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Assessment of nutritional status and dietary pattern of diabetes patients in Allahabad City

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Abstract

The study assessed the nutritional status of diabetic patients in Allahabad city, U.P. A well-structured questionnaire was used to elicit information on the socio-demographic data, anthropometric measurement such as height and weight was measured to determine the nutritional status while food frequency questionnaire was used to assess the intake pattern of foods. The result shows that 44.44 per cent were educated up to high school, 27.78 per cent educated up to intermediate and 27.78 per cent were graduate. In case of females, 50 per cent were illiterate, 16.67 per cent and 25 per cent were educated up to high school. A total of 30 respondents were recruited for the field survey and 18(60%) of them were male while 12(40%) were female. Shows that out of the 30 respondents, 16.67 percent females were underweight, 16.67 percent male were having grade 2 obesity, 55.55 percent male and 41.67 percent female were having grade 1 obesity. They should also reduce their fats and oils food products consumption. The reduction in the consumption of energy foods should be accompanied by regular physical exercises to improve blood circulation.

Keywords: Nutritional status, diabetic, obesity, consumption

Introduction

Diabetes is a disorder of carbohydrates metabolism characterized by high blood sugar level (hyperglycemic) and high level of sugar in urine (glucosuria). It is accompanied in many cases by secondary alteration of fat and protein metabolism resulting in an array of physical disorder. Diabetes therefore, is a metabolic disease that can be well under control and reasonably managed with proper care, though it cannot be cured once it occurs. Fruits and vegetables consumption have been found to be associated with decreased incidence of diabetes and mortality from a variety of health outcomes including obesity, hypertension and cardiovascular diseases (Thomas, 2005) ^[14].

Nutritional intervention is an integral part of diabetes management and self-care education, aiming at the attainment and maintenance of optimal metabolic outcomes. However, cross-sectional studies in Africa indicate low adherence to dietary recommendation for macronutrients intake and fruits and vegetables consumption among diabetic patients (WHO/FAO 2004) ^[16].

Diabetes is fast gaining the status of a potential epidemic in India with more than 62 million diabetic individuals currently diagnosed with the disease. In 2000, India (31.7 million) topped the world with the highest number of people with diabetes mellitus followed by China (20.8 million) with the United States (17.7 million) in second and third place respectively. According to Wild *et al.* the prevalence of diabetes is predicted to double globally from 171 million in 2000 to 366 million in 2030 with a maximum increase in India. It is predicted that by 2030 diabetes mellitus may afflict up to 79.4 million individuals in India, while China (42.3 million) and the United States (30.3 million) will also see significant increases in those affected by the disease.

The aim of the ICMR-INDIAB study is to establish the national and state-specific prevalence of diabetes and prediabetes in India. Such data will offer not only a more comprehensive understanding of disease burden, but also provide opportunities to explore state-level and individual level variation in diabetes and prediabetes. Here, we report on the prevalence of diabetes and prediabetes from 15 states of India and explore heterogeneities in diabetes and prediabetes phenotypes by state, rural and urban setting, and individual characteristics.

The prevalence of diabetes mellitus (DM) is steadily increasing everywhere, most markedly in the world's low and middle-income countries. DM is a metabolic disease characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both. DM is

recognized as an important cause of premature death and disability; it is one of four priority non-communicable diseases targeted by world leaders. Globally, the World Health Organization estimates that, 422 million adults were living with DM in 2014, and projects that DM will be the seventh leading cause of death in 2030. Most of DM deaths (More than 80%) occur in low and middle-income countries. Due to sophisticated laboratory tests that are usually required to distinguish between type 1 diabetes and type 2 diabetes (T2DM), separate global estimates of diabetes prevalence for type 1 diabetes and T2DM do not exist. In fact, the majority of people with diabetes are affected by T2DM.

Justification

The Indian Council of Medical Research India Diabetes Study (ICMR-INDIAB study) showed that India had 62.4 million people with diabetes in 2011. These numbers are projected to increase to 101.2 million by 2030. India has the second highest prevalence of diabetes among adults at 9.1% in the south East Asian region. About 1.1 million people die from diabetes related illnesses in India every year.

Objectives

1. To determine the socio-economic characteristic and anthropometric status of selected respondents.
2. To determine the nutritional status and dietary pattern of selected respondents.

Methods and Material

Location of the study

Respondents were randomly selected from Swaroop Rani Hospital of Allahabad city U.P.

Sample Selection

A total number of 30 respondents (female & male) aged 30-45 years were selected randomly for the study.

