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Dietary Profile and Prevalence of Hypertension in NIDDM

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Abstract

The study has been conducted for observing the dietary profile and prevalence of hypertension in NIDDM patients [1]. It is the study of patients out of 100 in which 50 were males and 50 females were selected to conduct the study. Hypertension (bp) is the very important risk factor for chronic disease burden in India. Studies of India have reported high prevalence of hypertension. The aim of this study was to examine, profile, nutritional content, education, food habits ,medicinal utilization of hypertension in NIDDM patients. Since food and dietary pattern of an individual have an important role to play in development, treatment or prevention of non-insulin dependent diabetes mellitus (NIDDM). The main criteria of the sample selection were non-insulin dependent diabetes mellitus male and female age group between 40-60 years of age. Few selected individuals had controlled diabetes. Their diabetes was controlled by the following:

- Limitation their food intake
- Morning and evening walk
- Do the exercise
- Yoga and meditation
- Avoiding of any stress

Taking medicinal herbs like methi seeds, bitter gourd (in powder form) or jamun seeds besides their regular medicine [2] (Figure 1).

(a) (b)

Figure 1.(a) Jamun seeds (b)Karela& Juice.

They got their urine and blood sugar levels checked regularly, every 15 days or after a month). Some diabetic subjects were dependent only on medication to control their blood glucose levels and did not regulate their dietary intake and physical activity.

Keywords: NIDDM; Nutrition; Diabetic; Hypertension; Disease and Health

Introduction

Diabetes mellitus is a disease in which the body does not produce or respond to insulin, a hormone that is necessary for the use or storage of body fuels.

Diabetes mellitus is a group of disease characterized by high blood glucose levels result from defects in insulin secretion, insulin action, or both. Abnormalities in the metabolism of carbohydrate, protein and fat are also present. People with diabetes have bodies that do not respond to insulin, hormone produced by beta cells of the pancreas that is necessary the use of body fuels. Without effective insulin, hyperglycemia occurs, which can lead to both the short term and long-term complications of diabetes mellitus [3]. Type 2 diabetes and hypertension are commonly associated conditions, both of which carry an increased risk of cardiovascular and renal disease. Insufficient production of insulin (either absolutely or relative to the body's needs) production of defective insulin (which is uncommon), or the inability of cells to use insulin properly and efficiently leads to hyperglycemia and diabetes [4]. Its latter condition affects mostly the cells of muscle and fat tissues, and results in a condition known as "insulin resistance"[5]. This is the primary problem in type 2 diabetes. In type 2 diabetes, there also is a steady decline of beta cells that adds to the process of elevated blood sugars.

The World Health Organization projects by the year 2025 more than 5% of the world population, i.e. 300 million people will suffer from diabetes. India is the diabetes capital of the world with 41 million Indians having diabetes; every fifth diabetic in the world is an Indian. It also leads in prevalence of metabolic syndrome as well as obesity around 20 million Indians are either obese or abdominally obese with children being the main targets. But the real impact of obesity and diabetes is through cardiovascular disease and hypertension [6], CURES cohort clearly shows every fifth individual is a hypertensive in Chennai which parallels even outstrips diabetes. So, hypertension may upsurge diabetes statistically in the genetically vulnerable Asian Indian race.

The 7th Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure defines hypertension as a systolic blood pressure (BP) ≥ 140 mmHg or diastolic BP ≥ 90 mmHg for adults≥ 18 years of age. These thresholds are reduced to systolic BP ≥ 130 mmHg or diastolic BP ≥ 80 mmHg for individuals with diabetes or kidney disease.A patient who suffers from type II diabetes has a 2–4 times greater risk of death from heart disease causes than the patient without diabetes. The most common cause of dying in the diabetic patient is cardiovascular disease. With uncontrolled hypertension, there is a consistent positive relationship between elevated systolic BP and increased risk for micro- and macrovascular diseases. Hypertension has been identified as a major risk factor for the development of diabetes. Patients with hypertension are at a 2–3 times higher risk of developing diabetes than patients with normal blood pressure (Figure 2).

