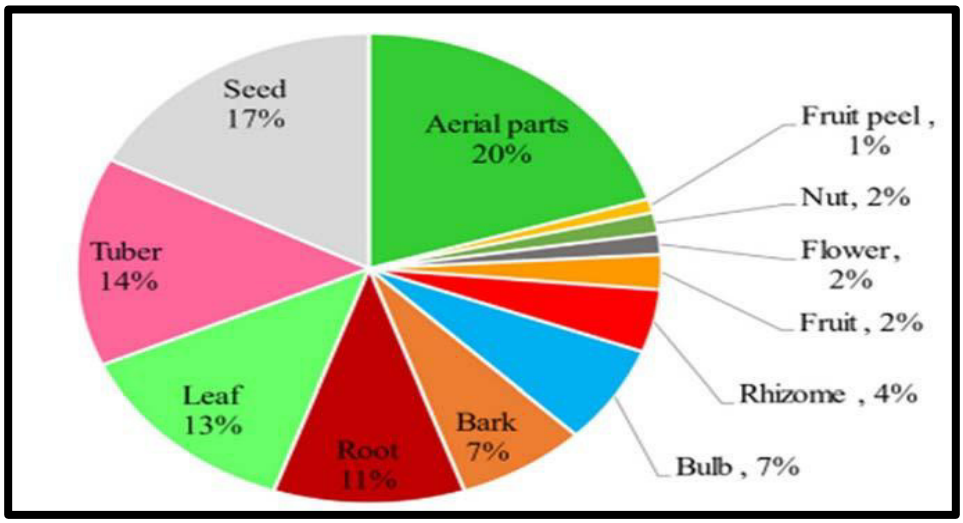

Figure No. 2.1 Parts of the Plants used in traditional Medicine.

Upstanding sections are the most frequently utilized manufacturing corridor, followed in usefulness by seeds, tubers, leaves, and roots. People also consume bulbs and dinghy, and rhizomes are also used. An ethnopharmacological study, however, indicates that the other areas that are emphasized are the ones that are used the least.[50]

2.2 Application & Dosage

The establishment of norms and criteria for use is problematic due to the significant variations in lozenge usage among individuals. In order to follow the prescribed norms, teaspoons, tablespoons, hand wins, little cutlet indicators, mugs, or glasses are typically employed. Decoction and infusion are done in a glass mug measure; a teaspoon of honey can be blended with it, but no sugar should be added. In addition to being typically ground and pulverized, sauces can also be combined with other ingredients like honey, milk, adulation, water, olive oil painting, or alcohol to create an oral or applied paste. Certain composites should be prepared an hour or two prior to intake. Conversely, other drugs must to be prepared and kept for a week before to usage. Typically, cases take one to three ladles one to three periods a day. Below is a pie chart that illustrates many modes of operation.[50]

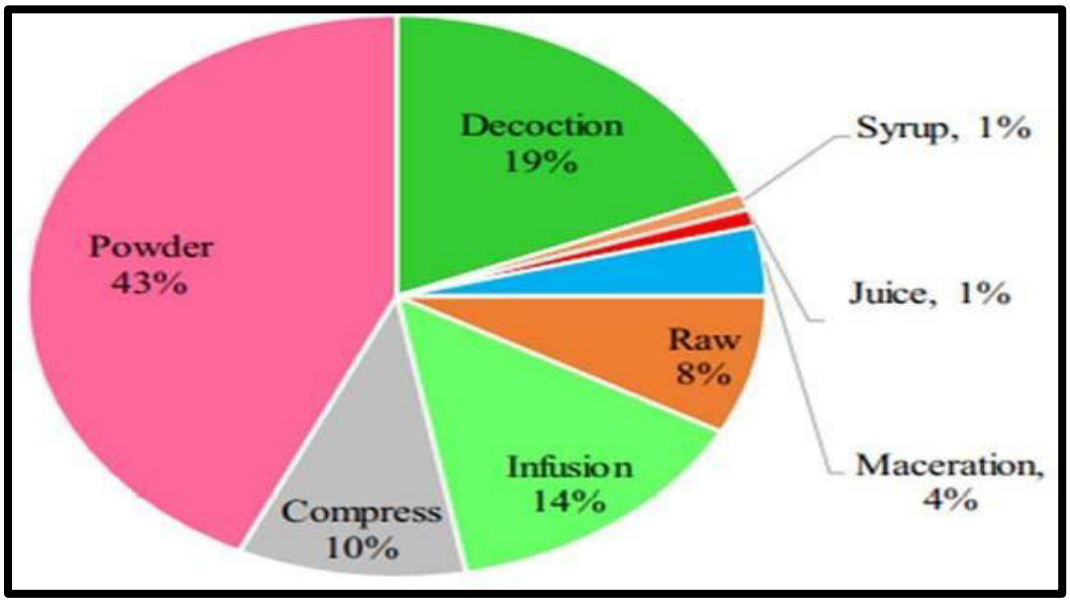

Figure No. 2.2 Various methods for using the parts of medicinal plants.

The aforementioned medicinal factory is often ground or crushed when used as a medication. However, many are created as decoctions, which include boiling the

mixture to reduce its volume by half and then giving the filterate orally. However, the medicinal sauces used for thyroid care were also made with herbal infusions and consumed orally. Similarly, a few of the stores serve as compressors for outside operations. Other applications, such as transformation into juice or saccharinity, have been demonstrated in numerous instances. Honey has also been brought up a lot. It was used as an additive in the therapy of composites made up of several different ingredients. Honey was administered either as a stand-alone remedy or as an infusion along with additional ingredients from other sources. Yogurt, olive oil painting, scapegoat's milk and praise, and other such practices are also citeable. These ingredients have the power to improve flavor, promote healing, and decrease the negative effects of retail drugs.[50]

2.3 Impact of Plant Ingredient

It is true that certain ingredients in factories can interfere with thyroid hormonogenesis enzymes, such as TPO, or decrease thyroid-specific gene expression. Insufficient thyroid hormonogenesis causes a decrease in T3 and T4 production, which in turn causes an increase in TSH stashing. In severe circumstances, hypothyroidism may develop. Numerous investigations have uncovered the primary manufacturing processes for Anti-thyroid products as well as their mechanisms of action through the course of the previous several decades. A few of the composites are explained hereunder. An alkaloid is among them. These are secondary factory metabolites with natural components and potential medical uses that have been thoroughly researched. The thyroid function is interfered with by the alkaloids mitragynine, arecoline, piperine, and harmine. Since that harmine can inhibit TPO, it is possible that it has anti-thyroid properties. Serum T3 and T4 conditions can be decreased using piperine. When exposed to arecoline, blood T3 and T4 levels rise while serum TSH levels decrease. Millet glycosyl flavones are a further component that exhibit TPO exertion inhibition. It also alleviates thyrotoxicosis and lowers serum T4 and T3 levels. The treatment of the well-known stilbenes resveratrol improved beast geste. and decreased stashing of TRH and TSH. It does not add thyroid hormone tube; instead, it acts on the hypothalamus-pituitary axis. In vitro experiments have shown that some hydroxyl cinnamon compounds can inhibit TPO or TSH binding to

the thyroid tube membrane. TSH and TPO activity are linked to thyroid tube membranes.[50]

2.4 Treatment objectives for disorders of hyperthyroidism and hypothyroidism

Numerous sauces have anti-thyroid effects on hypothyroidism and hyperthyroidism thyroid disorders. Numerous anti-thyroid herbs are listed below. Significantly distinct phytoconstituents, according to several authors who have researched under each medicinal store sauce, have diverse mechanisms of action and applications against both thyroid disorders. For hyperthyroidism, there are many herbal stores that provide remedies like bugleweed (Lycopus virginicus). Below is a list of some significant stores that treat thyroid issues.[50]

a. **Bugleweed (Lycopus virginicus):** Bugleweed is used as thyrosuppressive agent that suppress the thyroid function are the bone which are most effective sauces for thyroid complaint. The sauces are belonging to family of Lamiaceae. it contains hydrocinnamic acid deduced similar as lithospermic acid, rosimarinic acid, chlorogenic acid and caffeic. Bugleweed and its excerpt have numerous salutary goods similar as it has capability to inhibit the list of stimulating antibodies for Grave's conditions to the thyroid conditions, blockage product of thyroid stimulating hormones (TSH), drop deionization of supplemental T4 and also inhibit metabolism of iodine.

b. **Lemon balm (Melissa Officinalis):** Lemon balm is the condiment used as thyro suppressive agent in treatment of hyperthyroidism. It's effective in blockage of TSH list to the receptor by act on the hormones and receptor itself. It also acts on inhibiting the cyclic AMP product to stimulating by TSH receptor as antibodies. It contains large quantum of rosimarinic acid. substantially rosmarinic acid affects IgG antibodies. They've capability to rather of creating a receptor response on thyroid gland, the response in vulnerable system by reduce the lading of IgG, because of that IgG antibodies cannot be direct act on thyroid gland. Because of this result we conclude that bomb attar may also inhibit autoimmune exertion in vulnerable system. From traditionally, Lemon balm are used to treatment of symptoms associated with hyperthyroidism similar as wakefulness, tachycardia and hyperactivity also.

c. **Motherwort (Leonurus cardiac):** In aged studies, it studied that motherwort is condiment which substantially used in the combination with other sauces. utmost generally motherwort has an anti-inflammatory exertion, because it contains qurecetin, as a flavonoid. For treatment of autoimmune conditions, it's important to reduce inflammation or lump, because of that motherwort a good choice for treatment of hyperthyroidism. In this case, the enzyme 5 deiodanse is inhibit, when the addition to reducing inflammation. From traditionally motherwort uses include to treating symptoms of anxiety, pulsations and tachycardia.

d. **Gromwell (Lithospermum ruderale):** Gromwell has principally shown analogous exertion as bugleweeds. The gromwell sauces are belongingto family of Boraginaceae. It also contains rosmarinic acid The main function of sauces in hyperthyroidism is blocking the list of TSH to thyroid follicles, it also inhibits transport of iodine to thyroid follicles, and as analogous to bugleweeds it also drops the supplemental deionization of T4 and also drop the stashing of thyroid hormones.

e. **Rose marry (Rosmarinus officinalis):** Rose marry is a sauces which is a member of Lamiaceae factory. It contains a large quantum of Rosmarinic acid which is used in treatment of hyperthyroidism. Rosemary factory is also act as bomb attar, because in exploration it delved that rosmarinic acid act on the effect of TSH on receptor point, also inhibit immunoglobin goods on Thyroid stimulating hormone (TSH) receptor, and it also drop the supplemental conversion of T3. The rosmarinic acid may also salutary in the treatment of Grave's conditions.

f. **Sage (Salvia officinalis):** sage sauces are also belonging from the member of Lamiaceae shops. it also contains rosmarinic acid. Both rosemary and sage contains rosmarinic acid in a high percent. analogous it acts on act on the effect of TSH on receptor point, also inhibit immunoglobin goods on Thyroid stimulating hormone (TSH) receptor, and it also drop the supplemental conversion of T3. Because of that savant is also known as thyrosuppressive and sage sauces also have other exertion similar as antiviral, antioxidant, nervine and spasmolytic.

g. **Gotu Kola (Centella asiatica):** Gotu Kola splint is generally salutary for treatment of hypothyroidism. It contain asiatic acid, asiaticoside, brahmoside,, and

brahmic acid also called as madecassic acid. Morre sugguested that gotu kola has property to stimulate T4 conflation. It also used as nervous system controller to enhance the energy and vitality. Because of that it enerzging effect of this sauces it enhances or stimulate the conflation of T4. substantially tinge of gotu splint is used for treatment of hypothyroidism.

h. **Ashwagandha (Withania Somnifera):** Ashwagandha is a saponin glycoside which recognized as Indian ginseng or downtime cherry, it's an adaptive factory belonging to Solanaceae family. It also has antioxidant parcels. It contains alkaloids, steroidal and saponin chemicals which is essential for active in the hormonal pathways in system. These chemical ingredients involve in increase the product of T4 hormone with the help of conversion of T4 to T3. In 2011 study Ashwagandha excerpt has abilility to ameliorate thyroid exertion and also enhance the antiperoxidation exertion in towel.

i. **Guggul (Commiphora mukul):** The Guggul extract has oleo-resin derived from the Commiphora mukul tree. Z-guggulsterone, which has a high thyroid stimulating effect, is present in oleo-guggul resin. By mastering the conversion of T4 to T3 and hepatic lipid peroxidation, guggulsterone also increases the circumstances of T3. Increases in T3 levels have the potential to lower LDL cholesterol levels in hypothyroid patients. Loss of weight can be encouraged. Guggul is a traditional Ayurvedic medication used to stimulate the thyroid in India. Thus, it stimulates thyroid hormones by acting directly on the thyroid gland.

j. **Coleus or forskohlii (Plectranthus barbatus):** Forskohlii is an herbs substantially used for treatment of hypothyroidism, because it contains essential canvases and terpens. substantially generally product and conflation of thyroid hormones are enhanced by forskohlii or coleus. And it also activates product of cyclic AMP. It also used with thecombination of synthetic medicines to increase product of thyroid gland, if the case has not been to use drug remedy for long period of time.

k. **Bladder wrack (Fucus vesiculosus):** Bladder cream is a special type of algae, which one salutary advantage is that these algae used in remedy of both antithyroid complaint both hypothyroidism and hyperthyroidism. Bladder cream is attained from algae not from any factory source, because of that it belonging from

the family of Fucaceae. Traditionally use of bladder cream involve in thyroid function in different conditions if whether is hyperactive, or normal and or is in underactive. Bladder cream is order of seaweeds and all seaweeds contain variable quantum of iodine. Dried bladder cream contains approx. 50 mg of iodine. Iodine helps to stimulate thyroid gland. It contains substance that help to restore the normal function of thyroid gland and also reduce the size of goiter presence in thyroid. It's necessary to input iodine in case of low iodine situations, because it beget side effect and beget hyperthyroidism. It contains s Iodine and L- fucose emulsion, it has anti-obesity, anti-inflammatory, antioxidant and anti-carcinogenic parcels.

l. **Saussurea Costus :** synonymous with Saussurea lappa, aslo known a quest in Arabic or Costus root in English, belongs to family of Asteraceae, a types of thistle in the genus Saussurea found worldwide regularly in Western Himalayan region of Pakistan and India. natural therapies are not usually considered a part of standard care modern medicine which is evidence based. It has been envisaged to use natural therapies as a co treatment along with standard treatment speculating absence of side effects of natural treatments and in quest to do more to alleviate ones' symptoms and improve health. Available data has shown some role of S. costus in the management thyroid disorders in animal models but has not been proven for clinical use. The current available evidence is inconclusive regarding thyrotropic activities of S. costus and its potential role in the management of thyroid disorders in humans. More research is needed quantify the effectiveness of S. costus for its use in thyroid disorders.[52]

2.4 Medicinal Plants for Hypothyroidism Treatment

Due to their efficiency, safety, and lower risk of side effects, herbal medications for thyroid disorders have become more and more popular. Around the world, a number of factory species are consumed in an effort to lower thyroid function, support thyroid function as an iodine basis, or help balance thyroid hormones. The use of a range of medicinal sauces has also been proven to be useful in treating thyroid disorders when compared to prescription remedies. A study conducted on ethnopharmacology disclosed the utilization of drug stores in the management of hypothyroidism. The families Lamiaceae, Apiaceae, Fabaceae, Amaranthaceae, and Asteraceae were

among those that were notably represented. The following is a detailed list of the pharmacies that were established to effectively treat hypothyroidism.[53-54]

Table. No.2.1 Medicinal plants used for hypothyroidism

Family name	Species name	Common name	Availability (Country)	Active constituents	Uses
Apiaceae	Centella asiatica	Gotu Kola	Southeast Asian countries.	Madecassic acid	Improve synthesis of T4
Solanaceae	Withania Somnifera	Ashwagandha	South Asia, Central Asia, and Africa	Withaferin	Improve Thyroid Activity, Enhance Anti peroxidatio, production of T4. hormone with the help of alteration of T4 to T3
Ranunculaceae	Nigella sativa L.	black seed or black cumin	southwestern Asia and parts of the Mediterranean and African countries	Thymoquinone	it raises T3 and reduces the anti TPO synthesis & reductions VEGF level
Asteraceae	Saussurea Costus	Costus root	Western Himalayan region of Pakistan and India	Sesquiterpene terpenes (ST)	Alleviation of hypothyroidism induced hepatic enzyme derangement.

Burseraceae	Commiphora mukul	Guggul	Areas of India, Bangladesh, and Pakistan	Guggulsterone	increases T3. synthesis by boosting T4 to T3. change & hepatic lipid peroxidation
Lamiaceae	Plectranthus barbatus	Coleus or forskohlii	Brazil, tropical Africa and China	forskolin	Thyroid hormone production & synthesis are typically boosted

A. The healing properties of walnut partitions[55]

The healing properties of the partitions are due to the rich content of elements that have a positive effect on individual organs and systems of a person. It is worth considering the main components that make up the chemical composition of the product.

i. **Potassium.** Helps regulate water content in the body, increases the metabolic rate of carbohydrates and proteins. Decreases heart rate. Maintains the acid-base balance at the required level. Maintains the total content of substances in the blood. Promotes weight loss.

ii. **Iodine.** Participates in the processes of energy exchange, biological and chemical reactions, assimilation of many vitamins. Helps the body to develop properly, both physically and mentally. Like the previous element, it promotes the effective metabolism of nutrients in the body. Regulates body temperature. Increases the absorption of oxygen by various tissues. Iodine increases brain activity, gives the body more energy, helps burn excess fat, and keeps hair, skin, nails and even teeth healthy.

iii. **Magnesium.** It is an integral part of all body tissues. Participates in cell formation, digestion, and brain function. Regulates energy metabolism, kidney

function, digestion. Increases the efficiency of the heart and blood vessels, affects the tone and strength of the muscles. Stabilizes the nervous system.

iv. **Carotene.** Strengthens the immune system, significantly decreases the risk of infectious diseases. Assistances remove substances from the body that are not involved in biological processes.

v. **A nicotinic acid.** Serves for the regulation of cholesterol in the blood and tissues, maintains glucose levels, and resists free radical attacks. Participates in the production of hormones and tissue respiration.

2.5 The following positive properties of nut membranes are distinguished:

a) Increase the body's immunity;

b) Saturate the body with iodine;

c) Soothe in case of nervous disorders, stress, irritability, insomnia;

d) Improve heart function;

e) Create antiviral and antimicrobial protection;

f) Reduce blood sugar;

g) Improve the work of the digestive system;

h) Promote the resorption of tumors and cysts;

i) Have an antiseptic effect;

j) Reduce the presence of cholesterol in the blood, thereby improving the state of blood vessels and preventing the risk of atherosclerosis;

k) Reduce painc and relieve inflammation in various joint pains.

The produt is effective for bowel disorders. A decoction from the membranes not only helps to stop diarrhea, but also removes toxins from the body, protects against dehydration. Walnut partitions are used in the treatment of numerous female diseases (hormonal disruptions, reproductive system disorders). With regular intake of infusion and decoctions, it relieves painful menstruation, mastitis, mastopathy, various neoplasms, and reduces the symptoms of menopause.

A. What walnut partitions help with

Walnut partitions are used in folk medicine for the following diseases:

i. Hormonal disorders of various kinds;

ii. Male diseases (prostate adenoma, prostatitis, weak potency);

iii. Respiratory tract diseases (bronchitis, pneumonia, in some cases asthma);

iv. Bowel diseases (diarrhea, colitis, helminths);

v. Female diseases (fibroma, myoma, mastopathy);

vi. Colds (colds, flu, runny nose);

vii. Diseases of bones and joints;

viii. Disorders of the nervous system and mental disorders;

ix. Endocrine system diseases;

x. Oncological diseases.

I. Walnut Septa for Thyroid Gland

It is a known fact that walnut shells are rich in iodine. Iodine deficiency in the body leads to various endocrine disorders. With a lack of iodine, the thyroid gland is disrupted, a person becomes more irritable, weak, and puberty slows down.

II. Walnut partitions for joints

a) Tincture of walnut shells has been shown to be effective for joint pain, radiculitis.

b) Fill a half-litter container by a third with membranes and fill it 2/3 with vodka (double-distilled moonshine or alcohol diluted to 40%.). Put in a place protected from light for 15-20 days, filter.

c) Applied externally for rubbing into painful areas, as well as to increase efficiency, take 1 teaspoon orally half an hour before meals or on an empty stomach.

III. Cleaning of vessels with walnut partitions

a) For the normal functioning of the body, it is necessary to periodically clean the blood vessels. For these purposes, you can make a tincture of walnut partitions.

b) To do this, take a glass of ground partitions and pour half a liter of vodka. Insist for 2 weeks, filter. Take 15-20 drops, dissolved in a small amount of water three times a day for 14 days.

c) There is also a good recipe for relieving vascular spasms, as well as for normalizing blood pressure.

d) A glass of ground partitions is mixed with hawthorn tincture (diluted with water in a 4: 1 ratio, that is, 100 ml of cold purified water is needed for 400 ml of hawthorn). Insist for 7 days, then filter.

e) Take 3 times a day 30 - 40 minutes before meals (on an empty stomach) a single dose of 5 ml. The course of treatment is one and a half months.

IV. Walnut partitions for men

i. Walnut membranes contain zinc and magnesium, minerals important for potency. They are part of the hormone (testosterone), increase sperm motility.

ii. Due to the content of fatty acids, the permeability of the vessels is restored, and, as a result, the blood supply to the organs is improved.

iii. For the treatment of prostatitis and adenoma, you can effectively use tinctures that contain useful substances from the partitions of walnuts.

iv. Half a glass of partitions is poured with 250 ml of water. The partitions of walnuts are brewed and left for 20 minutes to infuse. Then it is filtered. The broth is taken 15 ml 3 times a day before meals. The required course of treatment is from 2 to 4 weeks.

V. Walnut partitions with menopause

a) The essence of the treatment of menopause with folk remedies is reduced to the normalization of hormonal balance. Symptoms are mitigated (irritability,

depression, poor sleep). Partitions are considered an effective folk remedy for improving well-being.

b) To prepare the broth, take membranes from 5 walnuts, pour a glass of cold water. In the morning, boil for several minutes, filter well, add 1 tablespoon of honey (not desirable last year). They must drink on an empty stomach or not earlier than 30 - 40 minutes before meals.

VI. Walnut membranes in diabetes mellitus

a) Medicinal tinctures and decoctions from walnut partitions, with regular use, reduce blood sugar levels, remove unpleasant symptoms of the disease (thirst, weakness, itching) and improve well-being.

b) The effectiveness of tinctures and decoctions is observed only with complex treatment together with traditional methods of treatment.

c) To prepare the broth, a glass of membranes is poured with a glass of boiling water and cooked over low heat for 1 hour. The resulting broth is cooled, filtered. Take 1 teaspoon half an hour before meals. The course of treatment should be 4 weeks.

d) To prepare the tincture, take 2 tablespoons of partitions and fill them with half a litter of vodka, insist for 2 weeks, filter. Take 8-10 drops, diluted in a small amount of water 20 minutes before meals. The course of treatment is from two weeks to a month, the duration depends on the severity of the disease.

B. Contraindications to the use of walnut membranes

Taking any medicine, you must read the contraindications for use. If they are, then you must refuse to take this drug.

a) For example, you cannot use a decoction and tincture of walnut partitions for eczema or psoriasis, neuro dermatitis, urticaria, since even larger rashes on the body are possible.

b) If you suffer from allergies, then you should refuse treatment with a tincture of walnut partitions, as there is a possibility of itching and rashes on the skin, coughing fits (in some cases, even Quincke's edema is possible).

c) Since walnut partitions have a strong effect, it is impossible to use for pregnant women and it is undesirable to take women who are breastfeeding, children under 5 years of age (after 5 years, only a decoction can be given).

d) You cannot use the tincture for diseases of the gastrointestinal tract. Ulcers and gastritis are contraindications to treatment with walnuts, especially on an empty stomach.

e) You should not immediately consume the full portion indicated in the recipe, even if there are no contraindications, as allergic reactions are possible. In this case, you should take the drug and refuse this treatment.

