Kumar et al. (2015) Researchers carried out an investigation to examine the potential antidiabetic effects of a 70% alcoholic extract from *S. grandiflora* flowers in rats with alloxan-induced diabetes. The rats received oral doses of the extract, at 250 mg/kg and 500 mg/kg, daily for 28 days. The findings showed significant decreases in serum total cholesterol, triglycerides, SGOT, SGPT, and BUN levels when compared to the diabetic control group.Serum total cholesterol, triglycerides, SGOT, SGPT, and BUN was analyzed using semiautoanalyzers and biochemical kits.When compared to diabetic control, the alcoholic extract's anti-diabetic action was significantly increased ($p > 0.01$) at doses of 250 and 500 mg/kg of flower. Additionally, when compared to diabetic control rats, the extract of both dosages significantly ($p < 0.01$) decreased serum total cholesterol, triglycerides, SGOT, SGPT, and BUN levels. [36]

Gyawali et al. (2015) the potential antidiabetic effects of a methanolic extract derived from *Urtica dioica* were evaluated using streptozotocin-induced diabetic mice and compared with a commercial polyherbal compound called "Jamedachurna." This blend of multiple herbs, well-known for its significant presence of alkaloids, tannins, and terpenoids, demonstrated excellent effectiveness in both controlled laboratory experiments (in vitro) and studies involving live animals (in vivo). [37]

Mawlieh et al. (2020) assessed the anti-diabetic efficacy of two herbal products, ADD1 (Dia Areca) and ADD2 (Asanadi Kahsaya Choorna), using rat models of streptozotocin-induced diabetes. Both formulations effectively reduced elevated blood sugar levels.The current investigation is done to validate the blood sugar-lowering effectiveness of these formulations using rat models of diabetes caused by streptozotocin. Groups four and five received test drug ADD1 in two different doses, whereas groups six and seven received test drug ADD2 in two different doses. Streptozotocin was administered at a medium dose (40 mg/kg body weight) to cause diabetes. The results show both the test compounds has decreased the elevated blood sugar level. [38]

Sharma et al. (2011) conducted a study on the ethanolic extract derived from the seeds of *Alangium salvifolium* Linn to evaluate its potential in treating diabetes. Tablet formulations containing the extract successfully cleared multiple quality assessments, affirming its therapeutic efficacy against diabetes. [39]

Suruse et al. (2012) formulated and evaluated a herbal anti-diabetic capsule containing dried extracts of *Gymnema sylvestre, Mucuna pruriens, and Ginkgo biloba*. The refined

formulation resulted in a notable reduction in serum glucose levels when compared with the conventional anti-diabetic drug. [40]

Sahu et al. (2018) the physicochemical properties and antidiabetic effects of a polyherbal formulation were investigated. This formulation consisted of hydroalcoholic extracts from *Andrographis paniculata, Azadirachta indica, and Moringa oleifera*. Results indicated a notable reduction in total cholesterol levels and an elevation in HDL, implying promising therapeutic efficacy. [41]

Nidhi et al. (2021) formulated a polyherbal anti-diabetic tablet and evaluated its physicochemical properties. The tablet exhibited good flow properties, moisture content, and disintegration time, indicating its suitability as a pharmaceutical formulation. [42]

Arora et al. (2013) the study explored the impact of a blend of natural ingredients including *Eugenia jambolana, Gymnema sylvestre, Tinospora cordifolia, Pterocarpus marsupium, and Terminalia bellerica* on diabetes. Results indicated promising effects in lowering blood sugar levels and exhibiting potential as an antidiabetic agent. [43]

Aziz et al. (2019) evaluated the antidiabetic activity of a polyherbal powder containing various medicinal plants. The powder exhibited good physicochemical properties and stability, suggesting its potential as a treatment for diabetes mellitus. Phytochemical qualitative analysis resulted identification of the presence of flavonoids, alkaloids, terpenoids, tannins, steroids, carbohydrates, and glycosides. According to physicochemical analysis, the polyherbal powder showed good flow properties and maintained stability throughout time. The multi-herbal powder was evaluated, which has a potential to treat diabetes mellitus. [44]

