



COMPARATIVE STUDY OF BITTER GOURD JUICE, ASH GOURD JUICE AND KNOL-KHOL JUICE ON BLOOD GLUCOSE LEVEL AMONG TYPE II DIABETES MELLITUS – A PILOT STUDY

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ABSTRACT

Background: Diabetes Mellitus comprises of a group of common metabolic disorders that share the phenotype of hyperglycaemia. The comparative effect of bitter gourd juice, knolkol juice and ash gourd juice was less understood on diabetes mellitus. Hence, this study was conducted to evaluate the comparative effect of bitter gourd juice, knolkol juice and ash gourd juice on diabetic individuals. Materials and method: Thirty (n=30) individuals with diabetes were selected for the study after proper screening according to diagnostic, inclusion & exclusion criteria. Subjects were recruited from SDM Yoga and Nature cure hospital Pareeka, Manipal. After a, thorough and detailed case history, the subjects were taken in the study and treatment was given. The blood glucose level is checked at the 1st day before we start with the juices and the pre-data are collected and post data is collected on the 5th day. Patient was divided into three groups, ash guard Group A (n=10), knoll khol Group B (n=10), bitter guard Group C (n=10). For group A was given ash juice 250ml in the morning in an empty stomach, for group B same amount knoll kohl (250ml) is given in the morning and for group C 250 ml of bitter gourd was given in same manner for 5 days along with Naturopathic diet, hydrotherapy treatment and yoga therapy. Data were collected for statistical analysis. Fasting blood sugar (FBS) and post prandial blood sugar (PPBS) was checked by using Glucometer. Results: There was a reduction in Fasting blood sugar and postprandial blood sugar after the consumption of bitter gourd juices than knol-khol juices and ash gourd juices with *P* value 3.89 in Fasting blood glucose level and in Post Prandial Blood Glucose level *p* value 0.00057. Conclusion: This study shows that significance lower of blood glucose level among the type II Diabetic patients. Hence bitter gourd juice is may be beneficial in Diabetes patients to reduce the blood glucose level.

KEYWORDS: Diabetes mellitus, Fasting Blood Glucose (FBS), Post Prandial Blood Glucose (PPBS).

INTRODUCTION

Type 2 Diabetes Mellitus is a complex chronic metabolic disease that expected to increase in prevalence of Type II Diabetes mellitus (T2DM) is predicted to rise from 171 million in 2000 to 366 million in 2030 worldwide.^[1] Though India has emerged out as super power in the last decades and has come out as a great democratic country and a great technical cyber hub in the world it is very sad to say it has also emerged out as a worst Diabetic Hub in the whole world. It is because of sedentary lifestyle, without regular exercises and intake of more Carbohydrate rich diets, unwanted stressed life style, leads the present Indian a diabetic at his 30's in general. In the last decade, the incidence of diabetes mellitus has tremendous increase among the Indian population.^[2] The effect of diabetes has increased because of worsening

obesity, global population aging and decrease in physical activity.^[3] Complications are still common and it leads to cause retinopathy (loss of vision), nephropathy (end stage of renal disease), neuropathy (degeneration of nerves).^[4,5] In addition, 50% people died in cardiovascular complications such as hypertension, strokes are the leading cause of morbidity, mortality and expenditures in type2 Diabetes Mellitus.^[6,7] Use of drugs has its own drawbacks, such as drug dependency, drug resistance, and adverse effects, if used for a long time. Hence, in recent years there has been an intense search for nonmedical measures not only to manage T2DM, but also to prevent its complications.

Complementary and alternative medicine (CAM) includes physical activities, herbal plant extracts and

dietary recommendation, which reduce the blood sugar level in type2 diabetes mellitus and it considered as first line clinical approach for type2 diabetes mellitus.^[8] Several complementary and alternative medicine modalities like naturopathy, acupuncture, therapeutic massage, reflexology, dietetics are found to be effective in the management of T2DM. Over the years, mankind had used to drink bitter gourd, knol-khol juices, etc. Bitter gourd (*L. Momordica charantia*) contains a lectin that has hypoglycaemic effect which develops after eating bitter gourd by acting on peripheral tissues and suppressing appetite, it's similar to insulin effect in the brain.^[9] We aimed to study the immediate effect of bitter gourd juice and knol-khol juice on blood glucose on Type II Diabetes Mellitus, as a practical strategy for controlling blood sugar without use of drugs.

