Dietary habits among type 2 diabetic patients in Erbil City

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Abstract

Background and objectives: Dietary modification is the cornerstone in the management of type 2 diabetes. The purpose of this study was to explore the dietary behavior of type 2 diabetic patients, along its association with glycemic control and sociodemographic factors and their perceived obstacles to follow diabetic dietary regimens. Methods: A cross-sectional study was conducted in Erbil City, Kurdistan Region of Iraq, from December 2017 to December 2018. In this study, 344 type 2 diabetic patients, who were attending Leila Qasim Center for diabetes care, were recruited. Patients who were ≥18 years and diagnosed at least for one year were enrolled. Data were collected through direct interview based on the questionnaire. Dietary behavior was assessed through modified UK Diabetes and Diet Questionnaire. Results: Out of all enrolled patients, 85.5% of them had unsatisfactory dietary habits. Adherence to whole grain and fish consumption were 2.9% and 5.5%, respectively, which had the lowest rate of dietary adherence. Only 24.4% of patients had their glycosylated hemoglobin level below 7%. Statistically significant association was found between dietary habits and glycemic control. Females tend to have more dietary adherence than males (16% vs 12.3%); however, there was no statistically significant association between gender and age with dietary habits. Lack of palatability was perceived as the main barrier for dietary adherence by the patients. Conclusions: Type 2 diabetic patients had low adherence to the recommended diet. The educational level and source of dietary advice were significantly associated with adherence. The dietary adherence of the patients was inversely associated with their glycosylated hemoglobin level.

Key words: Dietary adherence, Dietary barriers, Glycemic control, Type 2 diabetes mellitus.

Introduction

Diabetes is a major health burden worldwide. About 425 million people worldwide suffer from diabetes; 79% of diabetics are estimated to be from low- and middle-income countries. It is expected that the number of cases will reach 629 million people by 2045. Type 2 diabetes is the most common form of diabetes and accounts for 87% to 91% of all people with diabetes. The age-adjusted prevalence of diabetes in Iraq in 2012 was 19.7% (in adults 19)1. Self-care behaviors of diabetic patients which includes following advised diet, exercise recommendations, taking prescribed medications, and self-monitoring of blood sugar has a substantial role in achieving glycemic control2. Healthy dietary habit has integral role in overall management of diabetes mellitus3. Through evidence, it has been revealed that Medical Nutrition Therapy (MNT) alone can reduce glycosylated hemoglobin (HbA1c) by 1% to 2% in type 2 diabetes mellitus with greatest benefit on early stages of diabetes. Healthy diet successfully leads to better metabolic and clinical outcome4.

Adherence has been defined as the degree to which the patients follows medical recommendations (taking prescribed medicines, following the recommended diet and exercises) corresponding with agreed recommendations5. Although there is no ideal method to measure adherence behavior, evaluation of specific behavior corresponding to the specific guidelines (e.g. measuring dietary behavior by food frequency questionnaires) has been reported as one of the reliable methods of measuring adherence behavior6. It has been revealed that modifying diet can improve type 2 diabetes in many aspects, such as aiding in controlling of hypertension, reducing the extra weight, increase the release and the responsiveness of insulin. Difficulty in following dietary recommendation is a significant limiting factor in achieving glycemic control6. Despite the signifi-
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The importance of diet in the management of diabetes, the diabetic patients are often unaware of its importance in achieving glycemic control. Even when community does have good level of education, patients usually fail to follow diet recommendations. Nutritional management of type 2 diabetes patients includes an individualized dietary regimen, preferably provided by dietitian because there is no single ideal macronutrient distribution for diabetic patients. Despite nutrition being an essential part of type 2 diabetes management, up to the investigator's knowledge, no study was done in Erbil to exclusively address dietary habits of type 2 diabetic patients.

This study was done to explore the dietary behavior of type 2 diabetic patients and their perceived obstacles to follow diabetic dietary regimens.

Specific objectives of the study were to measure the proportion of type 2 diabetic patients who failed to follow dietary guidelines, assess the relation between dietary habits of type 2 diabetic patients and their glycemic control, to know if there is an association between socioeconomic statuses, source of dietary advice and the dietary behavior, and to find out patient's perceived barriers of following diet regimens.

