International Journal of Scientific Reports
Bashet MA et al. Int J Sci Rep. 2019 Jul;5(7):167-171
http://www.sci-rep.com
pISSN 2454-2156 | eISSN 2454-2164

DOI: http://dx.doi.org/10.18203/issn.2454-2156.IntJSciRep20192797

Original Research Article

A study on dietary pattern of patients with type-2 diabetes

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Received: 02 March 2019
Accepted: 21 May 2019

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ABSTRACT

Background: Diabetes prevalence is increasing rapidly in middle and low income countries. According to the World Health Organization, diabetes was the seventh leading cause of death in 2016. The study aimed to assess dietary pattern of rural patients with type 2 diabetes (T2DM) in Bangladesh.
Methods: A descriptive cross sectional study was conducted on 149 patients with T2DM from Nagorpur, Tangail district in Bangladesh. The daily intake of foods was assessed by a prepared seven days food frequency questionnaire. Descriptive statistics were computed and chi square test was employed to signify association between variables.
Results: Total 149 patients with T2DM were included in the study. The patient's mean age and BMI was 46.68 (±10.05) years and 22.51 (±2.28) respectively. The average intake of calorie, carbohydrate, protein and fat of the patients was 1572 (±268) Kcal/day, 241 (±33) g/day, 85 (±15) g/day and 57 (±11) g/day respectively. Gender was associated with calorie (χ^2=16.68, p<0.05), carbohydrate (χ^2=10.63, p<0.05) and protein (χ^2=9.42, p<0.05) intake. Age was also associated with calorie (χ^2=13.54, p<0.05) and fat (χ^2=13.16, p<0.05) intake. However, the study revealed that majority of the diabetic patients follows recommended dietary guidelines.
Conclusions: To prevent diabetes and manage its complications, dietary guideline should be followed appropriately. We found quite satisfactory results regarding dietary intake of patients with T2DM. Yet, continual interventions need to be provided.

Keywords: Dietary pattern, Type-2 diabetes, Interventions, Food items

INTRODUCTION

Diabetes is a chronic disease that results from insufficient insulin production or when the body cannot effectively use the insulin. The global prevalence was about 8% in 2011 and is predicted to rise to 10% by 2030.[1] In Bangladesh, a recent study estimated that the prevalence of diabetes among adults had increased substantially, 4% in 1995 to 2000 and 5% in 2001 to 2005 and 9% in 2006 to 2010.[2] Diabetes may leads to serious damage to many vital organs of the human body if remain uncontrolled over time. Type-2 diabetes (T2DM) accelerates many serious complications to the patients including thermogenesis, cardiovascular disease, eye disease, kidney damage, nerve damage, foot ulcer, diabetes ketoacidosis and others that occur in patient with diabetes.[3] Diabetes consequences may be prevented or delayed with diet and physical activity. Previous studies reported strong relationship between T2DM and dietary intake and physical activity.[4] Duc Son et al reported that dietary intervention with prepared meals plans led to weight loss, improvements in blood lipid and glucose profiles and others indicators of risk for cardiovascular disease, diabetes and chronic conditions.[5] Yu et al highlighted that adherence to a diet full of rice rather than bread, vegetables, fruits, and fish regimen put people more at risk for type 2 diabetes.[6] Royle and Walsh showed that diabetics seem to fail in keeping to an appropriate diet for various reasons.[7] Dietary pattern of the patients with T2DM are strongly related with blood lipids levels, as well as with the prevalence and the management of complications. Reduction of saturated fat

intake (<7% of total energy intake) and cholesterol intake (<200 mg/day) are strongly recommended for type-2 diabetes patients.[8] High fiber diet helps in lowering cholesterol in the blood, and improving blood glucose levels, thus decreasing the need for exogenous insulin.[9]

Dietary measures comprise the first line intervention for control and management of diabetes. Understanding dietary pattern of patients with T2DM may help to develop specific intervention. Many works exist on diabetic patient's physical conditions and complications but very limited data exists on the dietary pattern of rural patients with T2DM in Bangladesh. Therefore, the present study was designed to assess the dietary pattern of patients with T2DM.

