Contents lists available at ScienceDirect

Eating Behaviors

Perceived barriers to recommended dietary adherence in patients with type 2 diabetes in Iran

Faranak Halali [b], Reza Mahdavi [a,*], Majid Mobasseri [c], Mohammad Asghari Jafarabadi [d], Sanaz Karimi Avval [e]

[a] Nutrition Research Center, Faculty of Nutrition, Tabriz University of Medical Sciences, Iran
[b] Student Research Committee, Faculty of Nutrition, Tabriz University of Medical Sciences, Iran
[c] Bone Research Center, Tabriz University of Medical Sciences, Iran
[d] Traffic Injury Prevention Research Center, Faculty of Health, Tabriz University of Medical Sciences, Iran
[e] Department of Endocrine and Metabolism, Imam Reza Medical Research and Training Hospital, Tabriz University of Medical Sciences, Tabriz, Iran

ARTICLE INFO

ABSTRACT

Objective: To identify barriers to recommended dietary adherence in patients with type 2 diabetes.
Design: Observational cross-sectional study.
Sample: One hundred-forty six overweight/obese volunteers with type 2 diabetes, who had previously received dietary advice for at least one year, were recruited from two diabetes clinics in Tabriz, north-west of Iran.
Measurements: A 24-item questionnaire was designed to assess dietary barriers. The validity and reliability of the questionnaire were assessed by Content Validity Index, Content Validity Ratio and Cronbach's alpha, respectively. An exploratory factor analysis with principal component analysis extraction and varimax rotation was utilized in order to extract the underlying factors of dietary nonadherence.
Results: Factor analysis yielded seven barrier factors including: situational barriers/difficulty resisting temptation [percent variance = 11.64%], stress-related eating disorder/cost [percent variance = 9.11%], difficulty with meal and snack plans [percent variance = 8.76%], confusion [percent variance = 8.45%], work-related issues [percent variance = 7.72%], small portion size [percent variance = 6.87%] and lack of palatability/family support [percent variance = 6.78%]. These factors explained about 59.4% of the total variance.
Conclusions: Overall, patients with type 2 diabetes perceived some barriers to recommended dietary adherence. In dietary counseling, considering and addressing these barriers will likely be effective in increasing the dietary adherence for patients with type 2 diabetes in Iran.

1. Introduction

Type 2 diabetes accounting for 90–95% of all diagnosed diabetes cases affects more than 285 million people worldwide. As a chronic disease, prevalence of type 2 diabetes has increased in both developed and developing countries (Li et al., 2012). In Iran, as a developing country, diabetes prevalence, adjusted to the world population, was 11.1% in adults aged 20–79 years old in 2011 (Whiting, Guariguata, Weil, & Shaw, 2011). Lifestyle changes, like changes in dietary and exercise habits and urbanization, have been suggested as some of the important causes of the increase in diabetes prevalence for both developed as well as developing countries (Lusignan et al., 2005).

The management of type 2 diabetes is highly dependent on the patient's active involvement in self-care behaviors, such as following the recommended diet, doing regular exercise and taking prescribed medications (Jordan & Jordan, 2010). Although dietary modification has been proposed as the keystone of type 2 diabetes management and is usually recommended as the first step (Chechlacz et al., 2009), it is considered the most difficult aspect of diabetes management (Nagelkerk, Reick, & Meengs, 2006). It has been reported that the rate of nonadherence to dietary recommendation is high among patients with diabetes in both developed and developing countries. For example, in a study conducted in New Zealand, only 22% of patients with diabetes reported complete adherence to dietary recommendations (Broadbent, Donkin, & Stroh, 2011). In the US-based National Health and Nutrition Examination Survey [NHANES], 65, 28 and 18% of subjects with diabetes followed the recommendations for protein, saturated fat and fiber intake, respectively (Resnick, Foster, Bardsley, & Ratner, 2006). In Jordan, as a developing country, it has been reported that about 81.4% of patients with diabetes did not adhere to their dietary recommendations (Khattab, Khader, Khawaldeh, & Ajlouni, 2010). Despite the favorable effects of lifestyle and dietary modification programs on diabetes management, it has been reported that the adherence level diminishes over time because of the need to change long-established lifestyle patterns (Yoo, Lee, Lee, & Kim, 2007).

