CHAPTER - V

Summary and Conclusions
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SUMMARY AND CONCLUSIONS

Ayurveda is our traditional system of medicine which has been in practice since time immemorial. Ayurvedic materia medica contains a vast knowledge of drugs derived from medicinal plants. This treasure of knowledge is being explored for the development of plant based drugs that can be used as safer and cheaper alternatives to currently available drugs of modern medicine.

Considering the increasing emergence of drug resistance in bacteria and fungi and the high toxicity of currently available antibacterial and antifungal drugs, development of novel drugs for treating bacterial and fungal diseases is urgently required. Since our country is endowed with an enormous wealth of medicinal plants, bioprospection of this natural wealth could provide new herbal alternatives to currently available antimicrobial drugs, that can be employed to control the increasing drug resistance using different strategies.

1) With this long term objective, the present work was undertaken to study the antimicrobial properties of medicinal plants present in the surrounding region of Akola. Extracts of parts of 25 medicinal plants prepared in petroleum ether, acetone and 90% methanol were screened for the presence of antibacterial activity against five bacteria viz., S. aureus, B. cereus, P. vulgaris, E. coli and P. aeruginosa. Extracts of three other plants P. zeylanica, T. bellirica and T. chebula were tested simultaneously for the purpose of comparison because there are many reports revealing the presence of strong antimicrobial activities.
in these plants.

Out of total 28 plants, ten plants viz. *A. precatorius* (leaves), *B. serrata* (leaves and bark), *C. arborea* (bark), *E. officinalis* (leaves), *S. febrifuga* (bark), *S. cumini* (leaves), *W. fruticosa* (flowers), *P. zeylanica* (roots), *T. bellirica* (fruits) and *T. chebula* (fruits) exhibited significant antibacterial activities against four test bacteria out of five tested. Hence the organic extracts of these plants were further tested against nine bacteria at (0.1g/ml) concentrations. Aquous extracts of these plant were also tested at (0.5g/ml) concentration. Results of these investigations indicated that *A. precatorius* (roots), *C. arborea* (bark), *E. officinalis* (leaves) and *W. fruticosa* (flowers) together with the *P. zeylanica* (roots), *T. bellirica* (fruits) and *T. chebula* (fruits) possess antibacterial potential against all the nine test bacteria.

2) Petroleum ether, acetone and 90% methanol extracts of these plants were also tested against *M. gypseum, C. albicans, C. neoformans* and *F. oxysporum*. These experiments indicated that all the three extracts of *P. zeylanica* and acetone and methanol extracts of *T. bellirica* and *T. chebula* possess good antifungal activity against all the test fungi. Petroleum ether extract of *A. precatorius*, methanol extract of *B. serrata* leaves and petroleum ether and acetone extracts of *C. arborea* exhibited activity against three test fungi. Many of the extracts exhibited strong activity against *M. gypseum*. Since some of the plants were chosen which are mentioned in Ayurveda for skin diseases, inhibition of *M. gypseum* by the extracts of these plants justify their use in Ayurveda. However further studies are required to confirm their use for dermatomycoses.
Many of the extracts were found inhibitory for *F. oxysporum* and *X. campestris*, the two plant pathogens included in the study. These results are encouraging for future studies on active plant extracts to assess their potential for controlling plant pathogens.

3) Relative MICs of the acetone and methanol extracts of ten plants were determined against *S. aureus*, *B. cereus*, *B. subtilis*, *P. vulgaris* and *P. aeruginosa*. Lowest MIC values were obtained for acetone extract of *A. precatorius* roots (MIC between 3 µg/ml to 48 µg/ml). Acetone extracts of *C. arborea* and *W. fruticosa* were also found to be active at low concentrations (MIC values between 24 µg/ml to 390 µg/ml). Besides these, methanol extracts of *A. precatorius* and *W. fruticosa* and acetone extract of *Terminalia chebula* were also found to be active at lower concentrations.

4) Statistical analysis of the relative MIC values was done for comparison of the antibacterial activities of the plant extracts in terms of their average ranks. Results of this analysis revealed that the first five potent antimicrobial extracts in descending order of their potency are *A. precatorius* > *W. fruticosa* > *T. chebula* > *C. arborea* > *P. zeylanica*. Lower average ranks of these plants indicates their higher potency. Besides this, selected parts of these five plants were found to possess antibacterial potential against all the nine test bacteria. These results suggest that these plants hold a good potential for development of antibacterial drugs.

5) Various phytochemical tests were performed to detect the presence of a variety of chemical compounds belonging to different classes, such as alkaloids, flavonoids, steriods, terpenes, tannins, phenols etc. TLC fingerprinting was
also done to provide the basis for further chemical characterization of the extracts in future.

Phytochemical tests indicated that flavonoids, glycosides, phenols and tannins were commonly present in most of the extracts. Steroids and alkaloids were also detected in some of the extracts. Some of these chemicals may be responsible for the antimicrobial activities of these extracts. However, further characterization of the extracts by employing bioactivity guided fractionation would be required in future to identify the antimicrobial compounds of the active extracts.