Original Article

Evaluation of dietary habits and related factors among type 2 diabetic patients: An innovative study in Iran

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ABSTRACT

Introduction: The aim of this study was to assess dietary habits and related factors among type 2 diabetic mellitus patients for designing an effective nutrition intervention. **Materials and Methods:** A descriptive–analytical study was performed on 480 diabetic patients referred to four selected teaching hospitals affiliated to the Tehran University of Medical Sciences (TUMS) in Tehran for a period of nine months in 2012. Patients' dietary habits were measured by a 51-item self-report instrument with four general questions about dietary habits and four subscales reflecting domains including general diabetes information (12 items), planning, shopping for, and preparing meals (6 items), eating meals (17 items), and family influence on dietary habits (12 items). The collected data was analyzed by using SPSS software version 11.5. Results were considered significant at a conventional $P < 0.05$ level. **Results:** Mean age of the participants was 59.96 ± 11.53 years. Mean scores in the domains were (53.72 ± 19.83), (57.31 ± 23.82), (52.27 ± 12.13), and (64.72 ± 14.3), respectively. Family influence on dietary habits was highlighted as the most important domain in the dietary habits instrument. Study results revealed that there was a significant association between the four domains and socioeconomic and some variables related to dietary habits such as dietary self-management, planned healthy lifestyle and attending diabetes educational programs. **Discussion:** The important role of family on dietary habits among type 2 diabetic patients highlighted the role of perceived social support from the family. The results of the sociodemographic variables stressed the necessity of tailoring specific intervention programs accordingly.

Key words: Diet, dietary habits, family, type 2 diabetic patients

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INTRODUCTION

Type 2 diabetes is a group of metabolic disorder which can be described as uncontrolled blood glucose levels.[1] Type 2 diabetes is one of the most health problems in the world.[2] There is an increasing trend in the incidence of diabetes in both the developed and developing countries.[3,4] Disease chronicity has an increased risk of premature death, as well as short- and long-term complications.[2,5] It is estimated that there are more than three million diabetic patients living in Iran; this can increase up to seven million by 2030 if an effective preventive and control mechanism is not implemented.[6] In Iran, the prevalence of type 2 diabetes was 2%-10% in 2008.[7,8] It is a controllable disease,[1] and

lifestyle-related factors have been considered as potentially modifiable determinants to control it.[9] One of the most important factors of a healthy lifestyle is adherence to a healthy dietary pattern.[9] However, self-care is very important in diabetes control; self-management remains one of the bases of diabetes self-care mechanism.[9,10] As such, SMBG (self-monitoring of blood glucose), carbohydrate counting, and activity regimens are important and essential tools for people living with diabetes, and should be individualized for each diabetes patient in everyday life.[10] Diabetes care is complex and requires multifactorial risk-reduction strategies beyond blood sugar control.[11,12] The complexity of diabetes self-management activities need lifelong support and education.[13] Medical nutrition therapy is a fundamental part of diabetes self-management.[14] Based on qualitative and quantitative research, Collier (2007) identified dietary habit principals (domains) including general diabetes information, shopping for and preparing meals, eating, and family influence on habits.[15] As we have tried to indicate in the earlier paragraphs, dietary self-management has a unique role in the control and treatment of diabetes, especially dietary habits have a very important role. Because of this and the lack of evidence about dietary habits and related factors among type 2 diabetic patients in the Iranian literature; this study aimed to assess dietary habits and related factors among type 2 diabetic patients to tailor an effective intervention dietary program.

MATERIALS AND METHODS

A descriptive–analytical study was conducted for nine months in 2012 with continuous sampling of type 2 diabetic patients referred to four teaching hospitals affiliated to the Tehran University of Medical Sciences (TUMS) in Tehran, Iran. Eligibility of patient's participation was confirmed, and it involved having a history of type 2 diabetes at least for one year and willingness to provide informed consent to participate in the study. This study recruited 480 patients on the basis of a *P* ratio between diabetic patients (0.5%) at 95% confidence level and 80% power test, considering 20% sample size reduction. Patients' dietary habits were measured by a 51-item self-report instrument with four general questions about dietary habits and four subscales reflecting domains including general diabetes information (12 items), planning, shopping for, and preparing meals (6 items), eating meals (17 items), and family influence on dietary habits (12 items). The responses to each item domain were rated from 1 to 5 on a measurement scale (1: Never, 2: Rarely, 3: Occasionally, 4: Usually, 5: Always) based on a Likert scale.[15] Therefore, in each of these domains, the scores were considered on 100, to indicate that the instrument was used freely based on authors' permission.[15] One of the important steps of this study was translation process of the instrument from English to Persian and vice versa. This process was done by two expert teams form the Nutrition and Health Education and Promotion Departments. After comparing preliminary versions, the final version of the instrument was extracted. This instrument was used after determining validity and reliability. To validate the