Patients & methods

This cross-sectional study was carried out in Leila Qasim Center for diabetes care in Erbil City in Kurdistan Region of Iraq. It was conducted from 01/12/2017 to 01/12/2018. Sample size was 344 patients. Sample size was calculated by this formula: \( n = \frac{z^2 \times p(1-p)}{d^2} \) where \( n \) is sample size, \( z \) is the statistic corresponding to level of confidence (95%) which is equal to 1.96, \( p \) (expected prevalence of failing to follow diet regimens) = 64%, \( d \) (precision) = 5%. Systematic random sampling (in which every third patient in the list of those attending the center was selected) was used to select type 2 diabetic patients attending Leila Qasim Center for diabetes care regularly.

The inclusion criteria of this study were registered type 2 diabetic patients ≥18 years old attending Leila Qasim Center for diabetes care, and patients who have been diagnosed at least for one year.

Questionnaire in the English language was used in which responses were administered through direct interview. There were five domains in the questionnaire; the demographic data, the sources of dietary advice, HbA1c level, dietary behavior assessment, and the barriers to follow diet regimen. The socioeconomic status (SES) was evaluated by calculating socioeconomic index that is developed for health researches in Iraq. For dietary assessment part, modified UK Diabetes and Diet Questionnaire (UKDDQ) was used (which can be culturally tailored to the population). United Kingdom Diabetes and Diet Questionnaire was originally designed to assess dietary behaviors in adult patients with type 2 diabetes or those at risk of type 2 diabetes. It has been reported that it’s reliable and valid.

Modification of the UKDDQ was done with the help of nutritionist and endocrinologist.

The content validity of the questionnaire was assessed by an endocrinologist and nutritionist.

Dietary adherence according to UKDDQ protocol has been categorized to healthy diet, partially unhealthy diet and unhealthy diet. Scoring was done by following UKDDQ scoring protocol, according to the frequency of consumption from 0 (healthiest choice) to 5 (least healthy choice): 0 & 1 are healthy choices, 2 & 3 considered less healthy choices and 4 & 5 are unhealthy choices. For the purpose of data analysis, the mean UKDDQ Score was calculated for each individual; from the range of 0 to 5, the final score was given. Statistical Package for the Social Sciences (SPSS, version 25) was used for data entry and analysis. Measures of statistical dispersion, frequency distribution, non-parametric statistics (Data didn’t follow normal distribution as indicated by Kolmogorov-Smirnov test) were used. Mann–Whitney U test and Kruskal–Wallis test were used for comparing continuous variables. Chi square or Fisher's exact test was used to compare categorical variables. Spearman’s rank-order correlation was used to determine association between two numerical variables. P-value ≤0.05 will be regarded as statistically significant.

Informed consent was taken from all patients prior to the participation in the study.

The research protocol was reviewed and approved by the ethical committee of the Kurdistan Board of Medical Specialties. The anonymity of participants was preserved.
Results
This study recruited 344 patients with type 2 diabetic mel-
itus; 138 males (40.1%) and 206 females (59.9%). Gen-
eral characteristics of patients and their association with
dietary adherence is shown in Table 1.
Patients were aged between 34 and 74 years old; median
age was 56 years old, interquartile range (IQR) of 8 and
highest number of patients was between age groups of
50 and 59. In this study, it was found that patients have
a minimum socioeconomic index of 1.10 and a maximum
of 9.98; the median and the interquartile range (IQR) of
socioeconomic index was 3.99 and 3.04, respectively.
Meanwhile, most of the patients (56.1%) were in low soci-
oeconomic index scale. The treating doctor was the main
source of nutritional advice (56.1%).
Only 14.5% of patients had UKDDQ score of healthy diet
scale, 61.6% had partially unhealthy diet scale and 23.8%
had unhealthy diet scale. Median and IQR of UKDDQ score
were 2.87 and 1.53, respectively. Males tend to have
more UKDDQ score of unhealthy diet scale than females
(34.8% vs 16.5%). However, no statistically significant as-
sociation was found between gender and age with UKDDQ
score, \( p\)-value = 0.77 and \( p\)-value = 0.688, respectively.
Statistically significant association was found between
socioeconomic index and UKDDQ score; UKDDQ score of
healthy diet scale was more in higher socioeconomic index
patients (Spearman \( r_s = -0.391 \) \( p\)-value < 0.001). Also, a
Kruskal-Wallis H test showed that there was a statistically
significant difference between education levels and die-
tary adherence, \( \chi^2(2) = 52.2 \), \( p\)-value < 0.001. The mean
rank of 212.55 for illiterate, 162.90 for primary school,
172.18 for intermediate school, 117.56 for high school,
175.50 for institute and 90.94 for bachelor’s degree.
Those who had consulted dietitian had lower rates of un-
healthy diet in comparison to those whom the treating
doctor was the only source of nutritional advice (10.6% vs
24.9%, \( p = 0.015 \)).
Of all 344 patients, only 24.4% had HbA1c level below 7%.
Median HbA1c of 7.6% with IQR of 2% were considered
as poor control. There was a statistically significant asso-
ciation between HbA1c and UKDDQ in which patients with
UKDDQ in the healthy diet scale tend to have lower HbA1c
(Spearman \( r_s = 0.735 \), \( p < 0.001 \)).
Table (1): General characteristics of patients and their association with dietary adherence

