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A True Experimental Study to Assess the Effectiveness of 'Finger Millet Flour in Diet' for Reducing Blood Glucose Level Among Type-II Diabetes Mellitus Clients in Selected Hospital, Bhilai, Chhattisgarh

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Abstract*: Introduction: Diabetes, also known as diabetes mellitus, is a group of common endocrine diseases characterized by sustained high blood sugar levels. Diabetes is due to either the pancreas not producing enough insulin, or the cells of the body not responding properly to the insulin produced. Dietary interventions are an easy and cost-effective way to provide health benefit's to people at risk and those who have been diagnosed with type-2 diabetes, in addition to improving their quality of life Current guidelines for those with type-2 diabetes are to follow a healthy, balanced diet-notably including starchy carbohydrates with a low GI (Glycaemic index) and higher dietary fiber, both of which can help regulate post-prandial hyperglycemia and reduce body weight has been shown that a low glycaemic carbohydrate/high-fiber diet safely reduces plasma cholesterol levels and improves blood glucose control in people with type-2 diabetes . AIM: The aim of the study was to assess the effectiveness of 'Finger millet flour in diet' for reducing blood glucose level among type-II Diabetes Mellitus Clients in selected hospital, Bhilai, (C.G.) Material and Method: A true experimental research design was adopted to conduct study. target population was Type-II diabetes mellitus clients at Bhilai. A simple random sampling (probability) technique was utilized for select in a sample of 40 who having Type-II diabetes mellitus. Accessible population was clients with Type-II diabetes mellitus at hospital Bhilai. Expert opinion and content validity of the tools established by five experts (medical surgical nursing) and one statistician . Reliability of glucometer assessment of blood glucose level regarding Type –II diabetes mellitus and its prevention among Type –II diabetes mellitus was established by using Karl Pearson formula and 'r' was found to be 0.99. The tool was found valid and reliable. Data collection was done from 5 January to 4 February,2023 for main study. Formal written Permission was taken from the Nursing Director, shri Shankaracharya institute of medical Science hospital Junwani Bhilai (C.G.). Results: Overall analysis of the study shows that the in Pre-test random blood glucose level in experimental group was 4773, total mean 238.6 respectively. The standard deviation of pre-test random blood glucose level was 13.0 and post-test random blood glucose level was 4131, total mean 206.5 respectively. The standard deviation of post-test random blood glucose level was 12.0. Pre-test random blood glucose level in control group was 4621, total mean 231 respectively. The standard deviation of pre-test random blood glucose level was 3.32 and post-test random blood glucose level was 4292, total mean 214 respectively. The standard deviation of post-test random blood glucose level was 2.45. Conclusion: The study conducted that the 'Finger millet flour in diet' was effective to for reducing blood glucose level among type-II Diabetes Mellitus Clients.

***Keywords*: Assess, Effectiveness, Finger millet flour, Blood glucose level, Type-II Diabetes Mellitus, Hospital.**

1. Introduction

Diabetes is a chronic disease, with high prevalence across many nations, which is characterized by elevated level of blood glucose and risk of acute and chronic complication. The rising burden of type 2 diabetes is a major concern in healthcare worldwide. Diabetes is currently the most common condition, prevailing in the society. Preventing acute complications and reducing risk of the disease can be accomplished with medical support and education in patient self-management, as well as promoting beneficial lifestyle modifications, a healthy diet, physical activity and weight loss. Dietary interventions are an easy and cost-effective way to provide health benefts to people at risk and those who have been diagnosed with type-2 diabetes, in addition to improving their quality of life Current guidelines for those with type-2 diabetes are to follow a healthy, balanced diet-notably including starchy carbohydrates with a low GI (Glycaemic index) and higher dietary fiber, both of which can help regulate post-prandial hyperglycemia and reduce body weight has been shown that a low glycaemic carbohydrate/high-fiber diet safely reduces plasma cholesterol levels and improves blood glucose control in people with type-2 diabetes .

