Chapter 5
SUMMARY AND CONCLUSION

5.1 Summary

As Medicinal plants are gaining importance as antioxidative and antihyperglycaemic activity; The present study entitled “Biochemical effects of extracts of composite leaves and fruits of Syzygium cumini plants on diabetic rats” was conducted to evaluate the influence of methanolic extract of Azadirachta indica, Aegle marmelos, Ocimum sanctum, Murraya koenigii leaves and Syzigium cumini fruits composite on alloxan-induced diabetic in Wistar rats. The composite extract (CE) was prepared by mixing equal amounts of Azadirachta indica, Aegle marmelose, Ocimum sanctum, Murraya koenigii leaves and Syzigium cumini fruits. The numbers of animals used in the experiment were 36 and these were divided into 6 groups (Control, Diabetic control, Insulin treated, CE 25, CE 50 and CE 100), each group having 6 animals. The following parameters viz body weight, blood glucose were analyzed before, after and at the end of the study while alkaline phosphatase (ALP), creatinine, free fatty acid (FFA), ascorbic acid (AA), sialic acid, lipid profile (TC, TG, HDL, LDL and VLDL), malondialdehyde (MDA), reduced glutathione (GSH), advanced oxidative protein product (AOPP) and ferric reducing ability of plasma (FRAP). The following parameters such as GSH, MDA, Protein, protein carbonyl (PCO), glutathione peroxidase (GPx), catalase (CAT) and superoxide dismutase (SOD) were analysed in the liver and brain after scarifying the experimental animals.

The composite extract at the rate of 25, 50 and 100 mg/kg body weight and insulin showed increase in body weight. CE 100 and insulin exhibited higher efficacy to improve body weight. Glucose level of diabetic rats significantly dropped by oral administration of CE doses and subcutaneous administration of insulin. After 35 days of treatment CE dose 100 mg/kg body weight was significantly different with insulin treated group however, there was no significant difference between 25mg/kg, 50mg/kg and insulin treated groups.
There was significant decreased in alkaline phosphatase activity in CE (Dose 25, 50 and 100 mg/kg of body weight) and insulin treated group as compared to diabetic control group. CE dose 100 mg/kg body weight showed significant difference with insulin treated group but no statistical difference was exhibited between insulin and 25 and 50 mg/kg treated groups in alkaline phosphatase.

In serum lipid profile study total cholesterol (TC), triglyceride (TG), low density lipoprotein (LDL) and very low density lipoprotein (VLDL) were significantly decreased with oral supplementation of CE 25, 50 and 100 mg/kg and insulin treated groups when compared to diabetic control group except HDL significantly increased with these treatment. TC and TG level were significantly decreased by treatment with CE 25 as compared to insulin treated group. CE 100 mg/kg body weight showed increased HDL level in diabetic rats which was statistically significant with insulin treated group. In the content of LDL, CE dose (50 and 100 mg/kg body weight) treatment showed significant difference with insulin treated group. In VLDL level there was no statistical significant difference between CE treatment and insulin administration.

CE dose (25, 50 and 100 mg/kg body weight) and insulin administration significantly declined the free fatty acid (FFA) content in diabetic rats compared to diabetic control groups. CE doses showed insulin like activity but they were not statistically significant with insulin treated group.

The ascorbic acid (AA) level was significantly increased by ameliorating effect of CE (dose 25, 50 and 100 mg/kg body weight) and insulin treatment in diabetic rats as compared to diabetic control rats. CE (dose 25, 50 and 100 mg/kg body weight) and insulin treatment restored the AA level in plasma but there was no significant difference between both treatments.

CE treated groups (50 and 100 mg/kg body weight) and insulin treated group significantly decreased sialic acid concentration compared to diabetic control group however, CE 25 was non significant with diabetic group. CE and insulin groups were effective in lowering the sialic acid concentration but CE doses were not significantly different with insulin treated group.
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Free radical ability of plasma (FRAP) were significantly increased by CE treated groups and insulin treated group compared to diabetic control group. CE dose 100 mg/kg body weight differed significantly with insulin treated group however, CE dose 25 and 50 mg/kg body weight were not significant to insulin treated group.

