

Effect of jamun (*Syzygium cumini* L.) seed powder supplementation on blood glucose level of type-II diabetic subject

NEHA AYYA, VIJAYA NALWADE AND T.N. KHAN

Hypoglycemic effect of supplementation of *jamun* seed powder (*Syzygium cumini* L.) on the blood glucose level of the selected diabetic subjects of 51-60 years of age was studied. Total thirty type II diabetic subjects were selected for the study and divided into two groups. Group I control group (n= 15) and Group II experimental group (n= 15). The subjects of experimental group were supplemented with per day 2 g of *jamun* seed powder for 60 days. Blood glucose level of the selected diabetic subjects was analyzed initially, at 30th and 60th days of supplementation. Nutritive value of *jamun* seed powder was estimated and expressed on dry weight basis per 100g. Results of nutrient content of *Jamun* seed powder indicated, 3.21 per cent moisture, 5.25 g protein, 4.86 g fat, 14.88 per cent total mineral and 15.75 per cent crude fibre and trace elements like calcium, iron, copper, manganese, and zinc were 21mg, 18.62mg, 1.08mg, 1.45mg, and 13.33mg, respectively. Mean values of fasting blood glucose level was decreased significantly from 223.06 ± 80.9 mg/dl to 166.6 ± 64.91 mg/dl after thirty days of supplementation of *jamun* seed powder, further it was decreased to 139.66 ± 61.45 mg/dl at 60th days of supplementation among the subjects of experimental group. Even reduction in post prandial blood glucose level was also observed (369.93 ± 79.40 to 203.73 ± 60.95 mg/dl). On the other hand, similar trend was not noticed in the blood glucose level of the subjects of control group.

Key Words : Diabetic subjects *Jamun* seed powder, Supplementation and blood glucose

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INTRODUCTION

Diabetes mellitus is one of the leading causes of disability and mortality in the world, especially in India. The international Diabetic Federation (IDF) has estimated that the total number of diabetic subjects was

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50 million in India in the year 2010 and this was further set to rise to 87 million by the year 2030 (Unwin *et al.*, 2009).

The probable reasons for the escalation of diabetes in Indians are increased insulin resistance, stronger genetic factors and environmental factors particularly associated with epidemiological transition due to rapid urbanization, industrialization and demographic transition leading to increased income levels and all of which resulted in altered lifestyle today (Liese *et al.*, 2004 and Mohan *et al.*, 2007). Limitations due to high cost and side effects such as development of hypoglycemia,

weight gain, gastrointestinal disturbances, liver toxicity etc. (Dey *et al.*, 2002).

The Jamun tree which is native to India. The jamun belongs to the family Myrtaceae and is botanically identified as *Syzygium cumini* Linn. (Samba-Murthy *et al.*, 1989). The synonyms of *S. cumini* are *Eugenia Jambolana* (EJ) and *Eugenia cumini*. It is commonly known as jambolana, jamun or Indian blackberry. Jamun seed powder is a rich source of fibre and it also a rich source of ellagitannins (ETs). *Eugenia Jambolana* is regarded as a medicine against diabetes because of its effect on pancreas. when given in doses of 2-3 g per day. Therefore the investigation was carried out to know hypoglycaemic effect of jamun seed in diabetic subjects.

METHODOLOGY

The present study was carried out to know the effect of supplementation of jamun seed powder on blood glucose level of the selected diabetic subject. Thirty type II diabetic subjects of 40-60 years with a Fasting Plasma Glucose levels greater than 130mg/dl. Were selected from Parbhani city. They were equally divided into two groups. Group I control group, (n=15) Group II experimental group, (n=15). Subjects were personally interviewed by the investigator with the help of pretested questionnaire so as to elicit the information regarding socio-economic background, complications and signs and symptoms of diabetes.

The supplement consisted of a commercially available *jamun* seed powder which was procured from local market of Parbhani city. It was stored in air tight plastic container in refrigerator till the experiment was over. The nutrient content of jamun seed powder was analyzed on dry weight basis. Except moisture. Moisture free sample was used for analysis. The proximate composition (moisture, total protein, fat, fibre and total minerals) was carried out as per procedure prescribed by A.O.A.C. (1975). Carbohydrate content was calculated by difference method. Trace elements (iron, copper, zinc and manganese) were estimated by Atomic Absorption Spectrophotometer.