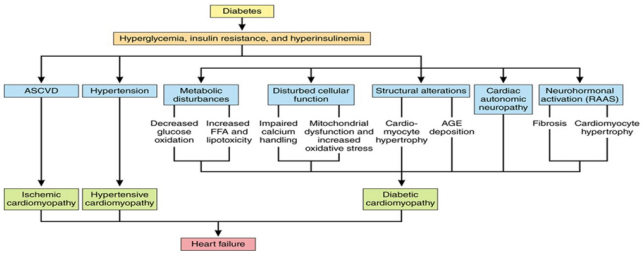

Figure 2. Flow chart of Dietary Profile and Prevalence of Hypertension in NIDDM.

Type II diabetes is chronic progressive disease that requires life style changes, especially in the access of nutrition and physical activity. The dietary structure, levels of physical activity and other diet related non-communicable diseases pattern like obesity and hypertension are changing rapidly throughout the developing world.The maximum numbers of diabetic subjects are in India [7]. Obesity and physical inactivity constitute part of risk for type II diabetes because of their propensity to induce insulin resistance. There is renewed interest in the prevention of insulin resistance, type II diabetes and hypertension through life style interventions. The key life style interventions are physical activity and a nutritional plan with reduced calorie intake [8]. Nutrition therapy for diabetes focuses on goals and strategies for the treatment &prevention of diabetes and on achieving optimal metabolic outcomes related to glycaemia, lipid profiles and blood pressure.

Objective

The main purpose of this study was to examine nutritional content, food habits, nutritional profile, nutrional education, medicinal utilization of hypertension in NIDDM patients. Since food and dietary pattern of an individual have an important role to play in development, treatment or prevention of non-insulin dependent diabetes mellitus (NIDDM), the current study was designed and carried out with the following objectives in mind.

- To study the prevalence of hypertension in NIDDM patients.
- To study the food habits and nutritional profile of NIDDM patients.
- To impart nutrition education to the patients.

Literature Review

Diabetes is rapidly emerging as a global health care problem that threatens to reach pandemic levels by 2030; the number of people with diabetes worldwide is projected to increase from 171 million in 2000 to 366 million by 2030. This increase will be most noticeable in developing countries, where the number of people with diabetes is expected to increase from 84 million to 228 million. According to the WHO, Southeast Asia and the Western Pacific

region are at the forefront of the current diabetes epidemic, with India and China facing the greatest challenges. In these countries, the incidence and prevalence of type 2 diabetes among children are also increasing at an alarming rate, with potentially devastating consequences.

Mean BMI, waist circumference, and family history of diabetes were significantly lower in the PUVs (periurban village). The PUVs had a lower prevalence of diabetes (9.2 [95% CI 8.0–10.5], P < 0.0001) than the city (18.6 [16.6–20.5]) and town (16.4 [14.1–18.6]). Approximately 40% of subjects were newly diagnosed. Prevalence of impaired glucose tolerance (IGT) was higher (P < 0.0001) in the city (7.4 [6.2–8.5]) than in the town (4.3 [3.3–5.3]) and the PUVs (5.5 [4.6–6.5]). Prevalence of IFG was generally low. Age, family history, and waist circumference were significantly associated with diabetes, while physical activity was not. Overweight, elevated waist circumference, hypertension, and dyslipidemia were more prevalent in the city [9].

Tripathyet al, reported that India is the diabetes capital with home to 69.1 million people with Diabeties, the second largest number of cases after China [10]. Recent epidemiological evidence indicates a rising Diabeties epidemic across all classes, both affluent and the poor in India. Overall prevalence of Diabeties among the study participants was found out to be 8.3% (95% CI 7.3–9.4%) whereas prevalence of prediabetes was 6.3% (5.4–7.3%). Age group (45–69 years), marital status, , obesity , hypertension and family history of Diabeties were found to be the risk factors significantly associated with Diabeties. Out of all persons with Diabeties, only 18% were known case of Diabeties or on treatment, among which only about one-third had controlled blood glucose status.