Uddandrao et al. (2020) the study explored the antioxidant and glucose-lowering capabilities of a polyherbal formulation (PHF) made from the fruits of *Piper nigrum*, bark of *Terminalia paniculata*, and bark of *Bauhinia purpurea*. Results showed that the PHF demonstrated notably superior antioxidant and glucose-lowering effects compared to the extracts from the individual plants. [45]

Shinde et al. (2021) formulated polyherbal pills using plant extracts and evaluated their antidiabetic potential. The tablets passed various quality tests, indicating their suitability for further study.The mixes took longer than a minute to finally dissolve, leading one to the conclusion that further study is necessary to fully comprehend the underlying mechanism of action and long-term toxicity of the produced tablet. [46]

Alam et al. (2013) investigated the antilipidemic and antidiabetic effects of a polyherbal formulation known as Ziabeetein powder in diabetic rats induced by streptozotocin. The study found that the formulation successfully decreased blood glucose levels and enhanced lipid profiles. [47]

Suman et al. (2016) conducted a study to assess the effects of a polyherbal aqueous decoction tablet (PHADT) on antihyperglycemic and antihyperlipidemic properties in diabetic rats. The research findings indicated notable enhancements in multiple parameters related to diabetes management. [48]

Patel et al. (2017) aimed to create a polyherbal anti-diabetic pill with a faster disintegration rate. The developed polyherbal compound exhibited satisfactory post-compression parameters, indicating its potential as a solid dosage form. [49]

Kwakye et al. (2017) emphasized the importance of stability studies on herbal products to ensure product quality and patient safety. They discussed stability issues associated with various herbal dose forms, highlighting the need for standardized stability testing protocols. [50]

Parasuraman et al. (2014) reviewed the importance of polyherbalism in traditional medicine systems like Ayurveda. They emphasized the synergistic effects of combining multiple herbs to enhance therapeutic efficacy. [51]

Gupta et al. (2013) developed herbal effervescent granules using *Calliandra haematocephala* leaf extract and evaluated their physicochemical properties. The granules exhibited good flow characteristics and dissolution properties. [52]

Kothari et al. (2017) investigated the antidiabetic properties of *Sesbania grandiflora* extract and compared its effects to Acarbose. The findings revealed significant inhibition of amylase activity, highlighting its potential as a natural treatment for diabetes. [53]

Panigrahi et al. (2016) Studied was the potential anti-diabetic effects of *Sesbania grandiflora* extract in a rat model of type 2 diabetes induced by a high-fat diet and low-dose streptozotocin. The findings showed significant reductions in blood glucose levels and improvements in insulin sensitivity following the extract's administration. [54]

Singh et al. (2014) conducted a study to investigate the antidiabetic effects of a hydro-alcoholic formulation containing extracts from *Luffa acutangula* and *Madhuca longifolia*.

Their findings showed a significant decrease in fasting blood glucose levels in diabetic rats after administering the formulation. [55]

Sabale et al. (2020) presented an investigation into herbal medications for managing diabetic complications. Their study focused on the role of garlic, known for its antidiabetic properties due to the presence of allicin, in reducing blood glucose levels. Additionally, they explored the wound-healing and anti-hyperglycemic activities of neem. The researchers developed a natural diabetes medication combining neem and garlic extracts and evaluated its efficacy using various tests such as disintegration, dissolution, hardness, angle of repose, and friability. [56]

Shrivastava et al. (2017) examined the medicinal properties of Agaricus bisporus, an edible mushroom, through phytochemical screening. Their study aimed to detect various bioactive compounds, including alkaloids, carbohydrates, glycosides, proteins, flavonoids, saponins, phenolics, and steroids, in the methanolic extract of Agaricus bisporus. The researchers assessed the oral dosage form of a herbal tablet derived from Agaricus bisporus and reported satisfactory results in terms of pharmaceutical quality. [57]

Saifi et al. (2017) conducted a study to determine the dose-response relationship of individual and combined herbal extracts in the context of hypoglycemia. They identified optimal doses for extracts from the stem barks of *Ficus bengalensis*, the fruits of *Momordica charantia*, the seeds of *Trigonella foenum graecum*, and *Syzygium cumini*. The anti-diabetic effects of modified doses were investigated in rats with alloxan-induced diabetes. Based on the identified optimum doses, the researchers formulated a polyherbal mixture with significant antidiabetic properties, as evidenced by biochemical results on the 21st day of withdrawal of blood samples. [58]

