

## Dietary profile and prevalence of “NIDDM”.

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### Abstract

The present study has been conducted for observing the dietary profile of NIDDM patients. This is the study of patients out of 100, 50 were males and 50 females were selected to conduct the study. Diabetes is the most important risk factor for chronic disease burden in India. Studies from various parts of India have reported high prevalence of diabetes. The purpose of this study was to examine nutritional content, food habits, nutritional profile, nutritional education, medicinal utilization of 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 for the sample selection were non-insulin dependent diabetes mellitus male and female between 40-60 years of age. Some of the selected individuals had controlled diabetes by the following:

- Restricting their food intake
- Going out for morning and evening walk
- Yoga and Meditation, Exercise, Avoiding any Stress

**Keywords:** NIDDM, Nutrition, Diabetes, Disease and health.

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### Introduction

Diabetes mellitus is a group of disease characterized by high blood glucose levels resulting from defects in insulin secretion, insulin action, or both. Abnormalities in the metabolism of carbohydrate, protein and fat are also present. Persons with diabetes have bodies that do not produce or respond to insulin, a hormone produced by beta cells of the pancreas that is necessary for the use or storage of body fuels. Without effective insulin, hyperglycemia occurs, which can lead to both the short-term and long-term complications of diabetes mellitus. Type 2 diabetes is mainly associated conditions, which carry an increased risk of cardiovascular and nephro (renal) disease.

The World Health Organization projects that 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.

A patient who suffers from type 2 diabetes has 2-4 times greater risk of death from cardiovascular causes than the patient without diabetes. The most common cause of dying in the diabetic patient is heart disease.

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 largest numbers of diabetic subjects are in India [1]. Obesity and physical inactivity constitute part of risk for type II diabetes because of their propensity to induce insulin resistance. Thus, there is renewed interest in the prevention of insulin resistance, type II diabetes through life style interventions. The key life style interventions are physical activity and a nutritional plan with reduced calorie intake [2].

Nutrition therapy for diabetes focuses on goals and strategies for the treatment and prevention of diabetes and on achieving optimal metabolic outcomes related to glycaemia, lipid profiles and blood pressure.

### Objectives

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 NIDDM patients.
- To study the food habits, nutritional profile, nutritional education of NIDDM patients.

### Materials and Methods

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.

### Risk factors of Diabetes mellitus

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, stress, lack of exercise, eating too much fatty foods etc. have all been shown to influence the development of diabetes.

### **Family history**

There is a strong hereditary predisposition to type II diabetes mellitus, stronger than for type I diabetes mellitus. In adults, the risk of disease in the mono zygote twin of a patient with type II diabetes mellitus is 90 per cent and the lifetime risk of the disease in a first degree relative is 40 per cent (in contrast to 5% for type I diabetes mellitus). Obesity

People who eat too much food and lead a sedentary life become over weight and obese. Obesity reduces the sensitivity of tissues to the action of insulin in the utilization of glucose. The major health consequences associated with overweight and obesity are type II diabetes, CHD, hypertension, gall bladder disease, and certain types of cancer, and insulin resistance.

### **Age**

Reported the age of onset was after 39 years in diabetics studied at Baroda [3]. Diagnosed 40,000 cases of diabetes. Most of them were over 40 years of age [4]. Prevalence of 'Impaired Glucose Tolerance (IGT) was higher than diabetes in the age group of <40 years. Only BMI showed an association with IGT in them. While the risk factors were similar to diabetes in the old group [5].

### **Sex**

People of diabetes according to sex vary with different geographical areas. Decreased prevalence was seen in males of some developing countries but in other the ratio was reversed .

### **Environmental factors**

NIDDM is partially of genetic etiology but also strongly influenced by environmental and life style factors .Cigarette smoking and alcohol consumption are also reported to have important roles either through their effect on obesity or directly through physiological factors related to insulin secretion or insulin resistance [6].

### **Vitamin D deficiency**

Recent evidence suggests that vitamin D deficiency may also increase the risk for the development of diabetes in humans. This is supported by studies where vitamin D deficiency was found to be associated with impaired glucose tolerance and reduced insulin secretion in humans. Hence adequate amount of vitamin D is required not only for bone health but also for maintaining normal insulin thereby facilitating glucose hemoglobin [7].

