PREFACE

In recent times, focus on plant research has increased all over the world and a large volume of evidence has been grooming together illustrating the immense potentiality of medicinal plants explored in various traditional systems. Research in traditional medicine has led to the development of many modern medicines. However, it is very interesting to note that there is no perfect cure available in the modern system of medicine for treating various ailments including hepatic disorders; only certain herbal preparations are available to treat these vulnerable diseases.

Liver, the biggest organ/gland in the vertebrate body, composed of spongy mass of wedge shaped lobes with many metabolic and secretary functions. Accordingly, the disorders associated with this vital organ are numerous and varied. A strict hepatological delineation of these disorders or systematic classification of liver therapeutic agents is practically not possible. Probably, this is the reason for the existence of nearly six hundred commercial therapeutic preparations against hepatitis alone. Therefore, it can be concluded that a most suitable therapeutic agent which can attend to the welfare of the liver has not yet been found. Most preparations support or promote the process of regeneration of the liver. It is in this context, evaluations of anti-hepatotoxic remedial solutions are highly needed.

In spite of tremendous strides in modern medicines, there are hardly any drugs that can stimulate liver function or offer protection to the liver damage or help in regeneration of hepatic cells. However, there are number of herbal formulations commercially available and widely used for treating liver disorders in Ayurvedic medicine as well as in case of other traditional system of medicine. But no scientific
data has been documented till date to support the efficacy, safety and mechanism of action of these traditional remedies.

The situation/background discussed above warrants for development of a safety, effective and scientifically validated hepatoprotective based on the remedial methods used in traditional medicine at an affordable price for the rural poor population.

The thesis entitled “Phytochemical and pharmacological evaluation of *Ricinus communis* leaves and seeds” is an attempt to isolate and characterize the phyto constituents from the bioactive extracts of plant (*Ricinus communis* leaves and seeds) selected for these studies and also to unfold the hepatoprotective activity, anti-inflammatory and analgesic properties.

**Chapter – I** comprises an general introduction, Importance of herbal / natural products in health care aspects explaining the extensive use of herbal medicine including screening natural sources such as plant extracts and microbial fermentation has led to the discovery of many clinically useful drugs. It also explains herbal medicines for liver diseases. Breakthrough in the field of research on natural products. Role of natural products as antioxidants and role of antioxidants in hepatotoxicity. Since our study includes the hepatoprotective activity an attempt is made to search the drugs for the treatment of liver diseases with certain efficacy and safety.

**Chapter – II** describes the basic information regarding introduction about the plant *Ricinus communis.*, vernacular names, taxonomical classification, geographical distribution, plant description and historical usage along with the past phytochemical and pharmacological work reported on *Ricinus communis.*
Chapter – III describes the materials and methods used in the collection of plant material, processing the plant material through shade drying and pulverizing and then subjecting for extraction with 95% ethanol and extraction with chloroform separately. Qualitative chemical tests for detecting the presence of various chemical constituents (both active and inactive). Isolation of active chemical constituents using column chromatographic techniques using petroleum ether, diethyl ether, ethyl acetate and chloroform for elution of the various compounds. Characterization of these compounds has been attempted through UV, IR, $^1$HNMR, $^{13}$CNMR and MASS spectroscopic techniques and assessed through comparison of melting points and TLC operations with established standard samples. The investigations lead to the identification of ten compounds namely triterpenoids (α-amyrin acetate, β-amyrin acetate and lupeol), two steroids (β-sitosterol and stigmasterol), one flavone (apigenin), four indole alkaloids (harmine, heyneanine, voacristine and apparicine) besides of three phenolic acids (salicylic acid, vanillic acid and syringic acid) in the examination of marc.

Chapter – IV describes about the hepatoprotective activity of ethanolic extract of seeds and chloroform extract of leaves of Ricinus communis. The results indicated no degeneration in the case of section of the liver treated with Tween 80 while it showed degeneration as observed through majority of vacuolated cells as well as massive centrilobular necrosis when treated with carbon tetra chloride. However when the process of the study extended to carbon tetra chloride in presence of sylimarin and also in case of treatment with carbon tetra chloride for chloroform extract by the author revealed a few vacuolated cells per lesion and focal necrosis of one or two cells per lesion leading to conclude that ethanolic extract of seeds of Ricinus communis is effective in hepatoprotective activity.
Chapter – V describes about the anti-inflammatory activity of ethanolic extract of the leaves and seeds of *Ricinus communis*. The experiments revealed that there is a dose dependence on the anti-inflammatory activity in case of *Ricinus communis* leaves. The results indicated that there is a more or less equal anti-inflammatory activity in case of use of 400mg/kg p.o of *Ricinus communis* as against 100mg/kg p.o of diclofenac sodium in terms of oedema volume.

Chapter – VI describes about the analgesic activity studies of ethanolic extract of the seeds and leaves of *Ricinus communis*. The results of acetic acid writhing test in mice showed a significant decrease in number of wriths in ethanolic extracts of both seeds and leaves of *Ricinus communis* suggesting peripheral analgesic effect indicating more or less equally successful in serving the cause of pain relief on par with an equal dose of aspirin. The anti-inflammatory activity and analgesic activity of ethanolic extract of the seeds of *Ricinus communis* may be attributed to steroids and triterpenoids.

Chapter – VII presents the summary and conclusion of the work which encompasses the phytochemical studies confirming the presence of alkaloids, carbohydrates, flavonoids, triterpenoids, proteins, resins and steroids. The chemical investigations revealed isolation of thirteen compounds namely, $\alpha$-amyrin acetate, $\beta$-amyrin acetate, lupeol, $\beta$-sitosteral, stigmasterol, apigenin, harmine, heyneanine, voacristine, apparicine, salicylic acid, vanillic acid and syringic acid. Out of which $\alpha$-amyrin acetate, $\beta$-amyrin acetate, lupeol, apigenin, harmine, heyneanine, salicylic acid, vanillic acid and syringic acid were isolated for the first time from the leaves of *Ricinus communis*. The references cited in the thesis were presented in chronological order at the end of each section.