Akula Sanjeevaiah et al., reported that the high prevalence of Diabeties may be due to rapid urbanization of the suburban regions [1]. Hypertension is an important public health problem in both rural and urban areas of economically developed . It is a chronic medical condition and is one of the most common life threatening non-communicable disease. It is an asymptomatic condition; symptoms do not arise unless the complications develop which result in delayed diagnosis and treatment especially among the uneducated and unexplained social groups such as rural population. The study was planned to determine the prevalence of hypertension in rural community by health camp. The prevalence of hypertension was found to be 17%, which was observed to be higher among female i.e. 170 (18.3%) than males 153 (15.8%) . The prevalence of hypertension was observed to be higher among the older individuals. It was found to be 5.26 times higher in older (>50 years) than the younger (<30 years) age group. We found prehypertension in 65.74%, Stage I hypertension in 11.33% and stage II hypertension in 5.69% individuals. This study showed the high prevalence of hypertension in rural area of Western Uttar Pradesh, Central India.

Hypertension is the most important risk factor for chronic disease burden in India. Studies from various parts of India have reported high prevalence of hypertension. These studies have also reported that hypertension is increasing and there is low awareness and control. Two recent studies have been conducted with uniform tools and nationwide sampling to determine the true prevalence of hypertension in the country. Fourth National Family Health Survey evaluated hypertension in a large population-based sample (n = 799,228) and reported hypertension in 13.8% men vs. 8.8% women (overall 11.3%) aged 15–49 and 15–54 respectively. More representative data (age > 18 years, n = 1,320,555) in Fourth District Level Household Survey reported hypertension in 25.3% with greater prevalence in men (27.4%) than women (20.0%). This translates into 207 million persons (men 112 million, women 95 million) with hypertension in India [11]. Prevalence would be much higher using 2017 American guidelines. Global Burden of Diseases study reported that hypertension led to 1.63 million deaths in India in 2016 as compared to 0.78 million in 1990 (+108%). The disease burden (DALYs) attributable to hypertension increased from 21 million in 1990 to 39 million in 2016 (+89%). Social determinants of hypertension are important and Indian states with greater urbanization, human development and social development have more hypertension. Motedayen et al reported that Hypertension is one of the most important issues in advanced and developing countries and is prevalent in diabetic patients [12]. The present study was aimed at estimating the prevalence of hypertension in diabetic patients in Iran through meta-analysis. In 32 reviewed studies with a sample of 34714 subjects, the prevalence of hypertension in Iranian diabetic patients was 51% (95% CI, 43%-60%). The prevalence of hypertension was 55% in type I diabetics and 53% in type II diabetic patients. Metaregression showed that there was no significant relationship between the prevalence of hypertension in diabetic patients with the sample size and year of study. About half of the diabetic patients in Iran suffer from hypertension. Patients with type 1 diabetes suffer from hypertension 2% more than type 2 diabetes patients.

Although the actual cause is not clear, it is general observation that diabetes, particularly of the NIDDM type, seems to run in families. However, hereditary predisposition alone is not enough. Several factors such as diet, obesity, ethnic background, aging,lack of exercise, stress, eating too much fatty foods etc. have all been shown to influence the development of diabetes.

With increasing overweight and obesity class, there is an increase in the prevalence of hypertension (18.1% for normal weight to 52.3% for obesity class 3), diabetes (2.4% for normal weight to 14.2% for obesity class 3), dyslipidemia (8.9% for normal weight to 19.0% for obesity class 3), and metabolic syndrome (13.6% for normal weight to 39.2% for obesity class 3). With normal weight individuals as a reference, individuals with obesity class 3 had an adjusted odds ratio of 4.8 (95% CI 3.8 to 5.9) for hypertension, 5.1 (95% CI 3.7 to 7.0) for diabetes, 2.2 (95% CI 1.7 to 2.4) for dyslipidemia, and 2.0 (95% CI 1.4 to 2.8) for metabolic syndrome. Fruits of the cultivated variety of Momordica charantia (karela) are consumed as a cooked vegetable in Asian diet and they are highly

