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RESEARCH ARTICLE

Hypoglycemic Effect of Traditional Breakfast Preparation by Incorporating Low Glycemic Mixes in Diabetics

Tripathi MA*, Sharma V, Tripathi A

Department of Food Science and Nutrition, SPTM College of Arts and Home Science, Vanita vishram, Surat, Gujarat, India.

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ABSTRACT

Diabetes mellitus, long considered a disease of minor significance to world health, is now emerging as one of the main threats to human health in the 21th century. In the Indian scenario, the world health organisation has estimated a sharp upswing in the number of diabetes from 19.4 million in 1995 to an expected 57.2 million by 2025. A study was therefore undertaken to assess the impact of ashwagantha root, Madhunasini leaves and Jamun seeds and oats incorporated breakfast preparation on glycemic index. The subjects were made to consume the test products. Blood samples withdrawn were similar to that of glucose load at zero minutes and post prandial blood glucose level at 60 minutes and 120 minutes. The results of the study clearly indicate that the Madhunasini leaves powder would prove to be more useful, simple, effective, easily available and economically affordable supplement for the effective management of type 2 diabetes.

KEYWORDS

Ashwagantha root, Madhunasini Leaves, Glycemic index, Type 2 diabetes

INTRODUCTION

Diabetes mellitus, long considered a disease of minor significance to world health, is now emerging as one of the main threats to human health in the next century. In the Indian scenario, the WHO has estimated a sharp upswing in the number of diabetics from 19.4 million in 1995 to an expected 6 million by 2025. Dietary modification, weight control and regular exercise are the main approaches in the management of diabetes, diet being the most important factor. Currently, the challenge is to identify hypoglycaemic diet supplements to control blood glucose levels.

***Address for Correspondence:**
Minakshi Anurag Tripathi
D-304,Prajit Appartmant
B/H Nehru Nagar
Icchanath, Surat-395007, Gujarat, India.
E-Mail Id: Minakshi4582@yahoo.co.in

More than 450 plants worldwide have been documented as beneficial in the treatment of diabetes. Studies with most effective plants, demonstrated that the anti-hyperglycaemic activities were in part explained by the ability of water soluble plant components it increase glucose transport and metabolism in muscle and / or stimulate insulin secretion.

A study was therefore undertaken to assess the impact of Ashwagantha root, madhunasini leaves and jamun seeds and oats incorporated breakfast preparation on glycemic index.

MATERIALS AND METHOD

Forty male type 2 diabetic subjects between the ages of 40-60 years with fasting plasma glucose levels between 120-150 mg / dl in Surat District were selected for the study using the purposive sampling technique.

Tools Used for the Study

An interview schedule was used to collect information regarding their socio-economic back ground, life style and dietary pattern. Fasting and post prandial plasma glucose were estimated by using an one touch basic plus glucometer , which gives the test results in 45 seconds.

Formation of Hypoglycaemic Mixes

The blends of the herb powders and cereals used in the formation of hypoglycaemic mixes are given in Table 1.

Table 1: Composition of Hypoglycaemic Mixes (HGM)

Mixes	Ingredients (per cent)			
	Oat	Ashwagandha roots powder	Madhunasini leaves powder	Jamun seeds powder
HGM I	50	50	-	-
HGM II	50	-	50	-
HGM III	50	-	-	50

Preparation of Breakfast Item Incorporated with Hypoglycaemic Mix

The information on commonly consumed breakfast preparations obtained by administering a pre-structured schedule showed that idla, khaman was commonly consumed among the breakfast items by the selected type 2 diabetic subjects.

So, idla was selected for incorporation of the developed hypoglycaemic mixes. GM-I, II and III were separately incorporated in the fresh batter in different proportion and sensory evaluation was done by using 5-point rating scale. The best accepted proportion was the three percent incorporation of hypoglycaemic mixes.

Estimation of Glycemic Index (GI) of the Products

Initially the selected subjects were subjected to Oral Glucose Tolerance Test (OGIT) using 50 g glucose load. Blood samples were withdrawn at zero minutes i.e. fasting and post prandial blood glucose at 60 minutes and 120 minutes.

The total of 30 subjects selected for the study were allocated for group I ,II ,III and IV randomly .After a 10 days interval of conducting OGIT, subjects were fed equal carbohydrate test products C, E_1, E_2 and E_3 respectively. The feeding was done in random order on separate occasions after an overnight fast. Control group ©-Control (Normal idla).

Experimental group (E_1)—idla + HGM I

Experimental group (E2)—idla + HGM II

Experimental group (E_3) ----idla + HGM III

The subjects were made to consume the test products; blood samples withdrawn were similar to that of glucose load at zero minutes and post prandial blood glucose level at 60 minutes and 120 minutes.

