Chapter 7

Chapter -7: SUMMARY, CONCLUSION AND RECOMMENDATION

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Chapter 7

Summary, Conclusion and Recommendation

7.1 Summary

An ethano-botical survey was carried out on folklore medicinal plants and few species found in nearby villages of Anantapur district, Andhrapradesh. Three medicinal plants were selected for the present investigation. From past literature survey it was found that many ethno medicinal uses of bark extracts of *Cinnamomum tamala* were not been explored and we found no specific pharmacognostical and pharmacological studies were reported for the whole plant extracts of *Stylosanthes fruticosa* and *Indigofera linnae*

7.1.1. Phytochemical investigation

Various crude extracts (alcoholic, aqueous, hydro-alcoholic and hot continuous soxhilation) obtained from *Stylosanthes fruticosa*, *Indigofera linnae* & *Cinnamomum tamala* were subjected for preliminary phytochemical investigations were described. Phytochemical investigation showed total phenolic, flavonoidal content, carbohydrates and glycosides present in the crude extracts of whole plant of *Stylosanthes fruticosa*, *Indigofera linnae* and bark of *Cinnamomum tamala*. Proteins and amino acids were found as a major source in *Indigofera linnae* and *Cinnamomum tamala*. Phytosterols found minimal amount in all the selected plants. Alkaloids identified as a main source in *Cinnamomum tamala* and *Stylosanthes fruticosa*. Saponin found only in *Stylosanthes fruticosa*. The aqueous, Hydro-
alcoholic, alcoholic and hot continuous soxhlate extracts of all the three plants showed flavonoid content. Among all the extract the cold macerated alcholoic extract and hot continuous ethanolic extract were proven to show phytochemical content when compared with the cold macerated aqueous and hydro-alcoholic extracts.

7.1.2. Pharmacognostical studies

Pharmacognotical and proximate analysis analysis were carried out for the fresh, dried powder and extracts (macerated and hot continuous). The fresh leaves and barks were studied for transverse section of crude drugs and powder microscopic analysis. From the studies made the lignified trichomes, fibres and calcium oxalate crystals were present in *Sylosanthes fruticosa*; parenchyma, tracheids, xylem, fibres were present in *Indigofera linnae*; cortex, xylem and phloem were present in *Cinnamomum tamala*

7.1.2.1. Proximate analysis

Proximate analysis of dried crude powder of whole plants of *Stylosanthes fruticosa* Linn, *Indigofera linnae* & barks of *Cinnamomum tamala* were showed that total ash content of 80%, 82.5% and 90%; Acid insoluble ash content of 30%, 03 % and 18.5%; Water soluble ash content of 8%, 12% and 9%; Hot extractable matter of 14%, 19.5% and 29% respectively.

7.1.2.2. Fluorescence analysis

Fluorescence analysis of dried crude powder of whole plants of *Sylosanthes fruticosa, Indigofera linnae* and dried barks of
Cinnamomum tamala were observed under UV short and long wave length by comparing day light and all the plants were explored for the presence of fluorescent.

7.1.3. In-vitro antioxidant studies

The results obtained for the antioxidant studies carried out for whole plant extracts of Stylosanthes fruticosa, Indigofera linnae and bark of Cinnamomum tamala. Among all the extracts the alcoholic and hydro-alcoholic extracts of Cinnamomum tamala showed total antioxidant activity and alcoholic, aqueous and hydro-alcoholic extracts of Indigofera linnae showed a potent antioxidant activity in scavenging of hydrogen peroxide models. Stylosanthes fruticosa showed moderate antioxidant activity in all the methods performed. Alcoholic extracts by sohxalation of Stylosanthes fruticosa, Indigofera linnae and bark of Cinnamomum tamala showed moderate activity in reducing power method when compared with the respective reference standard.

7.1.4. Antibacterial activity

The results obtained for the antibacterial activity carried out for the aqueous, alcoholic, hydro alcoholic and alcoholic sohxalet extracts of whole plants of Stylosanthes fruticosa, Indigofera linnae and barks of Cinnamomum tamala were studied against five standard microorganisms (Staphylococcus aureus, Proteus vulgaris, Bacillus subtilis, Pseudomonas auriginosa, Escherichia coli). All the extracts of the selected folklore medicinal plants and its zone of inhibition of
Indigofera linnae and Cinnamomum tamala showed very potent activity than Stylosanthes fruiticosa extracts were compared with the standard drugs of streptomycin, oxytetracycline and penicillin.

7.1.5. In-vitro α-amylase and α-glucosidase inhibition assays for bioactivity guided isolation

From the results acquired we observed better activities were revealed from alcoholic and aqueous extract of bark of Cinnamomum tamala percentage inhibition of aqueous and alcoholic extracts were reported as 97.49% and 93.78% respectively when compared to whole plants of Stylosanthes futicosa aqueous and alcoholic extracts were observed (83.76% and 58.34%) respectively. The aqueous and alcoholic extracts of Indigofera linnae were shown (62.62% and 83.76%) respectively.