regarded for the treatment of diabetes. For medicinal purposes the fruit is consumed raw or crushed to form juice. In a group of non-insulin dependent diabetic patients 50 ml karela juice acutely improved oral glucose tolerance without altering the insulin response to glucose. Leatherdale et al, reported that daily consumption of 0.23 kg fried karela for 8-11 weeks reduced the percentage of glycated haemoglobin and improved oral glucose intolerance [13]. Jambu seed is a cool fruit with that tangy flavour. This tiny fruit is packed with a number of remedies claims Ayurveda. Jambu or jambolan (Eugenia jambolana) belongs to family Mystaceae. The Indian Ayurvedic Vaidas has long been prescribing seed powder and fruit pickle to diabetic patient to keep diabetes under control. Girl and Shaktidevi had given jambu extract for 14 days to diabetic rats which resulted in markedly reduced blood sugar, urea, serum cholesterol and serum triglyceride level [14].

Method

This is the descriptive cross-sectional design and the data was collected during the month of September to October in the year 2020.

The study has been screened for selected parameters (weight, height, body mass index (BMI), 24-hour dietary recall, family history of diabetes) & biochemical analysis (fasting blood glucose levels) and environmental factors (lifestyle factors & dietary habits). Blood pressure was measured by a clinician using sphygmomanometer. Three readings were taken over five minutes and lowest one was recorded. Hypertension was considered present if any of the following conditions were met: systolic blood pressure of 140 mm Hg or more, diastolic blood pressure of 90 mm Hg or more or reported use of a medication for hypertension.

Sampling Tools and Techniques

This is the questionnaire cum interview and convenient sampling technique was used to select the study participants.

Information pertaining to age, sex, education, religion, marital status, family type and size will be recorded in the interview schedule. Information regarding food habits, intake of any traditional adjuncts, physical activities, family history of diabetes, any treatment etc. will be obtained. The height, weight of subjects will be measured according to method given by Jelliffe (1966). The body mass index (BMI) of the subjects will be calculated by using formulae weight in kg/height in metric square.

Measured height will be converted into meters and using the weight measurements, the BMI of the respondents will be calculated by using the formulae (Jelliffe 1966):

$$BMI = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}$$

A 24-hour recall method will be used to ascertain the dietary intakes of the respondents. The daily intake of nutrients from the diet will be calculated on raw weight basis using DietSoft- A solution to dietary guidelines, version 1.1.6 © Invincible IDeAS 2008-09 [15].

Fasting blood glucose levels of the subjects will be noted from the clinical and diagnostic laboratories where serum glucose will be analyzed based on GOD/POD method.

Classification of Blood Pressure

The following statistical measures will be used for the interpretation of data collected. The analyses will be done using Microsoft Office Excel 2007 (Table 1).

Table 1. Classification of blood pressure.

Classification	Blood Pressure (mm Hg)
Normal	SBP<120 and DBP<80 SBP
Prehypertension Stage	120-139 or DBP80-89
1Hypertension	SBP 140-159 or DBP 90-99
Stage 2Hypertension	SBP≥160 or DBP≥100

*SBP- Systolic Blood Pressure *DBP- Diastolic Blood Pressure

In the present investigation it was found that the incidence of diabetes was the highest among age group of 50-60 years (60 percent males and 74 percent females) 40 percent of the males and 26 percent of the females were in the age group of 40-50 years (Table 2, Table 3 and Table 4).

Table2. Distribution of respondents according to their food habits.

Food habits	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Lacto – vegetarian	23	46	33	66
Ova – vegetarian	4	8	6	12
Non – vegetarian	23	46	11	22

Table 3. Distribution of respondents according to the criteria for choosing food items.

Criteria for choosing food Items	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Taste	25	50	22	44
Custom	10	20	8	16
Cost	~	~	~	~
Nutrition	5	10	8	16
Doctor or dietician's advice	6	12	6	12

Table 4. Distribution of the respondents according to commonly consumed cereal.