Method of enquiry and data collection

The data pertaining to the study according to the research problem, Pre-structured questionnaire will be used for the collection of data from the respondents. The schedule was including the aspects which lead to the fulfillment of the objectives of the study. The respondents were drawn randomly for the study.

The interview schedule consisted of the following information-

- I. General profile
- II. Nutritional status
 - a) Anthropometric measurement
 - b) Dietary intake (24-hour dietary recall method)
 - c) Lifestyle and Clinical observation

I. General profile

Data regarding general profile of the respondents will be collected using the first part of the schedule. This section covered the aspects including respondent name, age and sex, religion, types of family, family income and educational status. All these are important for knowing the respondent's socio-economic status.

II. Nutritional status

a. Anthropometric assessment

This technique will be concerned with the variations of physical dimensions, the gross composition and degree of

nutrition. Hence anthropometric measurements will be useful criteria for assessing nutritional status. Measurements technique used are: - height, weight and BMI (Joshi, 2010) [8].

Height

Height in centimeter of the subject was taken with the help of a measuring tape by sticking it to the wall. The subjects were made to stand erect looking straight, buttocks, shoulders and head touch in the wall, heels together, toes apart and hands hanging loosely by the sides. Three consecutive readings were taken and the mean value was recorded (Srilakshmi, 2010) [12].

Weight

The weighing scale with maximum capacity of 120 kg and the minimum division of 0.5kg was used to weight all the subjects. The respondents were made to stand erect on the weighing scale, with minimum clothes, without foot will be, not leaning against or holding anything and the weight was record in kilograms (kg). The measurement was making to the nearest 0.1 kilogram. Three consecutive reading will be taken for all the subjects and the mean value was recorded the scale was adjust to zero after each measurement (Srilakshmi, 2010) [12].

BMI (Body Mass Index)

The Body Mass Index (BMI) or Quetelet Index is a measure for human body shape based on an individual's mass and height was used to access the nutritional status of respondents.

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

(According to WHO classification)

The following range of BMI indicates the health status of an individual;

BMI (kg/m ²)	Indicator
<18.5	Underweight
18.5-24.9	Normal
≥25.01	Overweight
25.0- 29.9	Pre-obese
≥30	Obese
30.0-34.9	Obese class 1
35-39.9	Obese class 2
≥40	Obese class 3

a. Dietary Intake (24-hour dietary recall method)

A diet survey was conducted as described by (Swaminathan, 2003) [13]. The food consumption frequency was record in term of cereals, pulses, milk and milk products, green leafy vegetables, other vegetables, fruits, poultry, sugar, jaggery, and salt intake. Information related to dietary pattern, food habits, food intake, food frequency will be also recorded. The food intake was record by 24-hour Dietary Recall Method and nutrient intake in term of energy, protein, carbohydrates, fats, calcium, iron, niacin, and vitamin A was also calculate. Calculation of nutrient intake was done with the help of the food composition tables (Gopalan *et al.*, 2004) [6].

b. Lifestyle and Clinical Observation

Clinical measurement is the most important part of nutritional assessment. This method is helpful to give direct information of the physical sign, which is the final event in the development of nutritional abnormalities and dietary

deficiency.

Clinical signs and symptoms like Feeling very thirsty, feeling very hungry - even though you are eating, extreme fatigue, Blurry vision.

Statistical analysis

The data was obtained, statistically analyzed by using paired t test and other appropriate techniques (Gupta and Kapoor, 2002) [7].

Results and Discussion

The data collected and tabulated under the study are present with appropriate illustration and discussed in this chapter. Socio-economic characteristics are presented in the following table.

General Information

Table 4.1: Distribution of Respondents Socio-economic characteristics

S. No.	Particulars	Male n=18	%	Female n=12	%	Total % N= 30
1.	Age(year)					
	25-35	8	44.44	4	33.33	40
	36-40	10	55.55	8	66.66	60
2.	Education level					
	Illiterate	2	11.11	6	50	26.67
	High school	8	44.44	3	25	36.67
	Intermediate	5	27.78	2	16.67	23.33
	Graduate	5	27.78	1	8.33	20
	Post graduate	0	0	0	0	0
	Other	0	0	0	0	0
3.	Type of family					
	Joint	5	27.78	3	25	26.67
	Nuclear	13	72.22	9	75	73.33
4	Occupation					
	Service	5	27.78	1	8.33	20
	Business	10	55.55	2	16.67	40
	Agriculture	3	16.67	0	0	10
	House Wife/ any other	0	0	9	75	30
5.	Monthly Income					
	5000-10,000	1	5.56	2	16.67	10
	10,000-15,000	5	27.78	3	25	26.67
	15,000-20,000	8	44.44	3	25	36.67
	More than 20,000	4	22.22	4	33.33	26.67

Table 4.1 Shows that socio- economic data of the respondents.

