Study of millet and non-millet diet on diabetics and associated metabolic syndrome

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(Received: December 2019 Revised: January 2020 Accepted: March 2020)

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ABSTRACT

Introduction and Aim: Diabetes and cardiovascular diseases are metabolic disorders, which are major disease burden in India. Unequal dietary propensities have added to this. The foxtail millet, finger millet, sorghum and wheat have been thought to have nutritious and zero cholesterol properties in combating metabolic diseases. Hence, this study was evaluated scientifically on the impact of millet diet and non-millet diet with respect to a randomized case control.

Materials and Methods: The investigation is cross sectional study in diabetes with hypertension as per the standard recommendations of International Diabetes Federation (IDF), which is attending tertiary care hospitals. 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.

Results: 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.

Conclusion: The result of the present study concludes that the millet diet regulates the glucose level in the diabetic patients better than the non-millet diet. Furthermore, the Diastolic, Systolic values and Lipid profiles of both the diet demonstrates the potential merits and health benefits of millet diet over the non-millet diet.

Keywords: Millet and non-millet diet; lipid profiles; blood sugar levels; anthropometric measurements.

INTRODUCTION

There is a widespread awareness for the numbers of lifestyle related disorders such as type 2 diabetes mellitus, hypertension, dyslipidemia and obesity have been on the rise in India. There have been huge changes in the types of physical activity and diet in our nation throughout the past and these have added to episode of such non-transferable illness 'pandemics'. Metabolic syndrome (MS) is a condition portrayed by increased IR (Insulin Resistance) and visceral adiposity. The occurrence of metabolic disorder has been ascribed to changes in lifestyle for example, stationary propensities, expanded mental pressure and dietary indiscipline. Changes in dietary examples might be the one of the most significant variables adding to the expansion in the frequency of metabolic disorder in Asia (1). In the southern states of India, the staple diet routines have been founded on the grain rice for a long time (2). Nowadays the metabolic disorders due to high intake of rice diets made big complications in the weight control plans, which may have added to the high heap of patients with diabetes and obesity in India. There has been growing interest about millet-based diet and their positive impact on health in the recent years.

The medical advantages related with millet use have been known for reasonably a long while however their effect on metabolic disorder in the Indian populace has been uncertain. Subsequently in this examination, we set out to think about the parameter of metabolic disorder in patients who use millet- based diet routine and in those devouring non millet-based eating regimen. Millet is one of the most significant grains grown even in Asian and African drought zones (3). It has been accepted explicit consideration in view of its enriched nutritive and good bio activities such as anti-inflammatory, antioxidant and anti-obesity and cardiovascular diseases (4). In addition, food products from millets have particularly slower gastric emptying rate than pasta, rice and potato (5). Recent studies suggested that effective control and management of diabetes was made on regular intake of finger millet (6) and livestock field millet (7). There are only few studies on the hypoglycemic impact. However, this present study is the scientifically validated on the nutritional and therapeutic values of foxtail millet. Comparative study of in vitro starch absorption of foxtail millet flour was clearly lower than that of wheat

flour. Foxtail millet-based food items have a moderate glycemic index and a gentle stimulation of pancreatic β-cell, which could help diabetics with avoiding risky spikes in blood glucose (8). These properties may add to the improvement of postprandial blood glucose in diabetics. Moreover, the animal studies demonstrated that intake of foxtail millet enhancing the sensitivity of insulin and metabolism of cholesterol in hereditary history of patients with type 2 diabetic mice (9). Human trials are important to approve the outcomes of the millet from in-vitro studies and in vivo animal studies (10).

MATERIALS AND METHODS

The investigation is a cross sectional study in diabetes with hypertension as per the standard recommendations of IDF (International Diabetes Federation) which is attending tertiary care hospitals.

Study Population

A total of 150 diabetic patients were selected in tertiary care hospital Sree Balaji Medical College and Hospital, Chromepet based on their diet regimen. The study period was from 2017 to 2018. We found that 80 patients consumed a millet diet and 70 patients consumed a non-millet diet. Institutional ethical committee permission was obtained for the study and the reference number is 0027/SBMCIHEC/2018/098.

Study parameters

Anthropometric parameters such as waist size, BMI and study of blood pressure estimations were recorded trailed by biochemical parameters such as of FBS and PPBS and Fasting Lipid profile Total cholesterol, Serum Triglycerides, Serum HDL, Serum LDL, FBS, PPBS, Diastolic BP (mm Hg), Systolic BP (mm Hg) were analyzed in the study population. All the data were collected in triplicate and statistically done by SPSS software 21 version.