The subjects in the experimental group were instructed to consume two grams of jamun seed powder that is one gram in the morning, half an hour before breakfast and one gram at night, half an hour before dinner. The subjects in the control group did not receive any supplementation. Blood glucose level of each

selected subjects were analyzed on the 1st day, after 30 and 60 days of supplementation period in both the groups. One touch glucometer was used to estimate the blood glucose level at initial, after 30th days and after 60th days. Blood glucose level of each selected subject was estimated before breakfast and post prandial after 2 hrs of lunch. The data obtained from the experiment such as glucose level was subjected to statistical analysis by using statistical tests like percentage, standard deviation, 't' test (Panse and Sukhatme, 1985).

OBSERVATIONS AND ASSESSMENT

Maximum per cent of diabetic subjects were belonged to 51 to 60 years of age group, nuclear family and educated up to secondary school level. Majority of the subjects were belonged to monthly family income between Rs. 15000 and 30000. All the selected diabetic subjects found to be have one or more of diabetic symptoms. A relatively very high per cent of the subjects complained of having easy tiredness (83.33%), nocturia (80 %), polyuria (73.33 %), eye problem (63.33 %) and polydipsia (60 %). Also feet problem and polyphagia was reported by 53.33 and 36.66 per cent of diabetic subjects, respectively. Besides these weight loss was found in 20 per cent of diabetic subjects. Results showed that more number of (06) selected diabetic subjects had experienced dyslipidemia complication arising due to diabetes mellitus, followed by infection (02) and the remaining subjects found to have complications such as kidney stone, heart disease, Parkinson, constipation and hyperlipidemia (3.33%) each.

Results indicated that out of 30 selected diabetic subjects, maximum number (12) of subjects was found

Table 1 : Proximate composition and content of trace elements in jamun seed powder (per 100g)

Nutrients	Composition
Moisture (g)	3.21
Protein (g)	5.25
Fat (g)	4.86
Total mineral (g)	14.88
Crude fibre (g)	15.75
Carbohydrates (g)	6.05
Calcium (mg)	21
Iron (mg)	18.62
Copper (mg)	1.08
Manganese (mg)	1.45
Zinc (mg)	13.33

to have diabetes since more than 10 years. Whereas, 33.33 per cent subjects were suffering from diabetes mellitus from 2 to 5 years and the remaining 26.66 per cent subjects found to have diabetes mellitus from 5 to 10 years.

Information regarding proximate composition of *jamun* seed Powder is given in Table 1. Results indicated that the moisture content was 3.21 per cent, protein 5.21 per cent, fat 4.86 per cent, total mineral (ash) 14.88 per cent, crude fibre 15.75 per cent and carbohydrate was 56.05 per cent. Determination of moisture, protein, fat, total mineral, crude fibre, carbohydrate, calcium, iron, copper, manganese and zinc were the different parameters employed to assess the nutritive value of *jamun* seed powder. All the estimated values were expressed on dry weight basis per 100g. Trace element contents (mg/100

g) of calcium, iron, copper, manganese and zinc in *jamun* seed powder was 21, 18.62, 1.08, 1.45 and 13.33 per cent, respectively.

It is clear from Table 2 that mean values of fasting blood glucose level of the selected diabetic subjects of experimental group at initial was 223.06 ± 80.9 mg/dl. Significant reduction was noticed in blood glucose level after 30 and 60 days of supplementation (166.6 ± 64.91 mg/dl and 139.66 ± 61.45), respectively. Mean post prandial blood glucose level of experimental group, it was initially 369.93 ± 79.40 mg/dl with a range between 224 and 483 mg/dl. After 30th and 60th days of supplementation of *jamun* seed powder blood glucose level found to decreased significantly (272.13 ± 70.51 mg/dl) and (203.73 ± 60.95 mg/dl). On the whole, results indicated that supplementation of *jamun* seed powder

Table 2 : Mean fasting and post- prandial blood glucose level of the experimental group

Days	Mean blood glucose level (mg/dl) of the selected diabetic subjects of experimental group			
	Fasting		Post prandial	
	Range	Mean \pm SD	Range	Mean \pm SD
Initial	135-397	223.06 ± 80.9	224-483	369.93 ± 79.40
30 days	107-303	166.66 ± 64.91	146-372	272.13 ± 70.51
60 days	79-310	139.66 ± 61.45	125-350	203.73 ± 60.95

't' values of fasting and post-prandial blood glucose level of experimental group

