Food and nutrient intake and health status of diabetics

∎ MAYURI M. CHOUDHARY ᴀɴᴅ VIJAYA M. NALWADE

See end of the paper for authors' affiliations

VIJAYA M. NALWADE
Department of Foods and Nutrition,
College of Home Science,
Vasnatrao Naik Marathwada Krishi
Vidyapeeth, PARBHANI (M.S.) INDIA
Email : vm_nalwade@rediffmail.
com

∎**ABSTRACT :** India is known as the capital of diabetes as the rate is increasing day by day. Particularly, type II diabetes is more common. As food and dietary pattern of an individual have an important role to play in the development, treatment or prevention of NIDDM, the present study was conducted with an objective to determine the health status and food and nutrient intake of diabetics.Thirty non-insulin dependent diabetic subjects (men and women) were selected randomly from Parbhani city of Maharashtra state. Information regarding their diabetic symptoms and complications, exercise pattern, family history of diabetes, awareness regarding diabetes mellitus, consumption of different food groups in a day etc. was collected. Food intake was assessed by conducting 24 hours dietary recall method and nutrient intake was calculated using Nutritive Value of Indian foods. It was observed that almost all selected diabetic subjects had family history of diabetes and various symptoms and complications of diabetes mellitus. It was also observed that more than 50 per cent of the selected diabetic subjects were performing some or other exercise daily, preferred exercise was walking and yoga. Most of them acquired the information about various aspects of diabetes mellitus from physician, television and newspaper. Results indicated that consumption of foods such as cereals, pulses, green leafy vegetables, other vegetables, milk and milk products were found to be more by men and consumption of roots and tubers and fruits were found to be more by women. It was also noticed that intake of fats and oils and sugar and jaggary by men and women were almost same. Intake of almost all nutrients was more by men than women except calcium. The results of nutrient adequacy showed that the adequacy of nutrients such as fat, calcium, thiamin, niacin and vitamin C was more than 100 per cent, while the lowest nutrient adequacy was recorded for the β-carotene followed by riboflavin and energy in both men and women. On the whole the diet of the selected diabetic subjects was found to be nutritionally imbalanced. Hence, a dietary modification along with changes in behaviour and lifestyle needs to be followed by diabetic subjects to overcome the problems of diabetes.

∎**KEY WORDS:** Type II diabetes mellitus, 24 Hours recall method, Food intake, Nutrient intake, Nutrient adequacy

∎ **HOW TO CITE THIS PAPER :** Choudhary, Mayuri M. and Nalwade, Vijaya M. (2016). Food and nutrient intake and health status of diabetics. *Asian J. Home Sci.,* **11** (1) : 246-251, **DOI: 10.15740/HAS/AJHS/11.1/246-251.**

Diabetes mellitus is a complex disorder that in turn encompasses a whole spectrum of disease. India is known as the capital of this disease as the rate of diabetes is increasing day by day. Particularly, type II diabetes is more common and is an inherited disease. The management cost of the disease has been

reported to be 2.5 times more than the management cost of the individuals without the disease. It can affect people of any age from young infants to the elderly. It is estimated that 90-95 per cent of all patients with diabetes mellitus are of 40 years or older (Balachandran, 2001). The magnitude of diabetes as a problem is enormous and the implications for health services are staggering and it is lifelong condition with the diabetic who are always at the risk of associated complications like ketoacidosis, hypoglycemia and infections like bacterial and fungal infections, atherosclerosis, diabetic eye diseases and kidney diseases, retinopathy, nephropathy, neuropathy, foot ulceration and amputation. However, these can be avoided by meticulous management through medication and diet (Deepashree and Prakash, 2007).

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 *et al.*, 2001). Observational findings of Agrawal (2014) indicated that the diet of Indian diabetics of high income groups might be containing regular consumption of vegetarian foods including pulses, beans, fruits and dairy products. Therefore he suggested more epidemiological research with better measures of food intake and clinical measures of diabetes is needed in a developing country setting to validate the findings. As food and dietary pattern of an individual have an important role to play in the development, treatment or prevention of NIDDM, the present study was conducted with an objective to determine the health status and food and nutrient intake of diabetics.