Millets are the cereals apart from the major wheat, rice, and

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maize. Especially for individuals who live in hot, arid climates, millets constitute a significant source of nourishment for millions of people. Millet is an important crop for populations in Africa, Asia and parts of Europe. Nutritionally, millet is superior to other major cereals, such as wheat and rice, and its high content of many essential nutrients makes it an attractive ingredient for incorporation into healthy foods Millet grains have been successfully used to produce adult foods, beverages and weaning foods, such as porridge, bread (fermented and unfermented) and snacks, in African and Asian areas, where they provide the main component of traditional meals. Recently, millet has been found to be nutritionally superior compared to other traditional food grains due to the higher proportions of fibre, polyphenols and antioxidants. This has drawn more attention to millet as a dietary option for helping manage diabetes by reducing blood glucose levels, which is of clinical importance for individuals with type-2 diabetes. Several studies have addressed the beneficial effects of millet on the risk markers for type-2 diabetes. Therefore, this systematic review aims studies investigating the effects of consuming different types and forms of millet on markers of type-2 diabetes and highlight the need for future adequately powered trials in this important area of research.

According to WHO INDIA is one of the epicenters of the global diabetic mellitus pandemic and being termed the "diabetes capital of the world". Rapid socioeconomic development and demographic changes, along with increased susceptibility for Indian individuals have led the explosive increase in the prevalence of diabetes mellitus in India over the past four decades.

Global health Diabetes is a chronic disease, with high prevalence across many nations, which is characterized by elevated level of blood glucose and risk of acute and chronic complication. The rising burden of type 2 diabetes is a major concern in healthcare worldwide. This research aimed to analyze the global epidemiology of type 2 diabetes. We analyzed the incidence, prevalence, and burden of suffering of diabetes mellitus based on epidemiological data from the Global Burden of Disease (GBD). Global prevalence of type 2 diabetes is projected to increase to 7079 individuals per 100,000 by 2030, reflecting a continued rise across all regions of the world. There are concerning trends of rising prevalence in lower- income countries. Urgent public health and clinical preventive measures are warranted.

World Health Organization reported that there were 1.2 lakhs diabetes related deaths in India. For every 10 seconds, 2 new diabetic cases are diagnosed and every 10 seconds a person dies from diabetes related causes in the world. An estimation given by American Diabetes Association, its incidence is increasing rapidly and it is estimated that by 2030, this number will almost double. People with Diabetes are 25 times more likely to develop blindness, 17 times more likely to develop kidney disease, 30-40 times more likely to undergo amputation, 2-4 times more likely to develop Myocardial Infarction and twice as likely to suffer a stroke as non-diabetics. Diabetes is currently the fifth most common reason for death in the world. Around 1 in 8 people between 20 and 79 years old have their death attributed to diabetes and it is expected to rise. The life expectancy on average now is reduced by More than 20 years for people with Type 1 diabetes Up to 10 years for people with Type 2 diabetes However, these figures are based on historical data, and with improvements in modern care taking place, the figures presented could be subject to change in the coming decades.

R. Vedamanickam et al (2020) conduct study of millet and non millet diet on Diabetes and cardiovascular diseases are metabolic disorders, which are major disease burden in India. A total of 150 diabetic patients was selected randomly 80 of which consumed a millet diet and 70 of which consumed a non-millet diet. (80 patients) and non-millet diet (70 patients). Anthropometric parameters and study of blood pressure estimations was recorded trailed by biochemical parameters such as of Fasting Blood sugars (FBS) and Postprandial Blood sugars (PPBS) and Fasting Lipid profile war analyzed in the study population. Result of the study show that among the 150 patients in the investigation, 80 patients were consuming the millet diet in the age group of 40-55yrs the 70 patients who were consuming non-millet diet with the age group of 40-60 yrs. The millet diet had markedly decreased the weight and BMI levels compared to the non-millet diet. Also, the biochemical parameters such as lipid profiles, Fasting and PP blood sugar levels were significantly reduced when comparing the millet with the non- millet diet. Result of the study concluded that the millet diet regulates the glucose level in the diabetic patients better than the non millet diet. Furthermore, the diastolic, systolic values lipid profiles of both the diet demonstrates the potential merits and health benefits of millet diet over the non millet diet.