REVIEW OF PREVIOUS WORK DONE

1. **Neslihan Sirin et al., 2024**. In this study author said, Cholesterol is pivotal emulsion that plays vital part in cellular function in living organisms. Its redundant or insufficiency in tube can lead to destruction and decomposition of cell membrane structure. Maintaining balanced input of cholesterol in diet and seeking medical treatment, if necessary, can help these negative goods. likewise, people frequently resort to natural and herbal remedies, similar as walnut septum. Due to dearth of scientific data regarding goods of walnut septum on cholesterol metabolism, this exploration was accepted to explore its implicit goods. Analysis was begun by rooting septum using colorful detergents. Performing excerpts were also anatomized using GC- MS, and composites were linked by using an intertwined library database. To descry goods of excerpts on cholesterol esterase and HMG- CoA reductase, a colorimetric system was employed. Monophenol, 2,4- Di- tert- butylphenol, 2,6- Di- tert- butylphenol, ethyl linoleate, and butyl linoleate were some of composites detected by GC- MS scanning. The loftiest inhibitions were observed in the enzymatic analysis, with a rate of 3.2 (acetone) in the HMG- CoA reductase analysis and13.6 (water) in the cholesterol esterase analysis. Although the walnut septum excerpt contains colorful chemical composites, in vitro analysis data suggest that there's no inhibitory effect at remedial position on enzyme pathways that regulate tube cholesterol situations, videlicet HMG- CoA reductase and cholesterol esterase. We believe that farther exploration is necessary to exhaustively estimate its goods on other pathways.[56]

2. **Letit,ia Mates et al., 2023**. The author finding shows, In the last many decades, scientific substantiation has stressed the significance of shops in the forestallment and/ or probative treatment of a plethora of conditions, numerous of them habitual, age associated diseases. Juglans regiaL. is a traditional factory that has been integrated into traditional drug since ancient times. Due to the presence of biologically active composites, walnut was used in the treatment of colorful dis temperatures. lately, examinations have concentrated on the walnut by- products and waste products, with exploration on their precious ingredients and active parcels. Among these secondary products, walnut septum was anatomized in several studies, its phytochemical profile described, and some of the natural conditioning examined. still, compared to other walnut by- products, no comprehensive review to gather all the material scientific knowledge was set up in the literature. thus, the end of this study was to critically assess the information furnished by peer- reviewed papers regarding the walnut septum chemical composition and the affiliated natural conditioning, including antioxidant conditioning, anti-inflammatory goods, antimicrobial parcels, antidiabetic conditioning, anti-tumor parcels, and anti-aging eventuality. In conclusion, as these preclinical studies showed that walnut septum metabolites were responsible for a wide range of preventative and remedial uses, farther exploration should confirm the salutary issues in clinical trials. [57]

3. **Elif Azize Ozşahin Deliba et al., 2023**. In view of author work, Walnut (Juglans regia L.) kernel septum (or septa) (WKS), a traditional nutraceutical material in China, has not been explored in detail. In this study, antimicrobial exertion, total phenolic content (TPC) and antioxidant- oxidant status of WKS was delved in case it may be clinically important in the operation of colorful complications. The WKS was uprooted with ethanol in a Soxhlet device. TPC of WKS was analysed by using Folin- Ciocalteu's system. Antioxidant exertion was attained by using Rel Assay Diagnostics accoutrements. The antimicrobial exertion of WKS was estimated against two Gram-positive (Staphylococcus aureus, Bacillus subtilis), one Gram-negative bacteria (Escherichia coli) and one fungus (Candida albicans) strains using the agar prolixity system. The TPC of WKS was set up to be119.42 ±2.39 mg GAE/ gDW. It was determined that total antioxidant status (TAS), total

oxidant status (TOS) and oxidative stress indicator (OSI) values were7.542 ±0.389 mmol/ L,3.718 ±0.287 µmol/ L and0.049 ±0.001, independently. WKS widely inhibited the growth of Gram-positive bacteria and fungus, while. aureus was the most susceptible bone with 16 mm of inhibition zone. Gram-negative bacteria were resistant to the excerpt. As far as we know, this paper is the first work that demonstrates the antioxidant- oxidant status of WKS by using the system described over, and also there are no scientific reports which have examined WKS in such a multidisciplinary experimental design. This study explosively supports the reported traditional use of WKS. Results indicated that WKS can be used as a pharmacological natural agent due to its high antioxidant and antimicrobial conditioning. [58]

4. **Marius Emil Rusu et al. 2020.** As author reported that, Walnut (Juglans regia L.) septum represents an intriguing bioactive emulsion source by- product. In our study, a rich phenolic walnut septum excerpt, preliminarily named, was further examined. The tocopherol content determined by liquid chromatography- tandem mass spectrometry (LC- MS/ MS) revealed advanced quantities of α- tocopherol compared to γ- and δ- tocopherols. also, several natural conditioning were delved. The in vitro inhibiting assessment against acetylcholinesterase, α- glucosidase, or lipase attested a real operation eventuality in diabetes or rotundity. The excerpt demonstrated veritably strong antimicrobial eventuality against Staphylococcus aureus, Pseudomonas aeruginosa and Salmonella enteritidis. It also revealed moderate (36.08) and strong (43.27) antimutagenic inhibitory goods against TA 98 and TA 100 strains. The cytotoxicity of the excerpt was assessed on cancerous (A549, T47D- KBluc, MCF- 7) and normal (mortal gingival fibroblasts (HGF)) cell lines. Flow cytometry measures verified the cytotoxicity of the excerpt in the cancerous cell lines. also, the excerpt demonstrated antioxidant exertion on all four cell types, as well asanti-inflammatory exertion by lowering the seditious cytokines (interleukin- 6 (IL- 6), interleukin- 8 (IL- 8), interleukin- 1 β (IL- 1β)) estimated in HGF cells. To the stylish of our knowledge, utmost of the cellular model analyses was performed for the first time in this matrix. The results prove that walnut septum may be an implicit phytochemical source for medicinal and food assiduity.[59]

5. **CARLO GENOVESE et al., 2020.** In this publication, Walnut (Juglans regia L.) is considered to be a 'superfood' for its multiple defensive conduct on mortal health. Walnut excerpts have proven antitumor exertion in different cancer cell lines. still, the efficacity of septum excerpt against glioblastoma has still not been delved. Glioblastoma is the most delicate type of brain cancer to treat. The standard remedy, grounded on temozolomide, causes several side goods, including neutropenia and lymphocytopenia, which frequently favor the onset of opportunistic infections. In the present study, the chemical profile of the Sicilian walnut septum ethanolic excerpt was anatomized using high performance liquid chromatography (HPLC)- diode array discovery and HPLC- electrospray ionization tandem mass spectrometry. The implicit cytostatic exertion of the excerpt against the mortal A172 glioblastoma cell line was delved and the results showed that the excerpt could drop cancer cell proliferation and migration. Using cytofluorimetric analyses and caspase 3 assays, the pro-apoptotic action of walnut excerpt was demonstrated. likewise, the evaluation of the antibacterial exertion stressed the efficacity of the excerpt in reducing Gram positive and Gram negative bacterial growth, utmost of which were resistant to the antibiotic, ciprofloxacin. Eventually, vaticination of exertion Spectra for Substances analysis showed the prognosticated antitumor and antibacterial exertion of HPLC detected composites. The promising results could give new perspective in the field of chemotherapeutic-adjuvants.[60]

6. **Zahra Ghiravani et al., 2020**. In this journal, Walnut (Juglans regiaL.) is a well-known member of the Juglandaceae family and its kernel is extensively consumed around the world for both unique nutritive characteristics and health- related benefits. Indeed though several studies delved the composition and natural conditioning of different corridor of the walnut tree, the internal septum of the walnut kernel is less estimated. In the last two decades, some studies delved phytochemical and pharmacological aspects of the walnut septum. Their results showed a wide range of natural parcels along with safety of walnut septum ingredients persuading us to shift our view to walnut septum as a useless by-product to a natural herbal material with precious parcels. The purpose of this review was to epitomize the presently available examinations on chemical composition and natural conditioning of the walnut septum. Several

phytochemical studies showed that the walnut septum is a rich source of secondary metabolites like polyphenols are which estimated to be responsible for its high antioxidant property. farther experimental studies verified numerous natural conditioning of this by- product similar as radical scavenging, food preservative, antibacterial, antitumor, hypoglycemic, hypolipidemic, and hepatorenal defensive parcels. [61]

7. **Tooraj Mehdizadeh et al., 2019.** The outcome acquired reveal that, Objectification of natural constituents' antioxidants in comestible fats can profitably affect their oxidative stability during product and storehouse. The purposes of the current work were to assess the antioxidant and antimicrobial effect of walnut kernel septum membranes hydroalcohol excerpt (WHE) in traditional adulation (TB). Antioxidant characterization of the excerpt was screened through styles of DPPH, reducing power and total phenolic assays. After medication of traditional adulation from yogurt, WHE was incorporated into TB at three different attention;0.05,0.1 and0.5 and compared with a control, BHT and tocopherol treated samples (200 mg of BHT and tocopherol/ kg). Microbiological studies (Staphylococcus aureus, Coliforms, Psychrotrophic bacteria, provocations and molds) were done during 90 days of storehouse time. Changes in Anisidine value AV), acid value, peroxide value (PV) free adipose acids (FFA), Schaal and Totox value were covered at 45- day intervals. sensitive evaluation was done using 10 semi-trained panelists grounded on the 5- point hedonic scale.[62]

8. **Tejas Godase and Bugubaeva Mahabat Mitalipovna (2024).** The author finding shows, hyperthyroidism is rare but potentially life- hanging. It develops in fetuses of women with current or previous Graves complaint. In Graves complaint, motherly autoantibodies against the thyroid receptor for thyroid stimulating hormone (TSH) overstimulate thyroid hormone product by binding to TSH receptors in the thyroid gland. These antibodies cross the placenta and beget thyroid hyper function in the fetus (intrauterine Graves complaint), which can affect in fetal death or preterm birth due to fetal hyperactivity or tachycardia. Because babies clear the antibodies after birth, neonatal Graves complaint is generally flash. still, because the concurrence rate varies, duration of neonatal Graves complaint varies.[63]

9. **Dr. Vijay Kumar Sah (2023).** The author reported that, Vish Parikshan is one of the important part of the discovery of bane According to Ayurveda whole world has taken place from the panchamahabhutas. each matter is constituted of five mahabhutas. All the gross and fine rudiments in the macrocosm, differ in their rate of panchamahabhautic compositions and are named after the pre dominant bhuta. also vish dravyas are also made up of panchmahabhutas. The specific composition and pre dominance of each bhuta for vish dravyas wasn't described Samhitas. Their bhautic composition is guessesed and assessed grounding on the symptoms. They produce in the body. Panchbhautic Pareeksha Dalhana in his commentary on Sushruta Samhita has explained the teristic features of vish grounding on the bhautic charecters in the environment of vishaanna pareeksha (EXAMINATION OF toxic FOOD), also logical procedure is also important for discovery of bane and clinical symptoms of poisoning also indicates features of bane and help to discriminational opinion. Shabdha Pareeksha When the poisoned food is placed on fire it burns with cracking sound. Roop pareeksha; when the toxic food is placed on fire it emanates as dears in the colours of peacock neck Ras Pareeksha The canvases die after flying over the toxic food Gandha pareeksha; when toxic food is placed on fire it emits prickly, pungent and strong smothers which cannot be extinguished fluently. Sparsha pareeksha; toxic food comes in contact with skin and causes burning sensation, severe itching.[64]

10. **Megha Raghavan and Ajmal KK et al., (2023).** In view of author works, Walnut (Juglans regiaL.) a temperate nut crop coming under the family Juglandaceae have wide most significance in the diet of people in the history, present and unborn. Wide variety of study was conducted in walnut till now ranging from phonological to phylogenetic molecular position. Walnuts are rich in protein, fat, carbohydrate and minerals. The storehouse life of these nuts is longer than that of the other temperate fruits because their fruits are dry and light. Growth habit reflecting with tree box, volume and circumference are wide variety among the available genotypes and cultivars. The factory being Monoecious in nature starts flowering in the months of April to May. The setting of fruits starts from the last week of May to June and growing of fruits is over by September to October. Walnuts are dried to remove redundant humidity from the shell and kernel. These nuts are of high import value. This review paper gives some primary information about characters of walnut that can be useful for breeding work.[65]

11. **Aiman Farooq et al., (2023).** The author finding shows, The goods of three different hulling styles wiz natural heaping/ traditional (T1), steeping (T2), and scattering (T3), on humidity, colour, fat, free amino acids, adipose acids, antioxidant conditioning, flavonoids, tannins, total phenolic content, and organoleptic rates of walnut kernels were examined in this study. The kernels uprooted from walnuts subordinated to T3 system recorded significantly ($p \leq 0.05$) loftiest DPPH inhibition (68.61), ABTS (54.56 inhibition) and FRAP 0.106 μM trolox/ 100g); flavonoids (1993.08 mg QE/ 100g), tannin content (0.312) and phenols (0.736 mg GAE/ g) compared to T1 and T2. Walnut kernels of T3 treatment group were rated more in terms of taste (3.8), odour (3.6) and overall adequacy (3.78) likewise, walnut kernels attained from T3 treatment group displayed the loftiest chance of unsaturated adipose acids (UFAs) and sweet free amino acids. The outgrowth of the present study offers a fresh standpoint regarding the hulling processes of green walnuts to meet the quality conditions of walnut kernels.[66]

12. **Summaia Fordos et al., (2023).** The consequences of this study, Walnut is among the four most consumed dry fruits around the globe. piecemeal from the comestible walnut kernel, walnut fruit consists of a walnut shell (WS) and walnut cocoon / housing (WH), generally discarded in walnut processing and consumption. These walnut by- products are filled with beneficial composites that find their use in different fields. This review summarizes recent developments and exploration on functional aspects of walnut waste (shell and cocoon / housing) in colorful fields. WS has numerous important bioactive composites, including lignin, cellulose, oleic, and palmitic acids. The creation of WS and carbon-grounded accoutrements, similar as actuated imitations and unmodified / modified WS, as adsorbents have been explored. Possible uses for WS deduced by-products include each-natural but important adsorbents for barring dangerous substances, similar as heavy essence, dangerous composites, and synthetic artificial colors. also, WH also has numerous benefcial composites like juglone. WH has antioxidant parcels and can be used as cloth and protein strainers. These wastes are used in husbandry, laboratory, medical, and food diligence, which can be employed as sustainable and terrain-friendly druthers.[67]

13. **Aeyaz Ahmad Bhat (2023)** The present investigation, Juglans regia Linn. is a precious medicinal factory that possesses the remedial eventuality to treat a wide range of conditions in humans. It has been known to have significant nutritive and restorative parcels since ancient times, and nearly all corridor of this factory have been employed to cure multitudinous fungal and bacterial diseases. The separation and identification of the active constituents in J. regia as well as the testing of those active composites for pharmacological parcels are presently of great interest. lately, the naphthoquinones uprooted from walnut have been observed to inhibit the enzymes essential for viral protein conflation in the SARS- CoV- 2. Anticancer characteristics have been observed in the synthetic triazole analogue derivations of juglone, and the unique variations in the parent outgrowth of juglone have paved the way for farther synthetic exploration in this area. Though there are some exploration papers available on the pharmacological significance of J. regia, a comprehensive review composition to epitomize these findings is still needed. The current review, thus, abridges the most recent scientific findings about antimicrobial, antioxidant, anti-fungal, and anticancer parcels of colorful discovered and separated chemical composites from different detergents and different corridor of J. regia.[68]

14. **Yajun Zeng et al., (2022).** The outcome acquired reveal that, Walnuts (including those covered with a pellicle) are loved for their rich nutritive value. And the popular kinds of walnut civilization are Juglans sigillata L. The pellicle (seed fleece) of these walnut cultivars has different colors and has a necessary influence on the walnut quality conformation. still, there are many reports on the pellicle color and quality conformation in different experimental stages of walnut (Juglans sigillataL.). thus, in this study, three walnut cultivars (F, Q, and T) with different pellicle colors were named for transcriptome sequencing and physiological indicator analysis of the color and quality conformation mechanisms at different development stages. The results showed that with the development of walnut fruit, the bounce sucrose metabolism pathway in the pellicle was actuated and promoted bounce hydrolysis. Meanwhile, the expression situations of genes related to the nascence- linolenic acid metabolism pathway were significantly increased during walnut development, especially in F2. Some physiological pointers affiliated to lipid oxidation were also detected and anatomized in this study, similar as MDA,

CAT, cover and DPPH. These results were analogous to the expression patterns of corresponding nonsupervisory genes in the RNA- Seq profile. In addition, lignin conflation genes were over- regulated in the phenylpropanoid metabolic pathway, while crucial genes amended in the flavonoid and anthocyanin conflation pathways were down- regulated. The results were harmonious with the results of total anthocyanins and flavonoid content discovery during walnut development. thus, this trial suggested that with the development of walnut pellicle, the gene expression in the phenyl propanoid metabolic pathway flowed to the branch of lignin conflation, especially in the Q variety, performing in lower flavonoid and anthocyanin content at the maturity stage than immature. This is also the main reason for the pale pellicle of the three walnut kinds after mature. The findings of this study showed that changes in the expression situations of regulating genes for lipid, bounce, sugar, and flavonoid conflation during walnut development told the accumulation of the affiliated metabolite for walnut quality conformation and pellicle color. The results of this trial handed the molecular base and reference for the parentage of high nutritive quality walnut kinds. [69]

15. **Pan Gao et al., (2022).** In this publication, We totally estimated adipose acids and triacylglycerol composition, as well as tocopherol, phytosterol, and phenolics, in walnut oil painting and compared the cholesterol- lowering goods of oil painting reused with different styles (cold pressing, repast- pressing, hexane birth, subcritical butane birth, and supercritical CO birth). The different styles didn't affect the lipid composition of walnut oil painting. The tocopherol (41.11 mg/ 100g) and total phenolic content (TPC,4.26 mg/ 100g) of repast- pressed walnut oil painting and the phytosterol contents of subcritical butane- uprooted walnut oil painting (106.51 mg/ 100g) were advanced than those of other tested canvases. Walnut oil painting significantly dropped cholesterol conflation by downregulating the expression of HMGCR, SREBP- 2, and CYP51 genes, and increased cholesterol efflux by upregulating the expression of ABCG1, therefore significantly reducing total cholesterol and triacylglycerol. Phytosterols and TPC in walnut oil painting were responsible for lowering cholesterol; the optimal attention of phytosterols was 10μg/ mL, and that of TPC was12.5 × 10 μg/ mL. Through process optimization, a new processing system for walnut oil painting grounded on natural evaluation was previously established.[70]

16. **Mohammed Junaidh K et al., (2022).** The author finding shows, Walnuts have high nutritive and pharmacological parcels. They're considered to be a type of natural functional food. Its consumption at recommended quantities has a number of health advantages, including a lower threat of coronary heart complaint, rotundity, cardiovascular complaint, forestallment of some cancers, and type 2 diabetes, and also it acts as an antioxidant. The number of bioactive rudiments in walnuts, similar as polyphenols, factory sterols, salutary fiber, proteins, sterols, and essential adipose acids, contribute significantly. This review summarizes the bioactive factors present in walnut and how they affect the gut microbiota and also their studies and pharmacological parcels.[71]

17. **Munish Sharma et al., (2022).** In this study, Juglans regiaL. generally recognized as walnut is cast-off as the greatest expansive and provident sapling in the world. This evaluation goals to study the ethno-medicinal, phytochemical and pharmacological eventuality of walnut. The literature has been collected from diferent online sources like wisdom Direct, Scopus, Research Gate, Google Scholar, PubMed, etc. grounded on addition and rejection criteria. An ethnomedicinal check has also been conducted to document the traditional knowledge and uses of walnut among the original peoples of the Union Territory of Jammu and Kashmir. On surveying the original peoples in the different major walnut- producing areas, it has been followed that the walnut is locally used as a medicinal, nutritive, and marketable factory to treat common conditions and diseases in the position. The check has been conducted first time in the area and no study has been reported till now in the Jammu Division while some work has been reported in the Kashmir Division. Among the numerous bioactive composites present in colorful factory corridor, Juglone has been reported a significant anti-cancer emulsion in treating deadly cancer. This methodical review describes the signifcant knowledge and traditional information collected on ethnomedicinal uses, phytochemistry, niche, macro-morphology, area of distribution, and pharmacological significance.[72]

18. **Munish Sharma et al., (2022).** In view of author work, Juglans regiaL. is one of the high yielding dry fruit crops grown in Union Territory of Jammu & Kashmir in India. Jammu and Kashmir UT is the largest walnut product and force in India's

share of total product. But in recent times, there has been a decline in India's import of walnuts, largely as a result of the importing of walnuts from China and California. Consumer acceptance of walnuts from California and China is advanced than that of J&K walnuts, which negatively impacts the Indian walnut trade. Besides this, colorful other factors like lower mindfulness to original fruit farmers, trace connectivity, slice of perm for timber, preface of mongrel kinds, and other mortal interferences also contributed to lower import and product of J&K Walnut. There are great challenges in J&K fruit assiduity to manage up with these problems and increase the quality fruit product in J&K. This current study is a special case report on walnut grounded on present trends and secondary data, exploring the walnut assiduity sector and marketing in J&K.[73]

19. **Nael Abu Taha and Mohammed A. Al-wadaan (2021).** The author finding shows Juglans regia Linn is a medicinal factory that has been extensively used in traditional drug for a wide array of affections that include helminthiasis, diarrhea, sinusitis, bellyache, arthritis, asthma, eczema, scrofula, skin diseases, and colorful endocrine conditions similar as diabetes mellitus, anorexia, thyroid dysfunctions, cancer and contagious conditions. The present review, attempts to give comprehensive information on the ethnobotanical use, pharmacology, nutritive value, preclinical and clinical studies, toxin, other uses and current exploration prospects of the Juglans regiaL. presently, there's a renewed interest in walnut, and several examinations aimed at scientific confirmation of its traditional uses and a humble scientific disquisition aimed at insulation and identification of active ingredients of crude excerpts.[74]

20. **Sumbul Qadar et al., (2021).** The present study explains antimicrobial exertion and acute toxin of walnut (Juglans regiaL.) endocarp from Azad Jammu Kashmir (AJK). The walnut endocarp excerpt tested against fungal species i.e. Aspergillus niger and Penicillium notatum and bacterial species i.e. Staphylococcus aureus and Escherichia coli. Aspergillus niger and Penicillium notatum. at 10, 100 and 1000 µg/ ml attention showed Diameter Inhibition Zone (DIZ). Periphery Inhibition Zone (DIZ) was maximum against Aspergillus niger in all attention as compared to Penicillium notatum. also, Staphylococcus aureus showed advanced Diameter Inhibition Zone (DIZ) at 10, and 1000 µg/ ml attention independently as

compared to Escherichia coli Diameter Inhibition Zone (DIZ) at the same attention. Acute toxin of walnut endocarp excerpt showed the significant result at 100 mg/ kg, 200 mg/ kg and 400 mg/ kg attention with 0 mortality. It was concluded that walnut endocarp may be important source of antimicrobial exertion and may be used in pharmacognosy.[75]

21. **Abhishek Chaudhary et al., (2021).** The author concluded that, As we know, dire need for new medicines are demanded for colorful conditions and the demand for herbal drugs is adding day by day. The reason may be due to smaller side goods and good remedial value. One similar medicinal factory is Walnut or scientifically named Juglans regia. It's an implicit traditional drug with multitudinous remedial values ranging from diabetes, rheumatic pains, fever, diabetes, skin conditions, malaria, and rheumatic pain. Also, they show good exertion as an analgesic, antidiarrheal, antiparasitic, and antimicrobial. This review focuses on agitating the details of walnut or Juglans regia and its pharmacological uses.[76]

22. **Ali Jahanban-Esfahlan et al., (2020).** the effective use of agrarian by- products is surely a major challenge in waste operation. In the walnut fruit processing assiduity, large quantities of shells are produced as agrarian by- products and discarded or burned produced as energy. Walnut (Juglans regiaL.) is a precious tree nut in the Juglandaceae family. The fruit is composed of four main corridors the kernel, the skin, the shell, and the cocoon. The significance of walnuts is substantially related to theirs precious kernels. still, their shells are presently passing as important interest as their kernels due to the salutary goods of the shells. In the past several times, walnut shell (WS) has been extensively explored as a naturally inert factory- grounded biosorbent. In this review, we first punctuate recent scientific literature regarding the development of adsorbents from WS in the form of carbon- grounded accoutrements including unmodified/ modified WS, and actuated imitations (ACs). Next, we bandy the implicit operations of WS- deduced by- products as natural yet effective adsorbents for the junking of colorful dangerous accoutrements including heavy essence (HMs), synthetic artificial colorings, and dangerous chemicals.[77]

23. Jyldyz Shigaeva et al., (2020). The consequences of this study, totally reviews 146 publications on the socio- profitable significance of natural and planted walnut timbers in the 15 countries of the Silk Road in order to exhaustively assess the current state of knowledge, identify knowledge gaps and define precedences for farther exploration. Despite extensively spreading natural and cultivated walnut timbers along the Silk Road, which are intensely employed and make significant donation to original livelihoods, we set up that being socio- profitable exploration was still fairly limited and inversely distributed among the Silk Road countries, especially for Central Asia and Iran. As substantiated by the significant decline of walnut timbers and their continued declination, once timber conservation programs and programs were frequently not effective and, thus, new strategies and perpetration models are urgently demanded to achieve sustainable timber operation objects. Our review has shown that conducive profitable programs, well- funded public walnut breeding programs and profitable incitement schemes could effectively promote the establishment of walnut colonies, which both vastly contribute to the recovery and recuperation of demoralized lands and the diversification of tilling systems. At the same time, farther sweats are demanded in walnut exploration and practice to ameliorate being value chain arrangements, develop new products from J. regia and other underutilized timber species, and to more effectively examiner coffers and apply being legal fabrics. While country- position exploration gaps feel frequently to be driven by public dockets and patron interests, we also linked more general motifs that didn't have entered applicable attention in the literature across all the delved countries. This includes exploration on the impact and effectiveness of walnut colonies in reducing pressure on natural walnut timbers under land sparing strategies; examinations on the part volition forms of tourism can play in walnut timber conservation and development; and consumer studies that can give useful guidance to enterprises in the food processing, cosmetics, handcraft and other diligence to ameliorate the quality, value- added and profitability of products deduced from the walnut timbers. These points illustrate the need for further methodical studies in the walnut timbers of the Silk Road countries.[78]

24. **Nageena Nazir et al., (2020).** The author reported that, Walnut (Juglans regiaL.) occupies an important position in the horticulture assiduity of Jammu and Kashmir. It has the monopoly of producing excellent quality of walnuts contributing further than 90 per cent of Indian walnut product. The temperate climatic conditions favor its civilization and offer Jammu and Kashmir an exceptional edge to super pass the other countries in terms of walnuts. Being organic in nature (which is its USP), as no diseases or sprays are used on walnut shops and its yield, and high in nutrients with immense health benefits, Kashmiri walnut has seen growing demand and adequacy in the domestic and transnational request. The present study is an attempt to find once trends of walnut in Jammu and Kashmir using parametric, non-parametric andsemi-parametric retrogression styles. The performance of each system is compared using high value of R and low value of residual criteria. It's set up that non parametric/ semi parametric retrogression comes out to be a good fit for trend in walnut product in comparison to parametric retrogression. Indeed semi parametric spline is named as the stylish fit model for trend analysis. It's inferred that the area under walnut civilization in J&K is adding from 1998- 2017 and the productivity has also shown an adding trend except for some times where the trend is set up declining.[79]

25. **Bakhtaver Hassana et al., (2020).** This paper intends to study the Spatio-temporal growth of the walnut crop in Jammu & Kashmir, which holds a monopoly in walnut product in India. It also aims to assess the effectiveness of the being marketing channels of the walnut- crop in the region. Amulti-stage arbitrary selection fashion was used to collect primary data from three major walnut producing sections to identify the being marketing channels and estimate their separate edge. emulsion-Periodic Growth- rate and Cuddy- Della- Valle indicator was used to estimate the growth of the walnut crop. Shepherd's Marketing Efficiency Index was used to estimate the marketing edge of the channels involved in the marketing of the crop. This paper set up out veritably-high variability and slow growth in realty, veritably-high variability, and high growth in product as well as in yield- per- hectare of the walnut crop.[80]

26. **Gunjan Verma et al., (2020).** The consequences of this study, Medicinal sauces having a great part in mortal health care and weal services. These sauces extensively used in Ayurveda, Homeopathic and Allopathic system having colorful remedial parcels. Walnut (Juglans regiaL.) are the shops belonging to the family Juglandaceae generally known as Akhrot. It's extensively distributed in China, United State, Jammu & Kashmir, Himachal Pradesh, Arunachal Pradesh, Uttarakhand. It has different kinds similar as Black walnut, English/ Persian walnut, butternut/ white walnut. J.regiaL. have numerous retailed phrasings similar as Topical phrasings like Walnut oil painting, Face marshland, slipping mite, Soap, Shampoo, Hair color and Oral phrasings like capsules, tinctures, dilutions, shell greasepaint. Chemical study reveals that J.regiaL. contains Juglone, Alkaloids, Flavonoids, Saponins, Polyphenols, Polyunsaturated adipose acids, Oleic acids, Linoleic acids, Proteins, Napthaquinones, Ascorbic acid, Sitosterol, Tannins. Walnut contains different nutritive factors like Carbohydrates, Proteins, Dietary fibres, Iron, Phosphorus, vitamin E & C. This factory retain salutary goods include Antimicrobial, Antioxidant, Anticancer, Antidiabetic, Anthelmintic, Antiinflammatory, Antidepressant, Hepatoprotective, Antiulcer, Antiageing and Hypocholestermic exertion and other remedial conditioning. It's believed to be used in Dental shrine, Gingivitis, Oral hygiene, Eczema, Hemorrhoids, Burns, Blood Purifier, Dyeing or Colorant, Antiseptic and Astringent. In the present study, Pharmacognostic and Pharmacological parcels ofJ.regiaL. have been bandied. This review highlights the colorful Ethanobotanical and traditional uses as well as Pharmacognostic and Pharmacological report on J.regiaL.[81]