### **Stress**

Physical injury, surgery and emotional distress sometimes precede the list symptoms of diabetes.

### **Management of Diabetes**

The discoveries of insulin in 1921 and subsequently oral agents have some methods for treatment but neither treatment offers adequate level of metabolic control or protection from devastating long term complications of the disease.

A few studies in India and abroad one the etiology and control of this through dietary management have shown that there was

improved to control in NIDDM patients treated with hypocaloric diet, modified fat and sufficient protein. High carbohydrate and high fiber diet improved glucose and lipid metabolism in all NIDDM subjects. In addition, physical exercise and nutrition education also play a great role in the management of diabetes.

### **Nutrient intake**

**Energy:** The most effective dietary management for type II diabetes is caloric restriction for weight reduction, since most subjects with this type of diabetes are metabolically obese. Estimates of energy requirement should be based on body weight, age and activity level.

**Fat:** Reported that an increase in mono saturated fatty acid has been suggested to improve both glycemic control and lipoprotein profiles among patients with diabetes [8]. A study emphasized the importance of considering not just the quantity of fat but the quality of fatty acid finds more treatment of patient with diabetes [9].

**Carbohydrates:** Reported that nutrient used to substitute energy is of particular concern. High carbohydrate diet may worsen glycemic control, and have been associated with hypertriglyceridemia and reduced HDL cholesterol level which would increase an already existing risk for CHD among individuals with NIDDM [10]. However, carbohydrate rich foods that have low glycemic index or that are rich in soluble fiber may minimize the potential effect on glucose control and hyperlipidemia.

**Fiber:** Fiber is an important component of human diet. Studies on dietary fiber are steadily gaining importance in nutrition world. Dietary fiber also known as bean, roughage, is generally considered unavailable carbohydrate and used as mild laxative.

In a study it was observed that there was significant reduction in the concentration of total cholesterol, HDL and VLDL cholesterol and triglycerides, decreased fasting blood glucose and insulin concentration and improve glucose tolerance following the ingestion of diet containing 25 grams of fenugreek seeds, jamun seeds ,karela juice or powder. This is the descriptive cross-sectional design and the data as collected during the month of September to October in the year of 2020

The present study was conducted on sample of 100 respondents. The main criteria for the sample selection were non-insulin dependent diabetes mellitus male and female between 40-60 years of age.

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

Information pertaining to age, sex, marital status and family type was recorded in the interview schedule. Information regarding food habits, intake of any traditional adjuncts, physical activities, family history of diabetes, and any treatment etc.was obtained.

### **Body Mass Index (BMI)**

Measured height was converted into meters and using the weight measurements, the BMI of the respondents was calculated by using the formulae weight in kg/height in m<sup>2</sup> [11].

Weight (kg)

BMI

Height (m)<sup>2</sup>

### Dietary recall

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

### Biochemical analysis

Fasting blood glucose levels of the subjects were noted from the clinical and diagnostic laboratories where serum glucose was analyzed based on GOD/POD method [12].

### Socio-demographic characteristics

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 1). Occupation affects the food habits and activity patterns of the person. Therefore, data was obtained according to the type of occupation. It was found that 60 percent of the female subjects were housewives and 40 percent were working. In case of male subjects, 64 percent were businessmen, 30 percent were servicemen and 6 percent were retired. In the present study 90 percent of the male subjects and 80 percent of the female subjects were married and 10 percent of the male subjects and 20 percent of the female subjects were widows.

**Table 1.** Distribution of respondents according to their socio-demographic characteristics.

S. No.	Variable / characteristics	Males (n=50)		Females (n=50)	
		Number	%	Number	%
1	Age (years)				
	40-50	20	40	13	26
	50-60	30	60	37	74
2	K-S				
	Housewife	-	-	30	60
	Service	15	30	20	40
	Business	32	64	-	-
3	K-S				
	Unmarried	-	-	-	-
	Married	45	90	40	80
	Widow	5	10	10	20

### Dietary information

according to food habits, consumption of cereals, consumption of pulses, consumption of fruits, consumption of milk, consumption of sugar in tea /coffee, consumption of alcohol, cigarette smoking, methi seeds (Tables 2-10).

**Table 2.** Distribution of respondents according to 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 consumption of cereals.

