Conclusion

Diabetes mellitus is caused by the deficiency or resistance to insulin in glucose homeostasis. Insulin regulates glucose utilisation and cellular metabolism. Glutamate toxicity causes neuronal damage. Glutamate transport system is also involved in diabetes induced oxidative stress. Serotonin affects insulin function. Pyridoxine is involved in the synthesis of neurotransmitters—serotonin from 5-Hydroxytryptophan and GABA from glutamate. Serotonergic and glutamatergic systems are impaired during diabetes. We observed an increase in the glutamate content in the cerebral cortex, brain stem, cerebellum, hippocampus and pancreas of streptozotocin induced diabetic rats. Treatment using pyridoxine along with insulin and *Aegle marmelose* leaf extract has reversed the glutamate content, insulin receptor gene expression, 5-HT, 5-HT$_{2A}$ receptor binding parameters and gene expression of 5-HT$_{2A}$ to near control. Also, it has neuroprotective action mediated through the 5-HT transporter and GLAST at the mRNA level. Confocal studies in pancreatic islets of experimental groups of rats showed that Ca$^{2+}$ release regulates insulin secretion. Behavioural studies confirmed the serotonin, 5-HT$_{2A}$, glutamate receptor, gene expression data. Thus it is suggested that serotonin and glutamate receptor functional regulation controls glucose utilization at cellular level. *Aegle marmelose* and insulin treatment alone and in combination with pyridoxine have better therapeutic role in the management of diabetes.