27. **Pan Gao et al., (2019).** This study compared the lipid compositions, minor factors contents, oxidative stability indicator, and free radical scavenging capacities of walnut canvases from two species in China Juglans regia (common walnut) and Juglans sigillata (iron walnut). The results showed that iron walnut oil painting contained lower C160(4.97 –5.25) and special adipose acid (erucic acid C221). Common walnut oil painting handed advanced tocopherols (441.03 –490.32 mg/ kg), phytosterols(1014.49 –1211.40 mg/ kg), squalene(4.41 –5.21 mg/ kg), and polyphenols(44.78 –64.61 mgGAE/ kg) and better antioxidant capacities. The

walnut oil painting of the different walnut species could be distinguished by top element analysis and hierarchical cluster analysis. In addition, multiple direct retrogression was employed to estimate the benefactions of minor factors to the free revolutionary scavenging capacity of the walnut canvases and develop a prophetic model for the antioxidant capacity of the oil painting. This information has important counteraccusations for the nutritive value and artificial product of walnut oil painting in China.[82]

28. **Ali Jahanban-Esfahlan et al., (2019).** The author finding shows, The walnut (Juglanssp.) is an appreciated nut that belongs to the Juglandaceae family. The fruit includes four main corridor the kernel, the skin, the shell, and the green cocoon. It's extensively cultivated due to its comestible kernel. In walnut product centers, high quantities of the cocoon as anagro-forest waste product are produced and discarded down. lately, it has been demonstrated that the walnut green cocoon could be valued as a source of different natural bioactive composites with excellent antioxidant and antimicrobial parcels. Regarding this respect, in this donation, the current scientific knowledge on the antioxidant and antiradical conditioning, colorful linked and insulated individual chemical ingredients, as well as the functional operations of the walnut cocoon with further emphasis on the Persian walnut (Juglans regiaL.) are reviewed.[83]

29. **Ali Jahanban-Esfahlan et al., (2018).** In view of author works, Upon the processing of different agrarian products, considerable quantities of by- products and memoir wastes are produced and discarded or burnt as energy, which are an implicit source of precious composites. Over the once several decades, factory by-products have been honored as a source of nutraceutical factors, including salutary filaments, phenolics, and numerous other useful composites. The walnut is known as an important tree nut. The shell of a walnut is the middle part of the fruit and it's a waste product of walnut processing diligence. lately, pyroligneous acids from the walnut shell have been entering much- adding interest because of their excellent antimicrobial and antioxidant conditioning. Hence, this review deals with the recent scientific literature on walnut shell pyroligneous acids and their chemical composition as well as their functional operations.[84]

30. **Tabasum Fatima et al., (2018).** The author reported that, Walnuts are generally set up in our diet and have been honored for their nutritional parcels over a long period of time. Traditionally, walnuts have been known for their lipid profile which has been linked to a wide array of natural parcels and health- promoting goods. In addition to essential adipose acids, walnuts contain a variety of other bioactive composites similar as, vitamin E and polyphenols. Among common foods and potables, walnuts represent one of the most important sources of polyphenols, hence, their effect over mortal health heists attention. Walnuts retain well known antioxidant and anti-seditious bioactivity and several studies have assessed the implicit part of walnuts against complaint inauguration and progression, including cancer, cardiovascular and neurodegenerative conditions.[85]

31. **Hamdollah Delaviz et al., (2017).** The author finding shows, in recent times, the use of medicinal shops increased vastly; so that moment, the use of traditional drug, as well as medicinal shops is necessary for the end of producing further effective medicines with smaller side goods and determining the effective boluses. With the scientific name of Juglans regia, walnut factory is a medicinal factory with different parcels that's considered less, despite having great remedial eventuality in the traditional drug. The end of this study was to review the disbandment of walnut shops, the chemical composites, and remedial goods of walnuts on antioxidant exertion, antidiabetic, hypolipidemic, antimicrobial, and antihypertensive conditioning, as well as liver protection. Data of this review study have been collected from the books and scientific papers published in databases similar as Science Direct, Web of Science, Scopus, PubMed, and Scientific Information Database. While this factory having high antioxidant capabilities, walnuts are composed of numerous chemical composites similar as ascorbic acid, flavonoids, quercetin, and caffeic acid. Experimental studies have shown that walnuts reduced blood glucose and lipids and also dropped blood pressure. They've antioxidant, antidiabetic, antimicrobial, and liver - defensive parcels. The use of walnuts in traditional drug and review of experimental studies demonstrated the presence of multiple, effective, and useful composites which may give the occasion for the product of lipid - lowering, antidiabetes, and liver defensive medicines. Due to the goods of walnuts on perfecting the complications of colorful conditions, the need for doing comprehensive clinical trials for the use of walnuts in the treatment of conditions is necessary.[86]

32. **Parastoo Zarghami Moghaddam et al., (2017).** In this publication, Juglans regia seed has been used in traditional drugs as antimicrobial, antihelmintic andanti-diarrhoeal. In the present study, the antibacterial capabilities dichloromethane, ethyl acetate, methanol and waterless excerpts of endocarp and exocarp of walnut were determined against two Gram-positive bacteria and one Gram-negative bacteria. The antioxidant exertion was screened by 2, 2- diphenyl-1-picrylhydrazyl (DPPH) radical scavenging and ferric reducing antioxidant power (FRAP) assays. The loftiest antioxidant exertion was observed for methanol excerpt of endocarp in both styles and it was stronger than positive control butylated hydroxy toluene (BHT). The total phenolic contents were ranging between34.59 to68.34 mg GAE/ g DW. The results revealed that all excerpts had antibacterial exertion against named bacteria except waterless excerpt. The methanol excerpt of endocarp presented the loftiest zone of inhibition against tested pathogens (9- 21 mm). From the results it's conclude that the methanol excerpt from endocarp of walnut could be used as a natural preservative component in food and medicinal diligence.[87]

33. **Hamdollah Delaviz et al., (2017).** The author concluded that, In recent times, the use of medicinal shops increased vastly; so that moment, the use of traditional drug, as well as medicinal shops is necessary for the end of producing further effective medicines with smaller side goods and determining the effective boluses. With the scientific name of Juglans regia, walnut factory is a medicinal factory with different parcels that's considered less, despite having great remedial eventuality in the traditional drug. The end of this study was to review the disbandment of walnut shops, the chemical composites, and remedial goods of walnuts on antioxidant exertion, antidiabetic, hypolipidemic, antimicrobial, and antihypertensive conditioning, as well as liver protection. Data of this review study have been collected from the books and scientific papers published in databases similar as Science Direct, Web of Science, Scopus, PubMed, and Scientific Information Database. While this factory having high antioxidant capabilities, walnuts are composed of numerous chemical composites similar as ascorbic acid, flavonoids, quercetin, and caffeic acid. Experimental studies have shown that walnuts reduced blood glucose and lipids and also dropped blood

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34. **Zahra Ghiravani et al., (2016).** As the author reported that, Todays, the fashionability of herbal drug is adding worldwide. Due to significance the evaluation of medicinal sauces efficacity and safety, the present study was conducted to probe the antidiabetic and hypolipidemic goods of internal septum of walnut fruit (ISWF) ethanolic excerpt in diabetic rats. Alloxan diabetic rats treated orally with ethanolic excerpt of ISWF (0- 400mg/ kg) for 28 days. To estimate itsanti-diabetic exertion, the creatures dieting blood glucose were determined on the first, 14th and 29th days. also, oral glucose forbearance test (OGTT) was performed in diabetic rats at the last day of the study. After 24h of last administration, the blood samples were collected, and the Tube lipids and liver enzymes situations were measured in fasting overnight rats.[89]

35. **Thais Regina Mezzomo and Juliana Nadal (2016).** The present Investigation, this composition aims to develop a literature review of food nutrients and substances that can impact on thyroid function. A literature review using “hypothyroidism” associated with the descriptors iodine, selenium, zinc, soy, gluten and flavonoids was conducted. It was set up 172 papers and 42 were named, as well as other material demanded to achieve the ideal of this study. It was observed that iodide participates in the organification response and latterly engages with tyrosyl remainders to form the thyroid hormones. inordinate or deficient quantities of iodine contribute to thyroid dysfunction, including hypothyroidism. Selenium and zinc areco-factors for deiodination responses, which convert thyroxine (T4) into triiodothyronine (T3) peripherally. Deficiency of these minerals can be developed on restrictive diets or unstable diet at any stage of life, uniting with a dropped product of thyroid hormones. likewise, ingested substances, similar as thiocyanate and isothiocyanate can contend with iodide for

the entry in thyroid follicles and concession hormones conflation, as well as soy, which can inhibit thyroid peroxidase, enzyme responsible for the oxidation of iodide and conformation of thyroid hormones, when there's iodine insufficiency. In vivo studies that show the type and quantum of flavonoids that may intrude with the conversion of T4 to T3 should be performed, as well as studies to interpret the part of the impunity of gluten in the reversal of subclinical hypothyroidism.[90]

36. **GIRISH SHARMA et al., (2016).** In view of author works, Twelve walnut genotypes were estimated and characterized for factory height, factory spread, splint area, bearing habit, chronicity in bearing, nut weight, kernel chance and yield. On the base of growth characters' maximum factory height (5.45 m) was set up in Kainthal Selection whereas, factory spread was loftiest in 'Partap'. Shimla selection had loftiest nut weight (16.37 g) and splint area (705.33 cm2) among all the selections. Kernel chance was maximum in Kullu Selection (49.00) and minimum in Montignac (34.07). The nut yield varied from to87.50 kg/ tree, loftiest being in Kainthal Selection. On the whole, out of twelve genotypes estimated Kainthal Selection and Shimla Selection appeared to be promising for utmost features like yield, nut weight, splint area etc. All the genotypes were regular and terminal in bearing habit.[91]

37. **Naseem A et.al., (2015).** The author finding shows, Export performance of Indian walnut has been exhaustively anatomized in this study employing chronological data. The import of walnut from India has significantly increased over the times, but still constituted only 3 per cent of total world import. Between 1979 and 2012, the import of shelled walnut has significantly increased, at an periodic growth rate of about 3 per cent, while walnut with shell has shown a declining trend over the times, inferring widening of requests for value- added products of walnut. The import insecurity in volume and value of both shelled and walnut with shell has declined over the times; still, the insecurity in unit price of shelled walnut has increased over the times. The corruption analysis has revealed loftiest donation of change in mean import volume among the other factors of change in the average import value of walnut. The unit value of Indian walnut import has been set up lower compared to numerous other nations, indicating the possibility of an

advanced price by icing quality parameters as per global norms. The estimates of graveness model have revealed that per capita GDP, agrarian GDP, and consumption of importing mates, and also the Indian GDP are the significant factors determining Indian walnut import. The study has also unveiled unexploited eventuality of Indian walnut import to some trading mates. The study has emphasized on the enhancement in quality of walnut, integration of product and value addition, import creation and strengthening of bilateral ties with regular trade mates for enhancing import of Indian walnut.[92]

38. **Sevinç Aydın et al., (2015).** The purpose of this study is to demonstrate defensive goods of walnut samples on CCl4- convinced towel damage in vivo. Walnut fruits were uprooted and also subordinated to vitamin and flavonoid analyses. The excerpts attained were fitted intra peritoneally every other day to Wistar manly rats given carbon tetrachloride (CCl4) and the creatures were guillotined at the end of the study period. The brain, order, and liver apkins were removed and lipid peroxidation (LPO) measures were done in the lipid bit generated. The adipose acids in the lipid excerpt were anatomized by gas chromatography after converting them into methyl esters. In addition, the quantities of glutathione, protein, and vitamins were anatomized. Results Given the results achieved, it was set up that the situations of adipose acids increased in the brain and order apkins after CCl4 administration (perceiving fresh walnut in comparison with the controls (p Our data indicates that walnut excerpt has defensive goods against LPO conformation in the brain, order and liver apkins.[93]

39. **S. Angmo et al., (2015).** The author concluded that, Ladakh region includes Leh and Kargil sections of Jammu and Kashmir in India. The region is cold and thirsty limiting the growing of fruit crops. The study aims to characterize walnut diversity in the region which would be resourceful in the near future for colorful purposes and boost up walnut civilization. Four genotypes are named from colorful walnut growing areas of Ladakhviz. G1 from Skara, G2 from Nurla, G3 from Temisgam and G4 from Dhomkhar. It was apparent that maturity of the genotypes displayed intermediate tree vigour with spreading nature of growth habit, rough shoot pubescence and splint and rachis pubescence, strong shell seal and shell strength with good nut periphery and nut length, satisfactory kernel

flavor, well filled kernel and easy junking of kernel halves. pamphlet shape observed was elliptic, pamphlet periphery was entire, green splint and rachis colour, brown shoot colour, complete shell integrity and kernel plumpness was moderate in all the four genotypes. The branching habit was thick in genotypes G3 and G4, intermediate in G1 and intermediate to thick in G2 In general, the loftiest value of splint length and kernel chance was recorded in G2. G3 displayed the maximum range of splint, number of circulars, inshell nut weight and kernel weight. The nut shape was broad to ovate in G2 and G3 while G1 was broad ovate and G4 was broad elliptic in shape. The shell texture of G2 and G4 was medium while G3 was medium to rough and G1 was rough. The shell colour of G1 was light, medium in G2, light to medium in G3 and medium to dark in G4. The shell consistence recorded the outside in G4. The kernel colour was light in G2 and G4, while redundant light and light to amber was observed in G1 and G3 independently.[94]

40. **Neerja Rana et al., (2015).** In this publication, Walnuts (Juglans regia L) are nutritionally rich finest nut crop of temperate regions having salutary effect on the mortal health. Five different walnut cultivars grown in the temperate region of Himachal Pradesh videlicet; Kotkhai Selection, Govind, Lara, Partap and Maylannise were named and estimated for their physical characteristics, nutritive parcels and biochemical composition. Among the fruit physical characteristics, the nut length was set up in the range of29.59 –38.74 mm, nut periphery (26.72 mm-32.82 mm), nut consistence (28.81mm-34.70 mm), nut weight (7.07 g-12.98 g), kernel weight (3.04g-6.70 g), kernel rate (43.26-51.62) and shell weight (4.03-6.84 mm). Arnongst the nutritive parcels and biochemical composition of walnut cultivars, high protein content was observed in Kotkhai Selection (20), followed by Partap (19) cultivar. varied from ranged The fat content was set up to range between32.25-56.40, total carbohydrates8.09-14.0, humidity content2.71-3.01, Total phenol content renged32.61-80.00 mg/ g and Scavenging Anti oxidantactivity veried between 40- 85. On the base of forenamed characteristics, Kotkhai Selection and Partap suitable for cultivation was set up to be a superior walnut cultivar in temperate region of Himachal Pradesh, India.[95]

41. **Radha Mohan Sharma et al., (2014)** The author concluded that, Western Himalayan region of India provides agroclimatic conditions suitable for producing high quality walnuts. Jammu and Kashmir State of India produces major share of import quality walnut. The nuts brought to vend are generally a admixture of variable size and shape as they're gathered from different seedling perm. This study aimed to identify a clone, which has high import quality. We linked 63 walnut seedling trees and set up GL0109 tree as stylish meeting all the import norms like nut weight (20.10 g), nut size (45.45 mm x42.07 mm), nut grade (Jambo), shell consistence (1.24 mm), kernel recovery (61.40), proportion of light coloured kenel (83.40), protein content (15.66) and oil painting content (68.42). It was also set up largely resistant to anthracnose complaint as it showed 5- 10 prevalence and 0- 5 inflexibility against 60 prevalence and 75 inflexibilities in other 63 seedling trees. Overall, it scored numerical standing on 10-point scale grounded on the parameters specified by Jammu and Kashmir Walnut Exporters Association. therefore, GL0109 was linked and recommended for civilization in different walnut growing areas of the state.[96]

42. **Y.L. SATAV et al., (2013).** In present disquisition Burfi was prepared from buffalo milk with constant position of sugar (30 by weight of Khoa) and different situations of walnut greasepaint (2, 4, 6 and 8 by weight of Khoa). It was observed that the overall adequacy score for treatment T1, T2, T3, T4 and T5 were8.76, ,8.16,7.80 and7.50, independently. The results revealed that as the position of walnut greasepaint in Burfi increases the overall adequacy score decreases. On the base of results, it could be concluded that 2 per cent walnut greasepaint could be successfully incorporated in Burfi which increases nutritive value without majorly affected the sensational and textural quality profile of Burfi.[97]

43. **MONIKA THAKUR AND KARUNA SINGH (2013).** In this publication, Nuts are nutrient thick foods and have been a regular element of humanity's diet since neolithic times. In recent times there's a growing interest in nuts which give health benefits and are indispensable to medicine. Walnut (Juglan regiaL.) belong to family Juglandaceae have amazing health benefits. They aren't only succulent but also a complete functional food because they not only give nutritive but also medicinal health benefits. They're unique among nuts because they're loaded with omega-3 adipose acids, and colorful other bioactive composites, antioxidants, fibre, vitamins, minerals, and phytosterols.[98]

44. Ram S. Verma et al., (2013). The author concluded that, the walnut tree (Juglans regia L.), generally known as 'Akhrot' in India, is a precious tree has a long history of medicinal use to treat a wide range of health complaints. To explore the diversity in essential oil painting yield and composition of J. regia, leaves were collected during spring season from 28 populations growing in western Himalaya. relative results showed considerable variations in the essential oil painting yield and composition ofJ. regia leaves. The essential oil painting yield varied from0.02 to0.12 in fresh leaves of the different populations of J. regia. Analysis of the essential canvases by GC/ FID and GC/ MS and the posterior bracket by statistical analysis redounded in three clusters with significant variations in their terpenoid composition. Altogether, 70 ingredients, representing83.2 –98.0 of the total oil painting composition, were linked and quantified. Major factors of the essential canvases were (E)- caryophyllene (1.4 –47.9), β- pinene(4.5 –39.5), germacrene D(5.0 –23.3), α- pinene(1.5 –18.1), α- humulene(1.1 –11.8), α- zingiberene(0.1 –11.3), α- copaene(0.0 –10.1), limonene(0.8 –8.6), caryophyllene oxide(0.1 –8.6), ar- curcumene(0.0 –7.2), δ cadinene(0.3 –6.7),(E)- β- farnesene(0.0 –5.9), 1,8-cineole (<0.0–5.4%) γ- curcumene (0.0 –4.2), and methyl salicylate (0.1 –4.0). This is the first report on splint unpredictable oil painting composition ofJ. regia populations from western Himalaya. Out of the 70 linked ingredients, over 25 were described for the first time forJ. regia.[99]

45. Saeid Mousav (2013). This study employed product functions to examine the factors effective on walnut product in Kohgiloyeh VA Boyer- Ahmad fiefdom. Thecross-sectional data collected from 100 Walnut farmers by questionnaire with interview schedule. The variables of this study were Zulonfloo bane, labour, ministry, Iron fertilization, water and realty. The Cob- Douglas product function named as the most applicable model to dissect the walnut product function. The result of this paper showed that Walnut farmers have used the factors of product in the alternate area of product. The Findings also showed that the pliantness of factors product similar as Zulonfloo bane, labour, ministry, Iron fertilization, water and realty were 0.810,0.169,0.097,0.212,0.158 and0.093 independently. The result of Wald test showed that there's increase of Returns to gauge (IRS) in walnut vineyards of Kohgiloyeh VA Boyer- Ahmad fiefdom.[100]

46. **Naseer Ahmad Rather et al., (2013).** The consequences of this study, Under the changing agrarian script, it has been realized that the horticulture sector plays a vital part in furnishing livelihood security to the growers encyclopedically. Area, product, productivity and import of horticultural produces are vital for adding ranch income and overall employment in the agrarian sector. In this paper an attempt has been made to explore implicit and strength of Jammu and Kashmir with regard to its product and import of fresh and dry fruits. Jammu and Kashmir is the major patron of apple and walnuts in India, 77 percent of apple and 90 percent of walnut product in India belongs to Jammu and Kashmir and chance share of state in India's total product is showing an adding trend and the state has been declared as the "Agri. Export zone for Apples and Walnuts". Given the declining share of traditional agrarian goods in product, consumption and trade horticulture represent an important assiduity to ameliorate income growth and employment in pastoral areas of Jammu and Kashmir. Agribusiness including import of fresh and dry fruits is the foundation of frugality. The assiduity contributes nearly 60 percent of the countries profit and 22 percent of gross state domestic product (GSDP). It's also estimated that 80 percent of population is engaged in husbandry and its confederated sectors including horticulture sector in the state.[101]

47. **Nael Abu Taha and Mohammed A (2011).** The author reported that, Juglans regia Linn is a medicinal factory that has been extensively used in traditional drug for a wide array of affections that include helminthiasis, diarrhea, sinusitis, bellyache, arthritis, asthma, eczema, scrofula, skin diseases, and colorful endocrine conditions similar as diabetes mellitus, anorexia, thyroid dysfunctions, cancer and contagious conditions. The present review, attempts to give comprehensive information on the ethnobotanical use, pharmacology, nutritive value, preclinical and clinical studies, toxin, other uses and current exploration prospects of the Juglans regiaL. presently, there's a renewed interest in walnut, and several examinations aimed at scientific confirmation of its traditional uses and a humble scientific disquisition aimed at insulation and identification of active ingredients of crude excerpts.[102]

48. **Sina COSMULESCU et al., (2011).** The consequences of this study, Juglone (5-hydroxy -1,4-napthoquinone) is a chemical emulsion released by walnut trees that can be poisonous for girding factory species. In the present study, juglone was linked in leaves and green cocoon in five walnut cultivars 'Germisara', 'Jupanesti, 'Franquette', 'Vina', 'Valcor' by using high performance liquid chromatography (HPLC- RP). Juglone was set up predominant in green cocoon (average value of cultivars is about31.308 mg/ 100 g). Significant differences in contents of linked juglone were observed among cultivars that ranged from20.56 to42.78 mg/ 100g for green cocoon, and5.42 to22.82 mg/ 100 g for leaves. It was also set up that walnut green cocoon and leaves represent the most important source of walnut phenolics.[103]

49. **Zijia Zhang et al., (2009).** In this investigation, an exertion- directed separation and sanctification process was used to insulate 1,1- diphenyl-2-picrylhydrazyl radical (DPPH) scavenging factors from Juglans regia kernels. Ethyl acetate and n- butanol fragments showed lesser DPPH scavenging conditioning compared to those of water and petroleum ether fragments. The ethyl acetate bit was subordinated to sanctification using column chromatography. Seven phenolic composites, pyrogallol (1), p- hydroxybenzoic acid (2), vanillic acid (3), ethyl gallate (4), protocatechuic acid (5), gallic acid (6) and- pentahydroxydibenzo (b, d) pyran-6-one (7), containing significant antioxidant conditioning were insulated and linked in J. regia by spectroscopic styles for the first time in this study. The relative order of DPPH scavenging capacity for these composites was 7> 6 ⩾ 4 ⩾ 1> Trolox ⩾ 5> 3> 2. The results of this study suggested that the antioxidant conditioning of these phenolic composites may be told by the number of hydroxyls in their sweet rings.[104]

50. **Ivo Oliveira et al., (2008).** The present investigation, the total phenols content and antioxidant and antimicrobial conditioning were studied in walnut (Juglans regiaL.) green cocoons waterless excerpts of five different cultivars (Franquette, Mayette, Marbot, Mellanaise and Parisienne). Total phenols content was determined by colorimetric assay and their quantum ranged from32.61 mg/ g of GAE (cv. Mellanaise) to74.08 mg/ g of GAE t (cv. Franquette). The antioxidant

capacity of waterless excerpts was assessed through reducing power assay, scavenging goods on DPPH (2,2- diphenyl-1-picrylhydrazyl) revolutionaries and β- carotene linoleate model system. A attention-dependent antioxidative capacity was vindicated in reducing power and DPPH assays, with EC values lower than 1mg/ mL for all the tested excerpts. The antimicrobial capacity was screened against Gram positive and Gram negative bacteria, and fungi. All the excerpts inhibited the growth of Gram positive bacteria, being Staphylococcus aureus the most susceptible bone with MIC of0.1 mg/ mL for all the excerpts. The results attained indicate that walnut green cocoons may come important in the accession of a conspicuous source of composites with health defensive eventuality and antimicrobial exertion. [105]

51. **Diana O et al., (2008)** Walnut (Juglans regiaL.) In this publication, kernels have important quantities of phenolic composites. The objects of the work were twofold (a) to prize the phenolic bit from shells and walnut flour, and to examine its antioxidant capacity and (b) to estimate the effect of housing junking on solubility of protein fragments from walnut flour. In agreement with their advanced total phenolic content, housing excerpts had stronger antioxidant exertion than had flour excerpts. The presence of phenolic composites dropped protein solubility in walnut flour attained from whole kernels. Dehulling of kernels significantly bettered protein recovery but this result was explosively affected by the solvent system employed. Proteins from whole kernels, especially those uprooted with water and NaCl result, had a reduced solubility, indicating that phenolics bind to proteins when they're dispersed in waterless media at neutral pH. The results are bandied in the light of the different complex- forming mechanisms that bind phenolics to proteins.[106]

52. **José Alberto Pereira et al., (2008).** The author concluded that, the chemical composition, antioxidant eventuality and antimicrobial exertion were studied in six walnuts (Juglans regia L.) cultivars (cv. Franquette, Lara, Marbot, Mayette, Mellanaise and Parisienne) produced in Portugal. Concerning their chemical composition, the main element of fruits was fat ranging from78.83 to82.14, being the nutritive value around 720kcal per 100g of fruits. Linoleic acid was the major

adipose acid reaching the maximum value of60.30 (cv. Lara) followed by oleic, linolenic and palmitic acids. The waterless excerpts of walnut cultivars were delved by the reducing power assay, the scavenging effect on DPPH (2,2-diphenyl-1-picrylhydrazyl) revolutionaries and β- carotene linoleate model system. All the walnut excerpts displayed antioxidant capacity in an attention-dependent manner being the smallest EC values attained with excerpts of cv. Parisienne. Their antimicrobial capacity was also checked against gram positive (Bacillus cereus, Bacillus subtilis, Staphylococcus aureus) and gram negative bacteria (Pseudomonas aeruginosa, Escherichia coli, Klebsiella pneumoniae) and fungi (Candida albicans, Cryptococcus neoformans), revealing exertion against the different tested microorganisms.[107]

53. **José Alberto Pereira et al., (2007).** The outcome acquired reveal that, Different cultivars of walnut (Juglans regiaL.) leaves (Cv. Lara, Franquette, Mayette, Marbot, Mellanaise and Parisienne) grown in Portugal, were delved in what concerns phenolic composites and antimicrobial and antioxidant parcels. Phenolics analysis was performed by reversed- phase HPLC/ pater and 10 composites were linked and quantified 3- and 5- caffeoylquinic acids, 3- and 4- p-coumaroylquinic acids, p- coumaric acid, quercetin 3- galactoside, quercetin 3-pentoside outgrowth, quercetin 3- arabinoside, quercetin 3- xyloside and quercetin 3- rhamnoside. The antimicrobial capacity was screened against Gram positive (Bacillus cereus,B. subtilis, Staphylococcus aureus) and Gram negative bacteria(Pseudomonas aeruginosa, Escherichia coli, Klebsiella pneumoniae) and fungi(Candida albicans, Cryptococcus neoformans). Walnut leaves widely inhibited the growth of Gram positive bacteria, beingB. cereus the most susceptible one (MIC0.1 mg/ mL). Gram negative bacteria and fungi were resistant to the excerpts at 100mg/ mL. Lara walnut leaves were also submitted to antibacterial assays using 18 clinical isolates of Staphylococcussp. Antioxidant exertion was penetrated by the reducing power assay, the scavenging effect on DPPH (2,2-diphenyl- 1- picrylhydrazyl) revolutionaries and β- carotene linoleate model system. In a general way, all of the studied walnut leaves cultivars presented high antioxidant exertion (EC values lower than 1mg/ mL), being Cv. Lara the most effective bone.[108]

54. **G. Pandey S. K. Shukla, (2006).** This paper provides a review of the current status of the walnut assiduity in India. The artistic practices, growing regions and mar keting trends of the walnut assiduity in India are anatomized in detail. The paper also addresses the issues related to product constraints and unborn expansion in India's marketable walnut product. With the bettered living norms and increased interest in walnut growing, India is still getting a major walnut producing country.[109]

55. **Toshiyuki Fukuda et al., (2003).** In this study, three hydrolyzable tannins, glansrins A – C, together with adenosine, adenine, and 13 known tannins were insulated from the n- BuOH excerpt of walnuts (the seeds of Juglans regia L.). Glansrins A – C were characterized as ellagitannins with a tergalloyl group, or related polyphenolic acyl group, grounded on spectral and chemical substantiation. The 14 walnut polyphenols had superoxide dismutase (SOD)-suchlike exertion with EC21.4- 190 μM and a remarkable radical scavenging effect against 1,1- diphenyl-2-picrylhydrazyl (DPPH) (EC0.34 –4.72 μM). From walnuts (the seeds of Juglans regia), three ellagitannins, glansrins A – C, have been insulated together with 13 known hydrolysable tannins and their structures illustrated by means of 1D and 2D NMR analyses. Their antioxidative goods were also estimated.[110]

56. **Y. Ozturk et al., (1994).** The author finding shows, In Turkish folk drug, the fruits and leaves of Juglans regiaL. have been extensively used as an herbal remedy for the treatment of colorful endocrine conditions similar as diabetes mellitus, anorexia, thyroid dysfunctions, etc. The effect of fruits of J. regia on the thyroid hormone situations of mice was delved using two excerpts prepared from the fruits by different styles. The acute venom of these two excerpts in mice were assessed as well. On the base of our findings attained, the excerpts prepared from the fruits of J. regia enhanced thyroid hormone situations, while they wielded minimum acute toxin in mice.[111]

CHAPTER – III

AIM AND OBJECTIVE

3.1 Aim:

Thyroid can always be considered as one of your hard-working glands, this is the gland, which tells your body how fast to tick over by generating the known hormone called thyroxine. This is the genre where mostly girls must watch out more, as 1 in 50 women surely gets struck by this problem. To confirm its presence, it is essential to go for a thyroid test**.**

Who is affected by thyroid disease?