Chauhan L et al (2018) the current study's objectives were to develop and assess **a** transdermal medication delivery system for a herbal antidiabetic medicine. Herbal extract transdermal patches were created using the solvent casting technique.Further assessments of the adjusted formulations included FESEM investigations, in vitro drug release, and drug content.The study's findings demonstrated that the HPMC polymer-based herbal transdermal patch performed better in terms of physiochemical criteria like thickness, folding endurance, physical appearance, uniformity of weight, and moisture uptake investigations. The produced formulations had the lowest moisture content and moisture uptake and were determined to be uniform in thickness and folding durability.During the

in vitro trials, the patches made with 30% w/v of plasticizer released more medication from the herbal transdermal patch in 24 hours than those made with 20 and 25% w/v. [59]

Gauttam et al. (2013) developed hydro-alcoholic extracts of *Momordica charantia, Trigonella foenumgraecum,* and *Withania somnifera* in a specific ratio and evaluated their efficacy in managing diabetes. They formulated lipids containing the optimal extract combination within phosphatidylcholine and cholesterol vesicles. The vesicles underwent various evaluations for morphology, entrapment efficiency, and release profile. In a 21-day trial on diabetic rats, the encapsulated formulation showed superior anti-diabetic potential compared to the unencapsulated extract and was comparable to metformin. [60]

Jyothi D. et al. (2017) aimed to develop antidiabetic formulations with enhanced oral hypoglycemic activity, reduced side effects, and improved patient compliance by incorporating crude extracts of fenugreek seeds into capsule formulations. The capsule formulations were prepared by encapsulating fenugreek seed extract granules with varying concentrations of sodium starch glycolate as a superdisintegrant (ranging from 0% to 5%). The finished capsule formulations were subjected to evaluations such as in vitro drug release, weight variation, disintegration time, drug content (trigonelline), and in vivo antidiabetic activity. Their findings suggest that incorporating fenugreek seed extracts into herbal dosage forms could offer advantages over using raw plant ingredients for diabetes treatment. [61]

Telapolu S. et al. (2018) conducted a study on MD-1, a polyherbal preparation used for treating diabetes mellitus (DM), to assess its physical and chemical characteristics for routine quality control. The study proposed that MD-1 might enhance glucose uptake and modulate insulin sensitivity through mild PPAR agonism, similar to natural chemical agonists. It was suggested that MD-1's ability to mitigate diabetes-related issues could be attributed to its unique binding modalities within the formulation compared to synthetic ligands like thiazolidinediones (TZD). [62]

Petchi R. R. et al. (2014) conducted a study aimed at formulating a polyherbal mixture using ethanol extracts from *Moringa indica* leaves, *Tribulus procumbens* whole plant, and *Gymnema pentaphylla* stem bark. The research focused on evaluating the formulation's efficacy in preventing diabetes in animal models. Their findings demonstrated significant antidiabetic effects comparable to glibenclamide, as evidenced by biochemical and histopathological analyses. [63]

Panda A et al. (2013) focused on polyherbal antidiabetic formulations, investigating their effectiveness in diabetic rats induced with Streptozotocin (STZ). The study synthesized five different combinations of eleven medicinal plants and compared their efficacy with glibenclamide. The results showed that these combinations effectively reduced elevated lipid levels and blood glucose levels, bringing them close to normal. Additionally, liver function parameters were restored to normal levels. [64]

Farghaly U et al. (2014) a study examined the antidiabetic properties of fenugreek, onion, and garlic in rats with elevated blood sugar levels. The results demonstrated significant decreases in blood glucose levels in the groups given onion and fenugreek, while garlic led to the most rapid reduction. Despite the herbal combination significantly lowering blood glucose levels compared to the control group, its effectiveness was not as substantial as the standard drug, glimepiride. [65]

