Summary and Conclusion

Preliminary screening of the aqueous crude extract of *Cucumis prophetarum* showed potent antidiabetic and antioxidant activity. Phytochemical analysis revealed the presence of carbohydrates, reducing sugars, amino acids, saponins and sterols. Four different fractions were obtained from this crude extract and on screening for antihyperglycemic activity in STZ-NA induced diabetic rats, fraction 1 showed maximum antihyperglycemic activity when compared to other fractions.

Fraction 1 was subjected to HPLC-DAD analysis which showed major single peak at retention time of 7.26 min. The structure was elucidated using NMR, 2D NMR, LC-MS/MS and IR data. Comparison of this isolated compound with those of the compounds isolated from plants of *Cucumis* genus and scifinder database revealed no similar compounds and it is for the first time the compound has been isolated and characterized. Based on the structure of the compound and the group attached, the active principle was named as ‘N-Trisaccharide’.

Long term treatment of diabetic rats with N-Trisaccharide at a dose of 50 mg/kg/b.w for 28 days resulted in 69.3% reduction in FBG levels, accompanied by improvement in the levels of HbA1c. Also, it prevented reduction in body weight and enhanced the hepatic glycogen levels in diabetic rats reflecting the efficacy of N-Trisaccharide in the maintenance of normal carbohydrate metabolism.

N-Trisaccharide produced a marked rise in plasma insulin levels in diabetic rats as well as in normoglycemic rats, indicating the insulin secretagogue property which is compared to standard antidiabetic drug glibenclamide.

Effect on carbohydrate metabolic enzymes: Activities of hexokinase, glucose-6-phosphate dehydrogenase were significantly increased whereas, gluconeogenic enzymes viz., glucose-6-phosphatase and fructose-1,6-bisphosphatase were significantly decreased in liver and kidney of diabetic rats.
Effect on lipid profile: N-Trisaccharide produced significant antihyperglycemic activity by increasing insulin level in diabetic rats, thereby altering serum cholesterol, TG, LDL, VLDL and HDL cholesterol near normal.

Effect on enzymatic and non-enzymatic antioxidants: N-Trisaccharide markedly lowered the levels of TBARS and significantly increased the activities of CAT, SOD and GPx in liver and kidney of diabetic rats indicating reduction of oxidative stress.

Also, it improved the levels of non-enzymatic antioxidants: GSH, vitamin C and vitamin E reflecting the antioxidant efficacy of the active principle.

Histological studies

In diabetic untreated rat pancreas, there was insulitis with lymphocytic infiltrations. Atrophy and destruction of β-cells were marked. The restorative changes in tissue architecture of pancreas were observed in diabetic rat pancreas treated with N-Trisaccharide.

Diabetic untreated rats showed degenerative liver with severe congestion of central vein, hemorrhages in the sinusoidal spaces and granular appearance of the hepatocytes (degenerative change) with cloudy swelling (hazy nucleus). Treatment with N-Trisaccharide in diabetic rats showed normal liver architecture with slight congestions in central vein, normal sinusoidal spaces and normal hepatocytes.

The kidney of diabetic untreated rats showed atrophy of the glomeruli, necrotic tubular epithelial cells and dark pyknotic nuclei. The kidney of diabetic rats treated with N-Trisaccharide showed normal glomeruli, normal intertubular vessels and tubular epithelial cells indicating restorative changes.

Administration of N-Trisaccharide in normal rats did not show any signs of hepatic and renal toxicity, whereas, in diabetic rats it decreased the high levels of serum urea, creatinine and, the activities of AST, ALT and ALP. This suggests the protective role of N-Trisaccharide against liver and kidney damage during diabetes.
From all these observations, it is concluded that aqueous fruit extract of *Cucumis prophetarum* contain the active principle, N-Trisaccharide. The antidiabetic activity of the active compound could be due to its stimulatory effect on insulin secretion resulting in improvement in the altered activities of carbohydrate metabolizing enzymes and lipid metabolism in diabetic treated rats.

* * * * *