Currently, about 20 million Indians have some form of thyroid disease. People of all ages and races can get thyroid disease. However, women are 5 to 8 times more likely than men to have thyroid problems.

I. Liquid constituents are more easily absorbed in the body than tablets. This means medicinal properties of a medicine become more prominent in the syrup than in the tablets.

II. The human body cannot accept the solid form of a medicine; it needs to be transferred into liquid form before getting absorbed. Hence, even if a medicine is taken in the tablet form, it is at first liquefied and then used by the body.

III. It is found that more than 90% of syrup is extracted and used by the human body whereas maximum 50% of a tablet is actually utilized by the human body and remaining is wasted.

IV. A syrup starts working within 5-6 minutes, it is extracted really fast whereas a tablet takes nearly half an hour before it actually starts working in the body.

V. Anyone, even a kid, can take syrup easily whereas millions of people around the world feel nervous in the names of the tablets.

3.2 OBJECTIVE OF THE STUDY: To prepare suitable formulation of solution by one or more methods:

1) Solution with heat

2) Agitation without heat

3) Maceration

To evaluate the prepared powder and solution for parameters like

1) Moisture content

2) Total Ash values

3) Boiling point

4) Specific gravity

5) Density

6) Viscosity

7) PH

8) Appearance

9) HPTLC analysis/HPLC Analysis

10) FT-IR studies

11) To study *in vitro* drug release profile of prepared solution

12) To ascertain release mechanics and kinetics of drug release.

13) Comparative study of marketed product if available solution with Allopathy, Ayurveda, Homeopathy etc.

14) To perform stability studies as per ICH guidelines.

CHAPTER – IV

MATERIAL AND METHOD

4.0 MATERIAL AND METHOD

When human life started on earth, the basic needs of humans are fulfilling by plants and them by product in the form of medicine, healthcare, food, clothing, shelter, agriculture, agrochemicals, pharmaceuticals, narcotics, etc. at first the human life were fully depending on the basic essentials of GOD in the form of Prithvi (Earth), Agni (Fire), Jal (Water), Vayu (Air) and Akash (Space). These essentials of nature were visible god and as a result, got security for spiritual, pious cultural and social reasons. There are 72,000 plant species being used in various human cultures approximately the earth for medicinal reason. Out of which, 17,000 flowering plants report from India and 8000 plants are used in a range of systems of Indian medicine. The energetic principles found in medicinal plants are alkaloids, glycosides, tannins, flavonoides or other related compounds of a very complex nature. They are found in root, bark, nuts, stem, leaf, fruit and seed etc. About 70-80% of the rural populations in many steamy budding countries still depend on traditional medicine for their primary physical condition mind, which also means that the people have to depend on medicinal plant life for healing. India is the seventh largest and one of the 12 mega biodiversity countries in the world covering wide diversity in environmental and bio-geographical conditions which lead to the progress of a wide range of plant life types and represents extremely rich plants including a large number of endemic groups.

4.1 Extraction techniques of Medicinal plants

Extraction, as the term is used pharmaceutically, involves the separation of medicinally active portions of plant or animal tissues from the inactive or inert components by using selective solvents in standard extraction procedures. The products so obtained from plants are relatively impure liquids, semisolids or powders intended only for oral or external use.

These include classes of preparations known as decoctions, infusions, fluid extracts, tinctures, pilular (semisolid) extracts and powdered extracts. Such preparations popularly have been called galenicals, named after Galen, the second century Greek physician. The purposes of standardized extraction procedures for crude drugs are to

attain the therapeutically desired portion and to eliminate the inert material by treatment with a selective solvent known as menstruum.

The extract thus obtained may be ready for use as a medicinal agent in the form of tinctures and fluid extracts, it may be further processed to be incorporated in any dosage form such as tablets or capsules, or it may be fractionated to isolate individual chemical entities such as ajmalicine, hyoscine and vincristine, which are modern drugs. Thus, standardization of extraction procedures contributes significantly to the final quality of the herbal drug.

Methods of Extraction of Medicinal Plants Maceration In this process, the whole or coarsely powdered crude drug is placed in a stoppered container with the solvent and allowed to stand at room temperature for a period of at least 3 days with frequent agitation until the soluble matter has dissolved. The mixture then is strained, the marc (the damp solid material) is pressed, and the combined liquids are clarified by filtration or decantation after standing.

a. Infusion

Fresh infusions are prepared by macerating the crude drug for a short period of time with cold or boiling water. These are dilute solutions of the readily soluble constituents of crude drugs.

b. Digestion

This is a form of maceration in which gentle heat is used during the process of extraction. It is used when moderately elevated temperature is not objectionable. The solvent efficiency of the menstruum is thereby increased.

c. Decoction

In this process, the crude drug is boiled in a specified volume of water for a defined time; it is then cooled and strained or filtered. This procedure is suitable for extracting water-soluble, heatstable constituents. This process is typically used in preparation of Ayurvedic extracts called “quath” or “kawath”. The starting ratio of crude drug to water is fixed, e.g. 1:4 or 1:16; the volume is then brought down to one-fourth its

original volume by boiling during the extraction procedure. Then, the concentrated extract is filtered and used as such or processed further.

d. Percolation

This is the procedure used most frequently to extract active ingredients in the preparation of tinctures and fluid extracts. A percolator (a narrow, cone-shaped vessel open at both ends) is generally used. The solid ingredients are moistened with an appropriate amount of the specified menstruum and allowed to stand for approximately 4 h in a well closed container, after which the mass is packed and the top of the percolator is closed. Additional menstruum is added to form a shallow layer above the mass, and the mixture is allowed to macerate in the closed percolator for 24 h. The outlet of the percolator then is opened and the liquid contained therein is allowed to drip slowly. Additional menstruum is added as required, until the percolate measures about three-quarters of the required volume of the finished product. The marc is then pressed and the expressed liquid is added to the percolate. Sufficient menstruum is added to produce the required volume, and the mixed liquid is clarified by filtration or by standing followed by decanting.

e. Hot Continuous Extraction (Soxhlet)

In this method, the finely ground crude drug is placed in a porous bag or “thimble” made of strong filter paper, which is placed in chamber E of the Soxhlet apparatus. The extracting solvent in flask A is heated, and its vapors condense in condenser D. The condensed extractant drips into the thimble containing the crude drug, and extracts it by contact. When the level of liquid in chamber E rises to the top of siphon tube C, the liquid contents of chamber E siphon into fl ask A. This process is continuous and is carried out until a drop of solvent from the siphon tube does not leave residue when evaporated. The advantage of this method, compared to previously described methods, is that large amounts of drug can be extracted with a much smaller quantity of solvent. This effects tremendous economy in terms of time, energy and consequently financial inputs. At small scale, it is employed as a batch process only, but it becomes much more economical and viable when converted into a continuous extraction procedure on medium or large scale.

f. Aqueous Alcoholic Extraction by Fermentation

Some medicinal preparations of Ayurveda (like asava and arista) adopt the technique of fermentation for extracting the active principles. The extraction procedure involves soaking the crude drug, in the form of either a powder or a decoction (kasaya), for a specified period of time, during which it undergoes fermentation and generates alcohol in situ; this facilitates the extraction of the active constituents contained in the plant material. The alcohol thus generated also serves as a preservative. If the fermentation is to be carried out in an earthen vessel, it should not be new: water should first be boiled in the vessel. In large-scale manufacture, wooden vats, porcelain jars or metal vessels are used in place of earthen vessels. Some examples of such preparations are karpurasava, kanakasava, dasmularista. In Ayurveda, this method is not yet standardized but, with the extraordinarily high degree of advancement in fermentation technology, it should not be difficult to standardize this technique of extraction for the production of herbal drug extracts.

g. Counter-current Extraction

In counter-current extraction (CCE), wet raw material is pulverized using toothed disc disintegrators to produce a fine slurry. In this process, the material to be extracted is moved in one direction (generally in the form of a fine slurry) within a cylindrical extractor where it comes in contact with extraction solvent. The further the starting material moves, the more concentrated the extract becomes. Complete extraction is thus possible when the quantities of solvent andmaterial and their flow rates are optimized. The process is highly efficient, requiring little time and posing no risk from high temperature. Finally, sufficiently concentrated extract comes out at one end of the extractor while the marc (practically free of visible solvent) falls out from the other end.

This extraction process has significant advantages:

i. A unit quantity of the plant material can be extracted with much smaller volume of solvent as compared to other methods like maceration, decoction, percolation.

ii. CCE is commonly done at room temperature, which spares the thermolabile constituents from exposure to heat which is employed in most other techniques.

iii. As the pulverization of the drug is done under wet conditions, the heat generated during comminution is neutralized by water. This again spares the thermolabile constituents from exposure to heat.

iv. The extraction procedure has been rated to be more efficient and effective than continuous hot extraction.

h. Ultrasound Extraction (Sonication)

The procedure involves the use of ultrasound with frequencies ranging from 20 kHz to 2000 kHz; this increases the permeability of cell walls and produces cavitation. Although the process is useful in some cases, like extraction of rauwolfia root, its large-scale application is limited due to the higher costs. One disadvantage of the procedure is the occasional but known deleterious effect of ultrasound energy (more than 20 kHz) on the active constituents of medicinal plants through formation of free radicals and consequently undesirable changes in the drug molecules.

i. Supercritical Fluid Extraction

Supercritical fluid extraction (SFE) is an alternative sample preparation method with general goals of reduced use of organic solvents and increased sample throughput. The factors to consider include temperature, pressure, sample volume, analytic collection, modifier (co-solvent) addition, flow and pressure control, and restrictors. Generally, cylindrical extraction vessels are used for SFE and their performance is good beyond any doubt.

The collection of the extracted analytic following SFE is another important step: significant analytic loss can occur during this step, leading the analyst to believe that the actual efficiency was poor.

There are many advantages to the use of CO2 as the extracting fluid. In addition to its favorable physical properties, carbon dioxide is inexpensive, safe and abundant. But while carbon dioxide is the preferred fluid for SFE, it possesses several polarity limitations. Solvent polarity is important when extracting polar solutes and when strong analytic-matrix interactions are present. Organic solvents are frequently added to the carbon dioxide extracting fluid to alleviate the polarity limitations. Of late, instead of carbon dioxide, argon is being used because it is inexpensive and more

inert. The component recovery rates generally increase with increasing pressure or temperature: the highest recovery rates in case of argon are obtained at 500 atm and 150° C.

The extraction procedure possesses distinct advantages:

i. The extraction of constituents at low temperature, which strictly avoids damage from heat and some organic solvents.

ii. No solvent residues.

iii. Environmentally friendly extraction procedure.

The largest area of growth in the development of SFE has been the rapid expansion of its applications. SFE finds extensive application in the extraction of pesticides, environmental samples, foods and fragrances, essential oils, polymers and natural products. The major deterrent in the commercial application of the extraction process is its prohibitive capital investment.

j. Phytonics Process

A new solvent based on hydrofluorocarbon-134a and a new technology to optimize its remarkable properties in the extraction of plant materials offer significant environmental advantages and health and safety benefits over traditional processes for the production of high quality natural fragrant oils, flavors and biological extracts. Advanced Phytonics Limited (Manchester, UK) has developed this patented technology termed “phytonics process”. The products mostly extracted by this process are fragrant components of essential oils and biological or phytopharmacological extracts which can be used directly without further physical or chemical treatment.

The properties of the new generation of fluorocarbon solvents have been applied to the extraction of plant materials. The core of the solvent is 1,1,2,2-tetrafluoroethane, better known as hydrofluorocarbon-134a (HFC-134a). This product was developed as a replacement for chlorofluorocarbons. The boiling point of this solvent is -25° C. It is not flammable or toxic. Unlike chlorofluorocarbons, it does not deplete the ozone layer. It has a vapor pressure of 5.6 bar at ambient temperature. By most standards this is a poor solvent. For example, it does not mix with mineral oils or triglycerides and it does not dissolve plant wastes.

The process is advantageous in that the solvents can be customized: by using modified solvents with HFC-134a, the process can be made highly selective in extracting a specific class of phytoconstituents. Similarly, other modified solvents can be used to extract a broader spectrum of components. The biological products made by this process have extremely low residual solvent. The residuals are invariably less than 20 parts per billion and are frequently below levels of detection. These solvents are neither acidic nor alkaline and, therefore, have only minimal potential reaction effects on the botanical materials. The processing plant is totally sealed so that the solvents are continually recycled and fully recovered at the end of each production cycle. The only utility needed to operate these systems is electricity and, even then, they do no consume much energy. There is no scope for the escape of the solvents. Even if some solvents do escape, they contain no chlorine and therefore pose no threat to the ozone layer. The waste biomass from these plants is dry and "ecofriendly" to handle.

Advantages of the Process

Unlike other processes that employ high temperatures, the phytonics process is cool and gentle and its products are never damaged by exposure to temperatures in excess of ambient. • No vacuum stripping is needed which, in other processes, leads to the loss of precious volatiles. • The process is carried out entirely at neutral pH and, in the absence of oxygen, the products never suffer acid hydrolysis damage or oxidation. • The technique is highly selective, offering a choice of operating conditions and hence a choice of end products. • It is less threatening to the environment. • It requires a minimum amount of electrical energy. • It releases no harmful emissions into the atmosphere and the resultant waste products (spent biomass) are innocuous and pose no effluent disposal problems. • The solvents used in the technique are not flammable, toxic or ozone depleting. • The solvents are completely recycled within the system.

Applications

The phytonics process can be used for extraction in biotechnology (e.g for the production of antibiotics), in the herbal drug industry, in the food, essential oil and flavor industries, and in the production of other pharmacologically active products. In particular, it is used in the production of top quality pharmaceutical-grade extracts,

pharmacologically active intermediates, antibiotic extracts and phytopharmaceuticals. However, the fact that it is used in all these areas in no way prevents its use in other areas. The technique is being used in the extraction of high-quality essential oils, oleoresins, natural food colors, flavors and aromatic oils from all manner of plant materials. The technique is also used in refining crude products obtained from other extraction processes. It provides extraction without waxes or other contaminants. It helps remove many biocides from contaminated biomass.

4.2 Parameters for Selecting an Appropriate Extraction Method

i. Authentication of plant material should be done before performing extraction. Any foreign matter should be completely eliminated.

ii. Use the right plant part and, for quality control purposes, record the age of plant and the time, season and place of collection.

iii. Conditions used for drying the plant material largely depend on the nature of its chemical constituents. Hot or cold blowing air flow for drying is generally preferred. If a crude drug with high moisture content is to be used for extraction, suitable weight corrections should be incorporated.

iv. Grinding methods should be specified and techniques that generate heat should be avoided as much as possible.

v. Powdered plant material should be passed through suitable sieves to get the required particles of uniform size.

vi. Nature of constituents:

a) If the therapeutic value lies in non-polar constituents, a non-polar solvent may be used. For example, lupeol is the active constituent of Crataeva nurvala and, for its extraction, hexane is generally used. Likewise, for plants like Bacopa monnieri and Centella asiatica, the active constituents are glycosides and hence a polar solvent like aqueous methanol may be used.

b) If the constituents are thermolabile, extraction methods like cold maceration, percolation and CCE are preferred. For thermostable constituents, Soxhlet extraction (if nonaqueous solvents are used) and decoction (if water is the menstruum) are useful.

c) Suitable precautions should be taken when dealing with constituents that degrade while being kept in organic solvents, e.g. flavonoids and phenyl propanoids.

d) In case of hot extraction, higher than required temperature should be avoided. Some glycosides are likely to break upon continuous exposure to higher temperature.

e) Standardization of time of extraction is important, as:

i. Insufficient time means incomplete extraction.

ii. If the extraction time is longer, unwanted constituents may also be extracted. For example, if tea is boiled for too long, tannins are extracted which impart astringency to the final preparation.

f) The number of extractions required for complete extraction is as important as the duration of each extraction.

vii. The quality of water or menstruum used should be specified and controlled.

viii. Concentration and drying procedures should ensure the safety and stability of the active constituents. Drying under reduced pressure (e.g. using a Rotavapor) is widely used. Lyophilization, although expensive, is increasingly employed.

ix. The design and material of fabrication of the extractor are also to be taken into consideration.

x. Analytical parameters of the final extract, such as TLC and HPLC fingerprints, should be documented to monitor the quality of different batches of the extracts.[113]

MATERIAL

Table. No. 4.1 Equipment List

S. No.	Equipment	Model	Manufacturer
1	Weighing balance	AW 120	Shimadzu Corporation, Japan.
2	Weighing balance	Analytical balance	Sartorius GK Germany
3	Ultra Sonicator	Power Sonic 405	Huwashin Technology, Korea.
4	UV Spectrophotometer	Systronics 2202	Shimadzu Analytical India Pvt. Ltd.
5	Magnetic Stirrer with Hot Plate	LAB.MAG.101555094	Suresh Electricals and scientific works
6	Ostwald Viscometer	RG-93301	Borosilicate Glass wares
7	Specific Gravity Bottles	QLBG 074	Borosilicate Glass wares
8	Refrigerator	RD EDGE 215B TAF TH ST	Godrej and Boyce mfg.co.ltd
9	pH meter	pH Tutor	Eutech Instruments, India
10	FTIR	IRTracer-100	Shimadzu, Japan.
11	Hot Air Oven	DIGITAL MODEL	LABTECHPLUS
12	Muffle Furnace	Digital P.I.D. controller	LABTECHPLUS

All chemicals/reagents used in this study were purchased from SD Fine-Chem Ltd., Mumbai, India. All reagents and solvents used were of analytical grade. Water used in all analyses was ultra-pure distilled water.

METHOD

4.3 PREPARATION OF WALNUT KERNEL SEPTUM MEMBRANES:

Maceration is one of the oldest and simplest extraction methods in which coarse and powdered plant material is soaked in solvents such as methanol, ethanol, ethyl acetate, acetone, hexane etc. It is one of the general and budget techniques used for the extraction of dissimilar bioactive compounds from plant material. Though, maceration procedure has certain limitations such as low extraction yield, lower efficiency and use of big amount of solvents which have some health risks. Furthermore, the selection of suitable solvent is significant along the methodology for the extraction of specific plant extract. Maceration process contains of grinding of plant material into smaller particles to increase the surface area for easy mixing with solvent and efficient extraction of compounds. Before this mixture of plant material and solvent is kept for lengthier time, agitated at different intervals and filtered through a filtration medium. The effectiveness for the removal of bioactive compounds from the plant material depends on the kind of solvent and type of plant material. Maceration can be done with or without heat or agitation to enhance mass transfer. The material is left in the solvent for an extended period of time.

Fig. No. 4.1 Walnut kernel septum membranes

Fig. No. 4.2 Walnut kernel septum membranes powdered

The Walnut fruit was purchased from traditional medicine shopkeeper in local market of Hyderabad, Telangana, INDIA and confirmed by an expert botanist. crushing walnuts in the laboratory using a wooden hammer, by braking of walnut fruit separating the Walnut kernel septum membranes. carefully removing the walnut septa. Each walnut septum sample was a bulk sample that consisted of walnut septa originating from the same tree. The walnut membrane septum was dried by natural method approximately 21 days, in a dark place, in order to remove the moisture initially present. The walnut septum membrane was divided into two parts. In one method the directly walnut septum membrane soak into ethanol and distilled water directly.

Figure No. 4.3 walnut septum membrane soak into ethanol and distilled (F1-F5)

Figure No. 4.4 walnut septum membrane soak into ethanol and distilled (F6-F10)

Another part of Walnut kernel septum membranes was powdered by electric grinder and then The powdered material was soak into ethanol and distilled water. The solvents used were Ethanol and distilled water with different ration, at room temperature with occasionally shaking for 21 days. The solution was holding on in an exceedingly airtight dry, clean and away from light. Afterwards, the mixture was filtered using whatman filter paper and collected the concentrated extract for further evaluation. Obtained extract was stored in a refrigerator for further tests.

4.4 Preparation of Walnut Kernel Septum Membranes solution:

Table. No. 4.2 Kernel Septum Membranes solution with different concentration.

Method	Ratio Alcohol : Water	Alcohol	Water	Formulation No.
walnut septum membrane	100:0	250ml	0	F1
	0:100	0	250ml	F2
	75:25	187.5ml	62.5ml	F3
	50:50	125ml	125ml	F4
	25:75	62.5ml	187.5ml	F5
walnut septum membrane in powder form	100:0	250ml	0	F6
	0:100	0	250ml	F_7
	75:25	187.5ml	62.5ml	F8
	50:50	125ml	125ml	F9
	25:75	62.5ml	187.5ml	F10

All chemicals/reagents used in this study were purchased from SD Fine-Chem Ltd., Mumbai, India. All reagents and solvents used were of analytical grade. Water used in all analyses was ultra-pure distilled water.

4.5 EVALUATION PARAMETER

a. **Determination of Moisture content:** Moisture content is determined via a thermos gravimetric method i.e. by loss on drying. In which, the sample is heated & the weight loss due to evaporation of moisture is recorded.

Requirements:

Apparatus: Porcelain dish, spatula, tongs, digital weighing machine, hot air oven, desiccator.

Chemicals: Walnut kernel septum membranes powder **(0.5gm)**

Procedure:

1. Weigh the empty porcelain dish and note the reading. W1
2. Take the sample of Walnut kernel septum membranes in porcelain dish.
3. Weigh the porcelain dish with sample in it and note the reading. W2
4. Keep the porcelain dish in pre-heated hot air oven for 15 minutes at 100°C-105'C.
5. After heating, keep the porcelain dish in desiccator for 15 minutes.
6. Take out the dish from desiccator, and weigh the porcelain dish with dried sample. W3
7. Repeat the drying in the oven using above steps till a constant weight not obtained.
8. After determining the constant weight, note the reading and calculate the percent moisture content.

Water/Moisture content $W = [(W_2 - W_3)/(W_3 - W_1)]\ 100$

b. Determination of total ash

Principle: Principle involved is that when a known weight of feed is ignited to ash, the weight of ash thus obtained is expressed in terms of percentage.

Apparatus:

- Silica crucible
- Tongs
- Weighing balance
- Electrical bunsen burner
- Muffle furnace
- Desiccator
- Asbestos sheet

Procedure:

1. Find out the weight of a clean dry crucible.
2. Place about 2 g of Walnut kernel septum membranes powder sample and weigh this to find out accurate weight of the sample taken.
3. Carefully place the weighed crucible over electric burner. The crucible should be partially opened.
4. The sample will get charred with initial expulsion of smoke.
5. Place the crucible in a muffle furnace and heat to 600ºC. Keep it for 2 hours. At this temperature all organic matter will be burnt leaving behind minerals.
6. Remove the crucible from the furnace carefully and cool it in a desiccator to room temperature and weight again.

c. Determination of the boiling point of the solution

Materials Required: fusion tube, stand with clamp, capillary tube, tripod, thermometer, and kerosene burner

1. Take a capillary tube and close its one end by holding the end in the flame and rotate it for 2-3 minutes.
2. Transfer a few mL of Walnut kernel septum membranes solution to the fusion tube.
3. Dip the capillary tube into the liquid in the fusion tube keeping the sealed end up.

4. Insert the tube in one of the holes of aluminum block and insert the thermometer in the other hole.
5. Make sure that the liquid is visible in the fusion tube after it is put in the hole.
6. Place the Aluminum block on the tripod.
7. Start heating the block with the help of a kerosene burner.
8. Note down the temperature soon as the regular streams of bubbles are seen out of liquid in the fusion tube.

d. Determination of Specific gravity of the solution

1. Clean thoroughly the specific gravity bottle with chromic or nitric acid.
2. Rinse the bottle at least two to three times with purified water.
3. If required, rinse the bottle with an organic solvent like acetone and dry.
4. Take weight of empty dry bottle with capillary tube stopper (W1).
5. Fill the bottle with distilled water and place stopper; wipe out excess liquid from side tube using tissue paper (W2).
6. Weight bottle with stopper and water on analytical balance (W3).
7. Repeat the procedure for liquid under test by replacing the water after emptying and drying as mentioned in step 4 to 6.
8. Weight bottle with stopper and liquid under test on analytical balance (W4).

