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Antidiabetic Activity of Some Selected Indian plants in Food Induced Type 2 Diabetes

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Abstract

Type 2 diabetes usually begins in the middle age or after 40 years. It is not uncommon to come across the development of diabetes in third decade itself in our country. Diabetes mellitus is a complex and a multifaactorial group of disorders that disturbs the metabolism of carbohydrates, fat and protein. The chronic hyperglycemia of diabetes is associated with long term damage, dysfunction and failure of various organs. Diabetic complications arise partly from glycosylation damage to structural and functional proteins and reflect chronic failure to maintain blood glucose homeostasis. Some plants of genus Spermacoce and Sida have received great attention recently due to its long history of use in oriental countries and its medicinal values for the treatment of many diseases such as stomachaches, inflammation, arthritis, gastroenteric disorders, tumors and lymphatic disorders. In the current study, methanolic extract of Genus Spermacoce and Sida Plants evaluated for their antidiabetic effects in fructose fed rats. Present study has shown a significant glucose level control in blood.

Keywords: Diabetes, Medicinal Plants, Sida

Introduction

The diagnosis of diabetes is often suggested by the presence of hyperglycemic symptoms and glycosuria, sometimes with drowsiness or coma. The World Health Organization (WHO) criteria define diabetes by fasting plasma glucose (FPG) level of 140mg/dL (7 mmol/L) or greater, or post-prandial 2-h plasma glucose (PG) level of 200mg/dL (11.1 mmol/L) or greater during an oral glucose tolerance test (WHO, 1985). The National Diabetes Data Group of the National Institutes of Health recommends the following criteria for diagnosing diabetes:

- Fasting (overnight) venous plasma glucose concentration greater than or equal to 140 mg/dL on at least two separate occasions.
- Venous plasma glucose concentration greater than or equal to 200 mg/dL at 2-h post-ingestion of 75 g of glucose and at least one other sample during the 2-h test.
- The previously used terminology is non-insulin dependent diabetes mellitus (NIDDM). Type 2 diabetes usually begins in the middle age or after 40 years. It is not uncommon to come across the development of diabetes in third decade itself in our country. The pathophysiological basis is a combination of impaired beta cell function, with marked increase in peripheral insulin resistance at receptor / post receptor levels and increased hepatic glucose output production.

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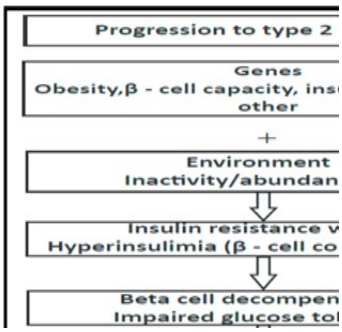

Material and Methods

Materials

A. **Food induced diabetes (Fructose):** The fructose diet was arranged to feed animals. Fructose diet contains 66% fructose, 15% protein, 8% fat, 4% cellulose, 3.5% of each mineral and mix vitamin. Pellet diet had same composition except that fructose was replaced with starch.

B. Animals: Albino Rats 36, Total group 5, per group 6

Methods

The anti diabetic activity was tested on a total of 30 rats (24 diabetic rats and 6 normal rats) and they were divided into six groups and each group consists of 6 animals as follows,

Group I- Served as control, received vehicle 0.5% CMC (1ml/kg; p.o) for 21 days along with standard diet pellet.

Group II- Diabetic control received fructose fed diet for 30 days

Group III- Fructose diet + Methanolic Extract of Plant (200mg/kg, b.wt; p.o) suspended in 0.5% CMC for 30 days

Group IV- Fructose diet + Methanolic Extract of Plant (400mg/kg, b.wt; p.o) suspended in 0.5% CMC for 30 days

Group V- Fructose diet + Standard Glibinclamide (600 µg/kg, b.wt; p.o) suspended in 0.5% CMC for 30 days.

Results and Discussion

Table 1: Effect of MESH and High fructose diet on blood glucose level

Blood Glucose level (mg/dl)				
Treatment	**0 day**	**7th day**	**14th day**	**21st day**
Control 0.5% CMC (1ml/kg; p.o)	85.12± 1.87	86.12 ± 2.12	86.54±1.92	87.12±1.24
Fructose Diet	271.76 ± 4.90	280.45±3.87	288.78±4.32	296.56±4.87
Fructose Diet + MESH (200mg/kg, b.wt; p.o)	276.56±3.65	170.78±2.98	158.87±3.12	153.87±2.87
Fructose Diet + MESH (400mg/kg, b.wt; p.o)	274.64 ± 3.82	150.65±3.72	135.82±2.12	115.32±1.76
Fructose Diet + Glibinclamide (600 µg/kg, b.wt; p.o)	272.24 ± 4.65	104.25±2.34	98.98±1.65	89.21±0.87