Days	Fasting	Post-meal
0 vs 30	2.10 ^{NS}	3.56**
0 vs 60	3.18 ^{NS}	6.43**
30 vs 60	1.17 ^{NS}	2.84**

NS=Non-significant

* and ** indicate significance of values at P=0.05 and 0.01, respectively

Table 3 : Mean Fasting and post- prandial blood glucose level of the control group

Days	Mean blood glucose level (mg/dl) of the selected diabetic subjects of control group			
	Fasting		Post prandial	
	Range	Mean \pm SD	Range	Mean \pm SD
Initial	120-300	184.46 ± 55.11	154-459	274.00 ± 88.01
30 days	98-280	140.66 ± 46.38	129-445	251.26 ± 84.15
60 days	77-406	173.8 ± 86.63	100-503	269.66 ± 91.56

't' values of fasting and post-prandial blood glucose level of control group

Days	Fasting	Post-meal
0 vs 30	2.3*	1.87 ^{NS}
0 vs 60	0.40 ^{NS}	0.13 ^{NS}
30 vs 60	1.30 ^{NS}	1.69 ^{NS}

NS=Non-significant

* and ** indicate significance of values at P=0.05 and 0.01, respectively

Table 4 : Mean Fasting and post- prandial blood glucose level (mg/dl) of the selected diabetic subjects before and after supplementation

Group	Mean blood glucose (mg/dl) level of the selected diabetic subject						't' value	E vs C (60 days)
	Fasting		't' value	Post prandial		't' value		
	Initial	60 days		Initial	60 days			
Experimental	223.06 ± 80.9	139.66 ± 61.45	3.17**	369.9 ± 79.40	203.73 ± 60.95	6.4**	0.13 ^{NS}	
Control	184.46 ± 55.11	173.8 ± 86.63	0.40 ^{NS}	274.00 ± 88.01	269.66 ± 91.56		2.32*	

NS=Non-significant

* and ** indicate significance of values at P=0.05 and 0.01, respectively

for 60 days had positive effect in reducing fasting and post prandial blood glucose level of the selected diabetic subjects. The reduction in blood glucose level was significant statistically at one per cent level.

Mean values of fasting blood glucose level of the selected diabetic subjects of control group is presented in Table 3.

It was found that on 1st day of experiment mean values of blood glucose ranged from 120 to 300 mg/dl with an average value of 184.46 ± 55.11 mg/dl. After 30 days, blood glucose level of control group was slightly decreased to 140.66 ± 46.38 mg/dl and again it raised to 137.8 ± 86.63 mg/dl after 60 days of experiment with a range of 77-406 mg/dl. Mean values of post prandial glucose level of the selected diabetic subjects of control group was 274.0 ± 88.01 at initial of the experiment, after 30 days it was slightly decreased (251.26 ± 84.15 mg/dl). Whereas after 60 days slight increase was noticed in blood glucose level (269.66 ± 91.56 mg/dl).

Mean fasting and post prandial blood glucose level (mg/dl) of the selected diabetic subjects before and after supplementation is presented in Table 4.

Mean fasting blood glucose level of the selected diabetic subject of the experimental group was 223.06 ± 8.09 at first day of experiment and it was remarkably decreased to 139.66 ± 61.45 after 60 days of supplementation of jamun seed powder. On the other hand, mean fasting blood glucose level of selected diabetic subject of control group was decreased from 184.46 ± 55.11 to 173.8 ± 86.63 mg/dl after 60 days of supplement. Mean post prandial blood glucose level of experimental group was decreased from 369.93 ± 79.40 mg/dl to 203.73 ± 60.95 mg/dl after 60 days of supplementation, which was significant at 1 per cent level. On the contrary the post prandial blood glucose level of the selected diabetic subjects of control group was not decreased significantly (274.0 ± 88.01 to 269.66 ± 91.56 mg/dl). Similar work related to the present topic was also done by Ayar *et al.* (2011) and Shinde *et al.* (2010).

Conclusion :

On the whole, it can be concluded from results that supplementation of *jamun* seed powder had significant hypoglycemic effect on the fasting and post prandial

blood glucose level may be due to its constituent glycoside, jamboline, which has the power to check the pathological conversion of starch into sugar in case of increased production of glucose (Bakhr, 2000). In the present study *Eugenia jambolana* (*Syzygium cumini*) seeds have significant blood glucose lowering effect. Hence such low cost effective therapies may help in controlling the rising incidence of diabetes mellitus in developing countries.

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