CHAPTER-6

SUMMARY AND CONCLUSION

Liver diseases and kidney failure have become one of the major causes of morbidity and mortality in man and animals all over the globe, considered as serious health problem. Liver and kidney injuries may be caused by excessive exposure to toxic chemicals and drugs. These toxicants mainly damage the liver and the kidney by inducing lipid peroxidation and other oxidative damages. The injury of these organs can result in many disorders, including fibrosis, liver cirrhosis, renal failure, and even hepatocellular and renal carcinoma. Conventional drugs used in the treatment of liver diseases are sometimes inadequate and can have serious side effects. The choice of treatment for common liver diseases with synthetic drugs is problematic. It is necessary to search for alternative drugs for the treatment of liver disease in order to replace currently used drugs of doubtful efficacy and safety.

The use of natural remedies for the treatment of liver and kidney diseases, has a long history starting with the Ayurveda treatment, and extending to the Chinese, European and other systems of traditional medicines. The plant C. albidum and S. fruticosa which is used by The tribals in Tamil Nadu and Kerala traditionally used the plants Combretum albidum and Salacia fruticosa for the treatment of liver disorders and renal failure. Hence the present study was undertaken to evaluate the hepatoprotective and nephroprotective potential of Combretum albidum and Salacia fruticosa in a rat model of hepatotoxicity evoked by carbontetrachloride and nephrotoxicity induced by Acetaminophen in order to confirm that this plant does indeed have a therapeutic benefit in liver and kidney disease. The findings of the present study have been summarized below.
The qualitative phytochemical screening of the ethanol extracts of *Combretum albidum* and *Salacia fruticosa* had been performed to identify the presence of bioactive components. The presence of carbohydrates, alkaloids, flavonoids, glycosides, saponins, steroids, terpenoids, phenolic compounds, protein may be accountable for their respective pharmacological properties.

The results of GC-MS-MS analysis of plants extracts of *C.albidum* whole plant indicate the presence of 47 phytoconstituents & 27 phytoconstituents were identified in *S.Fruticosa* root. The nature of phytoconstituents identified from the plants extracts were of various types of steroids, terpenes, fatty acids, alkaloids, flavonoids, amino compounds, vitamin, aldehydes and carbohydrates. The compounds identified in EECA with higher percentage of peak area 26.85% are 5-Hydroxymethyl furfural and 2-Furancarboxaldehyde,5-methyl[2.46%], an aldehyde reported to have Preservative and Anti-inflammatory activity. The phytochemicals present in EESF was identified with highest peak area 38.43%, are Myo-Inositol, 4-C-methyl, molecular formula C7H14O6, molecular weight 194,is a Phyto active compound have antidiabetic effect.

To assess the toxicity of the extract, acute oral toxicity study was carried out as per the guidelines No: 423 given by the Organization for Economic Co-operations and Development (OECD), Paris and it revealed that the extract was safe up to the dose level of 2000 mg/kg body weight of animals as no mortality was observed among the animals used.
Hepatoprotective effect of ethanolic extract of *Combretum albidum* and *Salacia fruticosa* were screened by using carbon tetrachloride (CCl4) intoxication of rats as experimental models. The extent of liver damage and effect of the plant extract was assessed by various biochemical parameters like alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), total bilirubin (TB) and total protein (TP) in blood serum and concentration of thiobarbit uric acid reactive substances (TBARS), reduced glutathione (GSH), superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPx), glutathione-s-transferase (GST) in liver were determined. Histopathological changes in the liver of different groups were also studied.

The administration of ethanolic extract of CA and SF at two different dose levels of 250 and 500 mg/kg/b.w., orally had decreased the rise of ALT, AST, ALP, TB and TBRAS levels and the effects were comparable to standard drug (Silymarin 25 mg/kg/b. w.) the GSH, SOD, CAT, GPx, GST and TP levels were significantly increased in the animals. The histopathological studies show decreased necrosis and hepatocellular degeneration when compared to the CCl4 intoxicated liver.

The Nephroprotective effect of the ethanol extract of *Combretum albidum* and *Salacia fruticosa* against Acetaminophen-induced nephrotoxicity and oxidative stress in rats were assessed by various biochemical and Hematological parameters in the experimental rats. Histopathological changes in the renal tissues of experimental rats were also studied.
The administration of effect of ethanol extract of *Combretum albidum* and *Salacia fruticosa* at dose levels of 250 and 500 mg/kg/b.w orally were decreased in levels of blood Urea, uric acid, creatinine and MCV, whereas the levels of Hb, PVC, PLC, MCH and MCHC were increased when compared to APAP treated rats.

The antioxidant studies reveal that the rats treated with EECA and EESF were increased the levels of renal SOD, CAT, GSH and GPx, however the level of MDA were reduced as compared with APAP induced nephrotoxicity in rats. Apart from these, histopathological changes also reveal the protective effect of ethanol extract of *Combretum albidum* and *Salacia fruticosa* against acetaminophen induced nephrotic damage of renal tissues.

In conclusion the above experimental results obtained in terms of biochemical changes, which were also confirmed by histopathological studies indicates that the hepatoprotective potential of CA against CCL4-induced hepatic injury and SF on APAP induced nephrotoxicity.

The possible mechanisms of hepatoprotective and nephroprotective effect may be stimulated by the presence of alkaloids, flavonoids, phenolic compounds, Steroids, terpene, vitamin and fatty acid, which are reported to be present in the whole plant of *Combretum albidum* and roots of *Salacia fruticosa* by GC MS/MS analysis.

Most of the results of the ethanolic extract of *Combretum albidum* and *Salacia fruticosa* are due to the free radical scavenging, antioxidant activity and synergistic effect of the chemical compounds present in them, makes these plants are precise source for the production of a hepato-renal protective natural remedy.
These results also suggested that the *Combretum albidum* shows higher hepatoprotective activity than *Salacia fruticosa*. However the *Salacia fruticosa* extract indicates enhanced nephroprotective activity than *Combretum albidum*. Therefore, the study scientifically supports the use of these plants in traditional medicine for treatment of liver disorders and kidney failure.