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

**Table 4.** Distribution of respondents according to consumption of pulses.

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 5.** Distribution of respondents according to consumption of fruits.

Consumption of fruits	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Yes	48	96	50	100
No	2	4	-	-

**Table 6.** Distribution of respondents according to consumption of milk.

Consumption of milk	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Cow	10	20	12	24
Buffalo	20	40	24	48
Tonned milk	20	40	14	28

**Table 7.** Distribution of respondents according to consumption of sugar in tea /coffee.

Sugar intake in tea/ coffee	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Yes	30	60	27	54
No	20	40	23	46

**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

**Table 9.** Distribution of respondents according to cigarette smoking.

Cigarette smoking	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Yes	5	10	-	-
No	45	90	50	100

**Table 10.** Distribution of respondents according to consumption of methi seeds.

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

## Results and Discussion

### Diabetic history

Table 11 shows 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 and/or dietician. Health programs on TV especially Baba Ramdev's yoga program, newspapers, books were other sources of acquiring information. Table 12 shows the present study shows that more cases of diabetes were diagnosed in age group of 40-45 and 45-50 years, 30 percent and 40 percent in the males respectively whereas 36 percent and 54 percent in the females respectively. Lesser number of cases was diagnosed in the lower and higher age groups. Table 13 Here, 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 percent 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/100 ml, 40 percent had in the range of 200-300 mg/100 ml, 8 per cent had in the range of 300-400 mg/100 ml and 2 percent had more than 400 mg/100 ml.

Table 11. Awareness regarding diabetes.

Awareness of the disease	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Yes	50	-	50	100
No	-	-	-	-

Table 12. Age at the time of diagnosis of the disorder.

Age group (years)	Males (n=50)		Females (n=50)	
	Number	%	Number	%
40-45	15	30	18	36
45-50	20	40	27	54
50-55	9	18	3	6
55 and above	6	12	2	4

Table 13. Fasting blood glucose level at the time of diagnosis of disorder.

Fasting blood glucose level (mg/100 ml)	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

**Family history of Diabetes**

The prevalence of glucose intolerance is significantly higher among subjects with both parent diabetic as compared to those with one parent diabetic and those with no family history of the diabetes (Mohan et al.)

(Table 14). The present study shows that 42 percent of the males and 50 percent of the females had one or more family members suffering from diabetes whereas 58 percent males and 50 percent females did not have any family history of diabetes.

Table 14. Distribution of respondents according to family history of diabetes.

Family history of Diabetes	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Yes	21	42	25	50
No	29	58	25	50

**Psychological stress**

Emotional stress has also been reported to be one of the factors in secretion of catabolic hormones which may precede or precipitate diabetes (Davidson and Passmore). Table 4 shows the distribution of the respondents on the basis of psychological stress (Table 15).

Table 15. Distribution of respondents on the basis of psychological stress.

Level of psychological stress	Males (n=50)		Females (n=50)	
	Number	%	Number	%
Less	15	30	10	20
Normal	25	50	13	26
More	10	20	27	54

Majority of the males (50 percent) were feeling normal stress whereas majority of the females (54 percent) were feeling more stress. 30 percent of the males and 20 percent of the females

We're feeling less stress, 20 percent of the males have more stress and 26 percent of the females have normal stress.

**Anthropometric measurements**

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

Height: The height of the male and female subjects ranged from 160.02-182.88 cm, 149.86-170.18 cm respectively with average height of 169.84 ± 7.66 and 158.98 ± 4.46cm respectively.

Weight: The weight of the male and female subjects ranged from 55-106.3 kg and 42-150 kg with the average weight of 81.04 ± 14.96 kg and 69.74 ± 15.90 kg, respectively.

Ideal Body Weight (IBW): Mean worked out to be 70 kg for male subjects and 59 kg for female subjects (calculated using Broca's index i.e. subtracting 100 from average height in cm) (Table 16).

Table 16. 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<sup>2</sup> and 17.18-62.48 kg/m<sup>2</sup>, respectively with average BMI of 28.40 ± 5.3 kg/m<sup>2</sup> and 27.57 ± 6.68 kg/m<sup>2</sup>, respectively.

Risk of diabetes increases with greater body mass index (BMI) and even women with average body weight (BMI=24 kg/m<sup>2</sup>) had an elevated risk. Even modest and typical adult weight gain increased risk of diabetes (Figures 1-3) and (Tables 17-20).