Formula for specific gravity: Specific gravity of liquid under test (solution) = weight of liquid under test /weight of water = w5/w4.

e. Determination of density of the solution

1. Clean thoroughly the specific gravity bottle with chromic acid or nitric acid.
2. Rinse the bottle at least two to three times with distilled water.
3. If required, rinse the bottle with an organic solvent like acetone and dry.
4. Take the weight of empty dry bottle with capillary tube stopper (W1).

5. Fill the bottle with Walnut kernel septum membranes solution and place the stopper, wipe out excess liquid from outside the tube using tissue paper.
6. Weight bottle with Walnut kernel septum membranes solution on analytical balance (W2).
7. Calculate weight in grams of Walnut kernel septum membranes solution liquid (W3).

Formula for density: Density of liquid under test (solution) = weight of liquid under test /volume of liquid under test = w3/v

f. Determination of Viscosity of the solution

1. Thoroughly clean the Ostwald viscometer with warm chromic acid and if necessary used an organic solvent such as acetone.
2. Mount viscometer in vertical position on a suitable stand.
3. Fill water in dry viscometer up to mark G.
4. Count time required, in second for water to flow from mark A to mark B.
5. Repeat step 3 at least 3 times to obtained accurate reading.
6. Rinse viscometer with Walnut kernel septum membranes solution and then fill it up to mark A, find out the time required for liquid to flow to mark B.
7. Determination of densities of liquid as mentioned in density determination experiment.

Formula for viscosity

$$\text{Density of test liquid} = \frac{\text{Time required to flow test liquid Viscosity}}{\text{Density of water} \times \text{Time required to flow water}} \times \text{Viscosity of water}$$

pH determination: The pH determination of Walnut kernel septum membranes solution by using two techniques.

a) Glass electrode.

b) pH paper.

Procedure for glass electrode

1. Prepare 30ml buffer of each pH. The volume of the stock solution to be taken. Prepare the buffer by mixing appropriate volume.
2. Allow the solution for 15minutes to establish equilibrium.
3. Measure the pH of Walnut kernel septum membranes solution using a pH meter.

g. Determination of Organoleptic Characters

Organoleptic evaluation resources the study of drugs using organs of senses. It refers to the approaches of analysis like colour, odour, taste, size, shape and special features, such as touch, texture, etc. Clearly, the initial sight of the plant or extract is so specific that it inclines to classify itself. If this is not enough, maybe the plant or extract has a distinguishing odour or taste. The education of form of a crude drug is morphology while explanation of the form is morphography. yet the greatest human form of examination.

h. High performance thin-layer chromatography (HPTLC) in the quality control of herbal products

The introduction of high performance thin-layer chromatography (HPTLC) for quality control of herbal products, using standardized methodology and system suitability tests for the qualification of the plates, has improved reproducibility.

Figure No. 4.5 HPTLC

The use of intensity markers implemented by the Ph. Eur. improved the description and interpretation of the chromatograms. Quantitative information can be retrieved from the electronic images of the chromatograms and used for comprehensive HPTLC fingerprinting: a single HPTLC analysis gives information on identity, purity and content of an herbal drug/preparation/product, simplifying the quality control.

i. HPLC method

a. Chemicals and Reagents

Methanol (MeOH) and acetonitrile (ACN), HPLC grade, were acquired from Merck. Acetic acid 99% and trifluoroacetic acid (TFA) 99% were obtained from Merck. The LiChrolut RP-18 (C18, 3 mL, 500 mg) SPE containers used were supplied by Merck (Darmstadt, Germany). Ultrapure water was provided by a Milli-Q decontamination system (Millipore, Bedford, MA, USA). The flavonoids catechin 98%, rutin 98%,

myricetin 98%, luteolin 98%, quercetin 98%, kaempferol 98%, and apigenin 98% were supplied by Sigma-Aldrich (Steinheim, Germany). Stock standard solutions at 1000 mg/L concentration level were prepared and stored in dark brown glass bottles at -20 °C. Working standard solutions were ready in MeOH after suitable dilution of the stock solutions each laboratory day, before analysis.

b. Instrumentation

A quaternary low-pressure incline HPLC–DAD system by Shimadzu (Kyoto, Japan) was used for examination. The HPLC system consisted of: (a) an FCV-10ALVP mixing system, (b) a Rheodyne 7725i injection valve, and a 20 µL loop for sample injection, (c) an LC- 10ADVP pump equipped with a Shimadzu SCL-10ALVP System Controller, (d) an SPD-M10AVP photodiode array detector. Real time examination monitoring and post run dispensation were carried out using the software Lab Solutions-LC solutions, supplied by Shimadzu. A glass space filtration apparatus, acquired by All tech Associates, and nylon 0.2 µm membrane Filters were utilized for the filtration of the mobile phase, and a DGU-10B de-gassing unit with helium was used for degassing. A vortexer purchased from FALC Instruments was used for sample agitation. Centrifugation was carried out using a HermLe centrifuge, model Z-230. An ultrasonic bath (MRC: DC-150H) by MRC was used for specimen preparation. For disappearance, after SPE extraction, a ReactiVap 9-port evaporator model 18,780 by Pierce was utilized. For sample filtration, prior to the injection in the chromatographic system, Q-Max RR syringe filters (0.45 µm nylon membrane) were purchased from Frisenette ApS.

c. Chromatographic Separation and Analysis

The chromatographic parting of the flavonoids was attained on a C18 Universe column (250 mm 4.6 mm, 5 µm), supplied by Fortis Technologies Ltd. on, A reverse-phase HPLC test was carried out using a gradient scheme with 1 mL/min flow rate, thermos stated at 30 ◦C. The mobile phase consisted of (A) 1% acetic acid in water, and (B) ACN. The gradient elution program begun with 80:20, v/v (A: B), gradually increasing to 50:50, v/v (A: B), in the following 25 min, and then outstanding constant for the next 5 min. The initial circumstances were restored for 10 min, prior to the next injection. The injection volume was 20 µL of solution and the total run

time was less than 25 min for each injection. For peak identification, the Rts of the peaks of the real samples were compared with the Rts of the standard mixtures, along with the spectral information providing by the DAD sensor that operated over the variety 280–400 nm. Peak nursing and quantitation were achieved at the maximum wavelength of each analyte.

d. Sample Collection

walnut septa models were created after crushing walnuts in the workroom using a wooden hammer, and carefully removing the walnut septa. Each walnut septum taster was a bulk sample that contained of ten walnut septa originating from the same tree. In this way, bulk walnut septum samples were created in the laboratory. All the walnut samples were collected during the harvesting period of November 2022.

e. Sample Preparation

The samples were homogenous in a porcelain mortar and stored at 20 °C until analysis. For model preparation, 50 mg of each standardized bulk sample was weighted in 2-mL Eppendorf tubes, and then, 0.5 mL of 0.05% TFA in methanol: water at 60:40 ratios (*v/v*), was added. The combination was vortexed for 1 min and, then ultra-sound assisted extraction acquired place in an ultrasonic bath for 10 min at 25 °C. Each sample was centrifuged for 10 min at 10,000 rpm and, then, the supernatant was collected, according to Kalogiouri et al. The extract was further diluted with water at a final volume of 2 mL. The diluent was purified using a adapted version of the SPE protocol planned by Bajkacz et al. The LiChrolut RP-18 (C18, 3 mL, 500 mg) SPE cartridges were used for this purpose. First, the C18 column was conditioned with 2 mL MeOH, followed by 2 mL of water. Then, the diluted sample extract was passed through the sorbent at a flow rate of roughly 1 mL/min. The analytes were eluted with 3 mL MeOH and the eluates were vanished to dryness with nitrogen. The residues were melted in 1 mL MeOH, and filtered through 0.22 µm nylon syringe filters. Finally, 20 µL was injected into the chromatographic system.

f. Method validation and Quantification

Linearity, choosiness, LODs and LOQs, within-day, and between-day precision and meticulousness were evaluated. Linearity was inspected by testing the lack-of-fit of the calibration curves finished the range 1–10 μg/g. The slopes, intercepts, and the resolve coefficients of each analyte were calculated using last square linear retreat analysis. LODs and LOQs were designed by the equations:

$$\text{LOD} = 3.3 \times Sa/b$$

$$\text{LOQ} = 10 \times Sa/b$$

where, *Sa* is the standard error of the intercept α; and b is the slope of the calibration curve. Precision was evaluated after spiking a wholesale sample at 1, 5, and 10 mg/kg concentration level, and examination was performed in triplicate. Accuracy was articulated as relative recovery, and precision was uttered as relative standard deviation (RSD%). Repeatability, expressed as within-day precision, was assessed in six replicates (n = 6), and reproducibility, articulated as between-days precision, was assessed after examining the spiked bulk samples within three consecutive days (n = 3 3). The analytes were measured using the consistent calibration curves of the standards. For the quantification of the analytes with high meditations that exceeded beyond the linear choice, such as catechin, the extracts were extra diluted with MeOH and re-injected in the chromatographic system to ensure that their calculated attentiveness was within the lined range of the curves

g. Chemometric Analysis

The quantification results were managed with one-way analysis of variance (ANOVA), using the data analysis tool of Microsoft Excel (Microsoft, Redmond, WA, USA). ANOVA was applied to inspect potential statistically significant modifications among the flavonoids' concentrations as well as the many walnut septa variants. The results were assessed using a p-value at a 95% confidence level. When the p-value was less than 0.05., there was a statistically important change between the samples; if the p-value was more than 0.05., there was no statistically significant difference. PCA (Primary Component Analysis) was utilized to investigate the

interactions between the identified flavonoids and the replicas from the different types. Utilizing the Metabo Analyst R package, PCA was generated in R.

h. Procedure for FT-IR studies

The goal of this study was to use FT-IR spectroscopy to ascertain the content and qualitative and quantitative properties of bioactive combinations in native herbal teas that are typically drank.

The FTIR spectra of the samples were verified FTIR instrument (Shimadzu, 8400S). A small quantity of sample was made into pellets using KBr for FTIR analysis. The data of infrared transmission was composed over a wave number ranged from 4000 cm-1to 500 cm 1. The spectra were associated with reference to recognize the characteristic functional groups present. FTIR spectra used for metabolite summarizing of the herbal samples.

i. To study in vitro drug release profile of prepared solution

Osmosis is the phenomena in which solvent particles permit through a semi-permeable membrane (parchment paper) from an area of developed concentration to an area of lesser concentration. The procedure continues until the quantity of liquid is balanced or equalized in both areas, the region of higher concentration and the region of lower concentration of the semipermeable membrane (parchment paper). In other words, osmosis is the diffusion or movement of solution from an area of higher solution potential to a region of lesser water potential.

Fig. No. 4.6 Assembly of drug release appratus

The walnut kernel septum membrane solution was examined in vitro utilizing the osmosis method and a magnetic stirrer instrument with a bead used as the stirrer. The dissolution medium employed was 250 cc of pH 7.4 phosphate buffer, spun at 50 rpm. The experiment was conducted at a constant temperature of 37 ± 0.5°C. For each test, a solution of walnut kernel septum membranes was employed. At predetermined intervals, a syringe equipped with a pre-filter was used to remove 1 milliliter of the dissolving media sample. The sample was then diluted appropriately with phosphate buffer and the absorbance at 360 nm was measured to determine the drug release. A new volume of dissolving liquid was added to the volume removed at each time interval. The amount of Walnut kernel septum membranes solution released was calculated and plotted against time.

Stability Testing:

Consistency The produced walnut kernel septum membrane solution was tested while the sample was reserved at a higher temperature. Ten sections of the final walnut kernel septum membrane solutions, A, B, and C, were held at room temperature and 40 degrees, respectively, at an accelerated temperature. At one-, two-, and three-month intervals, the solution was examined for all physicochemical limitations, homogeneity, and turbidity to appearance for any changes.[112]

CHAPTER – V

RESULT AND DISCUSSION

RESULT AND DISCUSSION

5.1 Moisture content

Five grams of walnut kernel septum membranes was weighed into a dish. For two hours, the plate was dried at 102 C. Until a steady weight was achieved, this drying process was repeated. The mass loss compensated for a walnut kernel septal membrane yielded a moisture content of 15.9%. The moisture level of the walnut kernels was low. Since low moisture satisfied lowers the likelihood of microbial growth and numerous unwanted biochemical variations typically related with these processes, it is essential for maintaining the quality and shelf life of kernels.

Table No.5.1 Result of evaluation parameters of F1 to F5

Sr. No.	Parameter	F1	F2	F3	F4	F5
1	Boiling Point	87	82	90	78	72
2	Density	0.9216	0.9217	0.9215	0.9217	0.92218
3	Specific gravity	0.919	0.927	0.920	0.929	0.923
4	Viscosity	72.8	73.7	75.4	73.5	73.6
5	pH Determination					
	pH meter	6.2	6.8	7.0	6.1	6.8
6	Organoleptic Characters					
	1) Color	Yellowish brown	Yellowish brown	Yellowish brown	Yellowish brown	Yellowish brown
	2) Odor	Aromatic	Aromatic	Aromatic	Aromatic	Aromatic
	3) Taste	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant
	4) Appearance	Good	Good	Good	Good	Good

Table No. 5.2 Result of evaluation parameters of F6 to F10

Sr. No.	Parameter	F6	F7	F8	F9	F10
1	Density	0.9215	0.9217	0.92218	0.9216	0.9217
2	Specific gravity	0.928	0.919	0.924	0.921	0.925
3	Viscosity	75.4	73.5	73.6	72.8	73.7
4	pH Determination					
	b) pH meter	7.0	6.1	6.8	6.8	6.2
5	Organoleptic Characters					
	1) Color	Yellowish brown	Yellowish brown	Yellowish brown	Yellowish brown	Yellowish brown
	2) Odor	Aromatic	Aromatic	Aromatic	Aromatic	Aromatic
	3) Taste	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant
	4) Appearance	Good	Good	Good	Good	Good

5.2 DETERMINATION OF λ MAX OF DRUG:

Determination of λmax of walnut septum membrane solution was done in Phosphate Buffer pH 7.4 solutions. Spectrums obtained for individually showed constant peak i.e. wavelength of maximum at 360 nm.

5.3 CONSTRUCTION OF CALIBRATION CURVE:

The absorption spectrum of UV showed λmax to 360 nm. The standard curves of walnut septum membrane solution in pH 7.4 Phosphate Buffer gotten are shown in Figure. The graph of absorbance v/s concentration for walnut septum membrane solution was create to be linear in the concentration range of 0, 5, 10,15, 20, 25, 30,

35 and 40 µg/ml at 360 nm. The walnut septum membrane solution obeys Beer - Lambert's law in the range of 0 – 40 µg/ml.

Table. No. 5.3: Standard Graph of walnut septum membrane solution

Sl. no.	µg/ml Concentration of Drug.	360 nm Absorbance
1.	0.	0.
2.	5.	0.109.
3.	10.	0.221.
4.	15.	0.338.
5.	20.	0.448.
6.	25.	0.562.
7.	30.	0.672.
8.	35.	0.791.
9.	40.	0.901.

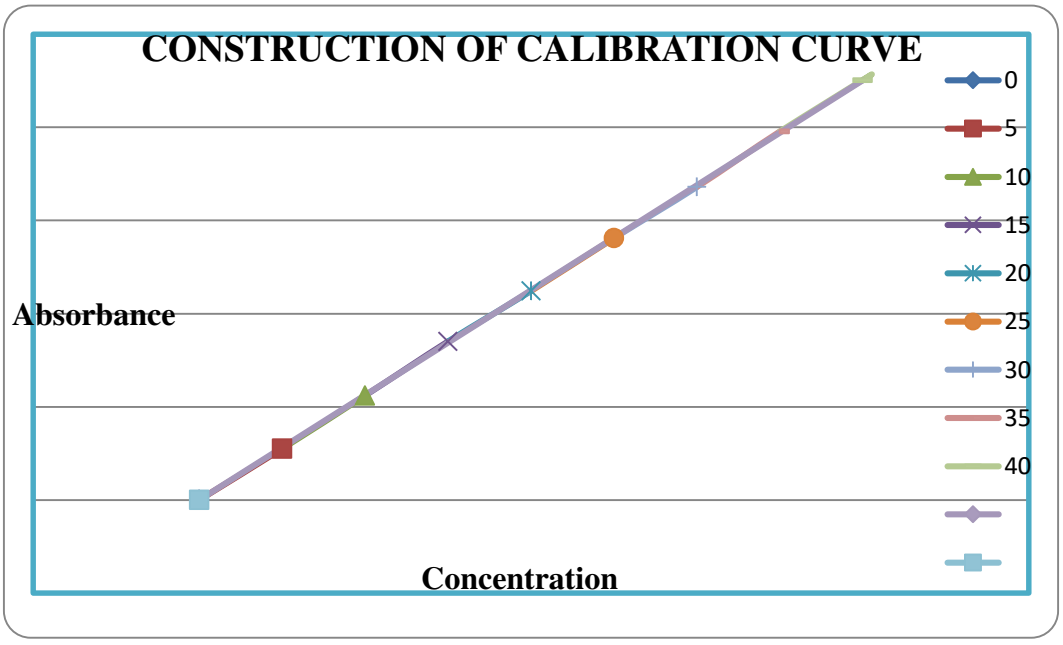


Fig. No. 5.1 : Standard Calibration Curve for walnut septum membrane solution

Table No. 5.4: Different formulation in Phosphate Buffer pH 7.4 (In- vitro Drug Release Profile)

Time (Min) .	Percent release of walnut septum membrane solution									
	F1.	F2.	F3.	F4.	F5.	F6.	F7.	F8.	F9.	F10.
0.	0.	0	0.	0	0	0	0.	0.	0.	0.
5	23.9	02.23	21.22	09.11	05.22	14.05	05.91	05.72	04.20	3.00
10	33.51	3.00	32.32	11.31	08.32	20.14	09.21	10.20	09.34	03.10
15	44.23	05.03	40.91	17.12	12.91	31.72	12.34	16.50	12.45	05.03
20	55.47	08.76	53.21	27.41	18.21	45.13	17.50	32.50	16.75	07.76
25	69.21	11.07	62.25	34.54	21.22	52.59	24.20	41.60	32.50	12.07
30	77.69	16.72	74.61	49.14	32.32	64.17	28.70	52.80	41.60	17.72
35	86.61	25.65	85.29	56.27	40.91	74.77	34.50	60.75	52.80	24.65
40	97.41	36.04	92.11	67.11	53.21	81.15	47.25	72.80	60.75	37.04

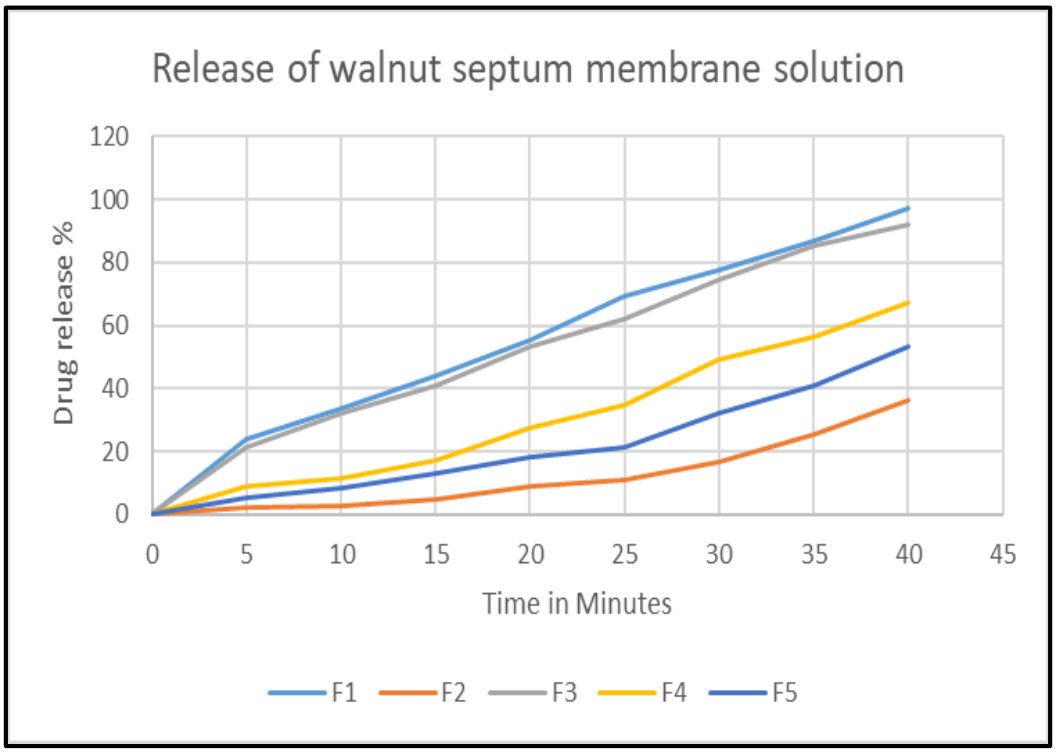


Figure No. 5.2 Percent release of walnut septum membrane solution F1 to F5

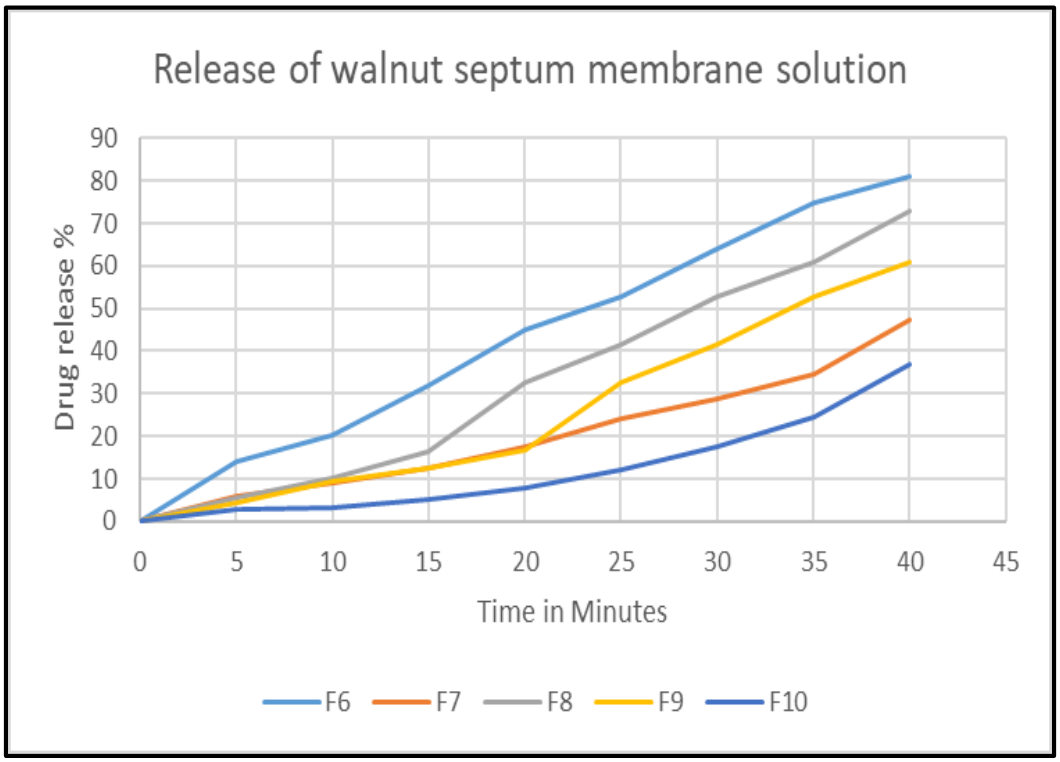


Figure No. 5.2 Percent release of walnut septum membrane solution F6 to F10

5.4 In-Vitro Drug release:

The table displays the drug release information for each walnut septum membrane solution. For forty minutes, the medication was released via the walnut septum membrane solution (formulations F1 through F10). At the end of 40 minutes, there was a noticeable difference in the drug release for all formulations F1 through F10. After 40 minutes, formulation F1 had the maximum release rate (97.41%) while formulation F10 had the lowest release rate (36.04%). When compared to other walnut septum membrane solutions, the three formulations (F4, F5, and F6) provide superior release out of the ten walnut septum membrane solutions (F1 to F10). According to research on drug content and osmosis, the F1 formulation walnut septum membrane solution release exhibits the optimum drug content and performance.

1) HPTLC analysis

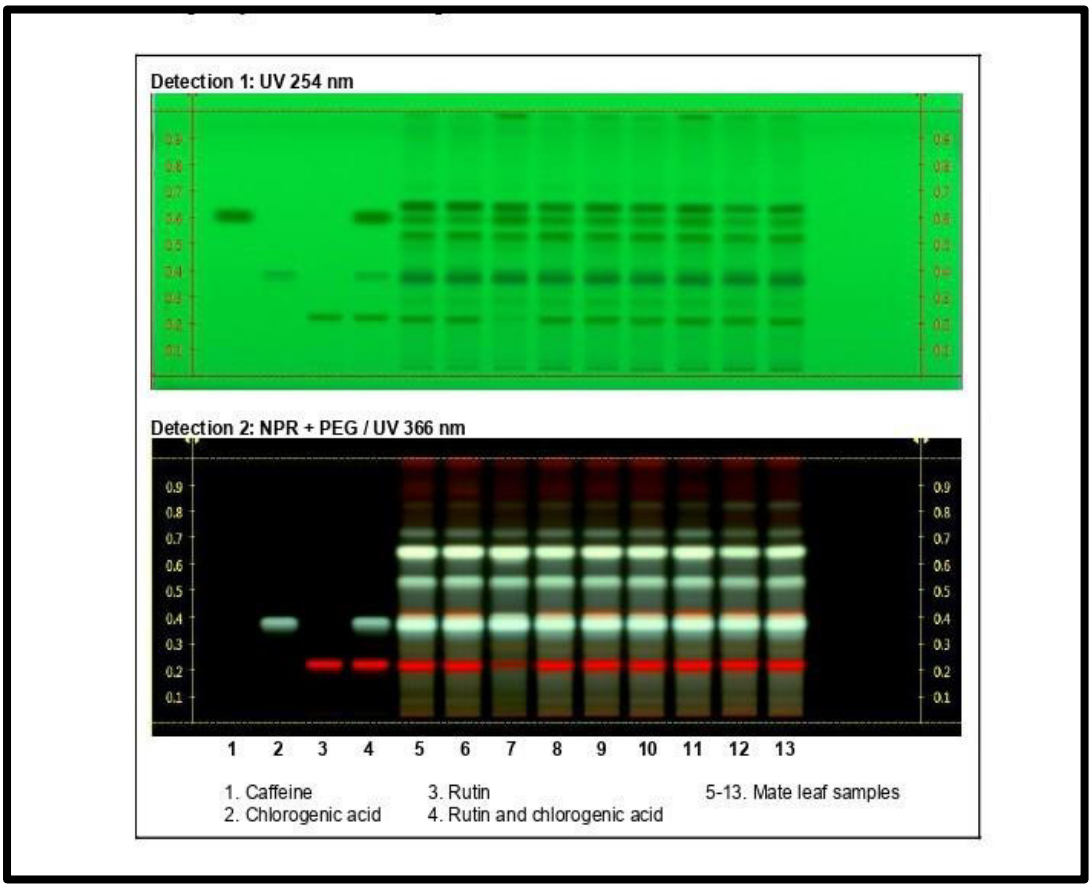


Fig. No. 5.3. Chromatography spots with HPTLC

The walnut kernel septum membranes solution, At 1740C, it had a sharp melting nature. The compound's mass spectrum revealed a molecular ion peak at m/z 173 [m-1] +, indicating that C10H6O3 is the molecular formula. Absorption bands were seen at 3444 cm-1 (-O-H stretching), 1717, 1653 cm-1 (α-β unsaturated ketone), 1644 cm-1 (double bond), and 1575, 1487 cm-1 (aromatic stretching) in the infrared radiation spectrum. At 423 nm, the UVVIS spectrum has λ max assigned. NMR spectra of the 1H and 13C were likened to those of the real material.

