

# Studies on dietary pattern of selected diabetic subjects of Parbhani city in Maharashtra

Rupali Shinde and Asha Arya

Diabetes is one of the most challenging non-communicable health problems in the twenty first century. Non-communicable diseases (NCD), also known as chronic diseases include cardiovascular diseases, diabetes, stroke, most forms of cancers and injuries. Such diseases mainly result from lifestyle related factors such as unhealthy diet, lack of physical activity and tobacco use. Hence, study was conducted with an objective to determine the socio-economic status, information about diabetes and food and nutrient intake of diabetics. Thirty non-insulin dependent diabetic subjects (men and women) were selected from Parbhani city of Maharashtra state. Information regarding their socio-economic status, duration and history about diabetes and food consumption pattern etc. was collected. The information regarding their dietary habits, frequency of consumption of different food groups in a day etc. were collected. The actual food intake of the selected diabetic subjects was collected for the immediate past 24 hours. The intake of different nutrients per day by each selected subject was then calculated from the food intake values using food composition tables. Food and nutrient adequacy was calculated based on balanced diets and recommended dietary allowances, respectively. It was observed that subjects were more diabetic subjects from 50-60 years age group 63.33 per cent, respectively. Sex wise data indicated that more number of male were sufferers of diabetes (53.33 %). Maximum subjects were from nuclear families (60%). Diabetes was observed more among the subjects who were engaged in the service (36.66 %). The income wise distribution indicated that there was increase in the number of subjects as the income was increased. Among them forty per cent were suffering from more than five years and 33.33 per cent subjects were suffering from 3 -5 years and few of them having family history of diabetes. These results clearly show that protein, energy, iron and fibre intake was lower than the RDA of ICMR among both these subjects. While fat consumption exceeded than RDA given by ICMR. It can be concluded that diabetes cannot be cured but it can be well controlled by modification in the diet and lifestyle.

**Key Words :** Diabetes, Socio-economic status, Diet history, Food intake, Nutrient intake

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## MEMBERS OF RESEARCH FORUM

### Author for correspondence :

**Rupali Shinde**, Department of Foods and Nutrition, College of Home Science, Vasant Rao Naik Marathwada Krishi Vidyapeeth, Parbhani (M.S.) India  
Email: [rupali10shinde@gmail.com](mailto:rupali10shinde@gmail.com)

### Associate Authors' :

**Asha Arya**, Department of Foods and Nutrition, College of Home Science, Vasant Rao Naik Marathwada Krishi Vidyapeeth, Parbhani (M.S.) India

## INTRODUCTION

Diabetes is one of the most challenging non-communicable health problems in the twenty first century (Rahman *et al.*, 2009). Prevalence of type 2 diabetes mellitus (T2DM) is increasing globally and has reached epidemic proportions in many countries. The recent estimates by the international diabetes federation (IDF) showed that the number of adults affected by the disease

in 2011 was 366 million which was projected to increase to 552 million by 2030 (IDF, 2011). It is estimated that India is home to the largest number of people with diabetes worldwide (Shaw *et al.*, 2010). The global increase in the prevalence of diabetes is due to population growth, aging, urbanisation and an increase of obesity and physical inactivity. The primary determinants of the epidemic are the rapid epidemiological transition associated with changes in dietary patterns and decreased physical activity.

Type 2 diabetes was previously called non-insulin-dependent diabetes. It is the most common form of diabetes, though obesity (excessive accumulation of body fat) increases the risk of diabetes, it is also seen in adults who are not obese, but who may have central (abdominal) obesity. In other words, centrally distributed abdominal body fat (abdominal adiposity) is also known to increase insulin resistance and diabetes type 2. In subjects with this type of diabetes, diet control, physical activity and oral anti-diabetic drugs may be enough to control the raised blood glucose.