**Table 17.** Distribution according to WHO (2020) classification of BMI with reference to Gender (male and female).

Classification	BMI (kg/m <sup>2</sup> )	Males (n=50)		Females (n=50)	
		Number	%	Number	%
Normal	18.5-24.9	12	24	9	18
Overweight	25.0-29.9	1	2	8	16
Obese grade I	30.0-34.9	18	36	22	44
Obese grade II	35.0-39.9	19	38	11	22
p-value		<0.05			

**Dietary recall**

\*Raghuram et al.

\*\*RDAs ICMR (2010)

\*Sri Lakshmi

It shows that 6 percent of the males and 10 percent of the females were keeping good control on their fasting blood glucose level which were within normal limits whereas 16 percent of males and 20 percent of females were maintaining fair control on fasting blood glucose levels which were between 110-130 mg/dl and 78 percent of males and 70 percent of females had fasting blood glucose level higher than 130 mg/dl and had poor control on fasting blood glucose levels.

**Table 18.** Distribution of the respondents according to WHO (2020) classification of BMI by age.

Classification	BMI(kg/m <sup>2</sup> )	Males				Females			
		40 – 50 (n=20)		50 – 60 (n=30)		40 – 50 (n=13)		50 – 60 (n=37)	
		Number	%	Number	%	Number	%	Number	%
Normal	18.5-24.9	3	15	9	30	0	0	8	21.6
Overweight	25.0-29.9	0	0	1	3.3	0	0	8	21.6
Obese grade I	30.0-34.9	13	65	5	16.7	5	38.5	17	45.9
Obese grade II	35.0-39.9	4	20	15	50	8	61.5	4	10.9
P-value	-	<0.05				<0.05			

**Table 19.** Average daily nutrient intake females and males.

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
CHO, g	230 ± 21.7	189*	121.6	297 ± 41.6	236	125.8
Dietary fibre, g	10 ± 4.1	10**	100	14 ± 4.1	10**	140
Iron, mg	12 ± 2.85	30**	40	14.5 ± 2.05	28**	51.7
Calcium, mg	850 ± 55.7	600**	212.5	1038 ± 68.1	600**	259.9
Thiamine, mg	1.5 ± 0.31	1.0**	122.2	1.65 ± 0.39	1.2**	137.5
Riboflavin	0.99 ± 0.19	1.1**	90	1.25 ± 0.35	1.4**	89.3
Niacin	10 ± 1.2	12**	83.3	12.5 ± 1.90	16**	78.1
Ascorbic acid, mg	125 ± 20.5	40**	312.5	130 ± 25.7	40**	325
Vitamin A, µg	1205 ± 479.5	600**	200.8	1367 ± 405	600**	227.8

\*Raghuram et al. (1993); \*\*RDAs ICMR (2010)

**Table 20.** Current fasting blood glucose level.

Fasting blood glucose level (mg/100 ml)	Degree of control*	Males (n=50)		Females (n=50)	
		Number	%	Number	%
<110	Good	3	6	5	10
110-130	Fair	8	16	10	20
>130	Poor	39	78	35	70

\*Sri Lakshmi

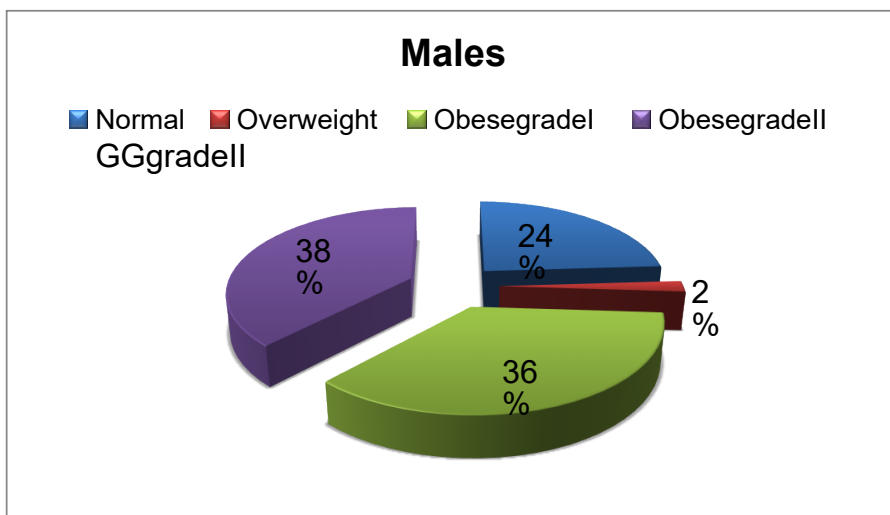


Figure 1. Prevalence of obesity in male respondents according to WHO (2020) classification of BMI.