RESULTS

A total of 150 participants diagnosed with metabolic syndrome participated in this study and classified into 2 groups based on their dietary patterns. Group-1 consuming millet diet composed of 80 patients aged 40-55yrs whereas the non-millet-based diet group-2 has 70 patients with age range of 40-60 yrs. The different characteristics for the participants of the two groups are shown in table 1. The millet diet group consumed preparation of millet items such as finger millet, fox-tail millet and sorghum followed by wheat-*chapathis* of the non-millet group. In accordance with the IDF criteria for diagnosis of metabolic syndrome, all the selected participants had a high waist circumference, along with presence of at least 2 other criteria – impaired blood glucose, raised BP, low HDL and elevated triglycerides and were already being treated for these. The two groups did not differ much in these respects with the exception of the number of patients with hypertriglyceridemia that was seen to be significantly higher in the non-millet-based diet group statistically compared with p = 0.000.

Table 1: Characteristic profiles of the participants involved in the study parameters of diabetic and obese persons

Variables	Mean		P value
	Millet	Non-millet	
Age (years)	40-55	40-60	0.612
Males	42	38	0.506
Females	38	32	0.401
Low HDL	60	53	0.176
Elevated Triglycerides	20	30	0.000
Hypertension	38	49	0.560
Type 2 Diabetes Mellitus	74	66	0.148

Table 2: Effect of millet and non-millet diet on the biochemical and anthropometric parameters

Parameters of Metabolic Syndrome	Millet Based Diet (Mean ± SD)	Non-Millet Based Diet (Mean ±SD)	p Value
BMI (Kg/m^2)	24.08 ±1.35	32.99 ± 2.42	0.08
Waist /Hip Ratio: Males Females	0.91 0.76	0.79 0.69	0.132 0.139
Total cholesterol (mg/dL)	164 ± 13.7	230.0 ± 23.4	0.001
Serum Triglycerides (mg/dL)	140.5 ± 20.3	153.4 ± 29.7	0.001
Serum HDL (mg/dL)	42.7 ± 20.4	38.6 ± 12.0	0.011
Serum LDL (mg/dL)	140.1 ± 16.5	160.1 ± 26.0	0.002
FBS (mg/dL)	103.1 ± 21.4	133.2 ± 10.2	0.002
PPBS (mg/dL)	142 ± 10.2	180 ± 15.2	0.001
Diastolic BP (mm Hg)	83.43 ± 4.86	89.51 ± 5.1	0.095
Systolic BP (mm Hg)	139.8 ± 3.2	155.6 ± 5.0	0.020

Comparison of the two groups with respect to the various parameters of metabolic syndrome revealed that the participants from the millet based diet group had much lower BMI (24.08±1.35 vs 32.99 ± 2.42 Kg/m^2, p = 0.08) although there was no significant difference between their waist to hip ratios, neither in men (0.846 vs 0.801, p = 0.138) nor in women (0.780 vs 0.711, p = 0.141).

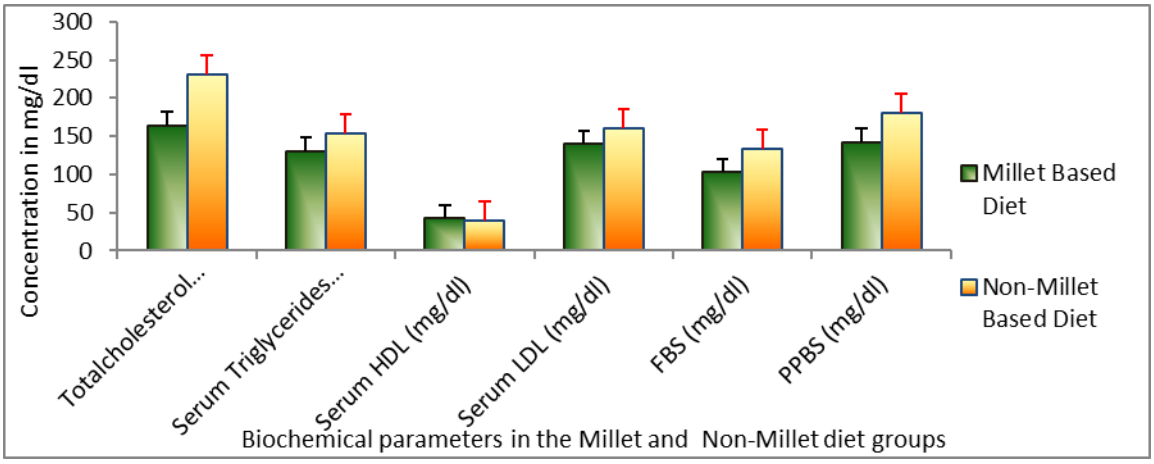

Fig. 1: Determination of biochemical parameters in the millet and non-millet diet groups.