■ **RESEARCH METHODS**

Thirty non-insulin dependent diabetic subjects (men and women) of 40 to 70 years of age based on their past medical history and blood glucose level were selected randomly from Parbhani city of Maharashtra state. All the subjects were interviewed with the help of pretested questionnaire. The information regarding their diabetic symptoms and complications, exercise pattern, family history of diabetes, awareness regarding diabetes mellitus, consumption of different food groups in a day etc. was collected. Food intake was assessed by conducting 24 hours dietary recall method. Intake of different nutrients per day by each selected diabetic subject was calculated from the food intake values using Nutritive Value of Indian foods (Gopalan *et al.*, 2010). In order to draw valid conclusions from the present study the collected data were consolidated, computed and exposed for statistical analysis (Panse and Sukhatme, 1989).

■ **RESEARCH FINDINGS AND DISCUSSION**

Information regarding socio-economic status of the selected diabetic subjects was collected by personal interview method. Out of 30 selected diabetic subjects, 15 were male and 15 were female. Majority of the subjects were belonging to 41 to 50 years (40 %) and 51 to 60 years (40 %) and the remaining 20 per cent were from 61 to 70 years of age group. Maximum subjects were having education up to secondary school and belonged to the nuclear families. A relatively high per cent of the subjects were homemaker and from high economic level *i.e.* monthly family income Rs. > 25000 to ≥ 50000.

Prevalence of symptoms of diabetes mellitus among the selected diabetic subjects are given in Table 1. All the selected diabetic subjects found to have one or more of diabetic symptoms. A relatively very high per cent of the subjects complained of having easy tiredness (86.66 %), polydypsia (80.00 %), polyuria (76.66 %), nocturia (73.33 %) and polyphasia (73.33 %). Beside these weight loss and eye problems was found in 60 per cent of selected diabetic subjects. These findings are in close conformity with results of the study conducted by Bhati and Goyal (2013) and Deepashree and Prakash (2007).

It is clear from Table 2 that more per cent of the

Table 1 : Prevalence of diabetes mellitus symptoms among the selected diabetic subjects (n=30)		
Symptoms	Diabetic subjects	
	Number	Percentage
Nocturia	22	73.33
Polyuria	23	76.66
Polyphagia	22	73.33
Polydipsia	24	80
Weight loss	18	60
Easy tiredness	26	86.66
Eye problem	18	60
Feet problem	14	46.66
Slow healing of cuts and wound	8	26.66
Any other	6	20

selected diabetic subjects had hypertension (56.66 %) followed by hypoglycaemia (36.66 %) and heart disease (36.66 %). Other complications experienced by few diabetic subjects were kidney disease (16.66 %) and infection (10 %). Magheswari *et al.* (2004) and Coulston (2004) reported that cardio vascular diseases found to be the most prevalent form of complications among diabetics which is in agreement with the results of present study.

Table 2 : Diabetic complications among the selected diabetic subjects (n=30)		
Complications of diabetes mellitus	Diabetic subjects	
	Number	Percentage
Hypoglycaemia or insulin shock	11	36.66
Infection	3	10
Kidney disease	5	16.66
Heart disease	11	36.66
Hypertention	17	56.66
Any other	6	20

Majority (73.33 %) of the selected subjects had family history of diabetes, 40 per cent of the subjects reported that it was inherited from the maternal side and 33.33 per cent of the subjects opined that it was inherited from the paternal side. These results are in line with the findings reported by Deepashree and Prakash (2007). On the other hand, 26.66 per cent of the selected subjects did not have any family history of diabetes mellitus. Beside these 33.33 per cent of diabetic subjects were having the family history of blood pressure and 16.66 per cent were found to have history of heart disease and acidity.On the whole, it can be said that more than 70 per cent of the selected subjects had the family history of diabetes inherited either from mother's side and or from father's side (Table 3). Even Kaur and Kalra (2009); Patel *et al.* (2012) and Jain *et al.* (2013) also

Table 3 : Family history of various diseases among the selected diabetic subjects (n=30)		
Family history of disease	Diabetic subjects	
	Number	Percentage
Diabetes	22	73.33
Inherited from father	10	33.33
Inherited from mother	12	40
Blood pressure	10	33.33
Heart disease	5	16.66
Acidity	5	16.66
Other disease	1	1

found that family history contributed as the major cause of diabetes in the incidence of diabetes.