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total No (%)</th>
<th>Median (IQR)</th>
<th>Healthy diet</th>
<th>Partially unhealthy diet</th>
<th>Unhealthy diet</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>138 (40.1)</td>
<td>17 (12.3)</td>
<td>73 (52.9)</td>
<td>48 (34.8)</td>
<td></td>
<td>0.77</td>
</tr>
<tr>
<td>Female</td>
<td>206 (59.9)</td>
<td>33 (16)</td>
<td>139 (67.5)</td>
<td>34 (16.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.11</td>
</tr>
<tr>
<td>Urban</td>
<td>290 (84.3)</td>
<td>33 (11.4)</td>
<td>189 (65.2)</td>
<td>68 (23.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-urban</td>
<td>54 (15.7)</td>
<td>17 (31.5)</td>
<td>23 (42.6)</td>
<td>14 (25.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Illiterate</td>
<td>132 (38.4)</td>
<td>10 (7.6)</td>
<td>86 (65.2)</td>
<td>36 (27.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>68 (19.8)</td>
<td>8 (11.8)</td>
<td>51 (75)</td>
<td>9 (13.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td>19 (5.5)</td>
<td>5 (26.3)</td>
<td>6 (31.6)</td>
<td>8 (42.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>63 (18.3)</td>
<td>12 (19)</td>
<td>45 (71.4)</td>
<td>6 (9.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institute</td>
<td>46 (13.4)</td>
<td>8 (17.4)</td>
<td>18 (39.1)</td>
<td>20 (43.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor degree</td>
<td>16 (4.7)</td>
<td>7 (43.8)</td>
<td>6 (37.5)</td>
<td>3 (18.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Government employee</td>
<td>80 (23.3)</td>
<td>17 (21.3)</td>
<td>44 (55)</td>
<td>19 (23.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private sector employee</td>
<td>20 (5.8)</td>
<td>0 (0)</td>
<td>18 (90)</td>
<td>2 (10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-employed</td>
<td>81 (23.5)</td>
<td>11 (13.6)</td>
<td>43 (53.1)</td>
<td>27 (33.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>House wife</td>
<td>131 (38.1)</td>
<td>20 (15.3)</td>
<td>18 (74.8)</td>
<td>13 (9.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retired</td>
<td>20 (5.8)</td>
<td>2 (10)</td>
<td>3 (15)</td>
<td>15 (75)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>12 (3.5)</td>
<td>0 (0)</td>
<td>6 (50)</td>
<td>6 (50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SES</td>
<td></td>
<td>3.39(3.04)</td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Low SES</td>
<td>193 (56.1)</td>
<td>21 (10.9)</td>
<td>120 (62.2)</td>
<td>52 (26.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium SES</td>
<td>138 (40.1)</td>
<td>24 (17.4)</td>
<td>87 (63)</td>
<td>27 (19.6)</td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>High SES</td>
<td>13 (3.8)</td>
<td>5 (38.5)</td>
<td>5 (38.5)</td>
<td>3 (23.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HbA1c</td>
<td></td>
<td>7.6(2)</td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>&lt;7</td>
<td>84 (24.4)</td>
<td>48 (57.1)</td>
<td>30 (35.7)</td>
<td>6 (7.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;7</td>
<td>260 (75.6)</td>
<td>2 (0.8)</td>
<td>182 (70)</td>
<td>76 (29.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source of nutritional advice</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.015</td>
</tr>
<tr>
<td>Doctor</td>
<td>193 (56.1)</td>
<td>29 (15)</td>
<td>116 (60.1)</td>
<td>48 (24.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dietician</td>
<td>47 (13.7)</td>
<td>5 (10.6)</td>
<td>37 (78.7)</td>
<td>5 (10.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relatives</td>
<td>103 (29.8)</td>
<td>16 (15.5)</td>
<td>59 (57.3)</td>
<td>28 (27.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass media</td>
<td>82 (23.8)</td>
<td>0</td>
<td>0</td>
<td>1 (100)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>344</td>
<td>50 (14.5)</td>
<td>212 (61.6)</td>
<td>82 (23.8)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Mann-Whitney test, "Kruskal-Wallis test, "*Spearman's rank-order correlation
SES, socioeconomic status. HbA1c, glycosylated hemoglobin. *Skewed data 0.735, p<0.001).