questionnaire, the content validity method was performed. So, the translated items were given to 10 members of the academic board of TUMS, who were experts on diabetes and nutrition fields, for validation. Internal reliability of the original instrument and the four subscales showed adequate agreement ($\alpha > 0.87$). To determine internal reliability of this instrument in this study, a test–retest method was used. Thirty diabetic patients completed the final instrument twice in an interval of two weeks. Chronbach's alpha was 0.75. The internal reliabilities of four domains (1) general diabetes information, (2) planning, shopping for, and preparing meals, (3) eating meals, and4) family influence on dietary habits) were 0.79, 0.73, and 0.74 respectively; and Chronbach's alpha was 0.74. The results of the pilot study were not included in the main study. Analysis was performed by using the SPSS software version 11.5 through descriptive [mean, standard deviation (SD)] and inference [x^2, Fisher's exact test, analysis of variance (ANOVA)] analysis. Results were considered significant at the conventional $P < 0.05$ level. For ethical consideration, permission was obtained from the TUMS research ethical clearance committee, all patients were informed about the aims of the study, and they provided their informed consent.

RESULTS

The response rate was 90.5% (480/530). Two hundred and eighty-two (58.7%) participants were female, 81.8% ($n = 393$) was married, and 72.7% ($n = 349$) had education lesser than a diploma. Half of the participants had the disease for less than 5 years (49.6%). More than half of subjects were on a regimen of oral agents only (58.3%).

More than one-third of the subjects (36.3%) were overweight based on the World Health Organization (WHO) definition of overweight (1,2 Approximately half of patients reported one time self-monitoring of blood glucose SMBG) during a day (48.2%). Two-thirds of the participants reported at least moderate dietary self-management (66.2%). Only 15.8% of the participants followed a planned healthy lifestyle. A minority of participants (17%) reported two snacks (morning and afternoon), and evening snack was not reported at all. Of the total, 41% ($n = 196$) participants were used to the consumption of three meals at regular timings, and the most prevalent missing main meal was dinner (95.1%). More than three-fourths (74.8%) of the participants did not report attending any diabetes educational program.

Mean scores in the domains of general diabetes information, planning, shopping for, and preparing meals, eating meals, and family influence on dietary habits were (53.72 ± 19.83), (57.31 ± 23.82), (52.27 ± 12.13), (64.72 ± 14.3), respectively. "Family influence on dietary habits" was highlighted as the most important domain in dietary habits scale.

Study results revealed that there were significant associations between the general diabetes information domain and

educational level (P = 0.007), family income (P < 0.001), occupational status (P = 0.001), body mass index (BMI) (P < 0.001), attending diabetes educational programs (P = 0.001), type of treatment (P = 0.03), and dietary self-management (P < 0.001). Moreover, there were significant associations between the planning, shopping for, and preparing meals domain and being female (P = 0.02), family income (P = 0.008), occupational status (P = 0.002), BMI (P = 0.001), and attending diabetes educational programs (P = 0.003). The findings showed that there were significant associations between the eating meals domain and education level (P = 0.003), family income (P < 0.001), BMI (P = 0.03), type of treatment (P = 0.009), and dietary self-management (P = 0.001). Also, the study results indicated that there were significant associations between family influence on dietary habits domain and age between 45–64 years (P = 0.003), education level (P = 0.02), family income (P < 0.001), occupational status (P = 0.02), attending diabetes educational programs (P = 0.02), and dietary self-management (P = 0.009). However, there was no significant association between other variables and non-mentioned domains [Table 1].

DISCUSSION

This study is one of the few studies that assessed dietary habits and related factors among type 2 diabetic patients for designing an effective nutritional intervention. The constructs of the domains and related factors were identified. Based on the study results, family influence on dietary habits was highlighted as the most important domain in the dietary habits instrument. This finding is in accordance with the study of Raberg and colleagues (2010) that determined concerns about children., perceived expectations, and pressures from family member as barriers to a healthy dietary pattern.[16]