Age: Out of 30 respondents, in the age group 25-35 years, 44.44 percent were males and 33.33 percent were females and in the age group 36-40 years, 55.55 percent males and 66.66 percent were females.

Education Level: Out of total 11.11 percent males are illiterate, 44.44 percent were educated up to high school, 27.78 percent educated up to intermediate and 27.78 percent were graduate. In case of females, 50 percent were illiterate, 16.67 percent were educated up to intermediate, 25 percent were educated up to high school and 8.33 percent were graduate.

Type of family: The above data shows that 27.78 percent males and 25 percent females belonged to joint families

where as 75 percent females and 72.22 percent males belonged to nuclear family.

Occupation: shows that 16.67 percent were male had agriculture as their occupation, 55.55 percent were male belonged to business class and 27.78 percent male were in service. In case of female, 8.33 percent were female in service, 16.67 percent were female belonged to business class and 75 percent were female housewives.

Monthly income: Maximum adults, i.e. 44.44 percent male and 25 percent females had monthly income of Rs 15000 - 20,000 followed by 22.22 percent male and 33.33 percent females who had an average monthly income of more than Rs 20,000 followed by 27.78 percent males and 25 percent female who had monthly income between Rs 10,000 – 15,000 and 16.67 percent female who had monthly income between Rs 5000- 10,000 per month.

Table 4.2: Distribution of the respondents according to their BMI

Particulars	Category	Males= 18		Female= 12		Total (%) N=30
		N=18	%	N=12	%	
BMI (wt.(kg)/ht ² (m)						
<16.0- 18.5	Underweight	0	0	2	16.67	6.67
18.6 -24.9	Normal	5	27.78	3	25	26.67
25.0-29.9	Obese grade 1	10	55.55	5	41.67	50
>30	Obese grade 2	3	16.67	2	16.67	16.67

Source; Srilakshmi (2010) [12]

Table 4.2 shows that out of the 30 respondents, 16.67 percent females were underweight, 16.67 percent male were having

grade 2 obesity, 55.55 percent male and 41.67 percent female were having grade 1 obesity, 27.78 percent male and 25

percent female were having normal BMI.

Table 4.3: Frequency distribution of respondents according to their food habits and dietary pattern

S. No.	Particulars	Male =18		Female=12		TOTAL N=30
		N	%	N	%	
1.	Food habits					
	Vegetarian	5	27.78	6	50	36.67
	Non-vegetarian	8	44.44	4	33.33	40
	Ova –lacto vegetarian	5	27.78	2	16.67	23.33
2.	Type of milk consumed:					
	Whole milk	10	55.55	4	33.33	46.67
	Toned milk	4	22.22	2	16.67	23.33
	Cow’s milk	4	22.22	4	33.33	26.67
	Any other/ powder milk	0	0	2	16.67	6.67
3.	Oils used for cooking:					
	Mustard oil	13	72.22	10	83.33	76.67
	Refined oil	5	27.78	2	16.67	23.33
	Any other /olive oil	0	0	0	0	0
4.	Fast food consumption:					
	Once a week	8	44.44	4	33.33	40
	Twice a week	5	27.78	3	25	26.67
	Once in a month	5	27.78	5	41.67	33.33
5.	Dietary pattern:					
a.	Brunch + Dinner	8	44.44	4	33.33	40
b.	Breakfast + lunch + dinner	5	27.48	3	25	26.67
c.	Breakfast +lunch + evening tea+ Dinner	4	22.22	3	25	23.33
d.	Breakfast + lunch + evening tea dinner+ bed time	1	5.56	2	16.67	10
6.	Method of cooking					
	Boiling	5	27.78	3	25	26.67
	Steaming	2	11.11	3	25	16.67
	Shallow frying/ deep frying	8	44.44	4	33.33	40
	Baking / roasting	2	11.11	1	8.33	10
	Any other	1	5.56	1	8.33	6.67

Table 4.3 Shows that food habits and dietary pattern of the respondents.

Food habits: Out of 30 respondents, 16.67 percent females and 27.78 percent males were ova lacto vegetarians, 50 percent females and 27.78 percent male were vegetarian and 44.44 percent male and 33.33 percent females were non-vegetarians.

Types of milk consumed: Out of 30 respondents, 55.55 percent of males and 3.33 percent females respectively consumed whole milk, 22.22 percent males and 16.67 percent females consumed toned milk and 22.22 percent males and 33.33 percent females respectively were taking cow’s milk whereas 16.67 percent females were consumed powder milk.