Commonly consumed cereal	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Wheat	50	100	50	100
Rice	15	30	20	40
Any other	~	~	~	~

It was found that all the respondents consumed wheat. Only 30 percent of the males and 40 percent of the females were eating rice once a week (Table 5,Table 6,Table 7 and Table 8).

Table 5. Distribution of respondents according to type of pulses consumed.

Pulses consumed	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Whole dal	6	12	8	16
Split dal	5	10	4	8
Both	35	70	32	64
Sprouted dal	4	8	6	12

Table 6. Distribution of respondents according to consumption of tea/ coffee.

Consumption of tea/coffee	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Only tea	25	50	27	54
Only coffee	10	20	6	12
Both	15	30	17	34

Table 7. Distribution of respondents according to consumption of artificial sweetener.

Use of artificial Sweetener	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Yes	17	34	20	40
No	33	66	30	60

Table 8. Distribution of respondents according to consumption of alcohol.

Consumption of Alcohol	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Yes	20	40	~	~
No	30	60	50	100

It was observed that 60 percent of the males were not consuming alcohol while 40 percent of them used to consume alcohol (Table 9).

Table 9. Distribution of respondents according to consumption of methi seeds.

Consumption of methi seeds	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Yes	23	46	26	52
No	27	54	24	48

The study shows that only 46 percent of the males and 52 percent of the females consumed methi seeds in the form of powder/ soaked seeds along with water, sprouted seeds and in different food preparations (Table 10).

Table 10. Distribution of respondents according to consumption of bitter gourd.

Consumption of bitter gourd	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Yes	44	88	47	94
No	6	12	3	6

Table 10shows that 88 percent of the males and 94 percent of females consumed karela. Respondents consumed karela in the form of juice, powdered form and in the form of vegetable preparation whenever available in the market (Table 11).

Table 11. Distribution of respondents according to consumption of jamun seeds.

Consumption of jamun seeds	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Yes	6	12	8	16
No	44	88	42	84

Table 11 shows that only 12 percent of the males and 16 percent of the females consumed 1 to 2 tsp of dry jamun seeds in powdered form daily whereas 88 percent of the males and 84 percent of the females did not consume jamun seeds (Table 12).

Table 12. Distribution of respondents according to the awareness of the disease.

Awareness of the Disease	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Yes	50	100	50	100
No	~	~	~	~

The present study indicates that all the respondents were well informed about diabetes. They were aware of its nature, control and treatment. Majority of the respondents were consulting, doctors or dietician. Health programs on TV especially Baba Ramdev's yoga program, radio, newspapers, magazines, books were other sources of acquiring information(Table 13).

Table 13. Distribution of respondents according to age at the time of the diagnosis of the disorder.

Age group (years)	Males (n=50)		Females (n=50)	
	Number	%	Number	%
25 – 30	2	4	4	8
30 – 35	6	12	5	10
35 – 40	14	28	10	20
40 – 45	15	30	18	36
45 – 50	5	10	7	14
50 – 55	5	10	4	8
55 & above	3	6	2	4

The present study shows that more cases of diabetes were diagnosed in age group of 35-40 years and 40-45 years(Table 14).

Table 14. Fasting blood glucose (FBG) levels at the time of diagnosis.

Fasting blood glucose level (mg/100ml)	Males (n=50)		Females (n=50)	
	Number	%	Number	%
<200	28	56	25	50
200 – 300	15	30	20	40
300 – 400	5	10	4	8
<400	2	4	1	2

Table 14depicts that for 56 percent male subjects the fasting blood glucose level at the time of diagnosis of diabetes was less than 200 mg/ml, 30 percent had it in the range of 200-300 mg/100 ml, 10 per cent had in the range of 300 - 400 mg/100 ml whereas 6 percent of the male subjects had more than 400 mg/100 ml. In case of female 50 percent of the subjects had FBG less than 200 mg/100ml, 40 percent had in the range of 200-300 mg/100ml, 8 per cent had in the range of 300 - 400 mg/100 ml and 2 percent had more than 400 mg/100 ml.