Majority (43.33 %) of the selected diabetic subjects were visiting physician once in 4 months for medical checkup and 36.66 per cent were going once in 2 months. On the other hand, monthly medical checkup was followed only by 20 per cent of the subjects.It was also observed that more than 50 per cent of the selected diabetic subjects were performing some or other exercise daily. Walking (63.33 %), running (3.33 %) and yoga (36.66 %) were the type of exercise followed by the selected diabetic subjects as a part of their daily exercise. Jain *et al.* (2013) also found walking was highly preferred exercise. Kaur and Kalra (2009) have also reported that majority (72 %) of the diabetic subjects were regular in their daily walk and some performed other exercises like yoga, jogging, cycling, swimming etc. as a part of their daily activity pattern.

Awareness about diabetes mellitus in the selected diabetic subjects is presented in Table 4. Out of 30 selected diabetic subjects, 80 per cent of subjects were having awareness about what diabetes means and also 50 per cent knew the causes of diabetes. A relatively high per cent (86.66) of the subjects acquired the knowledge from doctor followed by television (60 %), newspaper (53.33 %), magazine (33.33 %) and radio (20 %) about various aspects of diabetes. It was also noticed that five subjects had attended the camp conducted for diabetic patients.

Table 4 : Awareness regarding diabetes mellitus among diabetes subjects (n=30)		
Particulars	Diabetic subjects	
	Number	Percentage
What is diabetes?	24	80
Causes of diabetes	15	50
Information about diabetes acquired from		
News paper	16	53.33
Television	18	60
Radio	6	20
Magazine	10	33.33
Doctor	26	88.66
Diabetes camp attended	5	16.66

Average intake of foods by the selected diabetic men and women is presented in Table 5. Results indicated that consumption of foods such as cereals, pulses, green leafy vegetables, other vegetables, milk and milk products were found to be more by men than

that of women. On the other hand, consumption of roots and tubers and fruits were found to be more by women than that of men. It was also noticed that intake of fats and oils and sugar and jaggary by men and women were almost same. These results are in line with Garg and Varmani (2014) who reported intake of fruits was less in males as compared to females.They also found that

intake of pulses was less in men than those in women whereas in present study it was found that intake of pulses was less in women as compared to men.

Table 6 represents the average intake of different nutrients by the selected diabetic men and women. Mean values of intake of energy (kcal), protein (g), fat (g), iron (mg), calcium (mg), β –carotene (µg), thiamine

Table 5 : Mean value of food intake by the selected diabetic men and women				(n=30)
	Food intake of the selected diabetic subjects			
Food groups (g)	Men (n=15)		Women (n=15)	
	Range	Mean ± SD	Range	Mean ± SD
Cereals	210-450	326 ± 68.37	170-360	251 ± 47.63
Pulses	20 – 90	62 ± 17.50	0 – 80	43 ± 20.07
Green leafy vegetables	0 – 200	57 ± 72.84	0 – 150	35 ± 56.17
Other vegetables	0 – 200	84.7 ± 61.16	0 – 230	80.7 ± 77.87
Roots and tubers	20 – 130	51 ± 26.14	0 – 130	55 ± 38.33
Milk and milk product	50 – 560	252 ± 153.63	100 – 400	217 ± 85.91
Fruits	0 – 200	11 ± 19.95	0 – 200	19 ± 51.61
Fats and oils	15 - 25	22 ± 4.14	15 - 25	22 ± 3.71
Sugar and jaggary	0 – 10	4 ± 3.87	0 – 10	4.7 ± 2.96