On the other hand, the study of King *et al.* (2010) revealed that dietary habits in diabetes self-management showed a significant association with social support. They proposed focus on social support intervention planning in diabetes self-management.[17] Also, Nagelkerk *et al.* (2006) reported that modification of dietary habits needs perceived social support from the family for motivation and maintenance of self-monitoring and self-management dietary behaviors.[18] Based on the mentioned findings and study results, the role of the family in dietary habits and social support was highlighted as a reinforcing factor in healthy dietary behavior adoption. Reinforcing factors can provide support in diabetes prevention and control. Study results revealed that the eating domain showed the least mean score compared to others, and it was shown as a negative factor influencing desirable diabetes control. More specifically, Yu *et al.* (2011) highlighted that adherence to a diet full of milk and meat rather than vegetables, fruits, and fish regimen put people more at risk for type 2 diabetes.[19] A meta-analysis study by Wolfram *et al.* (2011) confirmed the findings that better diabetes control and more sensitivity to insulin was a result of a healthy diet including high fiber and low fat.[20] According to our findings, more of type 2 diabetic patients were not having three main meals and three snacks. This finding is in accordance with the study by Mekary *et al.,* (2012) which revealed that males who skipped breakfast and ate two main meals daily where 1.21 and 1.3 times more at a risk for type 2 diabetes, and they concluded that breakfast consumption has an influential impact on prevention and control of type 2 diabetes.[21]

Based on the current study results which found a relationship between socioeconomic status (SES) and diabetes dietary habits, Jaffiol *et al.,* (2012) in their study about diabetes and social deprivation found that SES as an undesirable outcome of deprivation can negatively affect diabetes dietary pattern. This class had a tendency to consume more carbohydrates and

Table 1: Relation between mean scores in dietary habits domains based on sociodemographic and diet-related variables

Variables	General diabetes information	Planning, shopping for, and preparing meals	Eating	Family influence on dietary habits
Age	NS	NS	-NS	0.003
Gender	NS	0.02	NS -	NS
Level of education	0.007	NS	0.03	0.02
Occupation	0.001	0.002	NS -	0.02
Family income	< 0.001	0.008	< 0.001	< 0.001
BMI	< 0.001	0.001	0.03	NS
Type of treatment	0.04	NS	0.009	NS
SMBG	< 0.001	NS	< 0.001	NS
Dietary self-management	< 0.001	< 0.001	0.001	0.009
Attending diabetes educational programs	0.001	0.003	NS	0.05
Planned healthy lifestyle	< 0.001	< 0.001	< 0.001	< 0.001

NS = Not significant, BMI = Body mass index, SMBG = Self-Monitoring of blood glucose

less protein, vegetables, and fresh fruits because of low income. This lifestyle resulted in some indices such as an increasing BMI, which was in accordance with our findings.[22]

The present study faced a limitation in terms of the patient's dietary habits instrument, its four domains, and comparison with socioeconomic variables. However, the results were similar to the finding of the study by Sumiyoshi *et al.*, (2010) which found a significant association between gender (being male) and occupation and diabetic patients' dietary practices, but in our study the association with gender (being female) was not in accordance with the Sumiyoshi study.[23]

Schuster *et al.* (2005) demonstrated financial support as an influencing barrier on the modification of dietary habits, which was an in agreement with our study results, which revealed there was an association between economic status and dietary habits domains. Additionally, the mentioned study suggested diabetes education with family involvement to encourage. the adoption of individual and familial diabetes self-management behaviors.[24] It was concluded that the perceived social support from the family was a very strong influential factor for adherence to diabetes dietary habits, which has been highlighted in several studies.[23-25] Murrock *et al.*, (2013) in their qualitative research about dietary challenges of managing type 2 diabetes, queried about dairy routines, family responsibilities, and individual needs in the context of their personal lifestyle factors. They concluded that there were frequent difficulties in the modification and support of dietary habits and information gaps. This study highlighted the role of lifestyle modification factors for diabetes control which was in accordance with the present study results.[26] Therefore, according to findings of our study including the results, a tailor-made intervention based on an educational program to maintain appropriate dietary behavior in diabetic patients is required, considering the role of individual characteristics and family involvement. Similarly, Sharifirad *et al.* (2009) concluded the effectiveness of an intervention program based on the health belief model on nutritional diabetes education in their study.[27] The key point of the present study was the use of the patient's dietary habits instrument for the first time after its development;, different domains of this instrument can lead to more effective theory-based intervention programs. On the other hand, this study has some limitations such as (1) patients' dietary habits instrument was based on self-report and there is a possibility that the results might not have contributed to exact estimation, (2) lack of sufficient research in the literature in terms of the patient's dietary habits instrument and its four domains and socioeconomic variables, and (3) all confounding factors which might play a role in reporting the dietary habits scores were not considered.

