5. SUMMARY AND CONCLUSION

Diabetes mellitus (DM) is a major health problem worldwide in recent time and Asia and Africa are the most viable areas where the disease is feared to raise 2–3 folds. An estimated 143 million people suffer from diabetes worldwide and the number is growing rapidly. Many herbal products have been recommended for the treatment of DM in ancient literature of Ayurveda in India. Plants have anchored to the mother earth long before man has set his feet and it is said that god had endowed them with materials for survival of man and animal long before these creatures were made by him.

The world health organization (WHO) estimates that about 80% of the population is still depends upon these herbal medicines for their treatment of diseases due to easy availability, economic and less side effects when compared to allopathic system of medicines. Many people attempted to study medicinal properties of Brassica oleracea L. and tried tp explore its antioxidant and anticarcinogenic activity. The medicinal value of the chosen plant as Brassica oleracea L. In the present investigation was carried out to evaluate the antidiabetic activity of Brassica oleracea L. Leaf extract against alloxan induced diabetic rats. The results were compared with standard drug as glibenclimaide. The phytochemical analysis was also studied.

GCMS is used to identify the constituents of volatile matter, long and branched chain hydrocarbons, alcoholic acids, esters etc. The results pertaining to GCMS analysis leads to the identification of 38 compounds from leaf of Brassica oleracea L. The prevailing compounds were 9,12-15 Octadecadienoic acid (21.55), Hexadecadienoic acid (19.90) Octadecanoic acid (CAS), Stearic acid (21.75) and 9 Octadecadienoic acid (21.59) were commonly present in Brassica oleracea L.

The UV-visible spectra were performed to identify the compounds containing σ- bonds, π-bonds, and lone pair of electrons, chromophores and aromatic rings. The profile showed the peaks at 211.15, 213.01, 354.40, 470.64 nm with the absorption 2.681, 2.682, 0.213, 0.154 % respectively. Occurrence of peaks at 234-676 nm reveals the presents of phenolic and alkaloids in the Brassica oleracea L. The FTIR spectrum was used to identify the functional groups of the active components present in extract.
based on the peaks values in the region of IR radiation. The results of FTIR analysis confirmed the presence of phenol, alkanes, alcohol, aromatic and aliphatic amines.

Supplementation of *Brassica oleracea* L. to alloxan induced diabetic rats has positive effects on glucose homeostasis, lipid profile, antioxidant defence, hepatic metabolism, organ functions and hormone. Glibenclimaide is a novel non-centrally acting anti-diabetic agent used to compare the *Brassica oleracea* L. The results demonstrated that *Brassica oleracea* L. extract has better activity than Glibenclimaide. The biochemical parameters analysed in this study is further supported by histopathological studies of liver, kidney and pancreas. The phytochemicals of *Brassica oleracea* L. extract synergistically active to modulate glucose, lipid profile, antioxidant defence, hepatic metabolism, organ functions by directly interacting with hormone systems.

Diabetes mellitus is associated with increased formation of free radicals and decrease in antioxidant potential. Due to these events, the balance normally present in cells between radical formation and protection against them is disturbed. The present investigation shows that *Brassica oleracea* L. leaf possesses an antioxidant activity, which may be attributed to its protective action on lipid peroxidation and to the enhancing effect on cellular antioxidant defense contributing to the protection against oxidative damage in alloxan diabetes.

Angiotensin I-converting enzyme (ACE) is potentially of great importance for controlling blood pressure. Inhibition of ACE is currently considered to be a useful therapeutic approach in the treatment of high blood pressure. In this study shows a potential inhibition of ACE activity by *Brassica oleracea* L.leaves fermented extract which leads to consider as a best source of ACE inhibitor secondary metabolites. The fermented leaves extract contained flavonoids, possible secondary metabolites responsible for the inhibition of the enzyme. The potential ACE inhibitor found for *Brassica oleracea* L.in the current study may well support the antihypertensive properties observed in fermented extract.

The 5 compounds namely 9,12-Octadecadienoic acid, n-Hexadecadienoic acid Octadecanoic acid, Oleic Acid, Phytol were obtained from the *Brassica oleracea* L.
extract was docked with native structure of human angiotensin converting enzyme using the docking program FlexX and the ligand-receptor interactions were analyzed using LeadIT. The results of the docking interactions observed that the presence of Arg522, Glu411 and His387 are the key amino acids that are favouring the bonded and nonbonded interactions with the docked ligands. This study suggests that residues Arg522, Glu411 and His387 in the active site of ACE should be considered during the design of novel ACE inhibitors.

Overall, it can be concluded from the present study that the *Brassica oleracea* L. leaf extract, besides its hypoglycemic, hypolipidemic, antihypertensive and antioxidant action, could protect the liver, pancreas and kidney against impairment due to diabetes and thereby regulation of glucose and lipid metabolism. The potential activity of *Brassica oleracea* L. leaf extract might be due to the presence of therapeutic phytochemicals like flavonoids, terpenoids, glycosides, steroids, saponins and phenols. Subsequently the molecular docking studies confirm the mechanism of action of phytochemicals present in *Brassica oleracea* L. leaf, further supported by the molecular docking studies. Hence, it might help in preventing diabetic complications including hypertension and may serve as a good alternative in the present commercially available antidiabetic and antihypertensive allopathic drugs.