Table 6 : Average intake of different nutrients by the selected diabetic men and women				(n=30)
	Nutrient intake of the selected diabetic subjects			
Nutrient	Men (n=15)		Women (n=15)	
	Range	Mean ± SD	Range	Mean ± SD
Energy (Kcal)	1695 – 2570	2004 ± 256.89	1414 – 2049	1728 ± 190
Protein (g)	54.6 – 88.05	67.68 ± 10.32	42.84 – 67.95	54.14 ± 6.79
Fat (g)	33.92 – 69.38	51.91 ± 10.81	40.23 – 61.65	51.29 ± 7.39
Iron (mg)	11.62 – 24.66	18.39 ± 3.21	8.76 – 41.12	15.29 ± 7.62
calcium (mg)	420 – 1444	807 ± 320	470 – 1308	812 ± 245
β–carotene (µg)	296 – 8879	2982 ± 3397	224 – 11158	2241 ± 3140
Thiamine (mg)	1.30 – 2.38	1.89 ± 0.34	0.92 – 1.90	1.4 ± 0.24
Riboflavin (mg)	0.61 – 1.79	1.11 ± 0.35	0.65 – 1.30	0.9 ± 0.18
Niacin (mg)	12.5 – 22.88	18.6 ± 3.26	8 – 19.4	14 ± 3.13
vitamin C (mg)	16 – 139.4	66.8 ± 40.83	11.9 – 133	52.2 ± 38.5

Table 7 : Per cent adequacy of different nutrient intake by diabetic men and women			(n=30)
Nutrients	Adequacy (%) of nutrient intake by diabetic men and women		'Z' Value
	Men (n=15)	Women (n=15)	
Energy (Kcal)	86.4	91	0.39[NS]
Protein (g)	113	98	1.61[NS]
Fat (g)	208	256	0.76[NS]
Iron (mg)	108	73	3.30[**]
Calcium (mg)	135	135	0.03[NS]
β – carotene (µg)	62	47	0.84[NS]
Thiamine (mg)	157	140	0.56[NS]
Riboflavin (mg)	79	82	0.17[NS]
Niacin (mg)	117	119	0.17[NS]
Vitamin C (mg)	167	130	1.17[NS]

** indicates significance of value at P=0.01,   NS = Non-significant

(mg), riboflavin (mg), niacin (mg) and vitamin C (mg) were 2004 ± 256.89, 67.68 ± 10.32, 51.91 ± 10.81, 18.39 ± 3.21, 807.52 ± 320.97, 2982 ± 3397, 1.89 ± 0.34, 1.11 ± 0.35, 18.6 ± 3.26 and 66.8 ± 40.8, respectively. Mean values of intake of respective nutrients by the selected diabetic women were 1728 ± 190, 54.14 ± 6.79, 51.29 ± 7.39, 15.29 ± 7.62, 812.66 ± 245.27, 2241 ± 3140, 1.4 ± 0.24, 0.9 ± 0.18, 14 ± 3.1 and 52.2 ± 38.5. It was observed that intake of almost all nutrients was more by men than those of women except calcium which was little more by women than men.Fat intake by men and women was almost same which was higher than RDA. Findings reported by Jain *et al.*(2013) are similar to the results of the present study.

Per cent adequacy of nutrient intake of the selected diabetic men and women is presented in Table 7. Adequacy of the nutrient intake such as energy (kcal), protein (g), fat (g), iron (mg), calcium (mg), β–carotene (μg), thiamine (mg), riboflavin (mg), niacin (mg) and vitamin C (mg) by the diabetic men was 86, 113, 208, 108, 135, 62, 157, 79, 117 and 167, respectively. On the other hand, the adequacy of the respective nutrients by the selected diabetic women was 91, 98, 256, 73, 135, 47, 140, 82, 119 and 130. From the above results it can be said that the adequacy of the nutrients like fat, calcium, thiamin, niacin and vitamin C is greater than 100 per cent while the lowest nutrient adequacy was recorded for the β-carotene followed by riboflavin and energy in both men and women.Garg and Varmani (2014) also found that mean intake of fat, calcium and vitamin C was significantly higher than RDA in adults. It was also observed that nutrient adequacy for protein and iron was more in men and less in women but significant difference was observed only in case of iron. In nutshell, it can be said that the diet consumed by the selected diabetic subjects was not nutritionally balanced. It was deficient in some nutrients or supplied some nutrients in excess amount.