Anthropometric Measurements

The results of anthropometric means i.e. height, weight and body mass index (BMI) of subjects are given below (Table 15):

Table 15. Anthropometric measurements of the respondents

Anthropometric parameters	Males (n=50)		Females (n=50)	
	RANGE	MEAN±SD	RANGE	MEAN±SD
Mean height (cm)	160.02-182.88	169.84±7.66	149.86-170.18	158.98 ±4.46
Mean weight (kg)	55-106.3	81.04±14.96	42-150	69.74±15.90
Ideal body weight* (Ht in cm-100)	~~	70	~	59

*Calculated using Broca's index.

Body Mass Index (Bmi)

BMI is the most commonly criterion to diagnose obesity and obesity is a strong risk factor for diabetes. The body mass index of the male and female subjects ranged from 20.81-39.73 kg/m^2 and 17.18-62.48 kg/m^2, respectively with average BMI of 28.40±5.3 kg/m^2 and 27.57±6.68 kg/m^2, respectively.

Golditzet alfound that risk of diabetes increases with greater body mass index (BMI) and even women with average body weight (BMI = 24 kg/m^2) had an elevated risk. Even modest andtypical adult weight gain increased risk of diabetes (Table 16, Table 17 and Table 18).

Table 16. Distribution of the respondents according to WHO (2000) classification of BMI with reference to gender.

Classification	BMI (kg/m^2)	Males (n=50)		Females (n=50)	
		Number	%	Number	%
Normal	18.5-22.9	12	24	9	18
Overweight	23.0-24.9	1	2	8	16
Obese grade I	25.0-29.9	18	36	22	44
Obese grade II	≥30.0	19	38	11	22
P-value	< 0.05				

Table 17. Distribution of the respondents according to WHO (2000) classification of BMI by age.

Classification	BMI (kg/m^2)	Males				Females			
	Range	40 – 50 (n=20)		50 – 60 (n=30)		40 – 50 (n=13)		50 – 60 (n=37)	
		Number	%	Number	%	Number	%	Number	%
Normal	18.5-22.9	3	15	9	30	0	0	8	21.6
Overweight	23.0-24.9	0	0	1	3.3	0	0	8	21.6
Obese grade I	25.0-29.9	13	65	5	16.7	5	38.5	17	45.9
Obese grade II	≥30.0	4	20	15	50	8	61.5	4	10.9
P-value		<0.05				<0.05			

Table 18. Average daily nutrient intake.

Food groups	Females (n=50)			Males (n=50)		
	Mean±S.D.	Suggested intake*	Percent adequacy	Mean±S.D.	Suggested intake*	Percent adequacy
Energy, Kcal	1500±80.7	1200	125	1876±90	1500	125.1
Protein, g	59±15.9	48	122.9	69±6.2	58	118.9
Total fat, g	40±13	28	142.9	55±6.7	36	152.8

Table 16 shows that as per WHO classification (2000) only 24 percent male subjects and 18 percent female subjects were having normal BMI whereas 2 percent male subjects and 16 percent female subjects were overweight. 36 percent male subjects and 44 percent female subjects were having grade I obesity. 38 percent male subjects and 22 percent female subjects were having grade II obesity (Figure 3,Figure 4, Figure 5 and Figure 6).

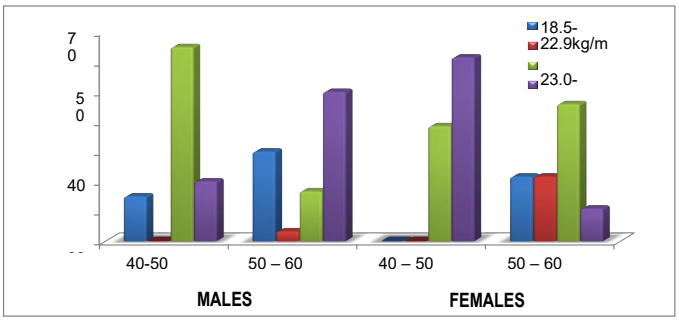

Figure 3. Distribution of the respondents according to BMI by age Diearty Recall.