Method Development and Validation

Method Development and Validation The flavonoid profile of walnut septum was measured using an HPLC-pater association that was created and validated. All logical parameters, such as estimation angles, direct range, determined portions (r2), delicacy and perfection, limits of discovery (LODs), and restrictions of quantification (LOQs), are shown in Table. When subjected to the lack-of-fit examination, the logical angles showed a good fit (F computed was lower than F tabulated in every case), with r2 exceeding 0.99, indicating their suitability for flavonoid measurement. The LODs were planned across the range of 0.10 µg/g to 0.30 µg/g, whereas the LOQs were set up to range between 0.30 µg/g and 0.90 µg/g. Acceptable elicacy was demonstrated by the RSD of the between-day (n = x 3) and within-day (n = 6) assays, which were independently less than 6.2 and 8.5. The consequences were respectable, ranging from 90.8 (apigenin, at 10 µg/ g attention position) to 97.5 (catechin, at 10 µg/ g attention position) for within-day assay (n = 6), and from 88.5 (myricetin, at 1 µg/ g contemplation position) to 96.2 (catechin, at 5 µg/ g contemplation position) for between-day assay (n = 3 × 3). The delicacy was measured using relative proportion of recovery (R) at low, medium, and maximum attention ituations of 1, 5, and 10 µg/g.

Ftab: Ftabulated., Fcalc.: Fcalculated., LOD: limit of detection., LOQ: limit of quantitation.

Table No. 5.5 HPLC-DAD method analytical parameters.

Compound.	Calibration Equation y = (a±Sa) . + (b±Sb)x. (Linear Range: 1–10 µg/g)	r^2	F_{calc}	F_{tab}	LOD µg/g	LOQ µg/g
Apigenin.	Y. = (1732± 152) + (1745± 665)x	0.994	4.6×10^{-7}	0.2334	0.29	0.87
Catechin.	Y. = (1095 ±1115) + (11808 ± 305)x	0.997	7.9×10^{-9}	0.2334	0.31	0.94
Kaempferol.	Y. = (1710 ± 54.3) + (19045 ± 685)x	0.996	1.7×10^{-9}	0.2334	0.29	0.90
Luteolin.	Y. = (1017 ± 1608) + (17008 ± 440)x	0.995	2.9×10^{-9}	0.2334	0.20	0.60
Myricetin.	Y. = (989 ± 1450) + (20005 ± 424)x	0.993	5.6×10^{-9}	0.2334	0.24	0.72
Quercetin.	Y. = (−1032 ± 1128) + (18404 ± 153)x	0.993	6.5×10^{-9}	0.2334	0.20	0.60
Rutin.	Y. = (389 ± 1200) + (19857± 204)x	0.995	1.9×10^{-9}	0.2334	0.20	0.60

Table No. 5.6 %Recoveries (%R, *n* = 6) for the evaluation of repeatability.

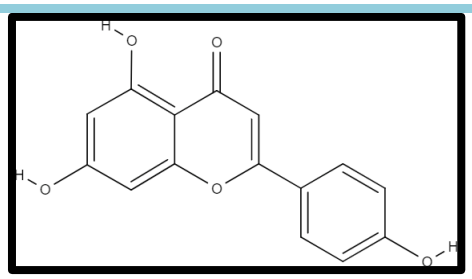
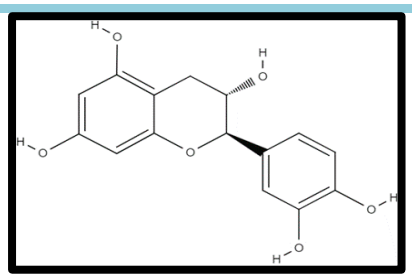
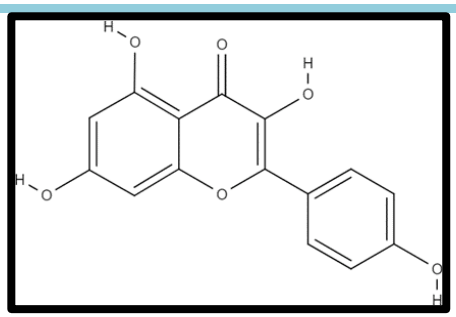
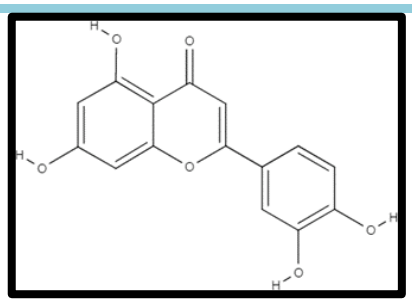
Compound	%R Medium. Conc. Level. (5. µg/g)	%RSD.
Apigenin	91.7	6.1
Catechin	96.4	6.2
Kaempferol	93.5	3.2
Luteolin	95.6	4.6
Myricetin	94.4	5.2
Quercetin	98.8	4.2
Rutin	92.5	4.5

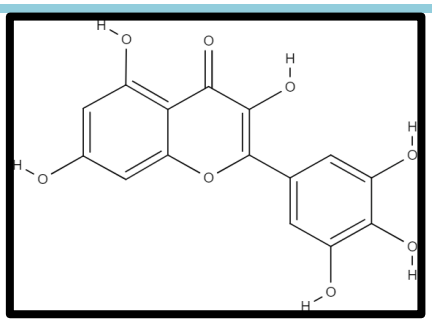
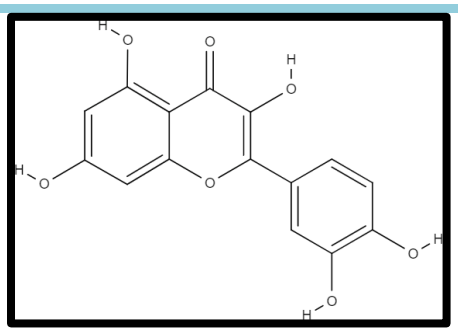
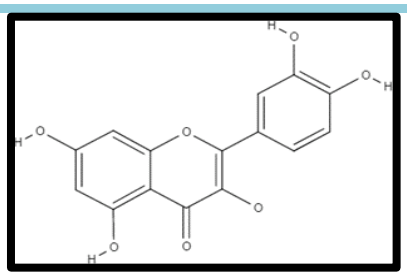
Conc.: Concentration.

Analysis of walnut Septum

walnut septum membranes solution was examined three times, and the flavonoids that were found were rutin., myricetin., luteolin., quercetin., apigenin., and kaempferol. Table displays the findings of the chromatographic documentation, counting the maximum absorption wavelengths (λ, nm) and retention durations (Rts) of the analytes. The flavonoid chromatographic separation in a walnut septum extract that was experienced at 280 nm is shown in Figure.

Table No. 5.7 Maximum absorption wavelength of the determined flavonoids

Compound	Chemical Structure	Rt	λ (nm)
Apigenin		24.5	360
Catechin		5.8	278
Kaempferol		26.1	360
Luteolin		21.1	356

Myricetin		16.5	370
Quercetin		22.7	378
Rutin		10.1	353

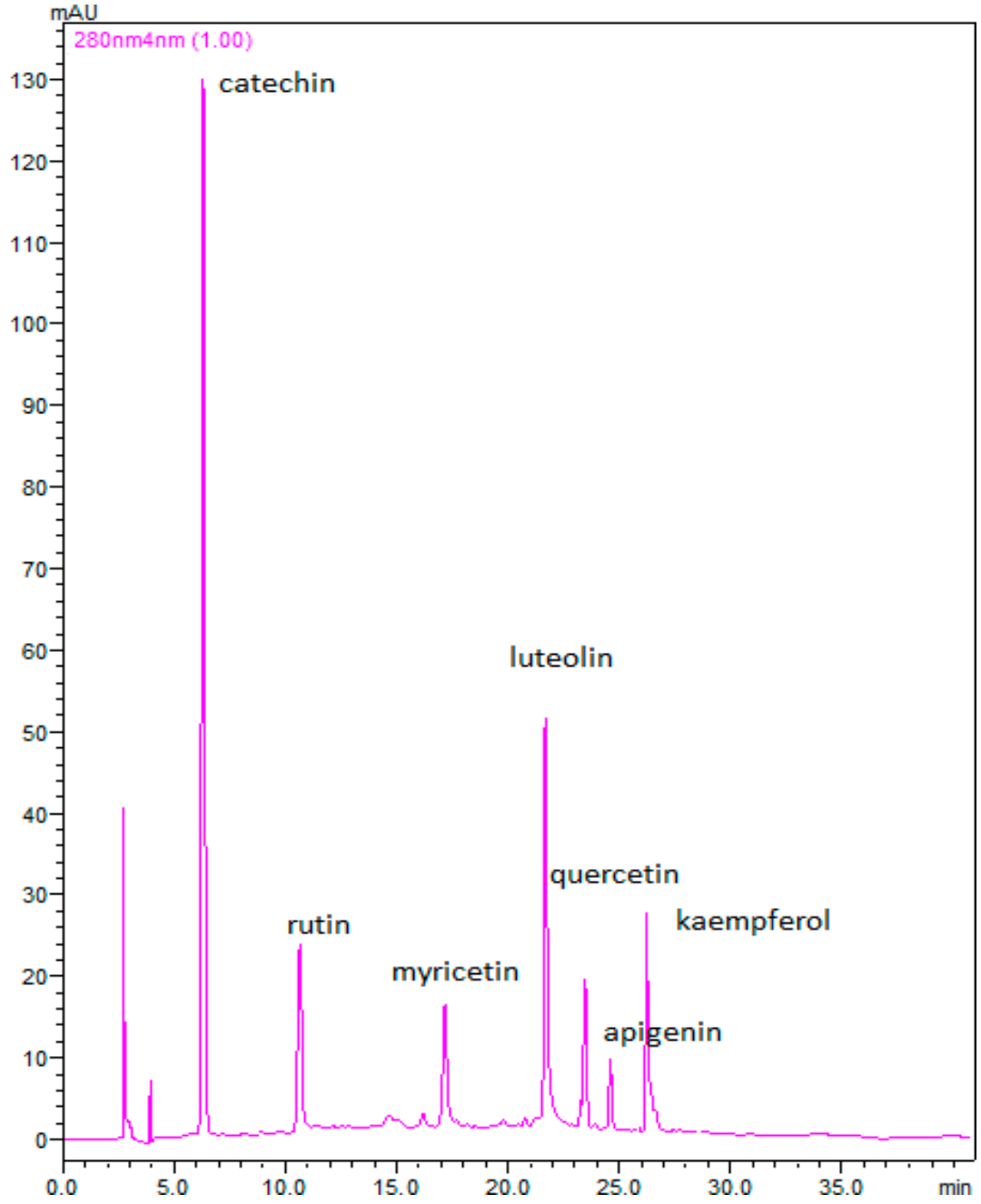


Figure No. 5.4 A walnut septum extract's characteristic chromatogram, measured at 280 nm.

1. Apigenin

The mean attention of walnut septa was found to contain 6 µg/g of apigenin. According to the ANOVA analysis, there was no statistically significant difference ($p = 0.147$) between the apigenin attention in the various forms of septa that were analyzed. In the past, apigenin-rich extracts, oils, and teas were utilized for their sedative properties as a mild painkiller, anesthetic, and sleep aid, supporting the

notion that walnut septa might be utilized as an infusion wood. Moreover, apigenin plays a role in food sedulity as a seasoning or adjuvant ingredient, strengthening the body's reaction to antigens. It may produce anti-metastatic and anti-proliferative products, reducing conformation and transforming undesirable excrescence cells. Likewise, it functions as an antioxidant, anti-inflammatory, and may even help prevent skin or colon cancer, it could help skin or colon cancer and acts as an anti-inflammatory., antioxidant., anti-allergic., antimicrobial., antiviral., cardio defensive, and neuroprotective agent.

2. Catechin

The flavonoid found in advance in all walnut septa was called catechin, and its concentration was 32 µg/g. Altogether of the walnut septa of the various varieties showed a statistically significant variation in catechin attention, as indicated by the ANOVA analysis ($p = 0.04$). The walnut septum is rich in catechin, as indicated by the attention ranges. It can be used as a food accretive to boost the Anti-Oxidant potential of food products, enhance foods, or serve as a functional component of newly developed practical food products, such as teas, infusions, soft drinks, etc. Catechins have been linked to a number of health benefits because they have shown promise as preventative measures against diabetes., obesity., metabolic disorders., arterial hypertension., and ischemic stroke. Additionally, catechins show a strong natural defense against bone cancer, Alzheimer's disease, Parkinson's disease, and mouth cancer. Similarly, catechin has special properties that account for a number of pharmaceutical and natural products since it can prevent chain reactions brought on by ROS, which makes it a potential antioxidant. Additionally, it exhibits strong anti-diabetic properties through hepato-defensive, anti-neurodegenerative, insulin-epigonic, and amyloid conformation-hindering effects.

3. kaempferol

The highest recorded mean concentration of kaempferol was 6 µg/g. Regarding the attention of kaempferol among the septa of the various sorts, no statistically important difference was found ($p = 0.06$). Regarding its inherent properties, kaempferol is a naturally occurring beneficial flavonoid that may function as a chemopreventive agent, protecting in contradiction of oxidative stress and inflammatory chronic diseases.

4. Luteolin

The walnut septa's mean attention levels for luteolin were 3 µg/g. The luteolin attention measured in the septa of the various kinds showed statistically significant differences ($p = 0.039$). Regarding its inherent properties, luteolin is a obviously occurring flavonoid with a pusillanimous liquid look. Research has shown that it may exhibit several cellular benefits, perhaps having a positive impact on overall health. In addition to acting as an antitumor, Anti-Inflammatory, antibacterial, or Estrogenic nonsupervisory conflation and aiding hepatic problems, it may showcase antioxidant packets, shielding cells from ROS-induced damage.

5. Myricetin

The walnut septa's mean attention levels for myricetin were 8 µg/g. According to the ANOVA analysis, there is a statistically significant difference ($p = 0.002$) between the septa of the various varieties. Myricetin, which has been demonstrated to have antioxidant, anti-inflammatory, antiviral, and anti-carcinogen effects, has sparked a great deal of scientific interest. It functions as an antineoplastic agent in situations of death since it has shown to have potent suppressive effects on the activity of many cancer cell types (such as cancer cell invasion or metastasis), controlling apoptosis and acting as an inhibitory factor on the growth of these cells.

6. Quercetin

The level of quercetin in walnut septa was found to be 9 µg/g. According to the ANOVA study, there is a statistically significant difference between the examined sorts and quercetin attention ($p = 0.0008$). The works claims that quercetin gives food its bitter flavor. Lately, it has been utilized as a food supplement to protect meat products from the growth of bacteria when combined with myricetin and other phenolic mixtures. It has a number of noteworthy health promoting properties, such as Antioxidant, antidiabetic, Anti-ulcer, cardio-defensive, and chemo-preventative properties. By inhibiting the lipoxygenase and cyclooxygenase pathways, it may also result in the production of Anti-Inflammatory and Anti-Allergy products by lowering the amount of pro-inflammatory or pro-oxidant compounds.

7. Rutin

Three to six µg/g of rutin was found in walnut septa. For the attention of rutin, there was a statistically significant difference between the septa of the various sorts (p = 0.002). Rutin is a vital component of many physiological processes in the mortal body and has substantial natural benefits. It also offers promising antioxidant potential. The literature suggests that rutin has a wide range of therapeutic benefits, including anti-inflammatory, anti-protozoal, antiviral, anti-hypertensive, vasoactive, cyto-defensive, anti-allergic, antispasmodic, anti-carcinogenic, antibacterial, and antiplatelet effects. Similarly, because of its strong ability to scavenge radicals, rutin helps to strengthen the capillaries that make up the blood vessels, protecting people from hemorrhagic disorders linked to fragility.

Analysis of Flavonoids by Quantitative methods

Triplet (n = 3) walnut septa were anatomized. Based on their maximum immersion wavelengths, the related flavonoids (myricetin., luteolin., quercetin., apigenin., and kaempferol) were assessed. A number of beneficial health properties and other bioactive meanings that have previously been documented in the nonfiction were associated with the presence of bent flavonoids, highlighting the potential functional exertion of the anatomized derivative. displays the mean values (± SD) and quantification ranges for the flavonoids originate in the walnut septa. To display the distributional properties and visually represent the flavonoid concentration, box and whisker plots were created. The quantification outcomes were further anatomized with ANOVA to examine if there are statistically important differences between the attention of the strongminded flavonoids and the variations of the walnut septa. FT-IR studies

2) To study *in vitro* drug release profile of prepared solution

3) To ascertain release mechanics and kinetics of drug release.

4) Comparative study of marketed product if available solution with Allopathy, Ayurveda, Homeopathy etc.

5) To perform stability studies as per ICH guidelines.

Stability Testing:

Consistency The sample was reserved at an accelerated temperature for the purpose of testing the set walnut kernel septum membranes. Ten sections of the final walnut kernel septum membrane results, A, B, and C, were held at room temperature and 40 degrees Celsius, respectively, at an accelerated temperature. At one-, two-, and three-month intervals, the result was checked for all physicochemical characteristics, including turbidity and unity, and no changes were found.

CHAPTER – VI

CONCLUSION AND SUMMARY

Conclusion and summary

Maintaining the health of the thyroid gland, which is thought to be the butterfly-shaped gland in the lower neck of humans, is important for a variety of bodily functions. The primary role of the gland is the production of the hormones that regulate metabolism, triiodothyronine (T3) and thyroxine (T4). In addition to their other functions, thyroid hormones control blood calcium levels, body temperature, and brain development. Underactive and hyperactive thyroid glands are the source of unequal thyroid functioning. These can only be reached; they cannot be treated. Consuming walnuts is designed to help the thyroid gland.

Working with a professional dietician, it is necessary to add selenium to one's diet in order to restore iodine in some situations. Selenium would aid in restoring bodily processes that suffer from inadequate iodine. Due to their high selenium content, walnuts may support thyroid growth. Walnuts, sometimes regarded as the healthiest nut of all, are an excellent source of selenium, which gives the body the trace element it needs to maintain a balanced thyroid. It has been established over time that the thyroid gland has a higher level of selenium attention than any other organ in the body. Similar to iodine, selenium plays important roles in the digestion and confusion of thyroid hormones.

According to the department of nutritional supplements, hypothyroidism has been associated with low selenium conditions, which may have an ineffective effect on the condition when combined with low iodine conditions. Similarly, optimal levels of selenium may reduce the risks of goiter and thyroid enlargement in humans. When it comes to selenium, brazil nuts are the highest-quality sources of the mineral among all fruits and vegetables. Though they shouldn't be taken in excess, one Brazil nut per day or three Brazil nuts per week can help treat thyroid problems.

Walnuts are beneficial for treating thyroid disease in addition because they contain omega-3 fatty acids, which reduce inflammation. Walnuts were helpful in reducing the high incidence of inflammation in the thyroid fight that. Consuming walnuts in moderation can combat thyroid inflammation because healthy fats, particularly those found in nuts and factory-ground sources, are essential for reestablishing thyroid function. However, it shouldn't be thought of as the only diet to support thyroid

function. As a strong source of protein, antioxidants, and healthy fat, walnuts can play a significant role in any diet. But in order to determine whether we have a thyroid issue, we visit a croaker. About how our nutrition contributes to our general health.

If we take medication. If medicines and walnuts are taken together, the body will not readily absorb the walnuts' high fiber content, as it does other foods. High selenium intakes can also have unfavorable effects that we need to be aware of. If we know what to eat and what not to consume, we can manage our thyroid. Regardless of whether we have hypothyroidism or hyperthyroidism, we need to adhere to the proper food plan. This would help to stabilize our thyroid conditions and prevent them from becoming out of control.

Walnuts (Juglans regia L.) consumption have also numerous health benefits because it’s a decent source of omega three adipose acids, vitamin E and other antioxidants associated with a healthy heart and implicit decrease of cancer cell growth. This dry fruit is generally used in bakery products, commonly as a preliminary element of nut paddings in a range of confectionary foodstuff similar as in the stuffing of chocolates, in cereal muesli fusions and in other food products, including epicure products. They can also be eaten as a coater used as a component in snacks and salads. Epidemiological studies show that systemic consumption of nuts in general, and walnut in particular supplements equally with myocardial infarction and (CHD) coronary heart complaint anyhow of other factors associated with threat similar as age, coitus, exercise, hypertension, smoking, and weight.

Food processing assiduity offers tremendous occasion for marketable exploitation of walnut assiduity of the state, but marketable processing is around less than one only due to lack of post harvesting and processing installations as well as unscientific packaging. Piecemeal from current stage of desultorily spread walnut colony of seedling origin, there are multitudinous new large walnut vineyards being planted or to be planted at present and one of the cornerstone questions is how to bring about development in the quality of walnut particularly in respect of walnut kernels. Shelled walnuts, exported from Jammu & Kashmir, earn substantial foreign exchange for the state. Still, superiority deterioration of walnut kernels after shelling has been a major grievance of numerous entrepreneurs who store kernels for some time before their

disposal in terminal request for import or domestic consumption. Hence, there's a need to identify the issue that accelerate kernel deterioration of walnuts and manipulate the processes involved in the post-harvest successively in such a way to minimize the quality declination of kernels and maximize quality conservation and improvement.

Walnut kernels varied significantly in their physicochemical parcels, total phenolic content, antioxidant exertion and oxidative stability with different correspondences under different temperature rules. The present disquisition showed positive and cumulative goods of the low temperature (10 ± 1°C) storehouse conditions and little air vacuity in HDPE vacuum sacks which was conducive for protection against downfalls during the walnut kernel storehouse up to eighteen months. In the absence of low temperature storehouse connections, use of HDPE vacuum sacks as packaging material alone is salutary to overcome the limitations of temperature and long term warehouse.

Walnut kernels varied significantly in their physicochemical parcels, total phenolic content, antioxidant exertion and oxidative stability with different pretreatments at ambient storehouse temperature. Ascorbic acid pre-treatment used as an antioxidant and as a dulling agent for walnut kernels handed superior goods as compared to other styles. This analysis can also play a vital part in designing of styles to enhances quality, shelf life, nutraceutical parcels and health benefits of walnut kernels. On the base of effect of crop maturity on walnut kernel quality analysis it can be determined that walnut kernels in the initial stages (pre-PTB) of growing show advanced consumer adequacy. At this stage kernels contain generally more biologically active composites than in the after stages (PTB and post-PTB) of fruit ripeness thereby signifying that harvesting of these walnut during pre-PTB stage of growing would be more profitable.

The objects of the present work, and therefore its compass, being well defined, yet diving all the applicable processing issues of walnuts are demanded. Quality aspects of walnuts are expressed by harvesting, processing and storehouse. In harvesting there are issue of rough running, homemade harvesting, lack of applicable harvesting tools, outfit and crop holders. In processing there are problems pertaining to shy field

sorting, grading and packing protocols lack of hygiene lack of acceptable processing technologies storehouse issues involve poor temperature conditions and lack of sanitation of the store house installations, lack of cold store house apartments and ferocious electricity power cuts. There's need to introduce ultra-modern technology that can condense and ameliorate the styles of reducing losses and promoting value added products. The creation of value-added invention of walnut (kernels), and its incorporation with product, handling would be a fruitful line of exploration work. Dragging store house of high quality walnuts gathered early (pre-PTB and PTB stages) is a challenge which needs to be dived through further exploration. Also, addition of different pretreatments especially comestible coatings of walnut kernels need further studies. Technological aspects of packaging styles and material are changing fast which graces detailed studies so that shelf life is further extended, and better walnut kernel quality is attained. The extractive effectiveness of phenolic composites from factory material is greatly depended on the detergent.

In conventional processes polyphenols are uprooted from vegetable material using different detergents in a temperature range from 40 to 90ºC. In this study, was proposed to prize polyphenolic composites from walnut membrane septum (woody septum) using the maceration, water and ethanol as a solvent admixture with different attention as detergent. The attained excerpts were estimated for total polyphenol content by Folin - Ciocalteu system, and UV ranges of the delved excerpts were also anatomized. In the course of these studies it was set up that optimum rate of water and ethanol for the birth of polyphenols from walnut membranes is 30 of the admixture. The effectiveness of septum excerpt in contradiction of neuroblastoma has still not remained delved neuroblastoma is the maximum delicate kind of brain cancer to treat. The temozolomide-based typical treatment has a number of adverse effects, such as lymphocytopenia and neutropenia, which frequently encourage the formation of opportunistic infections.

The chemical profile of the Sicilian walnut septum ethanol extract was examined in this study using high performance liquid chromatography (HPLC) diode array discovery and HPLC electrospray ionization tandem mass spectrometry. Upon investigating the extract's implicit hypostatic effect on the senescent A172 neuroblastoma cell line, the results suggested that the extract could prevent cancer

cells from migrating and proliferating. A walnut extract's pro-apoptotic activity was shown using cascade three assays and cyto colorimetric analysis. The assessment of the antibacterial activity also emphasized how well the extract worked to inhibit the development of both Gram positive and Gram negative bacteria, the majority of which were unaffected to the antibiotic ciprofloxacin. Ultimately, HPLC identified composites with prognosticated antitumor and antibacterial exertion were revealed using immunization of exertion Spectra for Substances investigation. The encouraging outcomes may provide fresh insight into the realm of co-adjuvant chemotherapy.

This product has stood utilized as a traditional remedy in traditional medicine to treat a variability of colorful endocrine illnesses, including thyroid issues. The pituitary may be the site of action for walnut kernel septum, according to this ethnomedical facts about the various benefits of walnut kernel septum on the endocrine system. According to the study's findings, walnut kernel fruit extracts still have a considerable thyroid hormone-boosting effect, and this means that novel treatment approaches for disorders involving the colored thyroid may draw from them. This study also showed that using extracts made from callow walnut kernel septum fruits too slowly could have detrimental side effects. additional research, still are required to support the main conclusions drawn from this discourse.

The theme of how important it is to indulgence subclinical hypothyroidism has sparked an interminable debate. It is clear that hypothyroidism has affected a number of important cardiovascular risk factors, including excessive blood pressure, cholesterol, and coagulability, in addition to a number of other health issues. It is essential for regulating both the physiological and pathological functions of our bodies. Medicinal plant use has been shown to be beneficial for treating illnesses with fewer side effects. As a result, increasing thyroid function in humans requires treating hypothyroidism. Along with improving the lipid profile, it lowers serum TSH levels and improves hypothyroid condition. In addition, there are additional plants with therapeutic qualities that can be applied to hypothyroidism.