* Corresponding author at: Golgasht St., Attar Neishaboori Ave., Nutrition Faculty, Tabriz University of Medical Sciences, Tabriz, Iran. Tel.: 00984133357580; fax: 00984133363430.
E-mail addresses: Faranakhalali@gmail.com (F. Halali), Mahdavirez@hotmail.com (R. Mahdavi).

Dietary adherence is of great importance in type 2 diabetes care. As well, the prevalence of obesity is increasing and has a high prevalence among patients with type 2 diabetes (Khattab et al., 2010; Serour, Alqhenaei, Al-Saqabi, Mustafa, & Ben-Nakhi, 2007; Talbot & Avery, 2001). Indeed, type 2 diabetes and obesity are so frequently correlated that the adoption of the term "diabesity" has been proposed (Astrup & Finer, 2000). It has been reported that the prevalence of type 2 diabetes is 3–7 times higher in obese than in normal-weight adults (Field et al., 2001). The comorbidity of type 2 diabetes and obesity may make the adherence to dietary modification more difficult.

It has been suggested that depression is associated with nonadherence, especially in regards to important aspects of diabetes self-care, such as diet (Gonzalez et al., 2007). Depression is a prevalent condition in patients with diabetes, which can also affect one's adherence to dietary recommendations (Anderson, Freedland, Clouse, & Lustman, 2001; Lustman et al., 2000). Also, in a meta-analysis it was reported that obesity could increase the risk of depression (Luppino et al., 2010).

The present study recruited overweight and obese patients with type 2 diabetes, based on the frequent correlation between type 2 diabetes and obesity, the fact that both overweight and obese patients with type 2 diabetes in Iran receive recommendations for weight loss and because the rate of nonadherence to weight loss diets is high (Alhassan, Kim, Bersamin, King, & Gardner, 2008). The causation of a patient's nonadherence to medical recommendations, as well as their own perceptions about lifestyle modifications, especially regarding dietary changes, has been studied in a few societies. Since different societies may have different dietary patterns and eating habits, causation of nonadherence needs to be thoroughly examined within the context of each culture. For example, in a study by Ma et al. (2003) about 72% of adults reported four or more eating episodes per day. However, Iranian people generally consume three main episodes. Ma et al. (2003) also found that about 30% of these meals were eaten away from home. Furthermore, Iranian people prefer their traditional foods cooked at home. Therefore, the purpose of this study was to identify the underlying causes of poor adherence to dietary recommendations among patients with type 2 diabetes, specifically in the developing country of Iran.

2. Material and methods

In this cross-sectional study we used the sample size recommendation of Gorsuch, with a minimum N:P ratio of 5 (N: minimum sample size; P: number of variables being analyzed) (Gorsuch, 1983). Here, 'P' refers to the number of questions in the questionnaire (P = 27). A minimum sample of 135 patients was needed. A total of 186 subjects with type 2 diabetes, 132 women and 54 men, was recruited. Convenience sampling was performed in two diabetes outpatient clinics belonging to Tabriz University of Medical Sciences, during the patient's visits with their physician between July 2012 and March 2013. The volunteers who were considered eligible to participate in this study had the following characteristics: they were diagnosed with type 2 diabetes for at least one year, aged 30–60 years old, and with body mass index (BMI) ≥ 27 kg/m². They were also taking oral anti-diabetic agents and had previously received dietary recommendations for diabetes (during their regular clinic appointments, monitored by the physician and dietitian every 3 months). None of the patients were pregnant or lactating. None of the patients were suffering from severe diabetes complications. Finally, patients taking insulin were excluded because their dietary modifications were more complicated than patients taking oral anti-diabetic agents. A further note: the inclusion of patients taking insulin may have inaccurately reflected our results for the perceived barriers to dietary adherence (Wen, Parchman, & Shepherd, 2004). Written, informed consent forms were obtained from all participants. The protocol of the study was approved by the Ethics committee of Tabriz University of Medical Sciences.