Oil used for cooking: In the table data shows that out of 30 respondents, 72.22 percent were male and 83.33 percent female were using mustard oil for cooking. Whereas 27.78 percent male and 16.67 percent female respectively were using refined oil for cooking.

Fast food consumption: The data indicates that 44.44 percent males and 33.33 percent females consumed fast foods once in a week, 41.67 percent females and 27.78 percent males consumed it once in a month, 27.78 percent males and 25 females consumed it twice a week.

Dietary pattern: Out of 30 respondents, 33.33 percent females and 44.44 percent males followed type (a) dietary pattern, 25 percent females and 27.48 percent males followed (b) dietary pattern, 22.22 percent males and 25 females followed (c) dietary pattern and 16.67percent females and 5.56 percent male followed (d) dietary pattern.

Method of cooking: Out of 30 respondent 27.78 percent of male and 25 percent of female were using boiling method for cooking, 11.11 percent male and 25 percent female were using steaming method of cooking, 44.44 percent male and 33.33 percent female were using shallow frying or deep-frying method, 5.56 percent male and 8.33 percent female were using any other method and 8.33 percent female and 11.11 percent male were using steaming and baking roasting method for cooking respectively.

Table 4.4: Distribution of Allahabad adults according to Food consumption frequency

Food items	Everyday		2-3 days		Occasionally		Never	
	N=30	%	N=30	%	N=30	%	N=30	%
Cereals	20	66.67	10	33.33	-	-	-	-
Pulses	18	60	12	40	-	-	-	-
Green leafy vegetables	10	33.33	20	66.67	-	-	-	-
Other veg	23	76.67	7	23.33	-	-	-	-
Fruits	4	13.33	8	26.67	16	53.33	2	6.67

Fats and oils	24	80	6	20	-	-	-	-
Egg	5	16.67	3	10	4	13.33	18	60
Meat	0	0	8	26.67	4	13.33	18	60
Nuts and oils seeds	2	6.66	5	16.67	18	60	5	16
Roots and Tubers	8	26.67	4	13.33	10	33.33	8	26.67
Junk food	2	6.6	12	40	16	53.3	0	0

Table 4.5: Distribution of average nutrient intake per day by adults male respondents

Parameters	Energy (kcal)	Protein (g)	Fat (g)	CHO (g/d)	Calcium (mg/d)	Iron (mg/d)	Retinol (µg/d)	Niacin (mg/d)
Intake	2320	51.25	21.50	286.05	420.67	26.98	430.02	11.06
RDA	2220	60	25	333	600	17	600	16
Difference	-100	8.75	3.5	46.95	179.33	-9.98	169.98	4.94
t-value(cal)	152.59	155.81	5189	626	275.5	13.13	261	5.39
t-table	1.66	1.66	1.66	1.66	1.66	1.66	1.66	1.66
Result	S	S	S	S	S	S	S	S

Table 4.5 shows that average nutrients intake by the males with references to energy, protein, fat, carbohydrate, calcium, iron, retinol and niacin. After comparing the average nutrients intake of male respondents with ICMR, RDA (2010) it was observed that protein, fat, retinol, calcium and niacin intake

was found less than the RDA. On applying t-test, significant differences were found between the intake and RDA for calories, protein, fat, carbohydrates, calcium, iron, retinol and niacin.

Table 4.6: Distribution of average nutrient intake per day by adults female respondents

Parameters	Energy (kcal)	Protein (g)	Fat (g)	CHO (g/d)	Calcium (mg/d)	Iron (mg/d)	Retinol (µg/d)	Niacin (mg/d)
Intake	2000	44.33	24	399.33	430.12	16.85	480.35	8.03
RDA	1900	55	20	375	600	21	600	12
Difference	-100	10.67	-4	-24.33	169.88	4.15	119.65	3.97
t-value (cal)	152.59	14.20	3.87	35.36	268.9	4.11	183	6.15
t-table	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96
Result	S	S	S	S	S	S	S	S

Table 4.6 shows the average nutrients intake by the females with references to energy, protein, fat, carbohydrate, calcium, iron, retinol and niacin. After comparing the average nutrients intake of female respondents with ICMR, RDA (2010) it was observed that protein, fat, retinol, calcium and niacin intake

was found less than the RDA. On applying t-test, significant differences were found between the intake and RDA for calories, protein, fat, carbohydrates, calcium, iron, retinol and niacin.