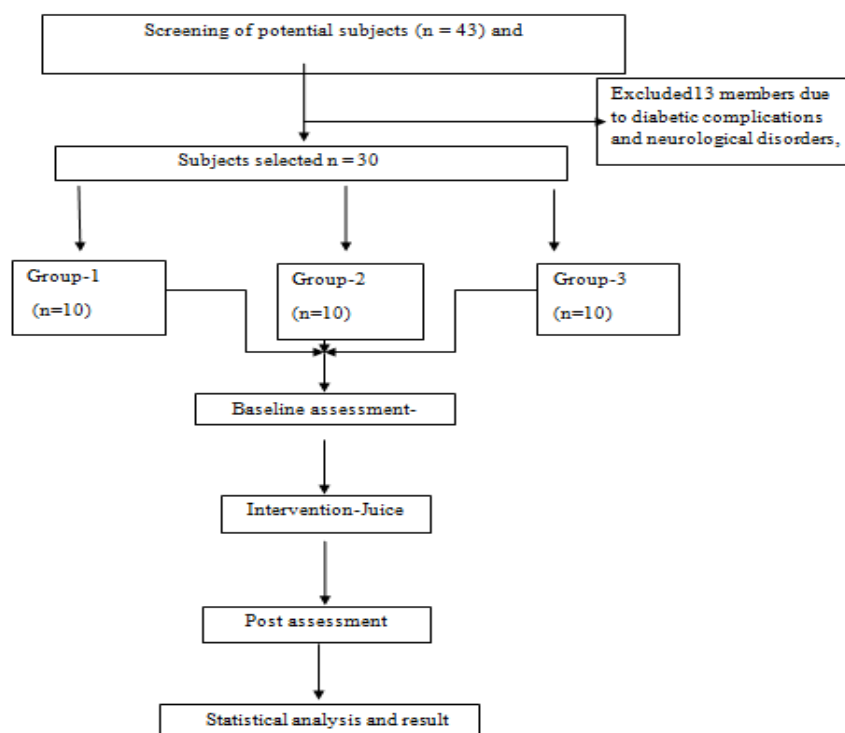
METHODOLOGY

Subjects: 30 Subjects who were diagnosed with type 2 Diabetes individuals were recruited for the study. Subjects who fulfilled the inclusion and exclusion criteria were apprised about the purpose of the study and their rights as a research subject.

Sources of subjects: The subjects were from in-patient of Shri Dharmasthala Manjunatheshwara Yoga & Nature Cure Hospital, SOWKHAYAVANA, Pareeka, Manipal.

Method of collection of data: Informed consents were obtained from the subjects by explaining the following both orally and in writing: study objectives, study methods, withdrawal of participants at any time and protection of privacy. Data were collected at baseline and post interventions.

Illustration of Study Plan



Criteria for diagnosis

Laboratory reports: Fasting blood sugar and Post prandial blood sugar.

Inclusion criteria: Subjects with Type II diabetes mellitus, both the gender having age between 30 to 65 years, on medication.

Exclusion criteria: Subjects with Type I diabetes mellitus, under Anti-psychotic drugs along with Type II diabetes mellitus, patients with other complication of diabetes like diabetic neuropathy, nephropathy and retinopathy and liver and kidney dysfunction.

Ethical considerations: The subjects were verbally explained in detail about the intervention involved in the study and its related assessments in the form of pre and post data of FBS and PPBS. A signed informed consent was taken from each subject before commencement of the intervention. The institutional ethics committee of SDMCNYS has approved this study.

Setting for Assessment and Intervention: The study was executed in the hospital and the pre data is collected on the 1st day of the admission to the nature cure hospital and post data on the 5th day (both FBS and PPBS) is checked on both the days.

Design:

A comparative study

Sample size: n=30

Assessment: The pre and post FBS (Fasting blood sugar) and PPBS (Post prandial blood sugar) was checked of the patient and noted down on both 1st day and at the 5th day after the patient is admitted to nature cure hospital. Finally compared the blood sugar levels (both FBS and PPBS) of 1st and 5th day.

Intervention: General description about intervention:
Bitter gourd juice/ bitter melon juice.

Bitter gourd juice should be prepared in 30:70 ratios, because of its bitter taste. 30% (75ml) of bitter gourd grinded concentrated and 70% (175ml) of water to make

250ml of juice which is given to each subject in the morning at 7:30 AM in empty stomach.

Knol-khol juice

Fresh knol-khol juice concentrate 200ml is mixed with 50ml of water, and made into 250ml of juice is also given to the subjects in the morning at 7.30 am in empty stomach.

