PREFACE

The thesis entitled **"Bioavailability enhancement of drug molecule through stratum corneum by using natural penetration enhancers viz. *B.Lanzan* and *S. Chinesis*"** Philosophy (Ph.D.) contains the research work carried out during the period of March 2016 to July 2024, at the Department of Pharmaceutics, Pacific University of Higher Education and Research, Rajasthan, India under the supervision of Prof. A. Venkatachelam and Dr Yogesh V Ushir. This thesis contains introduction, literature review, the detailed procedures for extraction of oil, its evaluation, the formulation of gel, its evaluation and characterization by physico-chemical and spectroscopic methods and finally pharmacokinetic evaluation in animal.

The formulated of colchicine were subjected to the physicochemical parameters. The gel contains colchicine as API along with IPA, TEA, PEG, methyl paraben, propyl paraben mixed with water. Before preparing formulation, the ingredients were evaluated for their compatibility which was found negative and hence ingredients used in final formulation.

- The formulated gel was evaluated for *in-vitro* permeation studies by using snake and goat skin. The obtained data was compared with standard permeation enhancer i.e. capsaicin. The data shown the ability of drug molecule to get into the blood through the skin. The selected formulation in the *in-vitro* studies were subjected to drug release kinetics in the rat. The area where gel was to be applied was shaved and cleaned. The selected formulations were applied on the skin of rat. The sampling was done by retro-orbital. The acute toxicity was performed on albino mice. Acute toxicity studies reveled that, no any abnormalities were shown by the mice throughout the study. Prepared gel formulations were subjected to skin irritation test and allotted score depending on the reaction shown on the skin of volunteers the score below 2 shows acceptability of gel formulations to be applied on skin. The optimized gel showed acceptable physical properties, pH, viscosity, spreadability, and extrudability.

The release of Phytoconstituents would in controlled manner at the site of action thereby decrease the possible side effects Mathematical models play a vital role in the interpretation of mechanism of drug release from a dosage form. It is an important tool to understand the

drug release kinetics of a dosage form. The drug release was found to be best fitted by Higuchi square root model r2 =0.865 for BL4 and SCO4 and r2 =0.865 for BL5 and SCO5 and r2 =0.865 for BL6 and SCO6 which implies that release of drug as a square root of time dependent process and diffusion controlled. The dissolution data was also plotted according to Hixson – Crowell r2 =0.9182 for BL4 and SCO4 and r2 =0.9182 for BL5 and SCO5 and r2=0.0.9182 for BL6 and SCO6 which describes that change in surface area and diameter of the formulation with the progressive dissolution as a function of time. Also, the model Korsmeyer-Peppas power law equation states the type of diffusion, which was evaluated by value, n (Release exponent) which is higher than 0.8751 which implies that the drug release from the system follow Super case II transport

In the end relevant references are included along with list of papers presented & published and reprint of publications from the present study is also included. The contents of this thesis may be useful for to work on natural penetration enhancers and open new vista in firmament of designing and developing topical gel for any DDS. The whole thesis was divided into nine chapters as follows:

Chapter 1: Introduction

Represented the detailed introduction about transdermal patch, NSAID's and *Simmondisia chinesis family of Simmondsiaceae and the B. Lanzan family of Anacardiaceae.*

Chapter 2: Need for study Explained about necessity of study **Chapter 3: Aim and Objectives**

The aim of the study is to make transdermal formulations of a few anti-inflammatory agents like extracts of seeds of *B.lanzan* family Anacardiaceae and extracts of seeds of *Simmondisia chinesis* family Simmondsiaceae.

Objectives:

A vast summary of literature survey gives some views, which hypothesized as follows,

- To Collect and identify, authenticate of plants materials and seeds.
- To study Morphology and microscopy of plant material.
- To study Isolation methodology
- To perform Qualitative analysis for isolated oil
- To study Toxicity of isolated penetration enhancers.

- To perform preformulation study of isolated components (oil)
- To prepare formulation using isolated oil.
- To evaluate formulated product (Medicated gel)
- To perform comparative drug release studies *(in vivo and ex vivo)*
- To establish of Pharmacokinetics in rat
- To establish of release kinetics.
- Accelerated stability studies

Chapter 4: Review of literature

Seeds of *B.lanzan* family Anacardiaceae and extracts of seeds of *Simmondisia chinesis are* a miracle herb widely used by Indian tribes for treating various diseases. Literature review reference for the pharmacological properties, pharmacognostic studies and phytochemical investigation of these two seeds extracts.

Chapter 5: Materials and methods

The Phytochemical investigation of a plant involves authentication and extraction of plant material; qualitative and quantitative evaluations; separation and Parallel to this may be the assessment of pharmacological activity.

Chapter 6: Results and discussion

The study comprises standardizing seed extracts from the *Simmondisia chinesis family of Simmondsiaceae and the B. Lanzan family of Anacardiaceae* using a variety of characteristics, such as ash value, extractive value, and loss on drying, preliminary phytochemical screening, and fluorescence analysis. After standardization, the chemical components and % yield were extracted for additional screening. Following drug characterization, pre-formulation experiments were conducted to determine the drug's organoleptic properties.

Chapter 7: Conclusion

Chapter 8: Summary

Chapter 9: Biblography