Mandlik R. V. et al. (2008) examined the hypoglycemic and antidiabetic properties of a herbal preparation, DRF/AY/5001, in normal and hyperglycemic rats induced with epinephrine and alloxan. Their findings suggested that the herbal formulation exerted its effects through both pancreatic and extra-pancreatic mechanisms. Specifically, it increased enzymatic antioxidants in pancreatic tissue and inhibited lipid peroxidation. Furthermore, the study indicated that the herbal preparation demonstrated significant antidiabetic activity comparable to that of glibenclamide. [66]

Majumdar P. et al. (2016) focused on developing and evaluating a polyherbal tablet for diabetes. Their formulations met acceptable standards, suggesting the potential for developing potent and stable oral dosage forms for diabetes treatment and providing insights into the synergistic effects of herbal combinations. [67]

Mandal et al. (2016) Researchers investigated the potential effects of methanol extract derived from Beetroots. Their study focused on examining its influence on blood glucose levels through an oral glucose tolerance test (OGTT). The results indicated a substantial decrease in glucose levels that correlated with the dosage of the extract administered. Additionally, the experiments revealed significant antinociceptive properties associated with the extract, implying potential therapeutic benefits. [68]

Al-Harbi LN et al. (2021) Conducted a study on the effects of methanolic Beetroot extract (BE) on dyslipidemia, liver fat accumulation, and liver damage in a rat model of type-2 diabetes mellitus (T2DM).Their research indicated that BE administration

increased antioxidant levels and PPAR expression in normal and T2DM rats, leading to reduced hepatic steatosis and liver damage. The findings suggest that higher doses of BE may offer greater benefits, underscoring its potential in diabetes management. [69]

Kumar S. et al. (2020) investigated the antidiabetic and haematinic efficacy of *Beta vulgaris* juice using an alloxan-induced experimental animal model. The study found that Beta vulgaris juice demonstrated anti-diabetic efficacy over the course of treatment, albeit slightly less potent than insulin. The results indicate the potential of *Beta vulgaris* as a haemolytic and anti-diabetic agent. [70]

Chauhan N. N. et al. (2021) aimed to develop a multi-herbal anti-diabetic pill and evaluate its physicochemical characteristics compared to commercially available herbal tablets. The study combined powdered extracts of *Enicostemma littorale*, *Aconitum heterophyllum* roots, *Picrorhiza kurroa* rhizomes, and *Piper longum* fruits to create the polyherbal anti-diabetic tablet. Various tests were conducted to assess the quality parameters. [71]

Harshmali K et al. (2019) the study assessed the efficacy of herbal formulations described in "Thalpathe Piliyam" for managing type II diabetes. It conducted a comparison between patients treated with a powdered herbal combination and those receiving conventional allopathic treatment. The results indicated notable reductions in fasting blood sugar, blood pressure, and heart rate in both treatment groups. These findings suggest that the herbal formulation could be beneficial for managing type II diabetes. [72]

Manekar S S et al (2014) the study used control and test groups of healthy rats that had been randomly given the diabetes-inducing drug streptozotocin (STZ). 500 mg/kg and 1000 mg/kg of a herbomineral formulation were given to diabetic rats. The goal of the current study was to determine whether a herbomineral formulation containing five different herbs and two minerals had any anti-diabetic effects on streptozotocin (STZ 50 mg/kg ip single dose)-induced diabetic rats. The effectiveness of the plant extract was comparable to that of the well-known hypoglycemic medication Glibenclamide and Insulin. [73]

Jain S et al. (2006) examined the hypoglycemic effects of herbal extracts in a type 1 diabetes animal model. Their study revealed varying degrees of hypoglycemic effects

with different herbal extracts, suggesting their potential as alternative treatments for diabetes. [74]

Kumar et al. conducted a study to assess the effectiveness of a polyherbal vati formulation for managing diabetes. The vati formulation consisted of several herbal ingredients, such as Giloy, Neem, Chirayata, Gurmar, Ashwagandha, Gokshura, Haritaki Chhoti, Bahera, Amla, Bilva, Kachur, Vasaka, Haldi, Kutki, Jamun, Shuddha Shilajit, Karela, Methi, and Malabar tree. The formulation was standardized by evaluating various physicochemical parameters, such as water-soluble and alcohol-soluble extractive values, moisture content, bulk density, pH, water-soluble ash, acid-insoluble ash, loss on drying, and organoleptic characteristics. The results showed that these parameters were within acceptable limits, indicating the quality and potential efficacy of the formulation for its intended use. [75]

