CHAPTER 5
SUMMARY AND CONCLUSION
Summary and Conclusion

Chapter 5

5 SUMMARY AND CONCLUSION

Medicinal herbs have been in use in one form or another, under indigenous systems of medicine like Ayurveda, Sidha and Unani. India, with its traditional background, needs to increase its share in the world market. But unlike China, India has not been able to capitalize on this herbal wealth by promoting its use in the developed world, despite their renewed interest in herbal medicines. This can be achieved by judicious product identification based on diseases prevalent in the developed world for which no medicine or palliative therapy is available. Such herbal medicines will find speedy access into those countries.

The present work was undertaken to fulfill the following objectives:

1. Collection and authentication of herbal antidiabetic Unani drugs viz., *Lactuca sativa*, *Rumex vesicarius*, *Gymnema sylvestre*, *Portulaca oleracea* and *Syzygium cuminii* from different regions.
2. Preparation of extracts of herbal drugs in different solvents.
4. Standardization and development of HPTLC fingerprints of different drug extracts.
5. Isolation and development of chemical markers by chromatographic techniques and their structural elucidation by spectral data and chemical reactions.

On the basis of literature and five plants were selected for a study of their efficacy as an anti-diabetic. To make the study more relevant towards the purpose of standardization,
which was the original aim of this work, the plants were sourced from four different geographical regions, viz., Delhi, Amritsar, Chennai and Lucknow. This provided for the recording of any differences in the activity of plants owing to the differences in geographical source and thus arrive at a list of plants with potent antidiabetic activity belonging to any specific geographical location. The selection of the plants was done keeping in mind that new, previously untested or not much studied plants may be compared with a few well established anti-diabetic plants.

The plants finally selected were:

1. *Syzygium cumini* seeds
2. *Portulaca oleracea* seeds
3. *Gymnema sylvestre* leaves
4. *Lactuca sativa* seeds
5. *Rumex vesicarius* seeds

They were identified and authenticated by Dr. M. P. Sharma, Taxonomist, Department of Botany, Jamia Hamdard, New Delhi. Voucher specimens were deposited in the Phytochemistry Research Laboratory, Department of Pharmacognosy and Phytochemistry, Faculty of Pharmacy, Jamia Hamdard, New Delhi, India.

Then study of anti-diabetic activity of the aqueous extracts of the drugs was undertaken. An overview of the results revealed that the aqueous extracts of *S. cumini*, *G. sylvestre*, *L. sativa* and *R. vesicarius* decreased the blood glucose of normal animals. In normal physiology glucose homeostasis is maintained by two kinds of hormones, including insulin and counter-regulatory hormones (glucagon, growth hormone, cortisol and catecholamines). Despite the presence of such counter-regulatory hormones extracts produced hypoglycaemia, indicating that the extracts possess the pharmacological activity.

In GTT, the blood glucose levels in control animals rose to a peak value around 120-130 mg/100ml after 30 min of glucose load. The aqueous extracts of the plants significantly suppressed the peak rise of blood glucose after the glucose load. The possible mechanism...
may be that the extracts increased the peripheral glucose utilisation or at the pancreatic level by stimulating the secretion of insulin in response to increased glucose.

Administration of streptozotocin (STZ) destroys β-cells of the islets of Langerhans in pancreas. Destruction of β-cells in the pancreas causes marked decrease in serum insulin levels. However, the aqueous extracts exhibited antihyperglycaemic activity in STZ-induced diabetic rats. The possible mechanism may be either the extracts increase the glucose utilisation in the periphery or decrease the endogenous glucose production in the liver. The possibility of either one or more mechanisms with each extract contributed to the activity can not be ruled out. The mechanism via intestinal delay or inhibition of glucose absorption can be ruled out as the animals used in the study were fasted overnight prior to the start of the experiment.

From the overall results it was evident that extracts of *S. cuminii*, *G. sylvestre*, *L. sativa* and *R. vesicarius* exhibited hypoglycaemic activity in normal rats as well as STZ-induced diabetic rats. The aqueous extracts of *Portulaca oleracea* seeds did not show any activity in any of the tests. When the percent decrease in blood glucose levels in the STZ diabetic rats produced by extracts of the same plant sourced from different places was compared to see whether the difference in the geographical source also led to a difference in the antidiabetic activity of the plant (Table 3.13), it was found that there was no specific or considerable difference in the activity of drugs from different regions in any of the models studied. On the basis of above results and discussion, only two plants viz., *Lactuca sativa* and *Rumex vesicarius* were finally selected for the further work.