The values are expressed ad Mean ± SEM, n=6.Comparisons is made between Fructose diet vs control; Fructose diet vs Fructose diet + MESH (200mg/kg) and Fructose diet vs Fructose diet + MESH (400mg/kg); Fructose diet vs Fructose diet + Glibinclamide. * Statistically significant, $p<0.05$; (As Reference)

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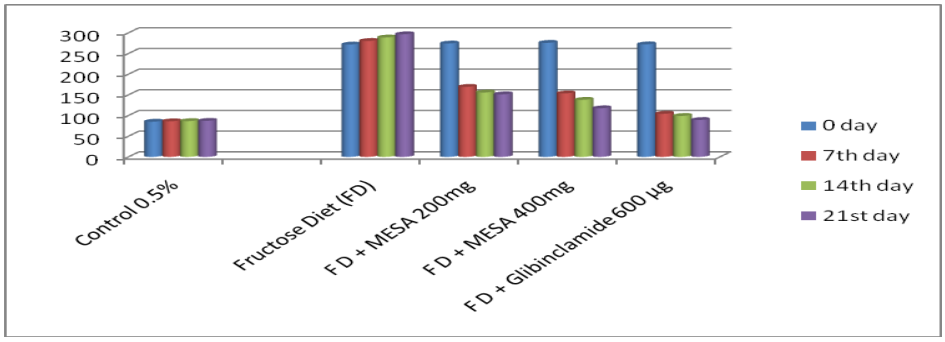
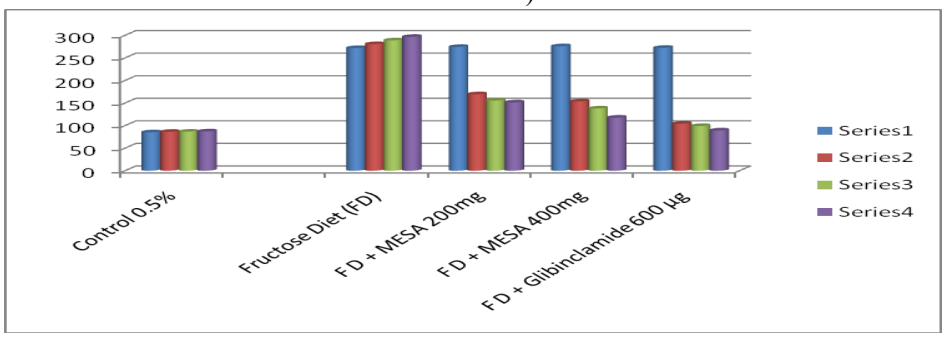


Table 2: Effect of MESA and High fructose diet on blood glucose level

Blood Glucose level (mg/dl)				
Treatment	**0 day**	**7th day**	**14th day**	**21st day**
Control 0.5% CMC (1ml/kg; p.o)	85.12± 1.87	86.12 ± 2.12	86.54±1.92	87.12±1.24
Fructose Diet	271.76 ± 4.90	280.45±3.87	288.78±4.32	296.56±4.87
Fructose Diet + MESA (200mg/kg, b.wt; p.o)	274.25±3.82	169.34±3.24	155.67±3.87	151.34±2.43
Fructose Diet + MESA (400mg/kg, b.wt; p.o)	275.82 ± 3.25	153.46±3.76	137.94±2.86	117.56±1.56
Fructose Diet + Glibinclamide (600 µg/kg, b.wt; p.o)	272.24 ± 4.65	104.25±2.34	98.98±1.65	89.21±0.87

The values are expressed ad Mean ± SEM, n=6.Comparisons is made between Fructose diet vs control; Fructose diet vs Fructose diet + MESA (200mg/kg) and Fructose diet vs Fructose diet + MESA (400mg/kg); Fructose diet vs Fructose diet + Glibinclamide. * Statistically significant, $p<0.05$; (As Reference)



Conclusion

Administration of MESH (Methanolic Extract of *Spermacoce hispida* 200 mg/Kg body weight and 400 mg/Kg body weight) and MESA (Methanolic Extract of *Sida Acuta* 200 mg/Kg body weight and 400 mg/Kg body weight) extracts to food induced diabetic rats displayed significant reduction in the blood glucose levels to make it near normal as shown in tables.

The exact mechanism of action of the extract is unknown; the reduction in blood glucose level could be due to increased pancreatic insulin secretion from existing β-cell of the pancreas

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