METHODS

Study design and study population

It was a descriptive type of cross sectional study carried out among diagnosed type-2 diabetes patients in Nagorpur, Tangail, Bangladesh. A total of 149 diagnosed type-2 diabetic patients was collected using convenient sampling. The study was conducted from November 2017 to April 2018.

Data collection

A prepared questionnaire was used as data collection instrument consisting of seven days food frequency questions. Data was collected through face to face interview. Before data collection, written consent was taken from each patients and the objectives of the study was fully disclosed. Privacy of the patients was also maintained. Demographic characteristics (age, sex, education level, occupation), anthropometric indices (weight and height), dietary intake of seven consecutive days of each patients were collected. Nutrition value of different food items was taken from the nutrient composition table of Helen Keller International, US Department of Agriculture and USDA Home and Garden Bulletin No.72 and the tables for East Asian Foods of the FAO of the United Nations Organization.[10]

Data analysis

Data collected was analyzed using statistical package for social science (SPSS) version 20. Descriptive statistics were computed and chi square test was employed to signify association between variables. Association was considered significant if p value was equal or less than 0.05.

RESULTS

Demographic characteristics and BMI of the patients

Total 149 patients were included in the study. Out of these, 51% were man and 49% were woman. The mean age of the patients was 46.68 (±10.05) years. 43.6% patients had education level below primary, 36.9% completed primary level and rest of them (19.5%) patients completed secondary level. 35% patients had owned business while 59.7% patients were unemployed and 16.8% patients were service holder.

Table 1: Socio-demography of the patients (n=149).

Variables	Category	N	%	Mean(±SD)
Gender	Men	76	51.0	
	Woman	73	49.0	
Age (years)	30-39	36	24.2	46.68± 10.05
	40-49	55	36.9	
	50-59	37	24.8	
	>59	21	14.1	
Education	Below primary	65	43.6	
	Primary	55	36.9	
	Secondary or higher	29	19.5	
Occupation	Business	35	23.5	
	Unemploy -ment	89	59.7	
	Service	25	16.8	
BMI	Normal	69	46.3	22.5± 2.28
	Under	33	22.1	
	Over	31	20.8	
	Obese	16	10.7	
Family history of diabetes	Yes	19	12.8	
	No	130	87.2	

The mean BMI of the patients was 22.23 (±2.8) kg/m². Considering BMI values, 46.3% of the patients were found normal and rest of them had were some form of abnormalities. It was also found that 12.8% patients had family history of diabetes (Table 1).

Assessment of nutrients intake

The dietary intake was assessed by seven days food frequency record. Nutrient composition of different food items were taken from the food composition table for Bangladesh (Institute of Nutrition and Food Science Center for Advanced Research in sciences, Dhaka, Bangladesh).[11]

Table 2 display the weekly frequency and percentage of different types of food consumption. Egg: maximum number of patients (83.9%) consumed egg 1-3 times in a week. Fish: above table also revealed that 69.7% patients consumed fish 1-3 times and 40.3% patient's consumed 4-6 times/week. Poultry: 53.7% patients did not eat poultry and 46.3% ate poultry 1-3 times in a week. Milk**:** about 32% patients took milk 1-3 times and rests were 4-6 times in a week. Pulses and leafy vegetables: 24.2%

and 35.6% patients consumed pulses and leafy vegetables 7 or more times per week. Fruits: 65.8% patients consumed fruits 1-3 times and 34.2% patients did not consume fruits weekly. Beef and mutton: 69.8% and 91.9% patients didn't consume beef and mutton per week. Rice and bread: all patients consumed rice 7 or more times weekly. 61.7% patients consume bread 4-6 times and only 38.3% consume 7 or more times in a week.

Table 2: Weekly consumption of food items (n=149).