From the above review of literature and by own observation, From my lived experience that the Finger millet diet is very effective to reduce blood glucose level in type-II Diabetes client. My uncle has diagnosed with type-II diabetes from past 10 year and also he has undergone with eye surgery (2021), his blood glucose level continue imbalance during that time (more than 320mg/dl) for maintaining blood glucose level she start to take Finger millet diet and he found that Finger millet diet effectively helping to reduce and maintain blood glucose level. Very few studies supporting the benefit of Finger millet diet. I plan to conduct the study to evaluate the effectiveness of " FINGER MILLET DIET " for reducing blood glucose level among Type II diabetic mellitus clients, as it is an easily available, protein & amino acids , high fiber, having a low glycemic index, low cost food item and has an increased effect in reducing blood glucose level

2. Objectives

1. To assess the pre-test blood glucose level among Type-II Diabetes Mellitus Clients in experimental & control group.
2. To assess the effectiveness of Finger millet diet among Type- II Diabetes Mellitus Clients in experimental group.
3. To assess the post-test blood glucose level among Type-II Diabetes Mellitus Clients in experimental & control group.

4. To find out the association between post-test blood glucose level among Type-II Diabetes Mellitus Clients with selected socio demographic variables.

3. Hypotheses

- H0- There will be no significant difference in blood glucose level among Type-II Diabetes Mellitus Clients between experimental & control group.
- H1- There will be significant difference between pre-test & post-test blood glucose level among Type-II Diabetes Mellitus Clients in experimental group.
- H2-There will be significant association between post test blood sugar level among Type-II Diabetes Mellitus Clients with their selected socio demographic variables.

4. Operational Definition

- Effectiveness: In this study it refers to the outcome of Finger millet diet reducing blood glucose level among Type-II Diabetes Mellitus Clients.
- Diabetic Mellitus Type-II: As per study it refers to the client who are diagnosed to have Non-insulin dependent diabetes mellitus by a Dialectologist.
- Finger Millet: Botanical Name: Eleusine corcana. In this study using of 100 gm. [2/5 cup] finger millet flour add in regular diet of diabetes mellitus client.
- Dm Type- II Adult: In this study it refers to Diabetic Type-II adults [30-60year].

A. Sampling Criteria

1) Inclusion Criteria

- Those who are willing to participate in the study.
- Those who are residing at Bhilai and are able to understand Hindi.
- Confirmed evidence of Diabetic Type-II within 6yrs.
- Those whose age is 30-60years of age.

2) Exclusion Criteria

- Type-II Diabetic Mellitus Clients with other systemic problem like renal disease, cardiac disorder.
- Type-II Diabetic adults have taken other then inject able insulin.
- The adult Clients who are consuming alcohol & tobacco within 6-12 months.
- Clients already administrating Finger millet diet prior to the start of the study.

5. Material and Method

The conceptual frame work adopted for the study is Imogene kings goal attainment theory. In this study true experimental research design was used. The target population was adult with type-II daibetes mellitus residing at Bhilai and accessible population was adult with type II diabetes mellitus admitted in shri shankaracharya institute medical science hospital Bhilai, Chhattisgarh. The present study was conducted. The setting for the present study is general medicine OPD male & female in hospital shri shankaracharya institute of medical science hospital Bhilai(C.G.). The sample consisted of 40 subjects who were having type-II diabetes mellitus. The simple random sampling (probability) technique was adopted to select the subjects. In the present study, independent variable was Finger millet. dependent variable of this study is blood glucose level.

A. Description of the Tool

Data collection tools are the procedure or instruments used by the researcher to observe or measure the key variables in the research problem.

The tools were used are under two sections:

1) Section A

Deals with the socio demographic variables such as age, gender, marital status education, dietary pattern, duration of illness, occupation, having a habit of doing exercise, follow diabetes diet, any knowledge regarding to finger millet.

2) Section B

Observation schedule includes pre-assessment of fasting and postprandial blood glucose level of both experimental and control group and there after post interventional assessment of blood glucose on 30 days for both the group.

