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Effectiveness of fenugreek on blood sugar levels among type ii diabetics in a selected community at Mangalore

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Abstract

Background of the study: Diabetes is emerging as a main threat to human health in the 21st century. It is estimated the global burden of Type II Diabetes Mellitus for 2010 was 285 million people, is projected to increase to 438 million in 2030. Similarly, for India this increase is estimated to be from 51 million people in 2010 to 87 million in 2030 [7].

Aims: effectiveness of fenugreek on blood sugar level among Type II Diabetics.

Methodology: An evaluative approach for 60 diabetics in the age of 40-60 years using purposive sampling technique was done. Baseline data, baseline blood sugar levels (PPBS) were measured. Fenugreek powder was given Experimental group I (10gm), Experimental group II (20gm) and Control group with no intervention for 4 weeks.

Results: Findings revealed mean pre-test blood sugar level of experimental group I (227.7) was higher compared to post-test (209.8) and the mean pre-test blood sugar level of experimental group II (252.1) was higher compared with post-test score (217.6). ANOVA and Tukey test were used to compare the effectiveness of fenugreek on blood sugar levels between the experimental groups and control group. A significant difference between the experimental group II and control group ($p = <0.001$), was found whereas no significant difference between the other groups. Chi-square and Fisher's exact found association between the demographic characteristics and blood sugar levels.

Interpretation and conclusion: Fenugreek was found to be very effective in reducing the blood sugar levels among the diabetics.

Keywords: Fenugreek, Diabetics, Blood sugar levels

Introduction

Diabetes Mellitus is a complex metabolic disorder characterized by abnormal levels of glucose (fasting plasma glucose level >126 mg/dl) in the blood. It is one of the chronic diseases that manifests when insulin production by the pancreas is insufficient or when the body cannot effectively utilize the secreted insulin [1]. According to W.H.O, by 2025 total 380 million of the worldwide population will be affected from diabetes. According to American Diabetes Association estimation for every 21 seconds, someone is diagnosed with diabetes, and every 10 seconds a person dies from diabetes-related causes in the world [12]. Fenugreek has been used as a remedy for diabetes, particularly in India. The active principle is the defatted portion of the seed which contains the alkaloid trigonelline, nicotinic acid, and coumarin which have confirmed to lower the blood sugar and lipid levels in the blood [2].

Background of the study

Diabetes is emerging as one of the main threats to human health in the 21st century. It is estimated that the global burden of Type II Diabetes Mellitus for 2010 was 285 million people which is projected to increase to 438 million in 2030. Similarly, for India this increase is estimated to be from 51 million people in 2010 to 87 million in 2030 [3].

Diabetes mellitus has a significant impact on the health, quality of life, and life expectancy of patients. Exercise, diet, and weight control are essential and effective means of improving glucose homeostasis [4].

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Materials and Methods

Aims: To assess the effectiveness of fenugreek on blood sugar level among Type II Diabetics.

Design and setting: A pretest post test control group design was carried in a community to identify the effectiveness of fenugreek on the blood sugar levels of the diabetes clients. Written permission was obtained from the participants after proper explanation about the purpose and usefulness of the study. Confidentiality was assured to the participants.

Participants

Sixty diabetics, both male and females in the age group between 40-60 years were selected through purposive sampling technique. Out of them (n =20) were randomly allocated into the control group who received no intervention and only the regular treatment, (n=20) in the experimental group I and (n=20) in the experimental group II using lottery method. The inclusion criteria were Diabetics who are only on oral hypoglycemic drugs, Diabetics who are willing to consume fenugreek powder as an adjuvant therapy, Diabetics who do not have complications such as Diabetic retinopathy, Diabetic neuropathy and Diabetic nephropathy. The exclusion criteria were as follows, Diabetics who are, on insulin or any other adjuvant therapy; chronically ill, already taking fenugreek seed powder.

Data collection

The diabetics were selected using purposive sampling technique and randomly allocated into the experimental group I (n=20), experimental group II (n=20), and control group (n=20). The data were collected using the demographic proforma for the baseline data and their pre test postprandial blood sugar levels were assessed using the calibrated glucometer. The experimental group I and II received the fenugreek powder in 10grms and 20 grms respectively for four weeks, whereas the control group were not given any intervention. Blood sugar levels of all the three groups were assessed after four weeks.

Ethical considerations

The study was approved by the institutional ethical committee. Written permission was obtained from the District Health Officer of the Concerned Community and informed consent was also obtained from the participants after proper explanation about the purpose and usefulness of the study.