Mahajan et al (2018) and colleagues conducted a study aimed at developing polyherbal eyedrops containing antioxidant-rich herbal extracts. They assessed the efficacy of these eyedrops in preventing diabetic cataract induced by galactose. The study utilized formulations that contained extracts from *Ginkgo biloba* leaves, Beetroot *(Beta vulgaris)*, and Amla (*Emblica officinalis*) fruits. Diabetic cataracts were induced in Wistar rats by giving them a daily dose of a 10% galactose solution for duration of 30 days.Prophylactic treatment with formulated eyedrops began concurrently with galactose administration and continued throughout the 30-day period. Examination using a slit lamp revealed clear lenses without signs of opacity in the group receiving prophylactic therapy. In contrast, rats treated solely with galactose exhibited dense nuclear opacity typical of diabetic cataract. The findings suggest that a polyherbal mixture with extracts from *Ginkgo biloba*, Beetroot, and Amla may be effective in preventing cataract development in individuals with diabetes. [76]

Gilchrist et al. (2014) A new nitrate-depleted Beetroot juice was developed for potential clinical trials to explore its impact on cognitive function in patients with type 2 diabetes mellitus, as part of a broader investigation into dietary nitrate effects in this population. This newly formulated juice was found to have similar sweetness, proton NMR characteristics, and taste as regular beetroot juice. After a two-week trial period, participants who consumed the active juice showed significantly faster simple reaction times compared to those who received the placebo (mean difference 13.9 ± 25.6 ms; 95% CI 3.8–24.0 ms; $p = 0.009$). However, no significant differences were observed in other

cognitive function tests between the two groups. The study concluded that the nitrate-depleted Beetroot juice placebo was suitable for use in dietary nitrate supplementation trials and highlighted that supplementing the diet with 7.5 mmol of nitrate significantly improved simple reaction times in patients with type 2 diabetes mellitus over the two-week period.[77]

Thissera et al. (2020) Researchers conducted a study to explore the potential anti-diabetic properties of *S. grandiflora*. They investigated its chemical composition and evaluated its impact on key enzymes involved in carbohydrate metabolism, specifically amylase and glucosidase. Through LC-HRMS dereplication analysis, they identified 32 metabolites in the leaves and twigs. Bio-guided fractionation and HPLC purification isolated 14 major metabolites, including two terpenoids, vomifoliol and loliolide, which exhibited glucosidase inhibitory activity (IC50 values of 64.5 µM and 388.48 µM, respectively). Additionally, the flavonoid quercetin showed the most potent glucosidase inhibition with an IC50 value of 17.45 µM. Molecular modeling studies supported significant binding interactions between these active compounds and the enzyme-binding pockets, affirming their inhibitory potential. Quantitative analysis indicated substantial concentrations of these inhibitors in the S. grandiflora extract, suggesting its potential as a dietary supplement for managing postprandial blood sugar levels. [78]

Reddy et al. (2019) investigated the therapeutic potential of a polyherbal formulation (PHF) in experimental animals with diabetic-induced nephropathy (DN). Diabetic rats were treated orally with PHF at doses of 250 and 500 mg/kg for approximately 16 weeks, while control groups received no treatment or a vehicle only. Following treatment, various markers of inflammation, renal function, and lipid metabolism were assessed, along with histopathological examination of kidney tissues. Animals treated with PHF exhibited significant improvements in multiple parameters associated with DN, including lipid profiles,renal function markers, inflammatory cytokines, and histological signs of kidney injury. These findings suggest that PHF treatment may offer renoprotective effects in DN, possibly through its effects on inflammation, lipid metabolism, and renal function. [79]

Pari L et al. (2001), the study investigated the potential antihyperglycemic effects of Diamed in rats with alloxan-induced experimental diabetes. Diamed was administered orally for 30 days at doses of 1.39, 1.67, or 1.94 mL/kg. This treatment resulted in notable reductions in both blood glucose levels and glycosylated hemoglobin. Furthermore, it led

to increases in plasma insulin and total hemoglobin levels. The highest dose, 1.94 mL/kg, exhibited the most significant effects and prevented weight loss in the rats. Compared to rats treated with glibenclamide at 600 mg/kg, Diamed-treated rats demonstrated significantly improved glucose tolerance in oral glucose tolerance tests. These findings underscore the potential of Diamed as an effective antihyperglycemic agent in experimental diabetes in rats. [80]