Table 1
Criterion measurement (Scoring)

Category	Level
Mild	145 -170mg/dl
Moderate	180- 220 mg/dl
Severe	240-330 mgl/dl

B. Content Validity

Content validity was established by requesting to experts, nursing experts in the field of nursing specialist, and one statistic to go through the developed tool and give the valuable suggestions. Their suggestions of experts were incorporated in the tools and then noted in the final copy for the present study

C. Pilot Study

The pilot study was conducted from 08/09/2022 to 30/09/2022 to assess the feasibility of the study and to decide analysis plan at General medicine ward in Lal Bahadur Shastri civil hospital, Bhilai (C.G.) The pilot study was conducted on 8 samples were 4 are in experimental group and 4 are in control group. The obtained reliability coefficient was high r = “0.8” which is significant.

D. Organization of Đata

- *Section I*: Description of socio demographic variables in frequency and percentage.
- *Section II*: Overall analysis of pre and post test score by using mean, mean percentage and standard deviation.
- *Section III*: Criteria wise analysis of pre and post-test blood glucose level among Type-II Diabetes Mellitus by frequency and percentage.
- *Section IV*: Unpaired ‘t’ test analysis to Comparison of pre test and post test blood glucose level among Type II Diabetes Mellitus in experimental and control group.
- *Section V*: Paired ‘t’ test analysis to assess the

effectiveness of among Type-II Diabetes Mellitus.

- *Section VI*: Chi-square analysis to find out the association between post-test score of blood glucose level among Type-II Diabetes Mellitus with selected socio demographic variables.

6. Result and Discussion

A. Section- I

1) Distribution of the Subject According to Socio-Demographics Variable

In accordance with age of the Diabetic type II Adult, a sizeable majority of them belongs to 09(45%) 41-50year of age in experimental and 09(45%)41-50 year were belongs to control group, 07(35%)31-40 year of age in experimental group and 06(30%)31-40 year were belongs to control group, 04(20%)51-60 years of age in experimental group & 05(25%)51-60 year were belongs to control group.

In accordance with the gender of type- II diabetes mellitus, a sizeable majority of them were belongs to 13(65%) males in control group and 12(60%) males in experimental group and were belongs to 08(40%) female in experimental group and 07(35%) female in control group.

In accordance with the education of type –II diabetes mellitus in control group 6 were no educational and high school, 5 were higher secondary, 2 were graduate and 1 were post graduate. In experimental group 6 were no educational and high school, 3 were higher secondary, 4 were graduate and 1 were post graduate.

Percentage distribution of client with type -II Diabetes Mellitus regarding their marital status, 19(97%) of the client's were married, 1(3%) were unmarried in the experimental group. In the control group, 18(94%) were married, 2(6%) were unmarried and none of the study subjects were in the category of divorced and widow/widower in in experimental and control group.

Majority of them were belongs to 12(60%) are vegetarian in experimental group and 11(55%) were belongs to control group, 2(10%) were belongs to non-vegetarian in experimental group and 4(20%) were belongs to control group, 6(30%) were belongs to eggetarian in experimental group and 5(25%) were belongs to control group.

Accordance to duration of illness of type-II diabetes mellitus, a sizable majority of them were belongs to < 2 year (45%) in control group and were belongs to < 2 year (40%) in experimental group and (40%) 2-5year duration were in experimental group, (35%)2-5year duration in control group and were belongs to (20%) >5year in experimental group, (20 %) > 5year duration in control group.

Accordance to type of Occupation of type-II diabetes mellitus, a sizable majority of them were belongs to 08(40%) government employee in experimental group, 07(35%) government employee in control group and were belongs to 06(30%) private job in control group, 06(30%) private job in experimental group and were belongs to 04(20%) business in control group, 03(15%) business in experimental group were belongs to 3(15%) lobar in experimental group, and 3(15%) labor in control group.

Accordance to follow diabetic diet of type-II diabetes mellitus, a sizable majority of them were belongs to 18(90%) no diabetic diet follow in control group ,17(85%) no diabetic diet follow in experimental group and were belongs to 03(15%) diabetic diet follow in experimental group,02(10%) diabetic diet follow in control group.