Ash gourd Juice

Fresh ash gourd juice concentrate 200ml is mixed with 50ml of water, and made into 250ml of juice is also given to the subjects in the morning at 7.30 am in empty stomach.

Table 1: Naturopathy treatment protocol for 10 days.

| S.no | Morning | Afternoon |
|------|---|---|
| 1 | Abdominal mud pack, Enema and Steam bath | Abdominal mud pack and Neutral hip bath |
| 2 | Abdominal mud pack and Neutral half bath with salt | Abdominal mud pack and Neutral spinal spray |
| 3 | Abdominal mud pack and Sauna bath | Abdominal mud pack and Gastro hepatic pack |
| 4 | Abdominal mud pack and Full body massage | Abdominal mud pack and Neutral immersion bath with salt |
| 5 | Abdominal mud pack and Turmeric bath | Abdominal mud pack and Kidney pack |
| 6 | Abdominal mud pack and Neutral under water massage | Abdominal mud pack and Neutral spinal bath |
| 7 | Abdominal mud pack and Salt glow oil massage | Abdominal mud pack and Cold immersion bath |
| 8 | Abdominal mud pack and Full mud bath | Abdominal mud pack and Alternate hip bath |
| 9 | Abdominal mud pack and Reclining steam bath | Abdominal mud pack and Alternate douche to whole body |
| 10 | Abdominal mud pack and Partial massage to back and legs | Abdominal mud pack and Deluxe hydro massage |

Table 2: Daily Yoga protocol for 10 days (1 to 1 ½ hour, twice a day).

| Name of the practice | Details | Duration |
|--------------------------|--|-------------------------------------|
| Sheethalikaarana vyayama | All the joints movements | 10 minutes |
| Suryanamaskara | 5 rounds | 10 minutes |
| Breathing practices | Shashankasana Breathing Rabbit Breathing Tiger Breathing | 2 minutes 2 minutes 2 minutes |
| Asana practices | Tadasana Tiryaktadasana Ardhakatichakrasana Uthkatsana Ardhachakrasana Padahasthasana Trikonasana Utthitapadasana Pawanamuktasana Setubandhasana Nawasana Shalabhasana Naukasana Baddhakonasana | 30 minutes |

| | | |
|---------------------------|--------------------------------|------------------------------|
| | Janusirshasana Ushtrasana | |
| Pranayama | Bhastrika or kapalabhati | 5 minutes |
| | Surya vedana | 2 minutes |
| | Chandra vedana | 2 minutes |
| | Nadisodhana | 5 minutes |
| | Bhramari | 5 rounds |
| Deep relaxation technique | | 5Minutes |
| Kriyas | Vamana dhouti | First 3 days |
| | Jalaneti | Daily once from each nostril |
| | Kapalabhati | 40 -120 strokes |
| | Trataka | Daily at 8:00pm (20 min) |
| Meditation | Yoga nidra (also on follow up) | Daily before sleeping 30 min |
| | Om-meditation(on follow up) | 15 minutes |

Table No.3 Diabetic Diet protocol.

| 7:30 am | 9:00 am | 11:30am | 2:00pm | 4:00pm | 6:30pm | 8:00pm |
|---|---------------------------------------|--|--------------------------------------|--|---|-----------------------|
| Bittergourd juice Ashgourd juice Knol khol juice 100ml | Ragiganji or barley water 200ml | Boiled diet Or Raw diet 300 – 400 gm | Knolkhol Ashgourd juice 100 ml | Cucumber Or Sprouts 100 Grams, barley water 100ml | Raw diet Or Boiled diet 300 – 400 gm | 1apple 75 – 100 gm |

Data extraction and analysis

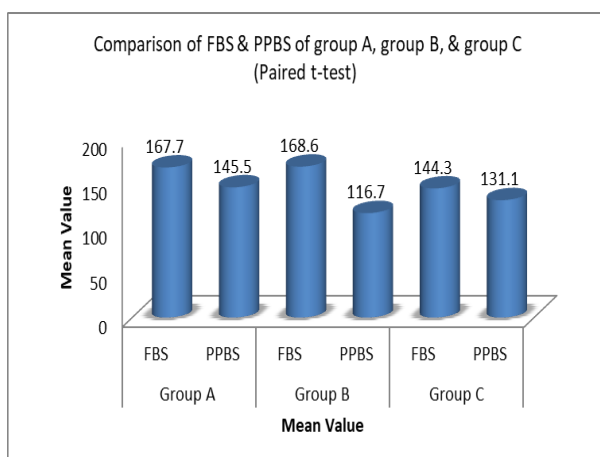
The data was collected by checking the pre and post random blood glucose level using a glucometer. The assessments were done prior and immediately after the intervention. The data was further scored using respective scoring keys and arranged in Microsoft excel sheets for statistical analysis. The statistical analysis of within the group was performed using paired sample t-test. P value <.05 was considered as significant.