CE dose (25, 50 and 100 mg/kg body weight) and insulin administration significantly decreased the advanced oxidation protein product (AOPP) level in diabetic rats compared to diabetic control groups. CE dose 25 and 50 mg/kg showed insulin like activity therefore they were statistically significant with insulin treated groups however, CE 100mg/kg was not significantly different with insulin treated group.

Reduced glutathione level was determined in erythrocytes, liver and brain. CE dose (25, 50 and 100 mg/kg body weight) and insulin treatment significantly increased the GSH level in erythrocytes, liver and brain when compared to diabetic group. In erythrocytes CE dose 25, 50 and 100 mg/kg body weight showed significant difference when compared to insulin treated group. In liver CE dose 50 and 100 mg/kg showed significant variation when compared to insulin treated group however, CE 25 was not statistically significant. In brain CE treated groups were not statistically significant with insulin.

Malondialdehyde (MDA) level was determined in erythrocyte, plasma, liver and brain. CE dose (25, 50 and 100 mg/kg body weight) and insulin treatment significantly decreased the MDA level in erythrocytes, plasma, liver and brain when compared to diabetic group. In erythrocyte and plasma CE doses were not statistical significant to insulin. In liver CE 25 and 100 mg/kg body weight significant differed with insulin however, CE 50 was not statistically significant. In brain CE dose 100 mg/kg exhibited significant difference with insulin while CE 25 and 50 mg/kg were not statistically significant.

The activity of glutathione peroxidase (GPx) was significantly increased with oral administration of CE (25, 50 and 100 mg/kg) and subcutaneous insulin treatment in liver and brain compared to diabetic control group. In liver and brain CE dose 25 and 100 mg/kg body weight were significant with insulin treated group however, CE 50 was not significant.
Catalase (CAT) showed significantly increased activity in liver and brain by administration of CE (25, 50 and 100 mg/kg) and insulin as compared to diabetic control group. In liver and brain CE 25 mg/kg body weight differed significantly with insulin however, CE 50 and 100 were not significantly different.

Cu, Zn Superoxide dismutase (Cu, Zn SOD) activity was determined in liver and brain of normal and experimental group of rats. Administration of CE dose (25, 50 and 100 mg/kg) and insulin in liver and brain significantly elevated the SOD activity compared to diabetic control group. In liver CE 100 mg/kg body weight was statistically significant when compared to insulin however, CE 25 and 50 were not statistically significant. In brain CE 25 mg/kg body weight was significant to insulin treated group however, CE 50 and 100 mg/kg body weight were not significant.

Protein carbonyl (PCO) level was significantly decreased in liver and brain of diabetic rats by oral administration of CE (25, 50 and 100 mg/kg body weight) and insulin compared to diabetic control group. In liver CE dose 25 and 50 mg/kg body weight showed significant difference with insulin treated group but CE 100 was not statistically significant to insulin treated group. In brain CE dose 100 was statistically significant to insulin treated group however, CE 25 and 50 were not significant to insulin treated group.

Protein content was determined in liver and brain of normal and diabetic rats. Oral supplementation of CE (25, 50 and 100 mg/kg body weight) and subcutaneous insulin significantly increased protein content in liver and brain of diabetic rats compared to diabetic control rats. In liver CE 100 mg/kg body weight showed significant difference with insulin treated group however, CE 25 and 50 mg/kg body weight were not statistically different to insulin treated group. In brain CE doses were not statistically significant with respect to insulin treated group but they showed insulin like activity to increase the protein content.
5.2 Conclusion

The influence of composite extract of different formulations along with insulin was assessed in alloxan-induced diabetes in Wistar rats to assess the antidiabetic and antioxidant activity of the composite. The following conclusion can be drawn from the study.

- All the formulations exhibited antioxidant and anti diabetic activity.
- The composite formulation at the rate of 100 mg/kg proved to be the best among different formulations used. In some parameters it exhibited significant effect on diabetes as compared to insulin.
- The composite formulations used at the rate of 25 mg/kg and 50 mg/kg although exhibited antioxidant and antidiabetic activity but the activity was not at par with insulin.
- As per our results the composite at the rate of 100mg/kg can be used as an antioxidant and antidiabetic agent having no adverse effect on the vital organs of the body.