HPTLC fingerprinting of the aqueous extracts of *Lactuca sativa* and *Rumex vesicarius* seeds from four places viz. Delhi, Amritsar, Lucknow and Chennai was performed. The solvent systems were Ethyl acetate: Glacial acetic acid: Formic acid: Water :: 11: 1.3: 1.3: 2.8 for *Lactuca sativa* seeds, Ethyl acetate: Glacial acetic acid: Water:: 5:2:1 for *Rumex vesicarius* seeds. The HPTLC fingerprint patterns of drugs from different regions were developed. These chromatograms can be used for verifying the identity and purity of these drugs.
Chapter 5

Summary and Conclusion

*Lactuca sativa* is an erect annual or biennial, about 0.3-0.9 m. high or sometimes up to 2 m. Stem-leaves erect-patent, obovate-oblong, undivided, sinuate-toothed or runcinate, sagittate-amplexicaul, sessile, subentire or acute-denticulate, 2-9 cm. long or more. The seeds have a strong odour; hypnotic, analgesic, aphrodisiac; good for headache and ophtalmia; prevent the fall of hair; the oil from the seeds has a sharp taste; good for the brain if applied to the head, the ear, or the nose; hypnotic, antipyretic; relieves inflammations and headache. Compounds like campesterol, stigmasterol, sitosterol, 5-dehydro-avenasterol, stigmas-7-en-3β-ol and 7-dehydro-avenasterol have been previously isolated from the seeds of *L. sativa*. Lactones like 3β-Hydroxy-11β, 13-dihydroacanthospermolide and 3β, 14 dihydroxy-11β, 13-dihydrocostunolide along with hydrolauctacin, lactucin and lactupicrin have been reported from the aerial parts (Mahmoud *et al.*, 1986). A guaiane type sesquiterpene type glycoside, lactucide C, was isolated along with lactuside A and macrolininside A. A Unani drug, *Safoof-e-Shori* containing *L sativa* showed antiseptic activity in urinary tract infection in UTI patients. The leaves of *L sativa* exhibited potent enzyme inhibitory activity against Dopamine-β-hydroxylase enzyme, an enzyme responsible for conversion of dopamine to nor-epinephrine.

The phytochemical investigation of *Lactuca sativa* seeds yielded four phosphoglycerides namely glyceryl-1.2-bis-heptadec-8-enoate-3-phosphate, glyceryl-1-octadec-9-enoate-3-phosphate, glyceryl-1-octadec-9-enoate-2-hexadecanoate-3-phosphate, glyceryl-1-octadec-9-enoate-2-octadecanoate-3-phosphate and stigmasterol.

*Rumex vesicarius* is an annual, monoecious, glabrous plant, branched from the root, rather fleshy, pale green, 15-30 cm. high, dichotomously branched. Leaves 2.5-7.5 cm., obtuse or acute, elliptic ovate or oblongl, 3-5-nerved. base cuneate rarely cordate or hastate, petiole as long as the blade. The herb is very sour, laxative, stomachic; useful in heart troubles, pains, tumours, constipation, alcoholism, diseases of the spleen, hiccough, flatulence, asthma, bronchitis, dyspepsia, omitting, piles; causes biliousness (Ayurveda). The herb is cooling; tonic, analgesic; useful in scabies, leucoderma, toothache, bites and stings of poisonous animals; checks nausea; promotes appetite (Unani). The leaves are
cooling and aperient, and, to a certain extent, diuretic. The root is tonic, astringent, antiscorbutic, refrigerant, anthelmintic, slightly aperient and diuretic. The seeds of several species of Rumex are used as antidyssenteric remedies in South Africa. The seeds are said to have similar properties, and are prescribed roasted in dysentery, and as an antidote to scorpion-stings. The leaves are considered an antidote to snake-venom, and the seeds an antidote to scorpion-venom (Charaka). The leaves are also applied externally to the part bitten. Neither the leaves nor the seeds have any value in the antidotal and symptomatic treatment of snake-bite or scorpion-sting.

The phytochemical investigation of Rumex vesicarius seeds yielded four flavonoids characterised as 5,7,3’-trihydroxy-4’-methoxy-8-[oct-5′ (8′′)-en]-3[2H]-dihydroflavone, 5, 7, 3’, 4’-tetrahydroxy-6-methoxy-8-[hept-3′ ′ (7′′)-en]-3[2H]-dihydroflavone, 5,7,3’-trihydroxy-4’-methoxy-8- (but-3-ene)-2′-(3a. 5a, 7a. 3’a. 4’a-pentahydroxy)-3a[2aH]-dihydroflavone]-3-[2H]-dihydroflavone and 5,7,2’, 3’-tetrahydroxy-4’-methoxy-8-{(5a, 7a. 2’a, 3’a, 4’a pentahydroxy)-8a-[1′′,2′′-dihydroxyhept-4-en-7′′-oic acid]-3a[2aII]-dihydroflavone]-3[2H]-dihydroflavone along with three phosphoglycerides, a sterol, a sterol diglycoside and an ester characterised correspondingly as glyceryl-1-octadec-9′-enoate-3-phosphate, glyceryl-1, 2-bis-hexadecanoate-3-phosphate, glyceryl-1-octadec-9′-enoate-2-octahexanoate-3-phosphate, stigmasta-5. 22-dien-3β-ol. stigmasta-5-en-3-O-β-D-glucopyranosido (4′→1′′)-O-β-D-glucopyranoside and n-heptacosanyl-1-hexanoate.