Nonetheless, the first line of treatment is levothyroxine replacement medication for thyroxinemia. However, there are limitations to this lifetime process. Therefore, using medicinal plants can be a helpful herbal supplement in addition to medications

prescribed for specific diseases. It is therefore plainly time to intensify scientific investigation into the mechanisms of action of these therapeutic herbs given their widespread use.

Humanity has been using herbal medicine and herbal therapy for thousands of years, and these practices continue today. Herbal medicine is increasingly being given priority for treatment in both developed and developing countries because of its many benefits. India is known as the country of herbs, and the old Ayurvedic medical system there was also developed using herbs and other therapeutic plants. India is a well-known source of medicinally useful herbal plants having recognized uses. Botanical medicine or phytomedicine is another word for herbal medicine. Eighty percent of people globally receive their basic medical care from traditional herbal remedies, according to a World Health Organization report. Because alternative medicine is safe, effective, and has no unfavorable side effects, its use is steadily increasing in wealthy countries. There is a long history of using herbal treatments, and patients tend to handle them better. the constraints and challenges faced during the production of walnut kernel septum solution. More research is needed on the septal membrane solution of walnut kernels.

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PUBLICATIONS

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Abandoned septum in Walnut (Juglans regia L.) kernel having many chemical active ingredients for mankind. A Review.

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ABSTRACT
Herbal medicines are the oldest type of health service known by humankind. Medicinal shops have been used by all societies throughout the history Walnut (Juglans regia L.) kernel membranes septum (or septa), a traditional nutraceutical material in China, around the world for both unique nutritive characteristics and health-related benefits kernel is extensively consumed, has not been explored in detail. the walnut septum excerpt contains colorful chemical composites. In the last many decades, scientific substantiation has stressed the significance of shops in the prevention and/or supportive treatment. lately examinations have concentrated on the walnut by- products and waste products, with exploration on their precious ingredients and active parcels. Indeed, though several studies delved the composition and natural conditioning of different corridor of the walnut septum, the internal septum of the walnut kernel is less estimated. In the last two decades, some studies delved phytochemical and pharmacological aspects of the walnut septum. Their results showed a wide range of natural parcels along with safety of walnut septum ingredients persuading us to shift our view to walnut septum as a useless by- product to a natural herbal material with precious parcels.
Keywords. Herbal, Walnut, Juglans regia L. Kernel, Septum

I. INTRODUCTION

Amazing advances in agricultural research have contributed to the rapid strides of agricultural technology. Modern technology is sophisticated, precise and highly specialized rendering the task of those involved in agriculture, horticulture and animal husbandry highly challenging.

The plant has been utilized in tropical medicine to treat cutaneous irritation and excessive perspiration in the hands and feet. The leaves are traditionally used to treat sinusitis and stomach aches and are also used throughout the world as an antibacterial, anthelmintic, antidiarrheal, hypoglycemic, tonic, and depurative medicine. In Turkish traditional medicine, fresh leaves are applied to the naked body or the forehead to reduce fever or to swollen joints to treat rheumatic agony[1-2].

Walnut (Juglans regia L.) Origin and distribution is the most widespread tree nut in the world. The tree is commonly called as the Persian walnut, white walnut, English walnut or common walnut. It belongs to juglandaceae family and has the scientific name Juglans regia. The walnut tree species is native to the old world. It is native in a region stretching from the Balkans eastward to the western Himalayan chain and was cultivated in Europe as early as 1000 BC. At present, walnut is cultivated commercially throughout southern Europe, northern Africa, eastern Asia, the USA and western South America. China is the leading world producer, followed by the USA, Iran, Turkey, Ukraine, Romania, France and India, but production in other countries such as Chile and Argentina has increased rapidly in recent years.[3-4]

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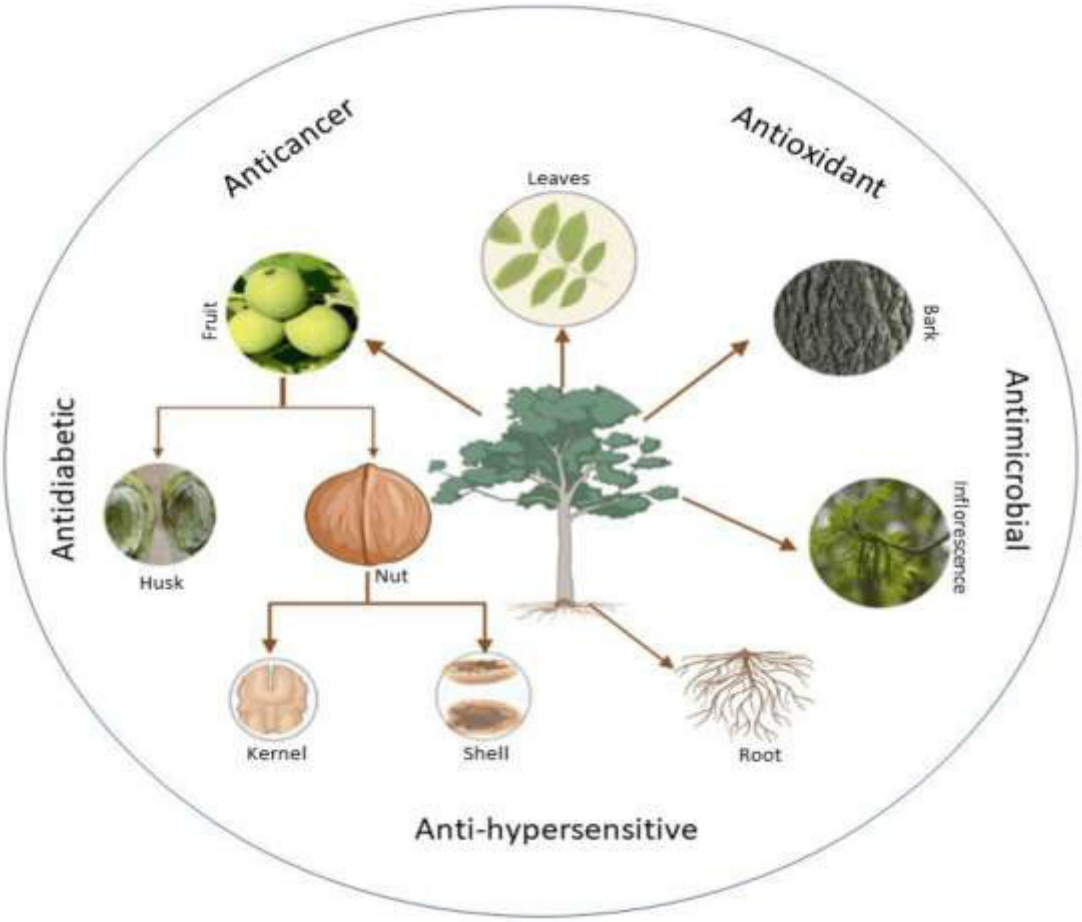

Figure No. 1. Different parts of walnut fruit (Juglans regia) with medicinal properties.

Figure No. 2. Different stages of walnut fruit during cultivation and collection

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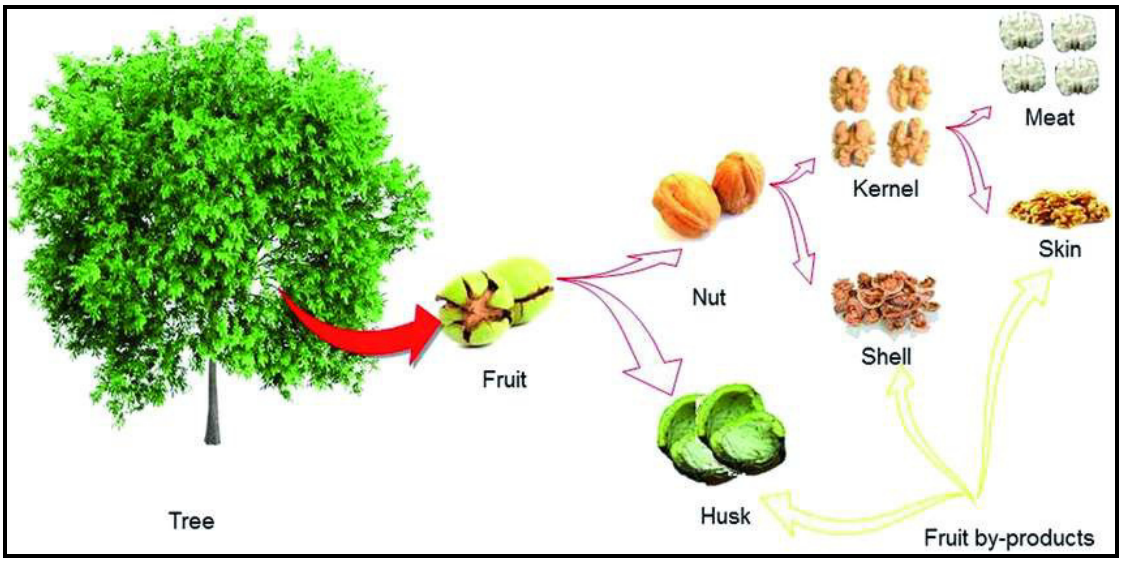

Figure No.3. Different parts of walnut fruit and the corresponding by-products.

The major walnut growing states of India are Jammu and Kashmir, Uttarakhand, Himachal Pradesh and Arunachal Pradesh. Among these, Jammu and Kashmir occupies the largest share in total area and production. India is the 8 th largest producer of walnut in the world and J&K stands first in the country, accounting for 92% of the production. Around 87,000 tonnes of walnut kernels are being produced annually from 40 lakh walnut trees cultivated on 61,000 hectares of land across the state.

Walnuts are available in Indian markets in two forms. These are in-shell walnuts (kernel inside the shell) and shelled walnuts (kernels obtained by shelling whole walnuts). The kernel being the edible portion has got the ultimate bearing on the economic returns. Walnuts have an inherent potential for prolonged storage. However, their shelf- life is governed by the physical characteristics of in-shell nuts, moisture content of the kernels and microbial status of the kernels after shelling.[5-6]

Figure No. 4. Walnut fruit

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Figure No. 5. Walnut Septum / membrane

A. The healing properties of walnut partitions[7]

The medicinal properties of the partitions are due to the rich content of elements that have a positive effect on individual organs and systems of an individual. It is worth considering the main constituents that make up the chemical composition of the invention.

- **Potassium.** Helps normalize water content in the body, increases the metabolic rate of carbohydrates and proteins. Decreases heart rate. Continues the acid-base balance at the required level. Maintains the total content of ingredients in the blood. Promotes weight loss.
- **Iodine.** Contributes in the processes of energy exchange, biological and chemical reactions, accommodation of many vitamins. Helps the body to grow properly, both physically and mentally. Like the earlier element, it promotes the effective metabolism of nutrients in the body. Normalizes body temperature. Increases the absorption of oxygen by numerous tissues. Iodine growths brain activity, gives the body more energy, helps burn additional fat, and keeps hair, skin, nails and even teeth healthy.
- **Magnesium.** It is an essential part of all body tissues. Participates in cell formation, digestion, and brain function. Regulates energy metabolism, kidney function, digestion. Increases the efficiency of the heart and blood vessels, affects the tone and strength of the muscles. Stabilizes the nervous system.
- **Carotene.** Strengthens the immune system, significantly reduces the risk of infectious diseases. Helps remove substances from the body that are not involved in biological processes.
- **A nicotinic acid.** Serves for the regulation of cholesterol in the blood and tissues, maintains glucose levels, and resists free radical attacks. Contributes in the production of hormones and tissue respiration.

The following positive properties of nut membranes are distinguished:

- Increase the body's immunity;
- Saturate the body with iodine;
- Soothe in situation of nervous disorders, stress, irritability, insomnia;
- Progress heart function;
- Create antiviral and antimicrobial protection;
- Decrease blood sugar;
- Improve the work of the digestive system;
- Encourage the resorption of tumors and cysts;
- Have an antiseptic outcome;
- Reduce the presence of cholesterol in the blood, thereby refining the state of blood vessels and stopping the risk of atherosclerosis;
- Reduce pain and relieve inflammation in several joint pains.

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The product is effective for bowel disorders. A decoction from the membranes not only helps to stop diarrhea, but also removes toxins from the body, defends against dehydration. Walnut partitions are used in the treatment of numerous female diseases (hormonal disruptions, reproductive system disorders). With regular intake of infusion and decoctions, it relieves painful menstruation, mastitis, mastopathy, various neoplasms, and decreases the symptoms of menopause.

What walnut partitions help with

Walnut partitions are used in folk medicine for the following diseases:

- hormonal disorders of various kinds;
- male diseases (prostate adenoma, prostatitis, weak potency);
- respiratory tract diseases (bronchitis, pneumonia, in some cases asthma);
- bowel diseases (diarrhea, colitis, helminths);
- female diseases (fibroma, myoma, mastopathy);
- colds (colds, flu, runny nose);
- diseases of bones and joints;
- disorders of the nervous system and mental disorders;
- endocrine system diseases;
- oncological diseases.

I. Walnut Septa for Thyroid Gland[7]

It is a known fact that walnut shells are rich in iodine. Iodine shortage in the body leads to various endocrine disorders. With a lack of iodine, the thyroid gland is disrupted, a person becomes more irritable, weak, and puberty slows down.

II. Walnut partitions for joints[7]

- Tincture of walnut shells has been shown to be real for joint pain, radiculitis.
- Fill a half-litter container by a third with membranes and fill it 2/3 with vodka (double-distilled moonshine or alcohol diluted to 40%.). Put in a place protected from light for 15-20 days, filter.
- Applied outwardly for rubbing into painful areas, as well as to increase efficiency, take 1 teaspoon orally half an hour before meals or on an unfilled stomach.

III. Cleaning of vessels with walnut partitions[7]

- For the standard functioning of the body, it is compulsory to periodically clean the blood vessels. For these purposes, you can make a tincture of walnut partitions.
- To do this, take a glass of ground partitions and pour half a liter of vodka. Insist for two weeks, filter. Take 15-20 drops, dissolved in a small amount of water three times a day for fourteen days.
- There is also a good recipe for dismissing vascular spasms, as well as for controlling blood pressure.
- A glass of ground partitions is mixed with hawthorn tincture (diluted with water in a 4: 1 ratio, that is, 100 ml of cold purified water is needed for 400 ml of hawthorn). Insist for seven days, then filter.
- Take three times a day 30 - 40 minutes before meals (on an empty stomach) a single dose of 5 ml. The course of treatment is one and a half months.

IV. Walnut partitions for men[7]

- Walnut membranes contain zinc and magnesium, minerals important for potency. They are portion of the hormone (testosterone), increase sperm motility.
- Due to the content of fatty acids, the permeability of the containers is restored, and, as a result, the blood supply to the organs is enhanced.
- For the treatment of prostatitis and adenoma, you can successfully use tinctures that contain useful substances from the partitions of walnuts.
- Half a glass of partitions is poured with 250 ml of water. The dividers of walnuts are brewed and left for 20 minutes to infuse. Then it is filtered. The broth is taken 15 ml three times a day before meals. The required course of treatment is from 2 to 4 weeks.

V. Walnut partitions with menopause[7]

- The essence of the treatment of menopause with folk medicines is reduced to the normalization of hormonal equilibrium. Indications are mitigated (irritability, depression, poor sleep). Partitions are considered an effective folk medicine for improving well-being.
- To prepare the broth, take membranes from 5 walnuts, pour a glass of cold water. In the morning, boil for several minutes, filter well, add one tablespoon of honey (not desirable last year). They must drink on an empty stomach

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or not earlier than 30 - 40 minutes before meals.

VI. Walnut membranes in diabetes mellitus[7]

- Medicinal tinctures and decoctions from walnut partitions, with regular use, decrease blood sugar levels, remove unpleasant indications of the disease (thirst, weakness, itching) and improve well-being.
- The effectiveness of tinctures and decoctions is observed only with complex action together with traditional methods of treatment.
- To prepare the broth, a glass of membranes is poured with a glass of boiling water and cooked over low heat for one hour. The resulting broth is cooled, filtered. Take one teaspoon half an hour before meals. The course of treatment should be four weeks.
- To prepare the tincture, take two tablespoons of partitions and fill them with half a litter of vodka, insist for two weeks, filter. Take 8-10 drops, diluted in a small quantity of water 20 minutes before meals. The course of treatment is from two weeks to a month, the duration depends on the severity of the disease.

B. Contraindications to the use of walnut membranes[7]

Taking any medicine, you must read the contraindications for use. If they are, then you must refuse to take this drug.

- For example, you cannot use a decoction and tincture of walnut partitions for eczema or psoriasis, neuro dermatitis, urticaria, since even larger rashes on the body are possible.
- If you suffer from allergies, then you should refuse treatment with a tincture of walnut partitions, as there is an opportunity of itching and rashes on the skin, coughing fits (in some cases, even Quincke's edema is possible).
- Since walnut partitions have a strong result, it is impossible to use for pregnant women and it is undesirable to take women who are breastfeeding, children under five years of age (after 5 years, only a decoction can be given).
- You cannot use the tincture for diseases of the gastrointestinal tract. Ulcers and gastritis are contraindications to treatment with walnuts, especially on an empty stomach.
- You should not immediately drink the full portion indicated in the recipe, even if there are no contraindications, as allergic reactions are possible. In this case, you should take the drug and refuse this treatment.

C. Phytochemicals and Biological Activities of Walnut Septum[8]

Walnut septum was anatomized in several studies, its phytochemical profile described, and some of the natural conditioning examined. still, compared to other walnut by- products, no comprehensive review to gather all the material scientific knowledge was set up in the literature. thus, the end of this study was to critically assess the information furnished by peer- reviewed papers regarding the walnut septum chemical composition and the affiliated natural conditioning, including antioxidant conditioning, anti-inflammatory goods, antimicrobial parcels, antidiabetic conditioning, anti-tumor parcels, and anti-aging eventuality. In conclusion, as these preclinical studies showed that walnut septum metabolites were responsible for a wide range of preventative and remedial uses, farther exploration should confirm the salutary issues in clinical trials. We consider walnut septum to be an important natural matrix, a rich natural source of bioactive composites that deserves to be delved in the future in order to be completely exploited in the food, ornamental, or pharmaceutical assiduity.

D. Investigation of antioxidant and antimicrobial activities of walnut (Juglans regia L.) kernel septum[9]

Walnut (Juglans regiaL.) kernel septum (or septa) (WKS), a traditional nutraceutical material in China, has not been explored in detail. In this study, antimicrobial exertion, total phenolic content (TPC) and antioxidant- oxidant status of WKS was delved in case it may be clinically important in the operation of colorful complications. styles The WKS was uprooted with ethanol in a Soxhlet device. TPC of WKS was analysed by using Folin- Ciocalteu's system. Antioxidant exertion was attained by using Rel Assay Diagnostics accoutrements. The antimicrobial exertion of WKS was estimated against two Gram-positive (Staphylococcus aureus, Bacillus subtilis), one Gram-negative bacteria (Escherichia coli) and one fungus (Candida albicans) strains using the agar prolixity system.

Results The TPC of WKS was set up to be119.42 ±2.39 mg GAE/ gDW. It was determined that total antioxidant status (TAS), total oxidant status (TOS) and oxidative stress indicator (OSI) values were7.542 ±0.389 mmol/ L,3.718 ±0.287 µmol/ L and0.049 ±0.001, independently. WKS widely inhibited the growth of Gram positive

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bacteria and fungus, whileS. aureus was the most susceptible bone with 16 mm of inhibition zone. Gram-negative bacteria were resistant to the excerpt. Conclusions as far as we know, this paper is the first work that demonstrates the antioxidant-oxidant status of WKS by using the system described over, and also there are no scientific reports which have examined WKS in such a multidisciplinary experimental design. This study explosively supports the reported traditional use of WKS. Results indicated that WKS can be used as a pharmacological natural agent due to its high antioxidant and antimicrobial conditioning.

E. Walnut (Juglans regia L.) Septum: Assessment of Bioactive Molecules and In Vitro Biological Effects[10]

Food and agrarian assiduity by- products can represent precious and affordable sources of bioactive composites. thus, our study aimed to increase the knowledge regarding walnut septum, a by- product that presently has limited use. The results of work indicate that walnut septum can be a source of natural biologically active motes. As far as we know, we determined for the first time the tocopherol content in this vegetable matrix. The tocopherols and the phenolics set up in WSE present antioxidant andanti-inflammatory conditioning, or can help cholesterol and lipid peroxidation, thus, significantly contribute to the precious goods of walnut septum on health. Further, our trial delved the in vitro goods of septum excerpt on some crucial enzymes involved in pathologies including neurodegenerative diseases, diabetes, and rotundity. Walnut septum contains important α- glucosidase and lipase asset phytochemicals that can obstruct salutary carbohydrate or lipid metabolism. also, this is the first study to demonstrate that walnut septum excerpt presents antimicrobial and antimutagenic eventuality, as well as strong antioxidant andanti-inflammatory conditioning. thus, using septum as a source of phytochemicals can lead to the valorization of this by- product and may increase the value of walnut product.

F. Effects of Walnut Septum on The Enzyme Pathways Associated with Plasma Cholesterol Level[11]

Cholesterol is pivotal emulsion that plays vital part in cellular function in living organisms. Its redundant or insufficiency in tube can lead to destruction and decomposition of cell membrane structure. Maintaining balanced input of cholesterol in diet and seeking medical treatment, if necessary, can help these negative goods. likewise, people frequently resort to natural and herbal remedies, similar as walnut septum. Due to dearth of scientific data regarding goods of walnut septum on cholesterol metabolism, this exploration was accepted to explore its implicit goods. styles Analysis was begun by rooting septum using colorful detergents. Performing excerpts were also anatomized using GC- MS, and composites were linked by using an intertwined library database. To descry goods of excerpts on cholesterol esterase and HMG CoA reductase, a colorimetric system was employed. Results Monophenol, 2,4- Di- tert-butylphenol, 2,6- Di- tert- butylphenol, ethyl linoleate, and butyl linoleate were some of composites detected by GC- MS scanning. The loftiest inhibitions were observed in the enzymatic analysis, with a rate of3.2 (acetone) in the HMG-CoA reductase analysis and13.6 (water) in the cholesterol esterase analysis. Conclusions Although the walnut septum excerpt contains colorful chemical composites, the in vitro analysis data suggest that there's no inhibitory effect at remedial position on enzyme pathways that regulate tube cholesterol situations, videlicet HMG- CoA reductase and cholesterol esterase. We believe that farther exploration is necessary to exhaustively estimate its goods on other pathways.

To clarify claims of cholesterol regulation by consuming walnut septum, the delved goods of septum excerpts on enzymes that are involved in enzyme pathways associated with tube cholesterol situations. They determined that the septum didn't have a conspicuous inhibitory effect on either cholesterol esterase, which is responsible for immersion of cholesterol from bowel, or HMG-CoA reductase, which is responsible for intracellular cholesterol product, in vitro. Low rate of inhibitions led us to consider goods of colorful substances that surfaced in content of walnut septum grounded on birth system used. Accordingly, this exploration yielded good of note data indicating that the walnut septum excerpts prepared in detergents of different oppositeness, despite having colorful chemical factors, didn't have a remedial position inhibitory effect on two different enzyme pathways that regulate the tube cholesterol position. They consider that farther exploration will be demanded to estimate its goods on other pathways deeply.

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II. CONCLUSION

Having considered the medicinal parcels of walnut partitions and contraindications, don't forget that this is a medicine. This means that it's largely judicious to consult a Doctor about the possibility of taking, lozenge and duration of treatment.

In conclusion and summary, phytochemical evaluation of walnut septum verified the presence of high quantum of phenolic composites and desirable radical scavenging and tyrosinase inhibitory conditioning. also, some experimental workshop has demonstrated its antibacterial, anti-tumor, antidiabetic and food preservative capabilities. Taken together, these parcels are opening up new possibilities regarding salutary goods of walnut septum on neuro degenerative conditions (like Parkinson complaint) and skin diseases (hyperactive saturation due to melanin as well as skin wrinkle conformation). None the less, farther studies are needed to probe other probable pharmacological conditioning of walnut septum.

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Design and development of Walnut kernel septum solution for thyroid function

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Abstract

In this study, we investigated the test of the septum in walnut kernel (Juglans regia L). Walnut septum has been widely used in Iranian traditionally used to treat diabetic patients and other different diseases like skin or colon cancer and acts as an antidiabetic, anti-inflammatory, antioxidant, anti-allergic, antimicrobial, antiviral, cardio protective, and neuroprotective agent etc.

Crushing walnuts in the laboratory using a wooden hammer, by braking of walnut fruit separating the Walnut kernel septum membranes. carefully removing the walnut septa. Each walnut septum sample originating from the same tree. The walnut membrane septum was dried by natural method approximately 7 days, in a dark place, in order to remove the moisture initially present. The walnut septum membrane was divided into two parts. In one method the directly walnut septum membrane soak into ethanol and distilled water directly.

Another part of Walnut kernel septum membranes was powdered by electric grinder and then The powdered material was soak into ethanol and distilled water. The solvents used were Ethanol and distilled water with different ration, at room temperature with occasionally shaking for 21 days. The solution was holding on in an exceedingly airtight dry, clean and away from light. Afterwards, the mixture was filtered using whatman filter paper and collected the concentrated extract (Walnut Septum Solution) WSS for further evaluation. Obtained extract was stored in a refrigerator for further tests.

The evaluation parameter like, Moisture content, Total Ash values, boiling point, Specific gravity, Density, Viscosity, PH, Appearance, HPTLC analysis/HPLC Analysis, *in vitro* drug release profile of extracted solution and stability studies shows all solutions are under the range. The solution F1 give excellent drug release.

With the help of HPLC method, we find the walnut septum membranes solution are having the flavonoids: catechin, rutin, myricetin, luteolin, quercetin, apigenin, and kaempferol were Present.

Keywords., Walnut, Juglans regia L. Kernel, Septum, solution

INTRODUCTION

In Turkish folk drug, the fruits and leaves of Juglans regiaL. have been extensively used as an herbal remedy for the treatment of endocrine conditions similar as diabetes mellitus, anorexia, thyroid dysfunctions, etc. The effect of fruits of J. regia on the thyroid hormone situations of mice was delved using two excerpts prepared from the fruits by different styles. The acute venom of these two excerpts in mice were assessed as well. On the base of our findings attained, the excerpts prepared from the fruits of J. regia enhanced thyroid hormone situations, while they wielded minimum acute toxin in mice.

Figure No. 1. Walnuts Kernel with Septum

walnuts are helpful in managing thyroid is because they've omega 3 which reduces inflammation. The rate of inflammation is high in thyroid and to combat that, walnuts can help. Healthy fats especially from nuts and factory- grounded sources are the key for restoring thyroid function and so, consuming walnuts in a regulated quantum can attack thyroid inflammation. still, it should not be considered the sole food to boost thyroid function Walnuts can be an important part of any healthy diet, being a good source of healthy fat, protein and antioxidants. However, you should see a croaker to know If you have a thyroid condition. about the part your diet plays in your overall health.