Mamatha M K et al (2020) Due to their lower side effect and affordable pricing, seasoner formulations have gained popularity recently, particularly in the treatment of type II DM. This review compares a suitable alternative polyherbal formulation with a monoherbal formulation to show the impact of polyherbal formulations on anti-diabetic activity. The group of illnesses known as diabetes mellitus may include hyperglycemia, which over time can seriously harm the intestines, blood vessels, eyes, kidneys, and nerves. [81]

Debnath B et al (2022) they wanted to create herbal neutraceutical tablets and test their effectiveness against diabetes in ob/ob mice. Using field survey techniques, five plant species were gathered based on oral interviews with Tripura's traditional healers. The findings imply that the newly created herbal pill might be suggested as a diabetic neutraceutical medication.[82]

Ghanshyam et al. (2016) a study investigated the effects of the methanolic extract of *Sesbania grandiflora* (MESG) on type 2 diabetic rats, which were induced using a combination of low-dose streptozotocin and a high-fat diet. For 28 days, the diabetic rats were treated orally with either metformin (10 mg/kg) or MESG at doses of 200 and 400 mg/kg.The study concluded with assessments conducted on the pancreatic-to-body weight ratio and hepatic glycogen levels.Administration of MESG led to a significant decrease in elevated blood glucose levels in the diabetic rats ($P < 0.05$), as well as normalization of other measured parameters. These findings suggest that MESG may possess antihyperglycemic and antihyperlipidemic properties, potentially improving conditions associated with insulin resistance. [54]

Rajit Kumar et al. (2015) the antidiabetic properties of *Sesbania grandiflora* flower were examined using a 70% alcoholic extract in rats with alloxan-induced diabetes. Treatment with *S. grandiflora* extract at dosages of 250 and 500 mg/kg significantly reduced diabetic symptoms compared to untreated diabetic rats, with statistical

significance ($P < 0.01$). Additionally, both dosages of the extract significantly decreased serum levels of total cholesterol, triglycerides, SGOT, SGPT, and BUN compared to diabetic control rats ($P < 0.01$). These findings suggest that the 70% alcoholic extract of *S. grandiflora* flowers exhibits a dose-dependent antidiabetic effect. [83]

Kanagavalli et al. (2023) assessed the efficacy of copper oxide nanoparticles (CuO NPs) synthesized using *S. grandiflora* leaves in inhibiting amylase and glucosidase enzymes and their potential antibacterial activity. The CuO NPs exhibited strong inhibitory effects against both enzymes, indicating potential antihyperglycemic activity. Moreover, the NPs demonstrated significant antibacterial activity against various pathogens, including Staphylococcus aureus, Escherichia coli, and Pseudomonas aeruginosa. The study highlighted the promising biological activities of Sg-CuO NPs, suggesting their potential for treating bacterial infections associated with hyperglycemia. [84]

Abdullah et al. (2023) developed and evaluated fortified yogurts containing extracts from *Cinnamomum verum, Elettaria cardamom, Beta vulgaris,* and *Brassica oleracea*. The sensory evaluation revealed favourable acceptability of the fortified yogurts, which also exhibited enhanced shelf life compared to plain yogurt. Phytochemical analysis showed the presence of bioactive compounds with angiotensin-converting enzyme (ACE) inhibitory activity in the flavoured yogurts. These findings suggested that the bioactive substances in the fortified yogurts may have potential health benefits, including ACE inhibition. [85]