Economic aspects of diabetes and diabetes care currently attract considerable attention as the world diabetes epidemic takes hold and the healthcare activities of countries come under pressure to accomplish more within constrained resources. Not only this, Indians succumb to diabetes, high blood pressure and heart attacks 5-10 years earlier than their western counterparts, during their most productive years. This leads to considerable loss of productive years, to the country (A Manual for Medical Officer, WHO 2008-2009). Indians have a high ethnic and genetic susceptibility for the disease, and also have lower threshold limits for the environmental risk factors. It is a matter of major concern that Indians develop T2DM at a younger age than the western populations. They also develop diabetes with minor weight gain (Ramchandran *et al.*, 2010).

Non-communicable diseases (NCD), also known as chronic diseases include cardiovascular diseases, diabetes, stroke, most forms of cancers and injuries. Such diseases mainly result from lifestyle related factors such as unhealthy diet, lack of physical activity and tobacco use. Changes in lifestyles, behavioural patterns, demographic profile (aging population), socio-cultural and technological advancements are leading to sharp increases in the prevalence of NCD. These diseases by and large can be prevented by making simple changes in the way

people live their lives or simply by changing our lifestyle. Development of diabetes and heart attacks at an early age is not largely because of environmental causes such as low consumption of fresh fruits and vegetables along with other unhealthy diet, increasing use of tobacco and higher prevalence of sedentary life-style (A Manual for Medical Officer, WHO 2008-2009).

Many studies have shown a significant association between nutrition and cardiovascular diseases, cancer, diabetes and other age related and life style diseases. The fundamentals of diabetes control largely depend upon drug therapy and lifestyle measures such as increased physical activity and restriction of energy intake/diabetic diet (Hu and Tuomilehto, 2001). Hence, the present study was conducted with an objective to determine the socio-economic status, information about diabetes and food and nutrient intake of the selected diabetic subjects.

## METHODOLOGY

A total sample of 30 diabetic individuals between 40 to 65 years of age were selected for the study from Parbhani city. All the 30 selected subjects were personally interviewed by the investigator with the help of pretested questionnaire so as to elicit the information on their socio-economic background, diet pattern, lifestyle, known risk factors for disease. The nutrient intake of the selected subjects was determined by 24 Hours Recall Method. The information regarding their dietary habits, frequency of consumption of different food groups in a day etc. were collected. The actual food intake of the selected diabetic subjects was collected for the immediate past 24 hours. The intake of different nutrients per day by each selected subject was then calculated from the food intake values using food composition tables (Gopalan *et al.*, 2011). Food and nutrient adequacy was calculated based on balanced diets and Recommended Dietary Allowances, respectively (ICMR, 2010). The collected data was consolidated, tabulated and analysed statistically (Gupta, 2014).

## OBSERVATIONS AND ASSESSMENT

Table 1 shows the general information of diabetic subjects. It was observed that subjects were more from 50-60 years age group 63.33 per cent, respectively. Sex wise data indicated that more number of male were sufferers of diabetes (53.33 %). Maximum subjects were from nuclear families (60%). Educational status of

subjects revealed that there was no specific trend observed according to educational status for the diabetic. Higher secondary school educated subjects were more in the diabetic subjects (33.33 %).

**Table 1: General information of the selected diabetic subjects (n=30)**

Sr. No.	Particulars	Diabetic subjects (n=30)	
		Number	Percentage
1.	<b>Age in years</b>		
	40-50	11	36.66
	50-60	19	63.33
2.	<b>Sex</b>		
	Male	16	53.33
	Female	14	46.66
3.	<b>Type of the family</b>		
	Joint	12	40.00
	Nuclear	18	60.00
	Extended	-	-
4.	<b>Educational status</b>		
	Illiterate	01	3.33
	Primary school	01	3.33
	Secondary school	06	20.00
	Higher Secondary school	10	33.33
	Graduate	08	26.66
	Postgraduate	04	13.33
5.	<b>Occupation</b>		
	Service	11	36.66
	Business	05	16.66
	Farmering	8	26.66
	Home maker	6	20.00
6.	<b>Monthly family income</b>		
	Rs.<15,000	03	10.00
	Rs.15,000- 30,000	09	30.00
	Rs.30,000 - 40,000	08	26.66
	Rs. >40,000	10	33.33

Diabetes was observed more among the subjects who were engaged in the service (36.66 %). The income wise distribution indicated that there was increase in the number of subjects as the income was increased. Maximum number (33.33 %) of subjects were from higher income category (> Rs.40,000 / per month) among the selected diabetic subjects.

