Summary

1. 5-HT and 5-HIAA contents were decreased in cerebral cortex, brain stem, cerebellum and hippocampus of diabetic rats which were reversed to near control in insulin and *Aegle marmelos* treated alone and in combination with pyridoxine.

2. Serotonin and 5-HT$_{2A}$ receptor subtype number were decreased in cerebral cortex, cerebellum and hippocampus whereas increased in brainstem of diabetic rats which were reversed to near control in insulin and *Aegle marmelos* treated alone and in combination with pyridoxine.

3. Serotonin receptor was increased whereas 5-HT$_{2A}$ receptor subtype number was decreased in pancreas of diabetic rats which were reversed to near control in insulin and *Aegle marmelos* treated alone and in combination with pyridoxine.

4. 5-HT$_{2A}$ serotonin subtype and 5-HTT serotonin transporter gene expression were down regulated in cerebral cortex, cerebellum, hippocampus and pancreas whereas up regulated in brainstem of diabetic rats which were reversed to near control in insulin and *Aegle marmelos* treated alone and in combination with pyridoxine.

5. Glutamate content was increased in brain regions and pancreas of diabetic rats which was reversed to near control in insulin and *Aegle marmelos* treated alone and in combination with pyridoxine.
6. Glutamate receptor number was increased in brain regions and pancreas of diabetic rats which were reversed to near control in insulin and *Aegle marmelose* treated alone and in combination with pyridoxine.

7. mGluR5 glutamate receptor subtype gene expression was increased significantly in all brain regions and pancreas of diabetic rats which were reversed to near control in insulin and *Aegle marmelose* treated alone and in combination with pyridoxine. Diabetes induces glutamate toxicity, modifies glutamate transporter GLAST and increases neuronal injury. Pyridoxine decreases intracellular levels of glutamate by increasing glutamic acid decarboxylase activity and decrease calcium influx through actions on cell surface calcium channels.

8. GLAST glutamate transporter gene expression was down regulated significantly in cerebral cortex, cerebellum, hippocampus and pancreas whereas it was up regulated in brainstem of diabetic rats which were reversed to near control in insulin and *Aegle marmelose* treated alone and in combination with pyridoxine.

9. Insulin receptor gene expression was down regulated significantly in cerebral cortex, brain stem, hippocampus and pancreas whereas it was up regulated in cerebellum of diabetic rats which were reversed to near control in insulin and *Aegle marmelose* treated alone and in combination with pyridoxine.

10. Status of antioxidants - SOD and GPx gene expression were down regulated significantly in all brain regions and pancreas of diabetic rats which were reversed to near control in insulin and *Aegle marmelose* treated alone and in combination with pyridoxine.
Summary

11. Immunohistochemical study of serotonin receptor subtype 5HT\textsubscript{2A}, 5-HTT serotonin transporter and mGluR5 glutamate receptor subtype in cerebral cortex, cerebellum and pancreas using confocal microscope showed an increased receptor expression in diabetic rats which were reversed to near control in insulin and \textit{Aegle marmelose} treated alone and in combination with pyridoxine.

12. Calcium imaging results showed increased calcium release from the pancreatic islets in diabetic rats. Treatment using insulin and \textit{Aegle marmelose} treated alone and in combination with pyridoxine decreased the release to near control.

13. A prominent neurodegeneration of cerebellum was demonstrated by rotarod test in diabetic rats which was reversed to near control in insulin and \textit{Aegle marmelose} treated alone and in combination with pyridoxine.

14. Treatment using insulin and \textit{Aegle marmelose} treated alone and in combination with pyridoxine to diabetic rats showed a reversal of anxio-depressive behaviour to near control which is evident by the \textit{Elevated Plus Maze Study}.

15. Streptozotocin induced diabetic rats lead to a sensorimotor dysfunction that was assessed by the beam-walk apparatus. Administration of pyridoxine alone and in combination with \textit{Aegle marmelose} and insulin significantly increased the ability of motor functions. Hence the treatment has curative role in motor deficit.

Thus our studies showed insulin and \textit{Aegle marmelose} treated alone and in combination with pyridoxine have anti-hyperglycaemic effect on serotonergic and glutamatergic receptors functions in streptozotocin induced diabetic rats. It is suggested that the corrective measures for the brain functional damage caused during...
diabetes and anti-diabetic treatment, through serotonergic and glutamergic receptors, have therapeutic role in the management of diabetes.