Content validity

To ensure the content validity, the tools along with the problem statement, objectives, hypothesis, and operational definitions were submitted to 9 experts from the field of Medical Surgical Nursing and the doctors from the Medicine and Surgery Department. The final data were translated by verbatim from English to Kannada by language experts.

Data collection

The following instruments were used for the collection of the data:

A demographic proforma, to identify the sample characteristics and a calibrated glucometer to record the blood sugar levels was used. A checklist on signs and symptoms of diabetic complications consisting of 38 questions were prepared in order to exclude the subjects with diabetic complications. The pre test blood sugar levels were assessed and the fenugreek powder was given to the subjects

Data analysis

SPSS version XVI was used to analyze the data. The demographic variables were analyzed using frequency and percentage. Difference between pre-test and post-test blood sugar levels of the diabetics was analyzed using paired ‘t’ test. Comparison between the differences of blood sugar level between the groups was analyzed using ‘One way ANOVA’. Pair wise Comparison between the differences of blood sugar level between the groups was analyzed using ‘Tukey test’.

Results

Section I: Description of sample characteristics

The frequency and percentage of Diabetics according to their demographic characteristics are presented in table 1(a).

Table 1(a): Distribution of samples according to demographic characteristics n= 60

Demographic Characteristics		Frequency (f)	Percentage (%)
Age(yrs)	40-50	20	33.3
	50-60	40	66.7
Gender	Male	31	51.7
	Female	29	48.3
BMI(kg/m ²)	10-20	11	18.3
	20-30	47	78.3
	>30	2	3.3
Religion	Muslim	18	30
	Hindu	33	55
	Christian	9	15
Educational status	No formal education	8	13.3
	Primary	24	40
	High school	20	33
	Graduation and above	8	13.3
Marital status	Single	1	1.7
	Married	49	81.7
	Divorcee	1	1.7
	Widow/widower	9	15
	Coolie	18	30

Occupation	Agriculture	15	25
	Professional worker	16	26.7
	Others	11	18.3
Monthly Income	≤ 10000	13	21.7
	10000-20000	32	53.3
	20000-30000	9	15
	>30000	6	10
Family History	Yes	51	85
	No	9	15
Duration of illness	< 5 years	16	26.7
	5-10 years	25	41.7
	10-15 years	8	13.3
	> 15 years	11	18.3
Diet pattern	Veg	15	25
	Non Veg	45	75
Physical Activity	Sedentary	11	18.3
	Moderately active	35	58.3
	Vigoursly active	14	23.3
Tobacco Chewing	Yes	17	28.3
	No	43	71.7
Alcohol	Yes	19	31.7
	No	41	68.3
Smoking	Yes	15	25
	No	45	75
Exercise	Yes	29	48.3
	No	31	51.7
Yoga	Yes	3	5
	No	57	95
Meditation	Yes	2	3.3
	No	58	96.7

Table 1 (a) above shows that majority of the diabetics 40(66.7%) were in the age group of 50-60 years. Majority of the diabetics had the family history of diabetes (51) and 9 had no family history of diabetes. Majority of the diabetics (25) were having diabetes mellitus since 5-10 years.

Majority of the diabetics were having mixed diet pattern (45).

Section II: Effectiveness of Fenugreek in controlling the blood sugar levels among Experimental group I and Experimental group II

Table 2: Difference between pre-test and post-test blood sugar levels of the diabetics by using paired t test n=40

SCORES		Mean	SD	t Value	p Value
Experimental group I	Pre test	227.7	65.9	3.58	0.002
	Post test	209.8	61.6		
Experimental group II	Pre test	252.1	74.41	7.79	< 0.001
	Post test	217.6	79.5		

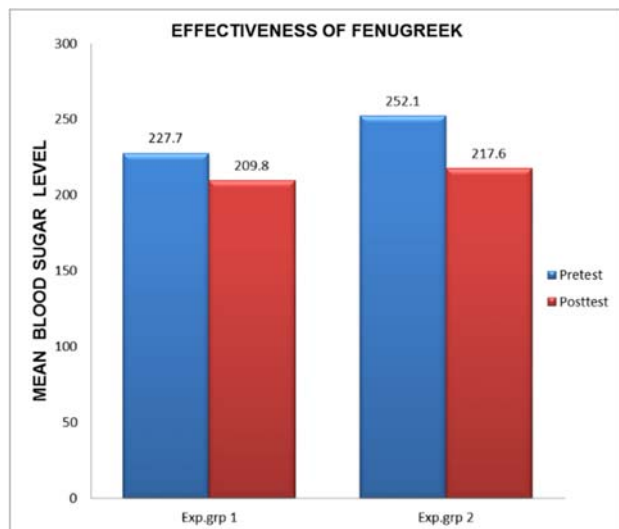


Fig 1: Bar Diagram showing frequency of mean blood sugar level (PPBS)