It is evidenced from the data that elder population

form the selected group was suffering from the diabetes. Male patients were more than female patients. Shrivastva *et al.* (2014) while studying the dietary pattern and lifestyle of diabetic patients reported the higher prevalence of diabetes in the age group 46-65 years. Snehlatha *et al.* (2003) also noticed that the prevalence of diabetes was higher in age group above 40 years. Kaur and Karla (2009) and Shrivastva *et al.* (2014) reported that males were more who were suffering from diabetes as compared to females. This may be due to the more mental and physical stress male members in the family have to face. Most of the patients were from nuclear families. Agardh *et al.* (2011) also reported that there was association between prevalence of diabetes and work related stress among those who were engaged in agriculture field.

**Information of subjects regarding various aspects of diabetes :**

Information of subjects with regard to diabetes among the selected subjects is presented in Table 2. Among the total selected diabetic subjects majority of them (40%) were suffering from more than five years and 33.33 per cent subjects were suffering from 3-5 years. Twenty per cent of respondents (6) were suffering from 1-3 years and only two subjects (6.66%) were suffering from less than one year from diabetes. Majority of the diabetic subjects (50%) were not having diabetic history from either of the parent side while 40 per cent having from maternal side and only three (10%) diabetic subjects were having diabetic history from parental side.

**Table 2 : Information about diabetes history (n=30)**

Sr. No.	Particulars	Diabetic subjects (n=30)	
		Number	Percentage
1.	Period of diagnosis		
	>5	12	40.00
	3-5	10	33.33
	1-3	6	20.00
	<1	2	6.66
2.	Family history of disease		
	Maternal	12	40
	Paternal	3	10
	None	15	50

Ayya *et al.* (2015) reported the duration of diabetes more than 10 years for 40 per cent subject, 26.66 per cent were suffering from 5-10 years while 33.33 per cent

subjects suffered from 2-5 years. Dutta *et al.* (2014) observed the average duration of diabetes mellitus 7.92 years in selected subjects. Patel *et al.* (2012) also reported the duration of diabetes as >2-5 years in majority of the subjects. These findings indicate that there is no specific trend in the number of patient registered for study and the duration of diabetes.

Table 3 indicated that only twenty per cent diabetic subjects followed the instructions given by doctors while

Sr. No.	Particulars	Diabetic subjects (n=30)	
		Number	Percentage
1.	<b>Instructions of doctors</b>		
	Follow	6	20
	Do not follow	24	80
2.	<b>Weight change after diagnosis</b>		
	Increased	20	66.66
	Decreased	-	-
	No changed	10	33.33
3.	<b>Checking of blood sugar/ lipid profile is done</b>		
	Yes	30	100.0
	No	-	-
4.	<b>Frequency of blood checkup</b>		
	Occasionally	3	10.00
	Monthly	25	83.33
	Fortnightly	1	3.33
	Weekly	1	3.33

majority of them *i.e.* 80 per cent did not follow the instructions.