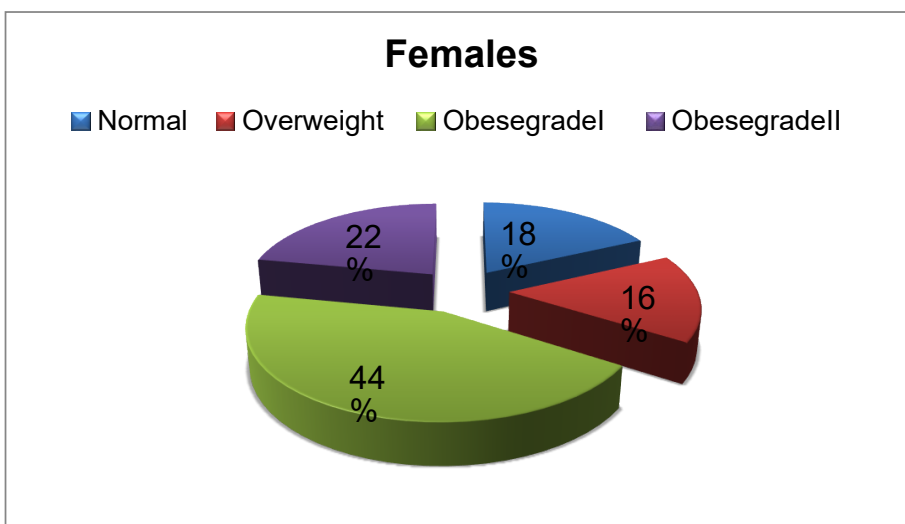


Figure 2. Prevalence of obesity in female respondents according to WHO (2020) classification of BMI.

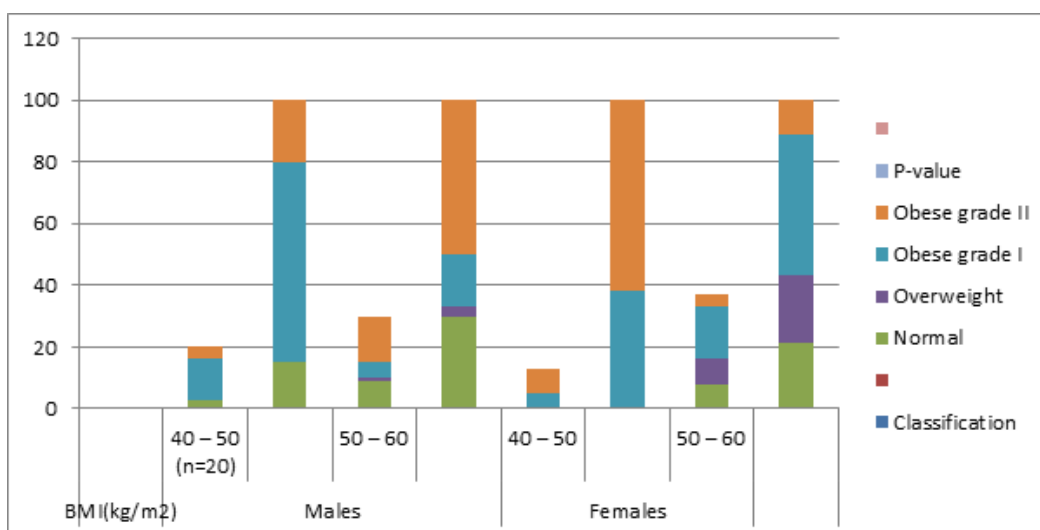


Figure 3. Distribution of the respondents according to BMI by age.

## Conclusion

This shows that the review conducted on, "Dietary Profile and Prevalence of 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 are high which supports the increasing trend in the diabetic population of India which is under the epidemiological transition.

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