Table 2 shows the overall adherence rate for each dietary item in the modified UKDDQ. Adherence to the following items had the highest rate of adherence: low alcohol drinking (96.5%), recommended fruit consumption (64%) and low fast food eating (41.6%). Adherence to the following items had the lowest rate of adherence: whole grain consumption (2.9%) and fish consumption (5.5%).
Table 3 shows the perceived barriers of patients to following healthy diet; the palatability was perceived as a main barrier (28.1%), in contrast, the lack of family support and high costs were the least chosen barrier among patients (0.6%).

Table (3)-Frequency distribution of perceived barriers of patients to following healthy diet

<table>
<thead>
<tr>
<th>Barriers</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of palatability</td>
<td>101</td>
<td>28.1</td>
</tr>
<tr>
<td>Inability to resist temptation</td>
<td>87</td>
<td>24.2</td>
</tr>
<tr>
<td>Small portion size</td>
<td>83</td>
<td>23.1</td>
</tr>
<tr>
<td>Confusion</td>
<td>54</td>
<td>15.0</td>
</tr>
<tr>
<td>Work conditions</td>
<td>31</td>
<td>8.6</td>
</tr>
<tr>
<td>High costs</td>
<td>2</td>
<td>0.6</td>
</tr>
<tr>
<td>Lack of family support</td>
<td>2</td>
<td>0.6</td>
</tr>
</tbody>
</table>

*Question with multi-response answers

Discussion

Diabetes mellitus as a chronic disease requires patients to make major alterations in their behaviors. To control diabetes, patients have to change their eating habits and adopt a healthy diet. Thus, adherence to a healthy diet becomes essential to ensure quality of life and success of treatment. The study showed that only 14.5% of patients had dietary adherence and 85.5% of patients had unsatisfactory adherence. Similar adherence rate was found in a study done by Mumu in which dietary non-adherence rate was 88%14. Meanwhile, in a study done by Lafta, it was reported that dietary adherence rate was 36%9. The low rate of adherence to diet could be contributed to lack of knowledge, as it is shown in our study that those whom treating doctors were the main source of nutritional advice had higher rate of unhealthy diet than those who consulted dietician (2 =10.469, p-value = 0.015).

The pivotal role of dietitian in diet modification and personalizing a diet based on patient’s preferences and health status has been documented15. Most physicians didn’t undergo training for offering nutritional therapy and it is a limiting factor in providing dietary consultations16,17. Moreover, nutritional consultation is time consuming for physicians18. In the best-case scenario, only a printed menu will be given to patients. Patients generally left the clinic just with a list of medications18. The use of nutritional therapy in managing type 2 diabetes mellitus shows wide variation. In our study, only 13.7% received nutritional therapy which is close to a study done by Mohan (5-10%)19, while Hippisley-Cox reported that 31% of type 2 diabetic patients are reported to be managed only by dietary modification20. It has been shown that with one-point percentage reduction in glycosylated hemoglobin (HbA1c), a 35% decrease in microvascular complications and a 7% reduction in all-cause mortality are achieved in patients with type 2 diabetes21. Because HbA1c doesn’t require specific time or preparation, it is a preferred method to assess glycemic control in diabetic patients22. The goal of HbA1c <7% seems reasonable for most people23. Only 24.4% of patients had their HbA1c level below 7%. Similar figures was found in a study by Adham (25.4%)24. Nationally, Sattar reported that 78.3% of diabetic cases had poor glycemic control25. The direct relationship between dietary adherence and glycemic control has been reported26. This
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Conclusions
Type 2 diabetic patients had low adherence to the recommended diet. The educational level and source of dietary advice were significantly associated with dietary adherence. The dietary adherence of patients was contrarily associated with their hemoglobin A1c level.

References
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