Further, bioactivity guided isolation studies were carried out on the most active potent plant extract subjected to isolation of bioactive molecule and obtained fractions of Ethyl Acetate Layer 5.34g (17.80%), Butanol Layer 9.87g (32.90%) and Water Layer 12.15g (40.54%) have found. The compounds were detected from the Ethyl Acetate fraction of alcoholic extracts of Cinnamomum tamala by TLC identification. The different percentage of ethyl acetate in pet.ether was used for the compounds isolated and confirmed as pure compound. The isolated compounds were marked as PC/CC/KF1, PC/CC/KF2, PC/CC/KF3, PC/CC/KF5, PC/CC/KF6, PC/CC/KF7, PC/CC/KF8 & PC/CC/KBF.
7.1.6. *In-vivo* Antidiabetic activity

Antidiabetic activity of alcoholic extract of dried whole plant of *Indigofera linnaei* 65.03 %, *Stylosanthes fruticosa* 55.03 % and *Cinnamomum tamala* 75.03 % were studied by alloxan induced Folin-Wu Method and among those *Indigofera linnaei* and *Cinnamomum tamala* have exhibited substantial reduction in blood glucose level of rabbits were assessed.

7.1.7. *in-vitro* Anthelmintic activity

*In-vitro* evaluation of anthelmintic activity was performed using Indian earthworm *peritima posthuma*. This clearly shows that aqueous and alcoholic extracts of all the plants have showed related response and good anthelmintic activity when compared with the standard albendazole (500µg/ml) paralysis time and death time were 64.0±0.49 and 94±0.49. The (100µg/ml, 200µg/ml and 500µg/ml) of SFAQ showed (44.5±0.42 and 95.5±0.42), SFSM showed (28.8±0.47 and 89.1±0.47), CTSM showed (28.8±0.47 and 90.0±0.47) paralytic time and death time respectively.

7.1.8. Isolation, identification and characterization

The chromatographic and spectral data's of the isolated compounds shows that PC/CC/KF3 (Cinnamic acid), PC/CC/KBR (Epicatechin), procatechuic acid, caffeine and coumarin were compared with the standard compounds by using TLC method, HPLC, IR and NMR (¹H and ¹³ C) spectroscopy.
7.2. Conclusion

The conclusion obtained from the various investigational report performed and discussed in the earlier chapter as follows

- The ethno-botanical survey was carried out in the local area of Anantapur district, Andhrapradesh few medicinal plants were identified. For the present investigation three medicinal plants were selected based upon the medicinal use are *Stylosanthes fruticosa, Indigofera linnae* and *Cinnamomum tamala*.

- The phytochemical screening shows that all the elected medicinal plants were enriched with phytosterols, pheolic and flavonoidal compounds.

- Pharmacognostical and proximate analysis were carried out for the fresh, powder and extracts (cold maceration and hot continuous)

- The antioxidant studies were carried out for the crude extracts among them alcoholic extract and hydro-alcoholic extracts of *Cinnamomum tamala* showed total antioxidant activity also alcoholic, hydro-alcoholic and aqueous extracts of *Indigofera linnae* showed a potent antioxidant activity in scavenging of hydrogen peroxide models.

- The antibacterial studies were carried out for the extracts of the selected folklore medicinal plants and its zone of inhibition of *Indigofera linnae* and *Cinnamomum tamala* showed very potent activity than *Stylosanthes fruticosa* extracts.
• The α amylase and α glucosidase inhibition assay showed activities on alcoholic and aqueous extract of bark of *Cinnamomum tamala*. when compared to whole plants of *Stylosanthes futicosa* and *Indigofera linnaei*

• Antidiabetic activity of alcoholic extract of dried whole plant of *Cinnamomum tamala* and *Indigofera linnaei* showed potent activity by alloxan induced Folin-Wu method have showed significant decrease in blood glucose level of rabbits were estimated, whereas moderate activity was observed for *Stylosanthes fruticosa*.

• *In-vitro* evaluation of anthelmintic activity clearly shows that aqueous and alcoholic extracts of all the plants have showed related response and good anthelmintic activity when compared with the standard albendazole.

• The chromatographic and spectral data's of the isolated compounds showed PC/CC/KF3 (Cinnamic acid), PC/CC/KBR (Epicatechin), Procatechuic acid and Caffeine were compared with the standard compounds by using TLC method, HPLC, IR and NMR (¹H and ¹³C) spectroscopy.

**7.3. Recommendations**

The present investigation clearly demonstrates that the alcoholic extracts of all the plants showed potent antimicrobial, anthelmintic, antioxidant, antidiabetic activity.

From the bioactivity guided isolation all the crude extracts were subjected for alpha amylase and alpha glucosidase activity, among
them the alcoholic extract (sohxa)lation) of *Cinnamomum tamala* showed better activity when compared with other plant crude extracts. Further the alcoholic crude extract of *Cinnamomum tamala* were subjected for fractionation with methanol, butanol and water. The methanolic extract showed potent activity for alpha amylase activity; hence the methanolic fraction was subjected for column fractionation for isolation of bioactive compound. The compounds were isolated from the ethyl acetate fractions of *Cinnamomum tamala* alcoholic extract.

Hence the author endorses that further studies on bioactive isolation on these potent extracts may lead to many bioactive compounds which may save the human society in curing diseases.