Accordance to habit of doing exercise of type-II diabetes mellitus, a sizable majority of them were belongs to 18(90%) not perform exercise in experimental group, 17(85%) not perform in control group and were belongs to 3(15%) perform exercise in control group ,02(1%) perform exercise in experimental group

Accordance to any previous knowledge regarding to finger millet of type-II diabetes mellitus, a sizable majority of them were belongs to 19(95%) having no previous knowledge regarding to finger millet in control group, 18(90%) having no previous knowledge regarding to finger millet in experimental group and were belongs to 02(10%) having previous knowledge regarding finger millet in experimental group,01 (05%) having previous knowledge regarding finger millet in control group**.**

B. Section II

1) Part I: Over Analysis of Pre and Post Test Score by Using Mean, Mean Percentage and Standard Deviation

The table 2 shows that the Pre-test random blood glucose level in experimental group was 4773, total mean 238.6 respectively. The standard deviation of pre-test random blood glucose level was 13.0 and post-test random blood glucose level was 4131, total mean 206.5 respectively. The standard deviation of post-test random blood glucose level was 12.0. Pre-test random blood glucose level in control group was 4621, total mean 231 respectively. The standard deviation of pre-test random blood glucose level was 3.32 and post-test random blood glucose level was 4292, total mean 214 respectively. The standard deviation of post-test random blood glucose level was 2.45.

2) Part II: Criteria Wise Analysis of Random Blood Glucose Reduction Pre Test Level in Frequency and Percentage of Both Experimental & Control Group

In pre-test score regarding random blood glucose level is severe 16(80%) were in moderate,04(20%) in mild 00(00%) in experimental group and 18(90%) were in moderate, 02(10%) were in mild 00(00%) in control group. Shows that in post-test score regarding random blood glucose level is mild 14(70%) were in severe, 04(20%) were in moderate 2(10%) in experimental group and severe 17(80%) were in moderate, 03(20%) were in mild 00(00%) in control group.

Table 2

Types of Blood Glucose Test	Experimental Group			Control Group		
	Total Mean	Mean%	SD	Total Mean	Mean%	SD
Pre Test	4773	238.6%	13.0	4621	231%	3.32
Post Test	4131	206.5%	12.0	4292	214%	2.45

C. Section III

1) Unpaired 't' Test Analysis to Comparison of Pre Test and Post Test Blood Glucose Level Among Type II Diabetic Adults in Experimental and Control Group

There was minimal significant difference between fasting pre-test random blood glucose level of diabetic type-II between experimental and control group as calculated 't' value 0.93(df.19) was greater than table value 2.09 at 0.05 level of significance. Shows that there was highly significant difference between random post-test blood glucose level of diabetic type-II between experimental and control group as calculated 't' value 4.09(df.19) was greater than table value 2.09 at 0.05 level of significance.

D. Section IV

1) Paired 't' Test Analysis to Assess the Effectiveness of Finger Millet Diet Among Diabetic Type-II Adults

There was highly significant difference between pre- test and post-test blood glucose level of type-II diabetes mellitus client after taking Finger millet diet as calculated 't' value 18.13(df.19) was greater than table value 2.09 at 0.05 level of significance in experimental group. There was significant difference between pre-test and post-test blood glucose level of diabetic type II adult after taking Finger millet diet as calculated 't' value 04.71(df.19) was greater than table value 2.09 at 0.05 level of significance in control group.

E. Section V

1) Chi-Square Analysis to Find Out the Association Between Post-Test Score of Blood Glucose Level Among Diabetic Type-II Adults with Selected Socio Demographic Variables

Chi square analysis for association between the post-test fasting blood glucose level with selected socio-demographic variables of experimental group.