Among the selected diabetic subjects 66.66 per cent subjects noticed the increase in their weight after diagnosis of diabetes. The remaining subjects did not experience any change in the body weight after diagnosis of disorder. All the 100 per cent selected diabetic subjects check their blood glucose level. It was checked once in month by 83.33 per cent subjects. Blood glucose was checked fortnightly and weekly by 3.33 per cent subjects whereas ten per cent subjects checked it occasionally. The duration of diabetes was more than five years for majority of the patients. Patel *et al.* (2012) reported that 75 per cent selected subjects were having positive history of diabetes. The blood glucose was checked by all the selected diabetic subjects but they were not conscious about it. Many studies show a strong family history among affected youth with 45-80 per cent having at least one parent with diabetes and 74-100 per cent having a first or second degree relative with type-2 diabetes (Anonymous, 2000 and Sinha *et al.*, 2000).

#### **Food intake of the selected diabetic subjects :**

Intake of all the food groups among the male and female diabetic subjects studied in present investigation (Table 4) clearly show that except fat and oils intake of all foods was deficient. According to American Heart Association (2012), high amounts of fats and sugar go hand in hand in triggering obesity, diabetes and CVD. The same study revealed that south Indian populations carry more fat mass for a given BMI which increases the risk for diabetes and CVD. Intake of fruits was lowest

Sr. No.	Food groups	Diabetic male subjects ( n= 16)			Diabetic female subjects ( n= 14)		
		Suggested intake ICMR 2010	Actual intake	Excess/ Deficit %	RDA ICMR 2010	Actual intake	Excess/ Deficit %
1.	Cereals (g)	375	342.62 ± 65.51	-8.8	270	266.21 ± 48.5	-1.41
2.	Pulses (g)	75	56.06 ± 8.84	-25.4	60	45.28 ± 15.82	-24.5
3.	Green leafy vegetables (g)	100	64.68 ± 31.05	-35.3	100	78.57 ± 32.31	-21.3
4.	Other vegetables (g)	200	124.62 ± 54.08	-37.6	200	118.21 ± 38.21	-40.9
5.	Roots and tubers (g)	200	128.68 ± 37.25	-36	200	112.12 ± 51.57	-44
6.	Fruits (g)	100	53.75 ± 32.83	-46.2	100	82.85 ± 34.95	-17.15
7.	Milk and milk product (g)	300	193.31 ± 45.08	-35.6	300	203.57 ± 36.5	-32.15
8.	Fats and oils (g)	25	29.81 ± 6.20	+19	20	31.28 ± 5.1	+56.00
9.	Sugar and Jaggery	20	12.5 ± 5.7	-37.8	20	13.92 ± 6.84	-30.4
10.	Nuts and oil seeds (g)	25	24.12 ± 8.66	-3.6	25	21.42 ± 8.4	-14.35

(46.2%) in male diabetic subjects intake of other vegetables was lowest (-40.9%). Further it was noticed that intake of sugar and jaggery was less in female diabetic subjects (-30.4 %). Next to fruits, intake of sugar and jaggery (-37.8%), other vegetables (-37.6 %), milk and milk products (-35.6 %) and roots and tubers (-36 %) found to be less than ICMR suggested amount in the female subjects. In both the groups the intake of only fats and oils is excess which is not desirable. However, the less consumption of sugars and jaggery is beneficial for the diabetic subjects. A study conducted on lifestyle and nutritional profile of NIDDM patients by Kaur and Karla (2009) showed that the average intake of cereals, milk and milk products, fats and oils was more than suggested intakes.

**Nutrient intake of the selected diabetic subjects:**

Nutrient intake of selected diabetic subjects was calculated and the data there on are presented in Table 5.

Nutrient intake of the diabetic male and female subjects showed that fat calcium, thiamine, ascorbic acid and carbohydrate intake in male diabetic subjects surpassed by 181.2, 106, 159 and 107 per cent, respectively over the RDA suggested by ICMR, 2010. While in female diabetic subjects the adequacy of fat, calcium, riboflavin, niacin, ascorbic acid and carbohydrate intake was 193, 101, 113, 104, 180 and 109 per cent. The intake of these nutrients was higher than suggested by

ICMR for female subjects.