Food items	Frequency of consumption, Times per week, number (%)			
	0 time	1-3 times	4-6 times	7 times or above
Egg	0	125 (83.9)	24 (16.1)	0
Fish	0	89 (59.7)	60 (40.3)	0
Poultry	80 (53.7)	69 (46.3)	0	0
Milk	0	48 (32.2)	101 (67.8)	0
Pulses	0	27 (18.1)	86 (57.7)	36 (24.2)
Leafy-vegetable	0	21 (14.1)	75 (50.3)	53 (35.6)
Beef	104 (69.8)	45 (30.2)	0	0
Mutton	137 (91.9)	12 (8.1)	0	0
Fruit	51 (34.2)	98 (65.8)	0	0
Rice	0	0	0	149 (100)
Bread	0	0	92 (61.7)	57 (38.3)

Table 3: Calorie (Kcal/day), carbohydrate (g/day), protein (g/day), fat (g/day) intake according to reference value.[19]

Variables	Category	Frequency	Percentage	Mean(±SD)
Calorie intake (kcal/day)	Low level	39	26.2	1572±268
	Perfect level	69	46.3	
	High level	41	27.5	
Carbohydrate intake (g/day)	Low level	33	22.1	241±33
	Perfect level	60	40.3	
	High level	56	37.6	
Protein intake (g/day)	Low level	12	8.1	85±15
	Perfect level	80	53.6	
	High level	57	38.3	
Fat intake (g/day)	Low level	29	19.5	57±11
	Perfect level	71	47.6	
	High level	49	32.9	

Table 4: Cross-tabulation of gender, age and occupation with dietary habits including: calorie, carbohydrate, protein and fat (n=149).

Variables	Category	Gender		χ^2	P value
		Male	Female		
		N (%)	N (%)		
Calorie intake (kcal/day)	High	32 (78.0)	9 (22.0)	16.679	<0.05*
	Perfect	29 (42.0)	40 (58.0)		
	Low	15 (38.5)	24 (61.5)		
Carbohydrate intake (g/day)	High	38 (67.9)	18 (32.1)	10.626	<0.05*
	Perfect	23 (38.3)	37 (61.7)		
	Low	15 (45.5)	18 (54.5)		
Protein intake (g/day)	High	36 (63.2)	21 (36.8)	9.424	<0.05*
	Perfect	38 (47.5)	42 (52.5)		
	Low	2 (16.7)	10 (83.3)		
Fat intake (g/day)	High	32 (54.2)	27 (45.8)	1.297	0.523
	Perfect	35 (46.7)	40 (53.3)		
	Low	9 (60.0)	6 (40.0)		

Continued.

Variables	Category	Age (in years)				χ^2	P value
		30-39	40-49	50-59	>59		
Calorie intake (kcal/day)	High	12 (29.3)	20 (48.8)	5 (12.2)	4 (9.7)	13.538	<0.05*
	Perfect	16 (23.2)	22 (31.9)	24 (34.8)	7 (10.1)		
	Low	8 (20.1)	13 (33.3)	8 (20.5)	10 (26.1)		
Carbohydrate intake (g/day)	High	12 (21.4)	21 (37.5)	15 (26.8)	8 (14.3)	3.779	0.71
	Perfect	18 (30.0)	23 (38.3)	11 (18.3)	8 (13.4)		
	Low	6 (18.2)	11 (33.3)	11 (33.3)	5 (15.2)		
Protein intake (g/day)	High	15 (26.3)	17 (29.8)	15 (26.3)	10 (17.6)	2.736	0.841
	Perfect	19 (26.3)	33 (38.6)	19 (27.5)	9 (7.6)		
	Low	2 (16.7)	5 (41.6)	3 (25.0)	2 (16.7)		
Fat intake (g/day)	High	8 (16.3)	19 (38.8)	16 (32.7)	6 (12.2)	13.161	<0.05*
	Perfect	21 (29.6)	29 (40.8)	15 (21.1)	6 (8.5)		
	Low	7 (24.1)	7 (24.1)	6 (20.7)	9 (31.1)		

Chi square test, reference value for χ^2 =3.85; P value=0.05 (95% confidence interval); n=number of patients.