RESULTS

The statistical paired t-test was done using the SPSS version 20.0. The below tables give a graphical representation of the pre and post Fasting blood glucose and Postprandial blood glucose. The statistical analysis of within the group was performed using paired sample t-test. There is a significant change in group B (p-value 0.346) than group A (p-value 0.457) and group C (p-value 0.529).

Table no. 4: Comparison of Baseline assessment and post assessment of group A, group B & group C by dependent t test.

| Group | Variables | Baseline assessment (Mean Value±SD) | Post assessment (Mean Value±SD) | t-value | p-value |
|---------------------------------|-----------|--|------------------------------------|---------|---------|
| Group A (Ash gourd Juice) | FBS | 167.60±52.29 | 145.5±50.48 | 0.9882 | 0.457 |
| | PPBS | 259.2±103.20 | 231.9±93.71 | | |
| Group B (Bitter gourd Juice) | FBS | 168.60±31.23 | 116.70±35.91 | 0.0746 | 0.346 |
| | PPBS | 223±53.60 | 155.70±45.10 | | |
| Group C (Knol kol Juice) | FBS | 144.3±31.99 | 131.1±33.79 | 0.9640 | 0.529 |
| | PPBS++++ | 186.8±49.40 | 162±35.21 | | |



Comparison of FBS and PPBS of group A, group B and group C

6. DISCUSSION

Almost all anti diabetic drugs cause mild to severe side effects.^[10] The naturopathic treatment approach frequently includes important dietary and lifestyle recommendations included in current medical treatment guidelines for diabetes, hypertension, and hyperlipidemia, although improvements can be made on the precision of recommendations.^[8] The objective of the present study was to determine the effect of bitter gourd and Knol-khol juices on type 2 diabetic management. Our results indicate that the blood sugar level was significantly lower by both bitter gourd than Knol-khol juice. A study done on Immediate effect of bitter gourd, ash gourd, knol-khol juices on blood sugar level of patients with type 2 diabetes mellitus – This study shows the significance of hypoglycaemic effects of bitter gourd

juice, knol-khol juices may be beneficial in Diabetes patients to reduce the blood sugar level.^[11] Another study done on *Momordica charantia* and type 2 diabetes: from invitro to human studies – this review describes anti-diabetic effects of bitter gourd, analyses of bioactive compounds have shown that bitter gourd is rich in nutrients and phytochemicals of which some have anti-diabetic effects. Juices, powders, extracts and isolated compounds have been tested in vitro and in vivo. Bitter gourd increases the insulin secretion of the pancreas, decreases intestinal glucose uptake and increases the uptake and utilization of glucose in peripheral tissues.^[12]

According to Lolitkar and Rao^[13] the blood sugar once lowered after 30 days' treatment did not increase even after 15 days of discontinuation of the treatment which expressed that bitter gourd was helpful in reducing blood sugar patients who have type 2 diabetes mellitus. Chongkol Tiangda *et al.*^[14] suggested that had no significant effect on the blood glucose level in normal rabbits but there is no direct evidence of reduced blood sugar level in normal healthy individual though it has hypoglycemic action in diabetic mellitus patient. Our results also showed significant reduction of blood sugar level after consuming 250ml of bitter gourd juice for 05 days but lasting effect was not noticed. Andallu B^[15] noticed that Knol khol juice significantly improved the glycemic control and also significantly brought down lipid peroxidation in erythrocytes (33 percent), plasma (21 percent) and urine (16 percent) due to presence of polyphenols, tannins and ascorbic acid in it. Hence it has the property of anti-diabetic effect and anti-oxidant activity. In the present study 250ml of Knol-khol juice showed significantly lowers the blood sugar level but lasting effect was not noticed. Smaller sample size. The changes in blood glucose level were checked only in type 2 Diabetes Mellitus individuals.

Limitations

The change in blood glucose level was checked immediately after the intervention and there was no test done further to evaluate if the changes sustained.

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