From the above values the glycemic index (GI) of the products were calculated by using the following formula,

$$GI = \frac{\text{Area under blood glucose response curve for 50g test Carbohydrate food}}{\text{Area under blood glucose response curve for 50 g glucose}} \times 100$$

RESULTS AND DISCUSSION

Background Information

Of the 40 selected subjects 31 subjects were found to come under normal BMI and nine subjects were overweight Thirty two of them were involved in sedentary activity while eight were moderate workers. The duration of the diabetes among the subjects ranged from one to seven years. Thirty subjects showed heredity as a major influencing factor for diabetes. Polyuria, polydipsia, loss of weight and giddiness were said to be the predominant symptoms by over 35 subjects, with regard to exercise pattern, 20 of them were in the practice of doing exercise regularly in the form of walking. Twenty eight

of the selected diabetics underwent blood sugar check-up once in a month. There of the diabetics checked their fasting and post prandial blood glucose levels once in 15 days.

Dietary Habits

Twenty eight of the selected subjects obtained dietary guidance from dietitian. Thirty two of the selected subjects was non-vegetarians. The mean calorie intake was found to be less compared to recommended allowances and it was found to be 2150 and2240 Kcal respectively for sedentary and moderate working men. Rice was the staple food of all the selected subjects while wheat and ragi were included by only 10 subjects frequently. Among the selected subjects 25 consumed three meals a day and 15 of them had four meals a day. All the selected subjects stated that they consumed vegetables and green leafy vegetables every day.

Estimation of Glycemic Index

The mean blood glucose response responses for reference food (glucose) and test foods are presented in Table II.

The mean fasting blood glucose responses in the selected subjects were in the range of 127.6 to 136.6 mg/dl. A steady rise in blood glucose level was seen after ingestion of reference food, the peak being reached at 60 minutes after ingestion.

The results of the mean tolerance test is presented in Table II.A steady rise in blood glucose level was seen after the ingestion of test products, the peak being reached at 60 minutes similar to reference food.

In general, peak values for all the test foods were lower than the reference food. The mean GI of four products is given in Table III.

The mean GI of the test products and control ranged from 62.0 to 78.0 in selected subjects. Glycemic index of idla (control) was comparatively higher than the test products. The test product E_2 i.e., idla incorporated with hypoglycaemic mix II showed the lowest GI.

Hepatic stimulation of madhunassini leaves components leads indirectly to secretion of insulin from pancreas and thus it reduces the blood sugar. The GI of test products were 67.0 and 64.0 for idlas incorporated with HGM I and III respectively as seen in Table III.

Table 2: Blood Glucose Values in Selected Subjects

Sources of carbohydrate	Fasting (mg/100ml^{-1})	60 minutes after ingestion (mg/100ml^{-1})	120 minutes after ingestion (mg/100^{-1})
Glucose	128.4±10.72	218.3±11.78	167.0±12.48
Control idla (c)	127.6±12.21	198.0±11.73	158.0±11.28
Glucose	135.3±12.67	225.3±14.82	174.7±16.11
Idla +HGM I (E_1)	136.6±13.12	195.3±15.02	165.0±14.70
Glucose	129.7±14.04	219.7±16.18	169.0±15.86
Idla+ HGM II ($E_{2)}$	129.3±13.24	190.0±14.31	164.7±14.84
Glucose	133.3±14.38	224.3±14.46	172±14.84
Idla + HGM III (E_3)	134±14.98	190.7±15.54	165±14.71

Values given are Mean ±SD

Table 3: Mean Glycemic Index of Reference and Test products

Source of carbohydrate	Glycemic index
Glucose	109.2
Control idla (c)	78.0
Glucose	109.7
Idla + HGM I (E_1)	67.0
Glucose	109.6
Idla + HGM II (E_2)	62.0
Glucose	110.7
Idla = HGM III (E_3)	64.0

The hypoglycaemic effect of jamun seeds was due to water soluble gummy fibre and also water soluble neutral detergent fibre. The hypoglycaemic effect of Ashwagantha root could be due to its property to increase the level of serum insulin and activities of canalise, superoxide dismutase and glutathione peroxidise.

Above all the individual ingredients, the common ingredient in all the three hypoglycaemic mixes is oats. The beta-glucon content of oats produces hypoglycaemic effect. The results are comparable with a study which shows 50 per cent decrease in glycemic response with approximately 5 g beta-glucon.

CONCLUSION

The incorporation of Ashwagantha roots, jamun seeds and oats in the diet has shown marked reduction in the plasma glucose levels. Based on the results, Ashwantha, jamun seeds and oats in diet has shown marked reduction in the plasma glucose levels. Based on the results, Ashwantha roots powder, madhunasini leaves powder, jamun seeds powder and oats can be strongly recommended in the daily diet of type diabetic subjects for effective management of diabetes.

The results of the study clearly indicate that the madhunasini leaves powder would prove to be more useful, simple, effective, easily available and economically affordable supplement for the effective management of type diabetes.

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