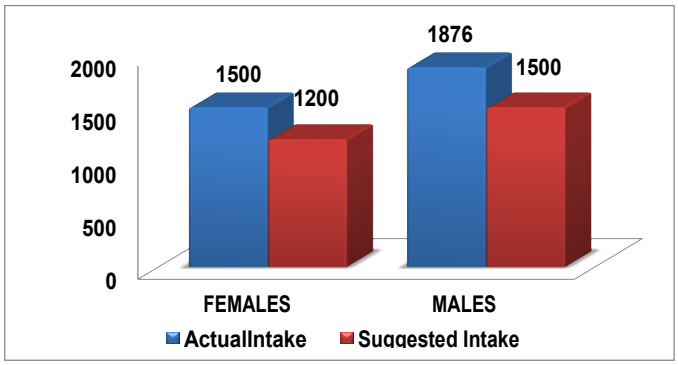

Figure 4. Average daily energy intake.

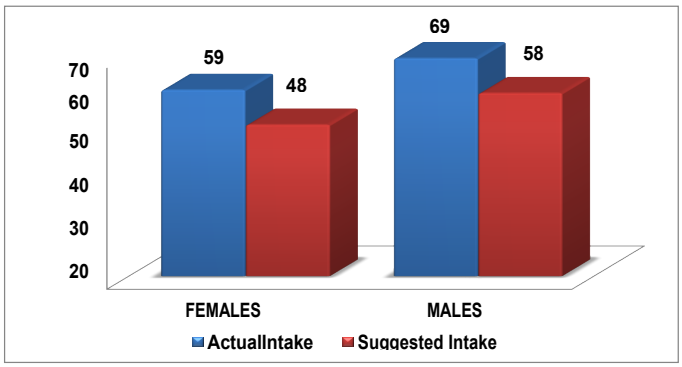

Figure 5. Average daily protein intake.

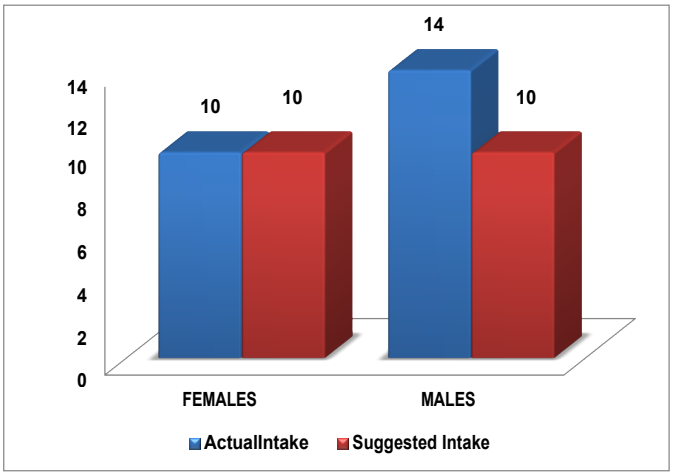

Figure 6. Average daily total fat intake.

Concluding Remarks

The results of the study conducted on, "Dietary Profile and Prevalence of Hypertension in NIDDM patients of Panchkula City" have been presented and discussed under following headings: Socio-demographic characteristics, Dietary information, Diabetic history, Activity pattern, Psychological stress, Anthropometric measurements, Dietary recall, Current fasting glucose level, Blood Pressure. Some of them were taking some medicinal herbs like methi seeds, bitter gourd (in dried form) or jamun seeds besides their regular medicine. They got their urine and blood sugar levels checked regularly (i.e. every 15 days or after a month). It was also seen that some diabetic subjects were dependent only on medication to control their blood glucose levels and did not regulate their dietary intake and physical activity. The present study shows that the prevalence of hypertension and pre- hypertension is high which supports the increasing trend in the diabetic population of India which is under the epidemiological transition.

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