Summary and Conclusion
CHAPTER V SUMMARY AND CONCLUSION

The present work is an account of pharmacognostical and antimicrobial activity of 6 species of Vitex such as Vitex trifolia L., Vitex leucoxylon L.f., Vitex pinnata L., Vitex altissima L.f., and Vitex negundo L. var. purpurascens Sivar. & Moldenke., Vitex negundo L. var. negundo and Vitex peduncularis Wallich ex. Schauer. Since Vitex is a potential medicinal plant, it is selected for the present study. The six species of Vitex are collected from the high altitude hills as well as from the plains exhibiting distinct variations both in the external features as well as in microscopic profile.

Vitex has some important medicinal properties. It has anticancerous activity. It is used for curing premensural epilepsy, premensural herps simplex, premensural mouth ulcers, premensural syndrome and related mensural disorders, breast tenderness, oedema, tension, headache, constipation, depression. It has certain hormonal effects (ie) low progestrone level increased with Vitex and also increases breastmilk production.

The two major aspects of study on the 6 species of Vitex are pharmacognosy and antimicrobial activity.

The pharmacognosy study provides detailed account of morphological descriptions followed by microscopic structures (i.e.) anatomical structures, such as, structure of lamina, midrib, petiole, petiolule, venation patterns, epidermal morphology, stomatal types, mesophyll organisation, anatomical structure of stem, root, nature of periderm, cellular inclusions like crystals, starch grains, tannins etc. The relevance of microscopical features in the herbal science is highlighted in the discussion. The pharmacognostic study is of great diagnostic value. It also provides ecological and geographical data.
The leaves are of mostly 3 – 5 foliate. The leaf shape exhibits a high spectrum of variation ranging from ovate to elliptic to lanceolate to oblong. *Vitex altissima* is unique among the species studied because of the presence of winged petiole. The leaf margin also shows some specificity. In *Vitex peduncularis* the leaf margins are undulate. The morphological diagnostic features among the two varieties of *Vitex negundo* are, the leaves are grey or white pubescent, corolla blue or violet with pink tinge and filaments white in *Vitex negundo* var. *negundo* where as in *Vitex negundo* var. *purpurascens*, the leaves are purple pubescent and the filaments are dark purple.

In addition to the morphological characters, the anatomical characters were also important for the diagnostic purpose. *Vitex pinnata* can be distinguished from the other species by the presence of interxylary phloem. The vascular bundles of the midrib do not exhibit much variation. It is broad or narrow, arc / bowl shaped collateral strand.

Cell inclusions, especially calcium oxalate crystals showed interesting variations both in the morphological categories and distribution patterns. Among the six species of *Vitex* studied, star shaped calcium oxalate crystals are seen along the veins in *Vitex trifolia* and *Vitex negundo* var. *purpurascens*. In *Vitex pinnata* secondary xylem consists of large tanniniferous cells with calcium oxalate crystals and druses. These characters have been well recognised by the pharmacognosists in dealing with the phytodrugs.

Presence of starch grains is also of diagnostic value. In *Vitex trifolia*, *Vitex pinnata*, *Vitex negundo* var. *purpurascens* and *Vitex negundo* var. *negundo* starch grains are abundant in xylem fibres. In the rest of the species no obvious cell inclusions are seen. In the present study gelatinous fibres are seen only in the old stem of *Vitex negundo* var. *purpurascens*. 
In the root, the periderm is also important for the diagnostic purpose. In *Vitex trifolia* and *Vitex negundo var. purpurascens*, broad homogeneous periderm is seen. In *Vitex altissima* and *Vitex peduncularis* irregularly fissured periderm is seen. In *Vitex pinnata* the periderm is broad and in this polyderm type of phelloderm is more evident.

The preliminary phytochemical studies, which are corroborative to microscopic investigations, have offered information of the inorganic purity as well as the presence of some unknown fluorescent compounds in the plant. The results obtained from the study of fluorescence analysis, ash content, extractive values and preliminary phytochemical analysis may be used as a tool to test the percentage and purity of the plant. The results may also be used as a tool to test the presence of adulterants if any.

Adulteration is the act of substitution of the original material partially or wholly with other similar looking substances. The plant drugs are adulterated by substitution with substandard materials and artificially manufactured substance. So, the macroscopic, microscopic and the chemical analysis of the drug materials are used to identify the original plant product and also used to detect the presence of any adulterants.

Another important aspect of the study is the antimicrobial activity of *Vitex*. The present study focused on the presence of antimicrobial agents in the *Vitex* species tested. The medicinal properties are due to the presence of secondary metabolites. The selected plants contain active principles such as alkaloids, steroids, terpenoids, flavonoids, tannins, phenols, quinine, coumarin, catachin etc. In *Vitex* the presence of particular compounds such as *Viteosin A, Vitexicarpin, Pentacyclic terpenoids, Pedunculariside, anguside*, etc. may act as antimicrobial agents.
Among the different solvents used the maximum zone formation was seen in chloroform and methanol extracts because they are high polar solvents and so more compounds were extracted from the plant materials. These compounds act as bioactive principles. The minimum inhibition was seen in water extract. All the extracts showed activity against both gram-positive and gram-negative bacterias. So these plant extracts have potent medicinal values.

In the present scenario natural medicines are gaining prominence because they are economical, easily available and relatively free from side effects. The increased global demand for phytomedicines is reflection of positive impact of consolidated efforts aimed at reviving the science of phytopharmacy.