Patient's average total energy, carbohydrate, protein and fat intake are shown in Table 3 and also this calculation was done with the help of patient guide book. The diet menu or reference value was prescribed for every patient by the doctor or dietician. Table 3 shows that, 69 (46.3%) patients took perfect amount of calorie from their daily consumption. Mean (±SD) intake of calorie was 1572±268. Study also found that, 40.3%, 53.6% and 47.6% of the patients took perfect level of carbohydrate, protein and fat per day respectively. Also 37.6%, 38.3% and 32.9% took high and 22.1%, 8.1% and 19.5% patients took low level of carbohydrate, protein and fat respectively per day.

Table 4 shows the association between patient's characteristics and dietary habit. It was found that gender was associated with calorie intake (x^2=16.679, p<0.05), carbohydrate intake (x^2=10.626, p<0.05), protein intake (x^2=9.424, p<0.05). Fat intake was not associated with gender. The table also revealed that, age was associated with calorie intake (x^2=13.538, p<0.05) and fat intake (x^2=13.161, p<0.05). Carbohydrate and protein intake was not associated with age.

DISCUSSION

Dietary intake is considered as one of the most important factors related to diabetes.[12,13]The development and further complications of diabetes is associated with unfavorable intake of calorie, carbohydrate, protein and fat.[14–16] The study found that majority of the patients was between forty and fifty years age group. This indicates that, type-2 diabetes develop in adult age comparatively. This finding agreed with UNRWA estimation in 2007 that approximately 91% of patients with T2DM were above 40 years of age.[17] In respect of education level, majority of the patients didn't complete primary level of education which was congruency with Sacerdote et al. (2012) study, which revealed that participants with a low educational level had a higher risk of T2DM.[18]

More than half of the respondents were unemployment. BMI for the patient indicates that, about half of the patients were normal. Only a small number of patients have family history of diabetes.

Dietary consumption showed that, egg, fish and fruit consumption was 1-3 times per week. Majority of the patients didn't consume poultry, beef and mutton per week. Milk, pulses, legumes, vegetables and bread intake showed that more than half of the patients took four to six times per week. All the patients took rice every day. The study also revealed that, majority of the patients follow the recommended calorie, carbohydrate, protein and fat intake per day.[19]

Study also showed the association of socio-demographic effect on dietary habit. It revealed that gender was associated with calorie intake, carbohydrate intake and protein intake. Fat intake was not associated with gender. The table also revealed that, age was associated with calorie intake and fat intake. Carbohydrate and protein intake was not associated with age. However, the results were similar to the finding of the study by Sumiyoshi et al they found a significant association between gender and dietary habits of diabetic patients.[20] In neighboring Qatar, no association was found between the level of diabetes related dietary practice and their age level.[21] Based on the current study results which found a relationship between socioeconomic status (SES) and diabetes dietary habits. Jaffiol et al in their study about diabetes and socioeconomic status can negatively affect diabetes dietary pattern. This class had a tendency to consume less calorie, more carbohydrates and less protein, vegetables, and fresh fruits because of low income, un-employment and low educational level.[22]

Dietary intervention is an important measure for control and management of T2DM. To prevent diabetes and manage its complications, dietary guideline as prescribed by doctor or dietician should be followed appropriately.

We found quite satisfactory results regarding dietary intake of patients with T2DM. Yet, continual interventions need to be provided. There is also need to develop a community based program which encourages patients to adopt the healthy food habits.