Al-Harbi et al. (2021) the research investigated the mechanisms by which methanolic Beetroot extract (BE) exhibits anti-dyslipidemic and hepato-protective effects in a rat model of type-2 diabetes mellitus (T2DM). The results demonstrated that treatment with BE led to significant reductions in serum levels of aspartate and alanine aminotransferases, hepatic malondialdehyde, tumor necrosis factor, interleukin-6, and mRNA expression of Bax, cleaved caspase-3, and SREBP 1/2. Additionally, BE markedly increased hepatic levels of total glutathione, superoxide dismutase, and mRNA expression of Bcl2 and PPAR in both normal and T2DM rats. These findings suggest that BE protects against hepatic steatosis and liver damage through its hypoglycemic, insulin-sensitizing, and antioxidant properties, and by upregulating PPARα. [86]

Kumar et al. (2020) the investigation focused on assessing the anti-diabetic and hematinic properties of *Beta vulgaris* juice in an experimental animal model induced with

alloxan. Diabetes, which involves disturbances in glucose regulation, was the main focus of the study. The diabetic control rats showed notably higher fasting blood glucose levels in comparison to the normal control rats.However, rats administered Beta vulgaris juice demonstrated hematinic and anti-diabetic efficacy on days 7, 14, 21, and 28 post-treatment. The study indicated that the anti-diabetic effect of *Beta vulgaris* juice, while slightly less potent than insulin treatment, yielded statistically significant results ($p < 0.001$). [87]

Bolkent et al. (2020), the researchers investigated the impact of a traditional Chinese medicine herb, known for its hypoglycemic properties, on pancreatic β cells and blood glucose levels. According to the study, diabetic subjects exhibited a reduction in β cell count within the Islets of Langerhans, decreased secretion, wider intercellular spaces, and some β cells showed swelling of the granular endoplasmic reticulum cisternae. In streptozotocin-induced hyperglycemic rats, the herbal extract effectively decreased blood glucose levels without affecting body weight or blood glucose levels in non-diabetic subjects. The most significant reduction in blood glucose levels occurred after 42 days of treatment. Additionally, diabetic rats treated with the herb showed a notable increase in body weight compared to untreated diabetic rats. [88]

Isabela Micheletti Lorizola et al. (2021) in study explored the potential benefits of supplementing mice on a high-fat diet with Beetroot stalks and leaves, which are often discarded despite containing bioactive flavonoids known for their anti-inflammatory and antioxidant properties. The researchers used male Swiss mice aged six weeks, dividing them randomly into five groups: a standard diet group (CT) and a high-fat diet group (HF). The HF group was further subdivided into three treatment groups, each receiving beet stalks and leaves prepared using different methods (oven-dehydrated, lyophilized, or extracted). While hepatic triglyceride levels showed no significant changes, supplementation with beet stalks and leaves did result in a modest improvement in glucose homeostasis and a reduction in TNF protein levels. However, the precise mechanism underlying the observed glucose homeostasis enhancement with HFSL treatment remains uncertain, prompting further investigation into whether it involves increased pancreatic insulin production or enhanced glucose absorption by skeletal muscle and white adipose tissues. [89]

Helmy, S.et al.(2021) A study was conducted to investigate the potential anti-diabetic properties of leaf extracts from *Purslane (P), Chard (CHA), and Chicory (CHI)* in

streptozotocin-induced diabetic rats. The study involved oral administration of various combinations of these extracts over a 40-day period, at a dose of 250 mg/kg body weight. A control group received Metformin at 100 mg/kg body weight for comparison. The study measured insulin levels, Fructosamine levels, fasting blood glucose, and oral glucose tolerance. Significant findings revealed that extracts rich in Purslane or Chicory demonstrated pronounced hypoglycemic effects compared to Metformin. Additionally, these extracts led to improvements in liver and pancreatic histology in diabetic rats. These findings suggest that the combination of leaf extracts may hold promise as natural treatments for managing diabetes. [90]

Haewook Han et al. (2015). In their review, Haewook Han et al. covered various aspects related to kidney stone formation, including epidemiology, mechanisms, diagnosis, pathophysiology, and techniques for assessing stone risks in both new and follow-up patients. The review concluded that preventing kidney stones involves individualized management of medical and dietary care, considering the unique risks associated with each type of stone. Identifying and addressing risk factors play crucial roles in preventing the recurrence of kidney stones. Dietary oxalate, found in foods such as Spinach, Beets, and Rhubarb, may contribute to stone formation by increasing oxalate excretion in urine, thereby raising the risk of calcium oxalate stones. [91]