The millet based diet participants also had lower readings for systolic BP (139.8±3.2 vs 155.6±5.0 mm Hg, p = 0.020), fasting blood glucose (103.1±21.4 vs 133.2 ±10.2 mg/dl, p = 0.002), total serum cholesterol (164±13.7 vs 230.±23.4 mg/dl, p = 0.001), serum LDL(140.1±16.5 vs 160.1±26.0 mg/dl, p = 0.002) and serum triglyceride levels (130.5±20.3 vs 153.4±29.7mg/dl, p = 0.001) as well as having higher HDL values (42.7±20.4 vs 38.6±12.0mg/dl, p = 0.011) compared to the non-millet based diet participants and these differences was found to be statistically significant (Table 2 and Fig. 1).

DISCUSSION

Millets are great wellsprings of nutrients especially proteins 9.9 g and fat 2.7g /100 g). Additionally, it provides significant bioactivity such as antioxidants, nutritional enriched substitutes for metabolic disorders such as Malnutrition, Diabetes Mellitus, Cancer, cardiovascular diseases, and other diseases (11). Different studies directed on millets, for example, Sorghum, finger millet and proso millet, S. italica (foxtail millet) have demonstrated their helpful impacts as against hypolipidemic and hyperglycemic metabolic disorders which might be owing to different phytochemicals in millets as, phytosterols, phenolic acids, anthocyanins, tannins and policosanols (12). Contribution of millets in the MNT for diabetes is hazy as the glycemic score of a few millets and their local conventional diet preparations is obscure.

Millets are concentrated wellsprings of vitality and can assume a significant contribution in nourishment security. It is very much recorded that use of entire grains, even without decrease in carbohydrate rich diet and diminishes hazard factors for CVD, including BMI, insulin affectability, and type 2 diabetes. Different epidemiologic partner studies have exhibited that a 2 or 3 serving per day increment in entire grain utilization is related with a 20-30% decline in type 2 diabetes, considerably after modification for confounders, for example, age, sex and BMI (13-15). An Indian study contrasting barley, millet-bajra and corn found that glycemic reaction to (bajra) and grain, yet not corn, was fundamentally lower than glycemic reaction to white bread, especially in people doesn't have history of Type 2 diabetes.

For diabetic patients in India, it has been demonstrated that wheat-based and millet-based preparations yield lower glycemic index than rice-based formulations (16). Since they are processed more gradually than refined grains entire grains keep up a lower glucose and insulin reaction in the body than refined grains (17). Sugars present in finger millet are gradually processed and consumed more than those present in different oats. Normal utilization of finger millet is known to diminish the danger of diabetes mellitus and GIT issue and these properties were ascribed to its high polyphenols and dietary fiber contents (18). Finger millet diets brought down blood glucose and cholesterol in diabetic rodent models (19). The nearness of flavonoids, for example, tricin, acacetin, Di-OMe luteolin, and 4-OMe tricin, show the chemo preventive viability of pearl millet.

Henceforth the present examination recommended that with increments in diabetes and other non-transferable illnesses, "ETIC" see or logical realities on increments stay just in course readings and research diaries except if thoroughly advanced in the network. The medicinal networks need to hold hands to utilize sufficiently prepared nutritionist to bestow advising to diabetics in their diabetes centers. Merits of millets which included the energy rich products and minerals are successful

relational abilities for counteractive action and treatment of diabetes.

CONCLUSION

The present study concluded that there is an increasing burden of metabolic diseases, which is due to life-style modification and food habits in this modern era. Hence, the current results of this study clearly validated that the intake of millet diet especially foxtail millet, finger millet, sorghum and wheat-based foods reduces triglycerides and regulated the glucose level in diabetic patients.

CONFLICT OF INTEREST

There is no conflict of interest from other authors.

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