Thyroid disorders and natural treatments. Worldwide, incidence of endocrine diseases including thyroid disorders is increasing. Thyroid disorders are generally classified into hyper and hypothyroidism. Women are more likely to have alteration in thyroid function as compared to men. In general, patients with thyroid disorders may have decreased circulating thyroid hormones (hypothyroidism) or increased levels of thyroid hormones (hyperthyroidism). Hypothyroidism is one of the most prevalent endocrine disorders characterized by low levels of thyroid hormones (T3 & T4) in the serum and high thyroid stimulating hormone (TSH).

Maceration is one of the oldest and simplest extraction methods in which coarse and powdered plant material is soaked in solvents such as methanol, ethanol, ethyl acetate, acetone, hexane etc.

Materials and Methods

Preparation of Walnut Kernel Septum Membranes:

The Walnut fruit was purchased from traditional medicine shopkeeper in local market of Hyderabad, Telangana, INDIA and confirmed by an expert botanist. By braking of walnut fruit separating the Walnut kernel septum membranes. The walnut membrane septum was dried by natural method approximately 7 days, in a dark place, in order to remove the moisture initially present. The walnut septum membrane was divided into two parts. In one method the directly walnut septum membrane soak into methanol and distilled water directly.

Figure. No. 2. Walnut kernel septum membranes

Figure. No. 3. Walnut kernel septum membranes powdered

Preparation of Walnut Kernel Septum Membranes solution:

Another part of Walnut kernel septum membranes was powdered by electric grinder and then The powdered material was soak into ethanol and distilled water. The solvents used were ethanol and distilled water with different ration, at room temperature with occasionally shaking for 21 days. The solution was holding on in an exceedingly airtight dry, clean and away from light. Afterwards, the mixture was filtered using Whatman filter paper and collected the concentrated extract for further evaluation. Obtained extract was stored in a cool dark place for further tests.

Figure No. 4. Walnut kernel septum membranes solution F1 to F5.

Figure No. 5. Walnut kernel septum membranes solution F6 to F10.

Method	Ratio Alcohol : Water	Alcohol	Water	Formulation No.
walnut septum membrane	100:0	250ml	0	F1
	0:100	0	250ml	F2
	75:25	187.5ml	62.5ml	F3
	50:50	125ml	125ml	F4
	25:75	62.5ml	187.5ml	F5
walnut septum membrane in powder form	100:0	250ml	0	F6
	0:100	0	250ml	F7
	75:25	187.5ml	62.5ml	F8
	50:50	125ml	125ml	F9
	25:75	62.5ml	187.5ml	F10

Table. No. 1. Different Walnut Kernel Septum Membranes solution

Determination of λ Max of walnut septum membrane solution: Determination of λmax of walnut septum membrane solution was done in Phosphate Buffer pH 7.4 solutions. Spectrums obtained for each showed constant peak i.e. wavelength of maximum at 360 nm.

Construction of Calibration Curve: UV absorption spectrum showed λmax to be 360 nm. The standard curves of walnut septum membrane solution in pH 7.4 Phosphate Buffer obtained are shown in Figure. The graph of absorbance v/s concentration for walnut septum membrane solution was found to be linear in the concentration range of 0, 5, 10,15, 20, 25,

30, 35 and 40 µg/ml at 360 nm. The drug obeys Beer - Lambert's law in the range of 0 - 40 µg/ml.

EVALUATION PARAMETER

1. **To determine the boiling point of** Walnut Septum Solution**:** Take a capillary tube and close its one end by holding the end in the flame and rotate it for 2-3 minutes, transfer a few mL of septum membranes solution to the fusion tube. fusion tube keeping the sealed, start heating the Note down the temperature soon as the regular streams of bubbles are seen out of liquid in the fusion tube.
2. **Determination of Moisture content of Walnut septum:** Moisture content is determined via a thermos gravimetric method i.e. by loss on drying. In which, the sample is heated & the weight loss due to evaporation of moisture is recorded. Taking Walnut kernel septum membranes powder (0.5gm). Weigh the empty porcelain dish and note the reading. (W1**).** Weigh the porcelain dish with Walnut kernel septum membranes in it and note the reading. (W2). Keep the porcelain dish in hot air oven for 15 minutes at 100°C-105'C. After heating, keep the porcelain dish in desiccator for 15 minutes. Take out the dish from desiccator, and weigh the porcelain dish with dried sample. (W3). After weighing all calculate the moisture content.
3. **Determination of total ash of walnut septum:** Find out the weight of a clean dry crucible. Place about 2 g of Walnut kernel septum membranes powder sample and weigh this to find out accurate weight of the sample taken. weighed crucible over electric burner. The crucible should be partially opened. The sample will get charred with initial expulsion of smoke. Place the crucible in a muffle furnace and heat to 600°C. Keep it for 2 hours. At this temperature all organic matter will be burnt leaving behind minerals. Remove the crucible from the furnace carefully and cool it in a desiccator to room temperature and weight again.
4. **Determine of density of Walnut Septum Solution:** Take the weight of empty dry bottle with capillary tube stopper (W1). Calculate weight in grams of distilled water (W3). Weight bottle with Walnut kernel septum membranes solution on analytical balance (W2). Calculate the density.
5. **Determination of Specific gravity of Walnut Septum Solution:** Take weight of empty, Clean and dry bottle with capillary tube stopper (W1). Fill the bottle with distilled water and weight (W2). Weight bottle with Walnut kernel septum membranes solution (W3).

6. **Determination of Viscosity of the Walnut Septum Solution**; Take clean the Ostwald viscometer, Fill water in dry viscometer up to mark G. Count time required, in second for water to flow from mark A to mark B. Rinse viscometer and take Walnut kernel septum membranes solution and then fill it up to mark A, find out the time required for liquid to flow to mark B. Determination of densities.
7. **pH Determination of pH of the Walnut Septum Solution**: The pH determination of Walnut kernel septum membranes solution by using pH meter.
8. **Determination of Organoleptic Characters of the Walnut Septum Solution:** Organoleptic evaluation resources the study of drugs using organs of senses. It refers to the approaches of analysis like colour, odour, taste.
9. **To study *in vitro* drug release profile of prepared Walnut Septum Solution**

Osmosis is the phenomena in which solvent particles permit through a semi-permeable membrane (parchment paper) from an area of higher concentration to an area of lesser concentration.

Figure. No. 6. Assembly of instruments for Walnut Septum Solution release.

In-vitro studies of Walnut kernel septum membranes solution were studied by osmosis method by test tube attached with parchment paper as semipermeable membrane and using magnetic stirrer apparatus employing a magnetic bead as stirrer. 250 ml of phosphate buffer of pH 7.4 was used as dissolution medium at 50 rpm. The temperature of 37 ± 0.5°C was maintained throughout the experiment. Walnut kernel septum membranes solution was used in each test. 1 ml of sample of dissolution medium were withdrawn by

means of syringe fitted with pre-filter at known intervals of time and analyzed for drug release by measuring the absorbance at 360 nm after suitable dilution with phosphate buffer. The volume withdrawn at each time interval was replaced with fresh quantity of dissolution medium. The amount of Walnut kernel septum membranes solution released was calculated and plotted against time.

10. **HPLC method**

1. Chemicals and Reagents

Methanol (MeOH) and acetonitrile (ACN), HPLC grade, were acquired from Merck. Acetic acid 99% and trifluoroacetic acid (TFA) 99% were obtained from Merck. The LiChrolut RP-18 (C18, 3 mL, 500 mg) SPE containers used were supplied by Merck (Darmstadt, Germany). Ultrapure water was provided by a Milli-Q decontamination system (Millipore, Bedford, MA, USA). The flavonoids catechin 98%, rutin 98%, myricetin 98%, luteolin 98%, quercetin 98%, kaempferol 98%, and apigenin 98% were supplied by Sigma-Aldrich (Steinheim, Germany). Stock standard solutions at 1000 mg/L concentration level were prepared and stored in dark brown glass bottles at -20 °C. Working standard solutions were ready in MeOH after suitable dilution of the stock solutions each laboratory day, before analysis.

2. Instrumentation

A quaternary low-pressure incline HPLC–DAD system by Shimadzu (Kyoto, Japan) was used for examination. The HPLC system consisted of: (a) an FCV-10ALVP mixing system, (b) a Rheodyne 7725i injection valve, and a 20 µL loop for sample injection, (c) an LC- 10ADVP pump equipped with a Shimadzu SCL-10ALVP System Controller, (d) an SPD-M10AVP photodiode array detector. Real time examination monitoring and post run dispensation were carried out using the software Lab Solutions-LC solutions, supplied by Shimadzu. A glass space filtration apparatus, acquired by All tech Associates, and nylon 0.2 µm membrane Filters were utilized for the filtration of the mobile phase, and a DGU-10B de-gassing unit with helium was used for degassing. A vortexer purchased from FALC Instruments was used for sample agitation. Centrifugation was carried out using a HermLe centrifuge, model Z-230. An ultrasonic bath (MRC: DC-150H) by MRC was used for specimen preparation. For disappearance, after SPE extraction, a ReactiVap 9-port evaporator model 18,780 by Pierce was utilized. For sample filtration, prior to the injection in the chromatographic system, Q-Max RR syringe filters (0.45 µm nylon membrane) were purchased from Frisenette ApS.

3. Chromatographic Separation and Analysis

The chromatographic parting of the flavonoids was attained on a C18 Universe column (250 mm 4.6 mm, 5 μm), supplied by Fortis Technologies Ltd. on, A reverse-phase HPLC test was carried out using a gradient scheme with 1 mL/min flow rate, thermos stated at 30 ◦C. The mobile phase consisted of (A) 1% acetic acid in water, and (B) ACN. The gradient elution program begun with 80:20, v/v (A: B), gradually increasing to 50:50, v/v (A: B), in the following 25 min, and then outstanding constant for the next 5 min. The initial circumstances were restored for 10 min, prior to the next injection. The injection volume was 20 μL of solution and the total run time was less than 25 min for each injection. For peak identification, the Rts of the peaks of the real samples were compared with the Rts of the standard mixtures, along with the spectral information providing by the DAD sensor that operated over the variety 280–400 nm. Peak nursing and quantitation were achieved at the maximum wavelength of each analyte.

4. Sample Collection

walnut septa models were created after crushing walnuts in the workroom using a wooden hammer, and carefully removing the walnut septa. Each walnut septum taster was a bulk sample that contained of ten walnut septa originating from the same tree. In this way, bulk walnut septum samples were created in the laboratory. All the walnut samples were collected during the harvesting period of November 2022.

Stability Testing:

Stability Testing of the prepared Walnut kernel septum membranes solution was performed on keeping the sample at accelerated temperature conditions. Ten portions of the final Walnut kernel septum membranes solution A, B and C were taken kept at accelerated temperature at Room temperature and 40 respectively. The solution was tested for all the physicochemical parameters, turbidity and homogeneity at the interval of one month, two months and Three months to observe any change.

Results and Discussion

The Moisture content of walnut kernel septum membrane is 15.9 %. The total ash of walnut septum 1.78 g. The other evaluation of Walnut kernel septum membranes solution parameters are as follows

Sl. No.	Parameter	F1	F2	F3	F4	F5
1	Boiling Point	87	82	90	78	72
2	Density	0.9216	0.9217	0.9215	0.9217	0.92218
3	Specific gravity	0.919	0.927	0.920	0.929	0.923
4	Viscosity	72.8	73.7	75.4	73.5	73.6
5	pH Determination					
	pH meter	6.2	6.8	7.0	6.1	6.8
6	Organoleptic Characters					
	1) Color	Yellowish brown	Yellowish brown	Yellowish brown	Yellowish brown	Yellowish brown
	2) Odor	Aromatic	Aromatic	Aromatic	Aromatic	Aromatic
	3) Taste	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant
	4) Appearance	Good	Good	Good	Good	Good

Table No.2. Result of evaluation parameters of F1 to F5

Sl. No.	Parameter	F6	F7	F8	F9	F10
1	Boiling Point	75	86	78	84	80
2	Density	0.9215	0.9217	0.92218	0.9216	0.9217
3	Specific gravity	0.928	0.919	0.924	0.921	0.925
4	Viscosity	75.4	73.5	73.6	72.8	73.7
5	pH Determination					
	b) pH meter	7.0	6.1	6.8	6.8	6.2
6	Organoleptic Characters					
	1) Color	Yellowish brown	Yellowish brown	Yellowish brown	Yellowish brown	Yellowish brown
	2) Odor	Aromatic	Aromatic	Aromatic	Aromatic	Aromatic
	3) Taste	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant
	4) Appearance	Good	Good	Good	Good	Good

Table No. 3. Result of evaluation parameters of F6 to F10

Construction of Calibration Curve walnut septum membrane solution:

SL. No.	Concentration of Drug (µg/ml)	Absorbance at 360 nm
1	0	0
2	5	0.109
3	10	0.223
4	15	0.339
5	20	0.448
6	25	0.561
7	30	0.671
8	35	0.790
9	40	0.900

Table. No. 4: Standard Graph of walnut septum membrane solution

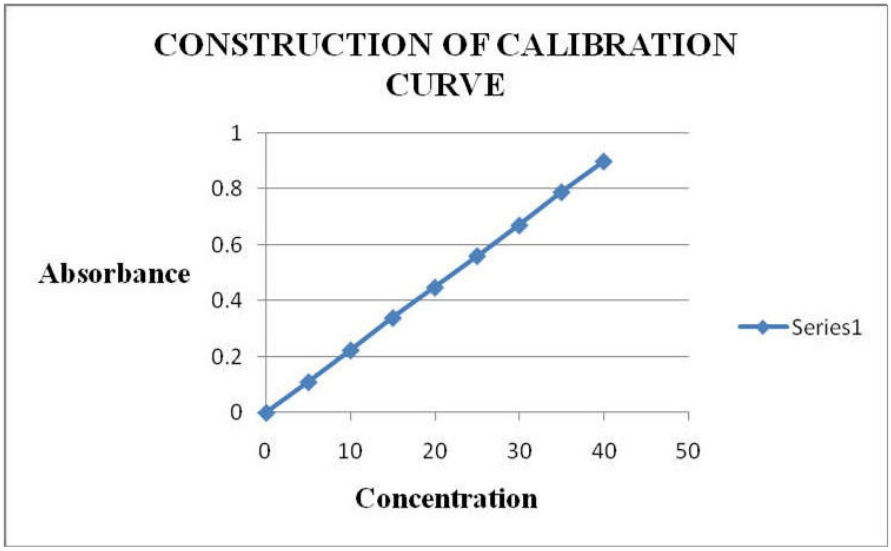

Fig. No. 7: Standard Calibration Curve for walnut septum membrane solution

Time (Min)	Percent release of walnut septum membrane solution									
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
0	0	0	0	0	0	0	0	0	0	0
5	23.9	15.11	17.01	19.11	21.22	17.12	17.50	14.05	16.75	2.01
10	33.51	19.79	21.37	27.31	32.32	27.41	24.20	20.14	32.50	11.07
15	44.23	30.95	29.72	39.15	40.91	34.54	28.70	31.72	41.60	16.72

20	55.47	42.15	45.77	51.57	53.21	49.14	34.50	45.13	52.80	25.65
25	69.21	50.67	57.41	61.72	62.25	56.27	47.25	52.59	60.75	36.04
30	77.69	62.95	65.92	70.97	74.61	67.11	55.80	64.17	72.80	44.34
35	86.61	72.11	72.96	83.01	85.29	77.91	67.30	74.77	80.25	58.34
40	97.41	84.43	83.79	91.01	92.11	85.01	75.95	81.15	87.10	70.39

Table No. 5: In- vitro Drug Release Profile of different formulation in Phosphate Buffer pH 7.4

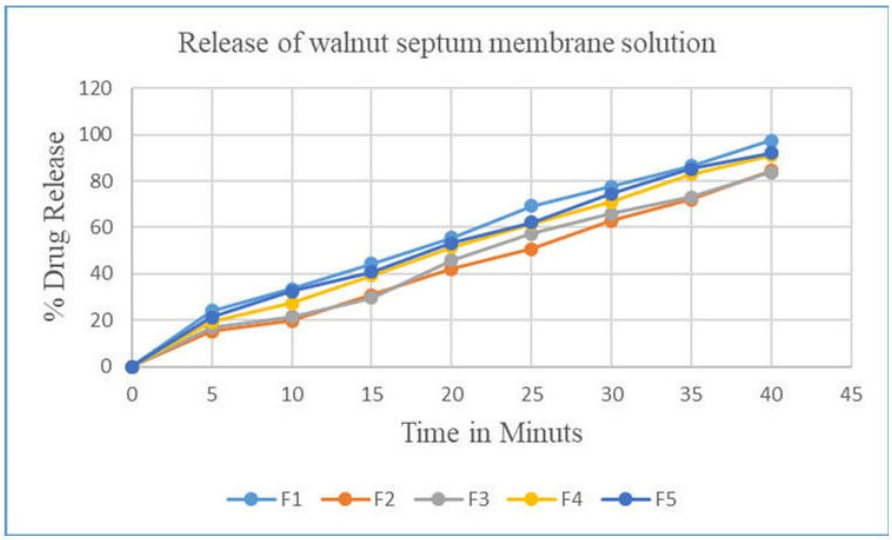

Figure No. 8. Percent release of walnut septum membrane solution F1 to F5

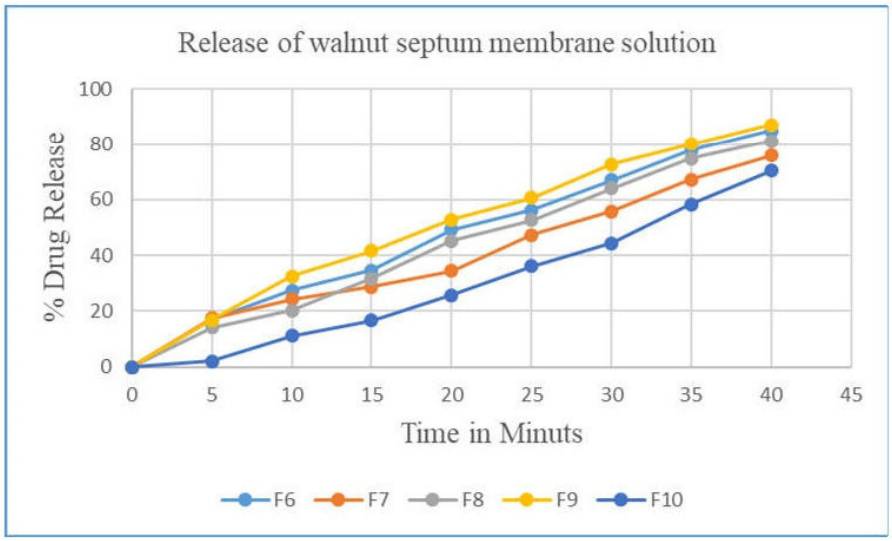

Figure No. 9. Percent release of walnut septum membrane solution F6 to F10

***In-Vitro* Drug release:**

Drug release data of the various walnut septum membrane solution is indicated in table. The walnut septum membrane solution released the drug for 40 min (formulations: F1 to F10. All the formulations F1 to F10 showed marked variation in the drug release at the end of 40 miniuts. Formulation F1 showed the highest release rate (97.41%) and formulation F10 least release rate (70.39%) at the end of 40 minutes. Among all 10 walnut septum membrane solution (F1 to F10), the 3 formulations (F4, F5 and F6) gives good release as compared to other walnut septum membrane solution. As per the drug content and osmosis studies are concerned, it indicated that F1 formulation gives best drug content and shows best walnut septum membrane solution release.

Method Development and Validation

Method Progress and Validation A HPLC-DAD organization was developed and validated to measure the flavonoid profile of walnut septum and all the analytical parameters, including the calibration curves, linear range, the determined coefficients (r2), accuracy and precision, restrictions of detection (LODs), and limits of quantification (LOQs) are presented in Table. The analytical curves presented an adequate fit when acquiesced to the lack-of-fit test (F calculated was less than F tabulated in all cases), with r2 above 0.99, showing that they can be used for the quantification of the flavonoids. The LOQs were found to range between 0.30 μg/g and 0.90 μg/g, while the LODs were planned over the range 0.10 μg/g to 0.30 μg/g. The RSD% of the within day (n = 6) and between-day assays (n = 3 × 3) were lower than 6.2, and 8.5, respectively, showing adequate accuracy. The accuracy was assessed by means of relative proportion of recovery (%R) at low, medium, and maximum concentration levels of 1, 5, and 10 μg/g, and the results were acceptable, ranging from 90.8 (apigenin, at 10 μg/g concentration level) to 97.5% (catechin, at 10 μg/g concentration level) for within-day assay (n = 6), and from 88.5 (myricetin, at 1 μg/g meditation level) to 96.2% (catechin, at 5 μg/g meditation level) for between-day assay (n = 3 × 3).

Compound	Calibration Equation $y = (a \pm Sa) + (b \pm Sb)x$ (Linear Range: 1–10 μg/g)	r^2	F_{calc}	F_{tab}	LOD (μg/g)	LOQ (μg/g)
Apigenin	$y = (1732 \pm 152) + (1745 \pm 665)x$	0.994	4.6×10^{-7}	0.2334	0.29	0.87

Catechin	y = (1095 ± 1115) + (11808 ± 305)x	0.997	7.9×10^{-9}	0.2334	0.31	0.94
Kaempferol	y = (1710 ± 54.3) + (19045 ± 685)x	0.996	1.7×10^{-9}	0.2334	0.29	0.90
Luteolin	y = (1017 ± 1608) + (17008 ± 440)x	0.995	2.9×10^{-9}	0.2334	0.20	0.60
Myricetin	y = (989 ± 1450) + (20005 ± 424)x	0.993	5.6×10^{-9}	0.2334	0.24	0.72
Quercetin	y = (−1032 ± 1128) + (18404 ± 153)x	0.993	6.5×10^{-9}	0.2334	0.20	0.60
Rutin	y = (389 ± 1200) + (19857± 204)x	0.995	1.9×10^{-9}	0.2334	0.20	0.60

Ftab: Ftabulated, Fcalc: Fcalculated, LOD: limit of detection, LOQ: limit of quantitation.

Table No. 6. HPLC-DAD method analytical parameters.

Compound	**%R Medium Conc. Level (5 µg/g)**	**%RSD**
Apigenin	91.7	6.1
Catechin	96.4	6.2
Kaempferol	93.5	3.2
Luteolin	95.6	4.6
Myricetin	94.4	5.2
Quercetin	98.8	4.2
Rutin	92.5	4.5

Conc.: Concentration.

Table No. 7. %Recoveries (%R, $n = 6$) for the evaluation of repeatability.

Walnut Septum Analysis

walnut septum membranes solution was analyzed in triplicate and the flavonoids: catechin, rutin, myricetin, luteolin, quercetin, apigenin, and kaempferol were resolute. The chromatographic documentation results, counting the retention times (Rts) of the analytes, and their respective maximum absorption wavelengths (λ, nm) are presented in Table. Figure

illustrates the chromatographic parting of the flavonoids in a walnut septum extract that was experiential at 280 nm.

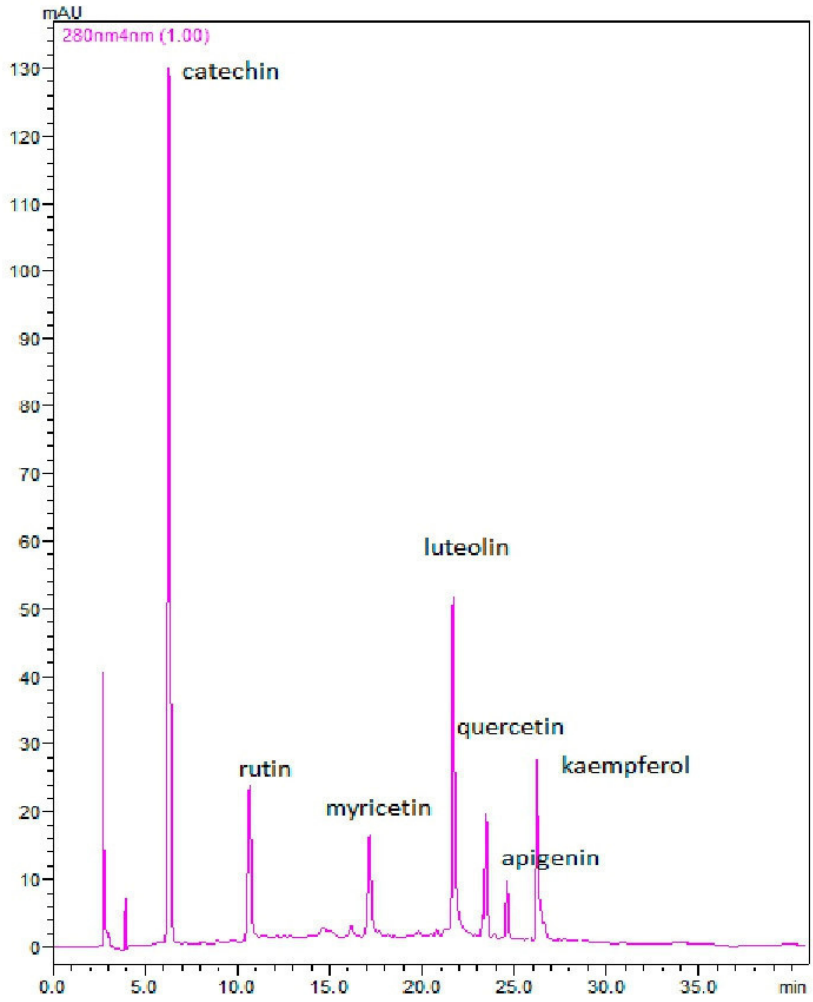

Figure No. 10. Characteristic chromatogram of a walnut septum extract; monitored at 280 nm.

Stability Testing:

Stability Testing of the prepared Walnut kernel septum membranes solution was performed on keeping the sample at accelerated temperature conditions. The solution was tested for all the physicochemical parameters, turbidity and homogeneity at the interval of one month, two months and Three months observed no changes in the solution. There is no major changes at all.

Conclusion

Walnut membrane septum are appreciated plants which contain an inspiring amount of biologically active substances that have a wide range of uses. During this study it was investigated the influence of water/ethanol solvent mixtures at different concentrations on the level of total polyphenol content of extracts from walnut membrane septum. Obtained experimental data are demonstrated in figure. During HPLC DAD analysis walnut septum membranes solution was analyzed in triplicate and the flavonoids: catechin, rutin, myricetin, luteolin, quercetin, apigenin, and kaempferol were resolute.

In this study water and ethanol, two environmentally and food safe solvents were used to optimize solid-liquid withdrawal of phenolic mixtures from walnut membrane septum. Total polyphenol content of walnut septum extracts was evaluated. It was established that optimal solvent for antioxidant extraction from walnut membrane septum is 100% mixture of ethanol. From prepared 10 solutions of walnut membrane septum with different concentrations of ethanol and water, the F1 gives excellent in-vitro drug lease. The walnut kernels septum need farther studies to make formulations for thyroid treatment.

We consider walnut septum to be a significant biological medium, a rich accepted source of bioactive compounds that deserves to be investigated in the upcoming in order to be fully exploited in the food, cosmetic, or pharmaceutical industry.

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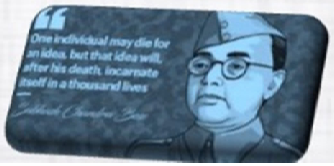

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