2.1. Measures

In order to develop a questionnaire about dietary adherence barriers, an extensive literature review was undertaken (identified by a search of the Medline database) using the keywords: type 2 diabetes, self-management behaviors, perceived barriers, and dietary adherence. Items extracted from these articles were then translated and a primary questionnaire was developed.

In order to find out the content validity of this questionnaire, it was reviewed by a panel of 10 experts in the field of nutrition and dietetics. These experts were asked to fill out a form designed to assess the 1. relevance, 2. clarity, 3. simplicity and 4. necessity of the questionnaire. For assessing the first three terms, we used a four-point scale. For instance, for the assessment of 'relevance', the scale was as follows: completely relevant, relevant, relatively relevant and not relevant. For the fourth term, 'necessity', a three-point scale was used: necessary, useful but not necessary, and not necessary.

Using the answers of the experts, the Content Validity Index (CVI) and the Content Validity Ratio (CVR) were used as measures of quantitative evaluation for overall content validity. The CVI was calculated using the sum total of the response agreements (completely relevant + relevant + completely clear + clear + completely simple + simple) reported for the first three terms in the questionnaire (1. relevance, 2. clarity, 3. simplicity). This sum total was then divided by the total number of panel experts.

The CVR was calculated by subtracting half of the total number of panel experts from the sum total of positive responses reported for the fourth term in the questionnaire (4. necessity). This sum was then divided by half of the total number of panel experts.

Based on the CVI and the CVR (Questions with CVI < 0.79 or CVR < 0.62 were excluded), the primary questionnaire was modified and finalized (Dehdari, Rahimi, Aryaeian, & Gohari, 2014; Lawshe, 1975; Polit & Beck, 2004). Afterwards, a pilot study was performed with 30 patients with type 2 diabetes, through a face-to-face interview exactly like our main study. Reliability, internal consistency and stability of the questionnaire-instrument were assessed using the calculation of Cronbach's alpha, the Spearman–Brown Index and the Intraclass Correlation Coefficient. The Cronbach's alpha was 0.77, the Spearman–Brown Index was 0.80, and the Intraclass Correlation Coefficient was 0.80. All of these levels were acceptable.

A questionnaire describing personal and demographic information was filled out through face-to-face interviews with a trained nutritionist. Body weight was measured to the nearest 0.1 kg, after removal of shoes and wearing light clothes, using a Seca scale (Seca, Reinach, Switzerland). Height was measured to the nearest 0.5 cm using a stadiometre (Leicester height measure; Chasmors Ltd., Camden, London, UK) with the participant's arms hanging freely by their sides. The BMI was calculated as weight in kilograms, divided by height in meters squared. Participants were also asked to complete the newly developed, nonadherence/barrier questionnaire. It is worth noting that the interviewer was not known to the subjects, since a personal relationship may have influenced the participants' response. In this questionnaire, each item was rated on a five-point Likert Scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). The total score ranged from a minimum score of 24 to a maximum score of 120.

2.2. Statistical analyses

Participants' characteristics were described using mean (SD) for continuous variables and 'frequency' (percentages) for categorical variables. An exploratory factor analysis (EFA), using a Principal Components Analysis (PCA) extraction method and varimax rotation was performed for the items considered to be common barriers to dietary adherence. We used PCA, which is a data reduction method, because the best fit for our data was found by this method. Based on the Kaiser–Guttman Rule (Pett, Lackey, & Sullivan, 2003), only eigenvalue