Table 4.7: Distribution of life style pattern of adult’s respondents:

S. No	Particulars	Male=18		Female =12		Total %
		N	%	N	%	
1.	Exercise:					N=30
	Walking	5	27.78	2	16.67	23.33
	Light exercise	8	44.44	6	50	36.67
	Jogging	0	0	0	0	0
	Any other	5	27.78	4	33.33	40
2.	Sleeping time:					
	5 hours	0	0	4	33.33	13.33
	6 hours	10	55.55	5	41.67	50
	8 hours	8	44.44	3	25	36.67
3.	Mode of transportation					
	Own vehicle	10	55.55	3	25	43.33
	Public transport	8	44.44	6	50	46.67
	Walking	0	0	3	25	10
4.	Harmful substance intake					
	Alcohol	0	0	0	0	0
	Cigarette	4	22.22	0	0	13.33
	Betel leaves and nut	5	27.78	0	0	16.67
	Pan parag	4	22.22	0	0	13.33
	Others	0	0	0	0	0
5.	Family History of diabetes					
	Yes	10	55.55	7	58.33	56.67
	No	8	44.44	5	41.67	43.33
6.	Medicine intake to control Blood Pressure					

	Allopathic	12	66.67	8	66.67	66.67
	Homeopathic	5	27.78	4	33.33	30
	Ayurvedic	0	0	0	0	0
	None	1	5.56	0	0	3.33

Table.4.7 shows that life style pattern of the respondents.

Exercise performed by the respondents: Table shows that average exercise performed by the respondents. Light exercise was the mostly exercise of respondents. From the above data in table it is clear that 44.44 per cent male and 50 per cent female preferred light exercise, 27.78 per cent male and 16.67 percent female preferred walking. From the above data number of female and male did not jogging, 27.78 per cent male and 33.33 percent female preferred any other exercise.

Sleeping hours of the respondents: The data shows that duration of the sleep-in hours and it was found that maximum respondents slept for 6 hours (55.55 percent male and 41.67 percent female), 44.44 percent male and 25 percent female slept for 8 hours and 33.33 percent female and none of the male slept for 5 hours.

Mode of transportation: Most of the respondents use public transport i.e. 50 percent female and 44.44 percent male use public transport, 55.55 percent male and 25 percent female

use own vehicle, 25 percent female and none of the male prefer walking.

Harmful substances intake: From the above data it is clear that none of female and male take alcohol, none of the female and 22.22 percent male take cigarette, no male and female take other harmful substances, 22.22 percent male and none of the female were consume pan parag, and none of the female and 27.78 percent male consume betel leaves and nut.

Family history of Diabetes: The above data shows that 55.55 percent male and 58.33 percent female were having family history of diabetes whereas 44.44 percent male and 43.33 percent male were not having any family history of diabetes.

Medicine intake to control Blood pressure: The above data shows that no male and females were taking ayurvedic medicine, 66.67 percent males and 66.67 percent females were taking allopathic medicine, 33.33 percent females and 27.78 percent males were taking homeopathic medicine whereas 12.5 percent females.

Table 4.8: Distribution of other Health related complication as reported by the respondents.

Other complications related to Health	Male = 18		Female =12		Total =30(%)
	N	%	N	%	
Hypertension	8	44.44	5	41.66	43.33
Cardiac Disease	0	0	2	16.67	6.67
Arthritis	2	11.11	2	16.67	13.33
Thyroid	0	0	1	8.33	3.33
Any other (stomach disturbance, body pain)	8	44.44	2	16.67	33.33

Table 8 shows that out of 30 respondents, total 13.33 percent respondents having arthritis, out of which 11.11 percent were male and 16.67 percent were female. In the same way, 6.67 percent having cardiac disease, out of which 16.67 percent were female and no male. From the above data it is also clear that 30 percent respondents having thyroid, out of which no male and 8.33 percent were female where as 33.33 percent respondents having any other health related problem, out of which 41.66 percent were female and 44.44 percent were male and 26.6 percent of respondents having hypertension.

Conclusion

The nutritional requirement of human beings varies according to their physiological stage, age and health conditions. This special consideration will be observed when preparing meals for these people based on their socio-economic status, dietary pattern, food habits and health condition. Diabetic patients need supplements of insulin and should drastically reduce his or her consumption of carbohydrates foods. Non -starchy vegetables consumption pattern of the respondents was low and diabetes was poorly controlled. Such patients should consume generous amounts of legumes and leafy vegetables. They should also reduce their fats and oils food products consumption. The reduction in the consumption of energy foods should be accompanied by regular physical exercises to improve blood circulation.

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