- There is no significant association between post-test blood glucose level and age of subject as the calculated chi square value is 0.978(df-2) is less than the table value of chi square 5.99 at 0.05 level of significance.
- There is significant association between post-test blood glucose level and gender of subject as the calculated chi square value is 0.22(df-1) is less than the table value of chi square 3.841 at 0.05 level of significance.
- There is no significant association between post -test blood glucose level and education of subject as the calculated chi square value is 2.553(df-4) is less than the table value of chi square 9.488 at 0.05 level of significance.
- There is no significant association between post-test blood glucose level and marital status of subject as the calculated chi square value is 8.33(df-1) is less than the table value of chi square 3.82 at 0.05 level of significance.H2 is accepted.
- There is no significant association between post-test blood glucose level and dietary pattern of subject as the calculated chi square value is 3.114(df-4) is less than the table value of chi square 9.49 at 0.05 level of significance.
- There is no significant association between post-test blood glucose level and duration of illness of subject as the calculated chi square value is 0.254(df-2) is less than the table value of chi square 5.991 at 0.05 level of significance.
- There is no significant association between post-test blood glucose level and occupation of subject as the calculated chi square value is 0.476(df-3) is less than the table value of chi square 7.81 at 0.05 level of significance.
- There is no significant association between post-test blood glucose level and follow diabetic diet of subject as the calculated chi square value is 0.312(df-1) is less than the table value of chi square 7.81 at 0.05 level of significance.
- There is no significant association between post-test blood glucose level and exercise regularly of subject as the calculated chi square value is 0.392(df-2) is less than the table value of chi square 3.84 at 0.05 level of significance.
- There is no significant association between post-test blood glucose level and previous knowledge regarding to finger millet of subject as the calculated chi square value is 1.053(df-1) is less than the table value of chi square 3.84 at 0.05 level of significance

F. Implication

1) Nursing Practice

- The community health nurse plays an important role in providing information regarding diabetes its prevention and its control methods to the people in the community.
- The community health nurse as a service provider should periodically organize and conducts mass education program regarding diabetes awareness.
- Finger Millet diet being cost effective, easily available and effective in reducing the blood glucose level, the community health nurse must implement information education and communication (IEC) to create awareness to the community about the benefits of Finger Millet diet.
- She has to educate family members about the importance of Finger and its beneficiary effect against diabetes.

2) Nursing Education

- As a nurse educators, we must strengthen the concept of non-pharmacological methods for management of diabetes mellitus.
- Nursing education should emphasize more on preparing the nurses to impart current changes in health information and to update the knowledge in all fields.

  Nursing curriculum to be equipped with knowledge regarding various health information.

3) Nursing Administration

- The community health nurse as an administrator

should design formal teaching program on diabetes mellitus and its prevention using pharmacological and various non-pharmacological methods in reducing blood glucose levels in the community.

- The nurses posted in the Primary Health Centers for control and prevention of non-communicable disease should take active part in identifying the risk peoples and preventing the occurrence of disease in its earlier stage.
- She should organize for diabetes camps with collaboration with nursing students attending the Primary Health Centre and along with other NGO'S and it should be properly communicated to the public through mass medias.
- The diabetes training program to be continued and opportunities must be provided to all the nurses for the effective training in control and prevention of diabetes mellitus.

4) Nursing Research

- Nurses should conduct periodic review of research findings and disseminate the findings through conferences, seminars and publication in professional, national and international journals and in the web site also.
- This study also bring about the fact that more studies need to be done at different settings which is culturally acceptable.

G. Limitations

The limitation of present study as follows,

- The study was limited to a sample size of 40.
- The study was limited to the type –II diabetes mellitus clients (30-60year).
- The study was limited to the 30 days of data collection period.
- The study was limited to the type-II diabetes mellitus clients at shri shankaracharya institute of medical science hospital, Bhilai (C.G.).

7. Recommendations

On the basis of the present study the following recommendations have been made for further study.

- A comparative study can be conducted using Finger millet diet in control of blood glucose level Type- II Diabetes mellitus clients among urban and rural people.
- A similar kind of study can be conducted foe a larger group to generate the finding.
- The same study can be conducted among different age groups.
- A STP for student to improve knowledge regarding diabetic mellitus prevention.
- This study can be done as a comparative studies between male & female patients.
- A similar study can be conducted in other population in hospital set up.
- This study can be replicated with larger samples for better generalization.
- The adolescent boys and girls should be educated by means of mass health awareness programs on diabetes mellitus.

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