Rest of the nutrients intake was found to be lower than the RDA. Among the studied nutrients fibre intake was lowest which was only 35.9 and 37.95 per cent, respectively in male and female diabetic subjects. The protein and energy intake was also found to be deficient. Another nutrient which was deficient in male (-11mg) and in female (-23.07 mg) was iron.

These results clearly show that protein, energy, iron and fibre intake was lower than the RDA of ICMR among both these subjects. While fat consumption exceeded than RDA given by ICMR.

The observed deficit intake of protein and excess intake of fats and carbohydrates among both male and female diabetic individuals is not recommended. It may lead to obesity and even it may complicate the health condition of the subjects.

Jain *et al.* (2013) reported deficient nutrient intake of all the nutrients except fat among diabetic subjects. The average energy intake was 1307.40 ± 204.05 Kcal among women and it was 1171.80 ± 183.27 among men which is far less than the present study. Kaur and Karla (2009) reported 1413 Kcal energy, 220g carbohydrates, 62g protein, 32g fat and 11.9g dietary fibre intakes per day by NIDDM subject from Punjab. In another study conducted by Garg and Varmani (2014) it was noticed that intake of fat, calcium and vitamin C was significantly higher than RDA in diabetic adults. These findings are in line with the findings of present

**Table 5: Nutrient intake of the selected diabetic subjects** (n=30)

Sr. No.	Nutrients	Diabetic male subjects (n= 16)				Diabetic female subjects (n= 14)			
		RDA ICMR 2010	Actual Intake	Excess/ Deficit %	% Adequacy	RDA ICMR 2010	Actual Intake	Excess/ Deficit %	% Adequacy
1.	Energy (kcal)	2320	2273 ± 318	-2.20	97.9	1900	1811.01 ± 4.14	-4.68	95.31
2.	Protein (g)	60	47.49 ± 8.2	-20.85	79.15	55	41.48 ± 1.14	-24.5	75.4
3.	Fat (g)	25	54.31 ± 6.28	+81.2	181.2	20	38.70 ± 4.4	+93.5	193
4.	Fibre (g)	40	54.31 ± 6.28	+64.1	35.9	40	15.18 ± 3.8	-62.05	37.95
5.	Calcium (mg)	600	789 ± 92.38	+31.6	131	600	607.07 ± 13.51	+1.17	101
6.	Iron (mg)	17	15.13 ± 3.03	-11	89	21	16.01 ± 3.59	-23.07	76
7.	β-carotene (µg)	4800	2930 ± 15.09	-38.95	61	4800	3046 ± 120.07	-36.5	63.4
8.	Thiamine (mg)	1.2	1.28 ± 0.33	+6.2	106	1.0	0.88 ± 0.35	-14	88
9.	Riboflavin (mg)	1.4	1.34 ± 0.42	-4.3	95.7	1.1	1.25 ± 0.57	+13.6	113
10.	Niacin (mg)	16	15.33 ± 2.83	-2.94	97	12	12.5 ± 0.57	+4.1	104
11.	Vitamin C (mg)	40	63.85 ± 12.91	+59.6	159	40	72.15 ± 15.38	+80.3	180
12.	Carbohydrate (g)	380	409 ± 83.61	+7.8	107	380	416.72 ± 87.4	+9.66	109

investigation.

### Conclusion :

It can be concluded from the results that almost all selected diabetic subjects had family history of diabetes and complications of diabetes mellitus. Only twenty per cent diabetic subjects followed the instructions given by doctors while majority of them *i.e.* 80 per cent did not follow the instructions. The results clearly show that protein, energy, iron and fibre intake was lower than the RDA among the diabetic subjects. While fat consumption exceeded than RDA given by ICMR. Intake of all the food groups among the selected male and female diabetic subjects clearly shows that except fat and oils intake of all foods were deficient.