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REFERENCES

1. Center for Disease Control and Prevention. 2005. National diabetes fact sheet. Available from: http://www.cdc.gov. [Last accessed on 2005 Nov 1].
2. Spinaci S, Currat L, Shetty P, Crowell V, Kehler J. Tough Choices: Investing in health for development: Experiences from national follow- up to commission on macroeconomics and health. WHO Report. 2006.
3. International Diabetes Federation. Diabetes Atlas. 4th ed. Brussels, Belgium: IDF; 2009.
4. World Health Organization. 2005. *Diabetes Programme*. Available from: http://www.who.int/diabetes/actionnow/en. [Last accessed on 2005 Nov 9].
5. Gerich JE. Matching treatment to pathophysiology in type 2 diabetes. Clin Ther 2001;23:646-59.
6. Task Force on Community Preventive Services. Recommendations for Health care system and self-management Education Interventions to reduce morbidity and mortality from diabetes. Am J Prev Med 2002;22:10-4. Available from: http://www. thecommunityguide. org. [Last accessed on 2013 Jun 2].
7. Esteghamati A, Gouya MM, Abbasi M, Delavary A, Alikhani S, Alaedini F, *et al*. Prevalence of diabetes mellitus and impaired fasting glucose in the adult population of Iran: The National survey of risk factors for Non-Communicable disease of Iran. Diabetes Care 2008;31:96-8.
8. Azizi F, Hatemi H, Janghorbani M. Epidemiology and Communicable disease control in Iran. Iran: Tehran Eshtiagh Publication; 2000. p. 34-9.
9. Knowler WC, Barrett-Connor E, Fowler SE, Hamman RF, Lanchin JM, Walker EA, *et al*. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. N Engl J Med 2002;346:393-403.
10. Tol A, Shojaeezadeh D, Sharifirad GH, Eslami AA, Alhani F, Mohajeri Tehrani MR. Predictors of Self-Management Behaviors among Type 2 Diabetes Patients. J Basic Appl Sci Res 2012;2:2270-4.
11. Vermeire E, Hearnshaw H, Van Royen P, Denekens J, Patient adherence to treatment: Three decades of research. A comprehensive review. J Clin Pharm Ther 2001;26:331-42.
12. Majlessi F, Mohebbi B, Tol A, Rhimi Foroshani A. Assessment of knowledge and beliefs' barriers to living with type 2 diabetes and its related factors. J Nurs Educ 2013;1:28-34.
13. Nagelkerk J, Reick K, Meengs L. Perceived barriers and effective strategies to diabetes self-management. J Adv Nurs 2009; 54:151-8.
14. Funnell MM, Brown T, Childs B, Hass L, Hoset G, Jensen B. National Standards for Diabetes Self-Management Education. Diabetes Care 2010;33(Suppl 1):S89-96.
15. Collier LT. Dietary Routines and Diabetes: Instrument development. Master thesis. Athens, Ohio: Ohio University, 2007.
16. Raberg Kjollesdal MK, Telle Hjellset V, Bjørge B, Holmboe-Ottesen G, Wandel M. Barriers to healthy eating among Norwegian-Pakistani women participating in a culturally adapted intervention. Scand J Public Health 2010;38:52-9.
17. King D, Glasgow R, Toobert DR, Strycker L, Estabrooks P, Osuna D, *et al*. Self-Efficacy, problem solving, and social-environmental support are associated with diabetes self-management behaviors. Diabetes Care 2010;33:751-3.
18. Nagelkerk J, Reick K, Meengs L. Perceived barriers and effective strategies to diabetes self-management. J Adv Nurs 2006;54:151-8.
19. 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;14:1133-41.
20. Wolfram T, Ismail-Beigi F. Efficacy of high-fiber diets in the management of type 2 diabetes mellitus. Endocr Pract 2011;17:132-42.
21. Mekary RA, Giovannucci E, Willett WC, van Dam RM, Hu FB. Eating patterns and type 2 diabetes risk in men: Breakfast omission, eating frequency, and snacking. Am J Clin Nutr 2012;95:1182-9.

22. Jaffiol C, Fontbonne A, Vannereau D, Olive JP, Passeron S. Diabetes and social deprivation. Bull Acad Natl Med 2012;196:953-75.

23. Sumiyoshi K, Kawata C, Shikata K, Makino H. Influencing factors for dietary behaviors of patients with diabetic nephropathy. Acta Med Okayama 2010;64:39-47.

24. Schuster, L. Family support in dietary routines in Appalachians with type 2 diabetes. Unpublished master's thesis. Athens, Ohio: Ohio University; 2005.

25. Yun JO, Kim KN. Relationships of family support, diet therapy practice and blood glucose control in type II diabetic patients. Nutr Res Pract 2009;3:141-8.

26. Murrock CJ, Taylor E, Marino D. Dietary challenges of managing type 2 diabetes in African-American women. Women Health 2013;53:173-84.

27. Sharifirad G, Entezari MH, Kamran A, Azadbakht L. The effectiveness of nutritional education on the knowledge of diabetic patients using the health belief model. J Res Med Sci 2009;14:1-6.