

CHAPTER XI

SUMMARY AND CONCLUSION

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The present study substantiates that the leaves of *Aegle marmelos* has the potential antidiabetic activity preventing the manifestation of diabetes in alloxan injected rats fed the leaf powder orally. Alloxan selectively destroys the β cells of pancreas. If the treatment would have been started with in 24h of alloxan injection the abnormal decrease in body weight, liver glycogen, serum insulin and increase in blood glucose, blood urea and serum cholesterol could be prevented. It was noted that the treatment of the whole leaf powder even after 5 days of alloxan injection was effective in preventing diabetic symptoms. To isolate the active principle, different extracts were given to diabetic rats. The aqueous extract showed the maximum activity ⁱⁿ preventing the abnormal increase in blood glucose and decrease in body weight. That means the active antidiabetic principle may be soluble in water. The administration of alkaloids isolated from the leaf powder was found to be effective in preventing the abnormal increase in blood glucose, blood urea, serum cholesterol and decrease in serum insulin, liver glycogen and body weight in diabetic rats. The antidiabetic activity of the *Aegle marmelos* leaves was found to be on par with ^{an} antidiabetic drug, Euglucon.

Glucose tolerance test (GTT) conducted with the whole leaf powder, aqueous extract and alkaloids of *Aegle marmelos* leaves in the normal animals showed the superiority of the whole leaf powder over aqueous extract and alkaloids in glucose clearance. In the diabetic animals also whole leaf powder was superior to aqueous extract and alkaloid fraction of the leaves. The alkaloid treatment was

superior to aqueous extract in normal animals while aqueous extract was superior to alkaloid fraction in diabetic animals as far as glucose clearance is concerned.

The glucose uptake by diaphragm muscles, spleen cells and intestinal segments modulated by aqueous extract and alkaloids of *Aegle marmelos* leaves substantiates the hypothesis that hypoglycaemic effect might be by ^{enhancing} encouraging the cellular uptake of glucose. .

Lipid peroxidation inhibition assay using the aqueous extract and alkaloids of *Aegle marmelos* demonstrated the ability of these principles in inhibiting the lipid peroxidation to the tune of 21% at 50 μ g and in the alkaloid fraction a 75 μ g concentration inhibited the lipid peroxidation to 35%. This might be one of the basic mechanisms affording protection to the pancreatic cells from chemically induced diabetes mellitus.

It can be assumed that the whole leaf powder was showing the maximum activity because all the constituents were supplied to the diabetic animals by this way. It may be preventing the damage to the β cells of islets and maintain normal insulin secretion. So also the whole leaf powder may be converting the proinsulin to active insulin. But when the alkaloids ^{were} ~~are~~ tested even though hypoglycaemic activity was exhibited the efficiency of it, when compared with the whole leaf powder, was less. Recently Das et al (1996) reported that the administration of the aqueous extract of *Aegle marmelos* leaves altered the function of pancreatic β cells and the acinar cells. The changes in the acinar cells were coarsening of endoplasmic reticulum and alterations in their secretory function. The changes observed in the liver were dilation of veins, loss of usual concentric arrangement of hepatocytes,

liver fibrosis and decrease in glycogen content. The kidney tubules were thickened and the glomerulus were expanded. The treatment reversed the altered parameters to near normal suggesting the regeneration of the damaged pancreas.

The results of the present study point out the possibility of utilising *Aegle marmelos* and its alkaloids as a potential antidiabetic agent. The results could confirm the ability of this plant in increasing the insulin level, enhancing the glucose uptake by cells, reduction of blood urea and cholesterol and keeping the blood glucose level almost at par with the normal controls. Though to a limited extent the results are confirmative of inhibition of lipid peroxidation and free radical scavenging which have a definite role in affording protection to the β cells of pancreatic islets by diabetogenic chemicals and preventing the incidence of diabetes mellitus.