Conclusion :

It can be concluded from the results that almost all selected diabetic subjects had family history of diabetes and various symptoms and complications of diabetes mellitus. Majority of the selected subjects preferred walking as a part of their daily exercise and acquired the information about various aspects of diabetes mellitus from physician only. In case of food intake, it was observed that intake of almost all nutrients was more by men than women except calcium. The results of nutrient adequacy showed that the adequacy of nutrients such as fat, calcium, thiamin, niacin and vitamin C was more than 100 per cent, while the lowest nutrient adequacy was recorded for the β-carotene followed by riboflavin and energy in both men and women. Only intake of iron was significantly more in men than that of women.In nutshell,it can be said that the diet of the selected diabetic subjects was not balanced in providing required nutrients in correct proportions. Therefore it is suggested that fat intake should be reduced and dietary modification must be done. Even changes in behaviour and lifestyle should be followed in controlling the prevalence of diabetes mellitus.

Authors' affiliations:
MAYURI M. CHOUDHARY, Department of Foods and Nutrition, College of Home Science, Vasnatrao Naik Marathwada Krishi Vidyapeeth, PARBHANI (M.S.) INDIA (Email : mayuri_choudhary@rediffmail. com)

■ REFERENCES

Agrawal, S. (2014). Frequency of food consumption and self-reported diabetes among adult men and women in India: A Large Scale Nationally Representative Cross-sectional Study. *J. Diabetes & Metabolism*, **6** : 1.

Balachandran, V.(2001). Pathophysiology of diabetic complications in type 2 diabetes. Bangalore: *The Indian Scenario 2025. Micro Labs Ltd.*

Bhati, K. and Goyal, M. (2013). Nutritional and health status of diabetic patients. *Stud. Home Com. Sci*., **7** (1) : 45-48.

Coulston, A.M. (2004). Cardiovascular disease risk in women with diabetes needs attention. *Am. J. Clin. Nutr.,* **79** : 931-932.

Deepashree, B.N. and Prakash, J. (2007). A study on the nutritional status of diabetics and associated risk factors. *J. Hum. Ecol*., **21**(4): 269-274

Garg, M. and Varmani, S.G. (2014). Nutritional health status of North Indian adults. *Internat. J. Food & Nutritional Sci.,* **3** (3):118-121

Gopalan, C., RamaSastri, B.V. and Balasubramanian, S.C. (2010). Nutritive value of Indian Foods. National Institute of Nutrition, Hyderabad (A.P.) INDIA.

Hu, F.B., Manson, J.E., Stampfer, M.J., Colditz, G., Liu, S. and Solomon, C.G. (2001). Diet, Lifestyle, and the Risk of Type 2 Diabetes Mellitus in Women. *N. Engl. J. Med.,* **345** : 790-797.

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 Nutrition & Health,* **2** (2): 3-10

Kaur, I.P. and Kalra, R. (2009). Life style and nutritional profile of Non-Insulin Dependent Diabetes Mellitus (NIDDM) Patients. *J. Exercise Scie. & Physiotherapy,* **5** (1) : 45-49.

Mageshwari, U., Joseph, S. and Minitha, S. (2004). Pattern of cardiovascular complications among diabetics. *Indian J. Nutr. Dietet.,* **41** : 507.

NNMB National Nutrition Monitoring Bureau. (1979-2002). *NNMB reports:* National Institute of Nutrition, Hyderabad (A.P.) INDIA.

Panse, V.G. and Sukhatme, P.V. (1989). *Statistical methods for agricultural workers*. ICAR Publications. New Delhi. pp:58-60 and 97-110.

Patel, M., Patel, I.M., Patel, Y.M. and Rathi, S.K. (2012). Factors associated with consumption of diabetic diet among type 2 diabetic subjects from Ahmedabad, Western India. *J. Health Popul. Nutr.,* **30** (4) : 447-455.

Raghuram, T.C., Pasricha, S. and Sharma, R.D. (1993). Diet and Diabetes. NIN, ICMR, Hyderabad, (A.P.) INDIA.

11 **th** Year
★★★★★ of Excellence ★★★★★