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## LITERATURE CITED

- Agardh, E., Allebeck, P., Hallqvist, J., Moradi, T. and Sidorchuck, A. (2011).** Type 2 diabetes incidence and socio-economic position: A systemtic review and meta analysis, *Internat. J. Epidemiol.*, **40** (3) : 804-818.
- A Manual for Medical Officer (2009). Developed under the Government of India – WHO Collaborative Programme National Programme for Prevention and Control of Diabetes, Cardiovascular Disease and Stroke.
- American Heart Association (2012), Know Your Fats.
- Anonymous (2000). Type 2 diabetes in children and adolescents. American Diabetes Association. *Diabetes Care.*, **23** (3): 381-389.
- Ayya , Neha, Nalwade , Vijaya and Khan, T.N. (2015).** Effect of jamun (*Syzygium cumini* L.) seed powder supplementation on blood glucose level of type-II diabetic subject. *Food Sci. Res. J.*, **6** (2): 353-356.
- Dutta, S., Beg, M., Mohammad, A., Varma, A. and Bawa, S. (2014).** Study of prescribing pattern in diabetes mellitus patients in a tertiary care teaching hospital at Dehradun, Uttarakhand. *Internat. J. Medical Sci. & Public Health*, **3**(11):1351-1354.
- Garg, M. and Varmani, S.G. (2014).** Nutritional health status of North Indian adults. *Internat. J. Food & Nutr. Sci.*, **3** (3): 118-121.
- Gopalan, C. Sastri, B.V.R. and Balasubramanian, S.C. (2011).** *ICMR-Food composition tables, nutritive value of Indian foods*, revised and updated by Rao, B.S.N. Deosthale Y.A. and Pant K.C, NIN, ICMR, Hyderabad, pp. 47-95.
- Hu, G. and Tuomilehto, J. (2007).** Lifestyle and outcome among patients with type 2 diabetes. *Internat. Congree Series*, **1303** :160-171.
- ICMR (2010). *Nutrient requirements and recommended dietary allowances for Indians*. A report of the Expert group of the Indian Council of Medical Research. National Institute of Nutrition. Hyderabad, India.
- Jain, M., Diwan, A., Gupta, K. and Jain, P. (2013).** Assessment of nutritional and health status of diabetic patients with and without renal complications. *J. Community Nutr. & Health*, **2** (2) : 3-10.
- Kaur, I.P. and Karla, R. (2009).** Lifestyle and nutritional profile of non insulin dependent diabetes mellitus (NIDDM) Patients. *J. Exercise Sci. & Physiotherapy*, **5**(1) : 45-49.
- Kaur, M. and Kuar, M. (2014).** Relation of sedentary lifestyle with cardiovascular parameters in primary care patients. *J. Cardiovascular Disease*, **10** (10): 1-7.
- Patel, M., Patel, M., Patel, Yash, M. and Rathi, S. (2012).** Factors associated with consumption of diabetic diet among type 2 diabetic subjects from Ahmedabad, Western India. *Health Poplar Nutr.*, **30** (4) : 447- 455.
- Ramachandran, A., Ma, R.C. and Snehalatha, C. (2010).** Trends in prevalence of diabetes in Asian countries. *Diabetes in Asia. Lancet.* (2010): 375 (9712):408-18. doi: 10.1016/S0140-6736(09)60937-5. Epub 2009
- Shaw, J.E., Sicree, R.A. and Zimmet, P.Z. (2010).** Global estimates of the prevalence of diabetes for 2010 and 2030. *Diabetes Res Clin Pract.*, **87** (1) : 4–14.
- Snehlatha, C. Ramchnadran, A., Kapur, A. and Vijay, V. (2003).** Age specific prevalence and risk association for impaired glucose tolerance in urban southern India population. *J. Assoc. Physicians India*, **51**: 765-757.
- Unwin, N., Whiting, D., Guariguata, L., Ghyoot, G. and Gan, D. (2011).** (Eds). *The IDF diabetes atlas*, 5<sup>th</sup> Ed. Brussels, Belgium: International Diabetes Federation; 2011. pp.7-12.

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