ACKNOWLEDGEMENTS

The authors are grateful to all patients who participated in the study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Nolan CJ, Damm P, Prentki M. Type 2 diabetes across generations: from pathophysiology to prevention and management. Lancet. 2011;378(9786):169–81.
2. WHO Prevalence of diabetes and prediabetes and their risk factors among Bangladeshi adults: a nationwide survey [Internet]. WHO. 2019.
3. Donnelly R, Emslie-Smith AM, Gardner ID, Morris AD. Vascular complications of diabetes. BMJ. 2000;320(7241):1062–6.
4. Duc Son LNT, Hanh TTM, Kusama K, Kunii D, Sakai T, Hung NTK, et al. Anthropometric characteristics, dietary patterns and risk of type 2 diabetes mellitus in Vietnam. J Am Coll Nutr. 2005;24(4):229–34.
5. Neuhouser ML, Miller DL, Kristal AR, Barnett MJ, Cheskin LJ. Diet and exercise habits of patients with diabetes, dyslipidemia, cardiovascular disease or hypertension. J Am Coll Nutr. 2002;21(5):394–401.
6. Yu R, Woo J, Chan R, Sham A, Ho S, Tso A, et al. Relationship between dietary intake and the development of type 2 diabetes in a Chinese population: the Hong Kong Dietary Survey. Public Health Nutr. 2011;14(7):1133–41.
7. Hendry. Priority setting in clinical nursing practice: literature review. Journal of Advanced Nursing - Wiley Online Library. 2019.
8. Mumu SJ, Saleh F, Afnan F, Akhter A, Ahmed KR. Pattern of dietary intake among newly diagnosed type 2 diabetic subjects with hypercholesterolemia. Pak J Nutr. 2009;8(6):721–4.
9. Smeltzer SC, Bare BG. Brunner & Suddarth's textbook of medical-surgical nursing. Philadelphia: JB Lippincott; 1992.
10. Gebhardt SE, Thomas RG. U.S. Department of Agriculture, Agricultural Research Service, Nutrient Data Laboratory, Beltsville, Maryland. 2016: 104.
11. Dey S, Islam S. Food Composition Table for Bangladesh. 1st edition. Bangladesh: Intergraphic Ltd; 2013: 1-214.
12. Van Dam RM, Willett WC, Rimm EB, Stampfer MJ, Hu FB. Dietary fat and meat intake in relation to risk of type 2 diabetes in men. Diabetes Care. 2002;25(3):417–24.
13. Feskens EJ, Virtanen SM, Räsänen L, Tuomilehto J, Steng\a ard J, Pekkanen J, et al. Dietary factors determining diabetes and impaired glucose tolerance: a 20-year follow-up of the Finnish and Dutch cohorts of the Seven Countries Study. Diabetes Care. 1995;18(8):1104–12.
14. Harding A-H, Sargeant LA, Welch A, Oakes S, Luben RN, Bingham S, et al. Fat consumption and HbA1c levels: the EPIC-Norfolk study. Diabetes Care. 2001;24(11):1911–6.
15. Hu FB, Manson JE, Stampfer MJ, Colditz G, Liu S, Solomon CG, et al. Diet, lifestyle, and the risk of type 2 diabetes mellitus in women. N Engl J Med. 2001;345(11):790–7.
16. Salmeron J, Hu FB, Manson JE, Stampfer MJ, Colditz GA, Rimm EB, et al. Dietary fat intake and risk of type 2 diabetes in women. Am J Clin Nutr. 2001;73(6):1019–26.
17. The Annual Report of the Department of Health. 2011: 1-91.
18. Sacerdote C, Ricceri F, Rolandsson O, Baldi I, Chirlaque M-D, Feskens E, et al. Lower educational level is a predictor of incident type 2 diabetes in European countries: the EPIC-InterAct study. Int J Epidemiol. 2012;41(4):1162–73.
19. Mehrotra JP. Diet Chart For Diabetes Patient. 2019.
20. Sumiyoshi K, Kawata C, Shikata K, Makino H. Influencing factors for dietary behaviors of patients with diabetic nephropathy. Acta Med Okayama. 2010;64(1):39–47.
21. Rafique G, Azam SI, White F. Diabetes knowledge, beliefs and practices among people with diabetes attending a university hospital in Karachi, Pakistan. East Mediterr Health J. 2006;12(5):590-8.
22. Jaffiol C, Fontbonne A, Vannereau D, Olive J-P, Passeron S. Diabetes and social deprivation. Bull Acad Natl Med. 2012;196(4–5):953–75.

Cite this article as: Bashet MD, Dash TC, Rahman ME, Moonajilin MS. A study on dietary pattern of patients with type-2 diabetes. Int J Sci Rep 2019;5(6):167-71.