Table 2: The data presented in the table II indicates that the mean pre-test± SD of blood sugar level of experimental group I (227.7 ± 65.9) was higher as compared with post-test score (209.8 ± 61.6) and the mean pre-test ± SD blood sugar level of experimental group II (252.1 ± 74.41) was higher as compared with post-test score (217.6 ± 79.5). The calculated 't' value in experimental group I is 3.58 and in experimental group II is 7.79. The calculated values are more than the table 't' value, which is 2.015 and also, the p values in each experimental group is less than 0.05. Hence there is a difference in the PPBS (postprandial blood sugar levels) before and after consumption of fenugreek and is effective in controlling blood sugar level. n=20+20

Section III: Comparison between the differences of blood sugar level between the Experimental group I, Experimental Group II and Control group.

Table 3 (a): Comparison between the differences of blood sugar level between the groups by using one way ANOVA n=60

Group	Difference In Mean (Pre- Post)	S.D.	F Value	P Value
Experimental group I	22.3	17.71	7.915	<0.001
Experimental group II	34.5	19.79		
Control group	13.4	17.3		

Table 3(a) shows that the calculated F value is 7.915 is more than the F table value 2.25 also the p value is less than 0.05.

Hence there is a difference in effectiveness of fenugreek on the blood sugar levels between the three groups.

Table 3 (b): Pair wise Comparison between the differences of blood sugar level between the groups by using Tukey test n=60

Comparison	Mean Difference	P Value
Experimental group I v/s Experimental group II	12.2	0.112
Experimental group I v/s Control group	11.6	0.137
Experimental group II v/s Control group	23.8	<0.001

Table 3 (b) shows that the ‘p’ value for the comparison group i.e., experimental group II v/s control is 0.001 which is less than 0.05 level of significance. Hence it shows that 20 grams of fenugreek powder is more effective in controlling blood sugar level. Whereas for the other two comparisons the p value is more than 0.05. Hence there is no difference in effectiveness at 5% level of significance.

Discussion

In the present study, majority of the diabetics 40(66.7%) were in the age group of 50-60 years. The finding were in agreement in a study conducted by Maggi S.M *et al* on risk factors of diabetes showed that majority of the subjects had diabetes mellitus at the age of 40-60 years (34.8%) [5].

Majority of the diabetics 51(85%) had family history of DM, similar according to Valeriya Lyssenko and Markku Laakso on genetic screening for the risk of type II DM and results revealed that the concordance of Type II diabetes in monozygotic twins is 70% compared with 20–30% in dizygotic twins. The lifetime risk of developing the disease is 40% in offspring of one parent with Type II diabetes, greater if the mother is affected and approaching 70% if both parents have diabetes [6].

Our study evaluated that majority of the diabetics were having mixed diet pattern 45(75%) and 15 were vegetarians. In a study conducted by Teresa. *et al* to identify the association between dietary patterns, meat intake, and the risk of Type II Diabetes in elderly. The result revealed that a diet higher in processed meats may increase the risk of type 2 diabetes in the elderly [7].

This results current study revealed that the mean pre-test blood sugar level of experimental group I (227.7 ± 65.9) was higher as compared with post-test score (209.8% ± 61.6) and the mean pre-test blood sugar level of experimental group II (252.1% ± 74.41) was higher as compared with post-test score (217.6% ± 79.5).The calculated t value in experimental group I is 3.58 and in experimental group II is 7.79. The calculated values are more than the table t value, which is 2.015 and also, the p values in each experimental group is less than 0.05. This finding of the study is supported by a study conducted by T. Alfonsa and S. Ciba, on effectiveness of fenugreek seed powder, reveals that there is a significant difference in the experimental group (N=15) before and after administration of fenugreek seed powder (t₁₄=2.145, p<0.05). There was a significant difference in the blood glucose level of experimental and control group (t₂₉=13.8, p>0.05) [8].

Findings of the study revealed that after the administration of fenugreek, there was a great decrease in the blood sugar levels of diabetics. Hence, Fenugreek was found to be very effective in reducing the blood sugar levels among the diabetics. Further studies can be made to identify the exact doses which could be more effective in reducing the blood glucose levels, comparison can be made between the diabetics using hypoglycaemic drugs and those on insulin.

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Conclusion