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Research paper

Association between depression symptoms and Mediterian dietary adherence in adults with cardiovascular disease risk factors in the north of Iran in 2016

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Abstract

Introduction: Depression is prevalent in cardiovascular patients and may have significant effects on patients' adherence to their diet which is necessary for health.

Aim: The study aimed to examine the association between depression and dietary adherence in adults with cardiovascular disease risk factors in the north of Iran.

Material and methods: This cross-sectional study was performed on 344 participants who were admitted to a tertiary hospital in Rasht. The participants' demographic characteristics, blood pressure, anthropometrics indexes and blood factors were measured. To assess the dietary adherence, we used the 14-point Mediterranean Diet Adherence Screener (MEDAS) validated for this region and to check depression, we used Beck Depression Inventory (BDI). Logistic regression analysis was performed to analyze the data.

Results: Depression symptoms were observed in 43% of the patients. The frequency of patients with low, moderate and good dietary adherence was 44%, 54% and 2%, respectively. In the univariate analysis, there was a relationship between depression and dietary adherence. In the univariate analysis, being female, being diabetic, high waist circumference, high HbA1C and low level of hematocrit were associated with lower diet adherence. After controlling for confounders, no relationship was discovered between depression and dietary adherence (P = 0.249). Odds ratio of the low dietary adherence in patients with depression compared with patients without depression was 1.311 (95%CI: 0.827–2.079).

Discussion: Depression symptoms and dietary non-adherence were prevalent in our participants. Also our data showed there were no association between depression and mediterian dietary adherence.

Conclusions: More studies are needed to further consolidate our understanding of the association between depression symptoms and dietary adherence.

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1. INTRODUCTION

Depression is a mood disorder showing a depressed mood, loss of pleasure, disturbed appetite, low energy, and poor concentration.[1] Results from a review of 174 surveys across 26 high income countries and 37 low and middle income counties indicated that on average 1 in 5 adults experienced a common mental disorder within the past 12 months and 29.2% across their lifetime.[2] Studies found that depression is more prevalent among people with chronic disease than among the general population.[3] A meta-analysis of 42 studies showed that people with diabetes were twice as likely to have depression as those without diabetes.[4] According to previous studies, depression also is common in cardiovascular disease patients and is linked to higher mortality and morbidity rates.[2] Moreover, cardiovascular disease and depression are expected to become common causes of disability for countries of all income levels by 2030.[5] Optimal management of chronic disease is complex, requiring involvement of patients and practitioners. In chronic diseases that are related to cardiovascular system such as diabetes, hypertension, coronary artery disease and stroke, health behavior changes including sodium reduction, dietary improvement, physical activity and weight controlling, hare associated with a reduced risk of cardiovascular events and mortality. Similarly, in high-risk populations, measuring serum cholesterol and blood glucose levels, blood pressure measurement and adherence to healthy diet are associated with improved outcomes. Unfortunately, many patients do not make health behavior changes or pay heed to recommendations.[6,7] Studies evaluating factors related to non-adherence to health behaviors have focused on patients' attitude and beliefs about health behavior recommendations such as dietary restrictions.[8,9] However, psychological and social factors may also play an important role in patient adherence to dietary recommendations. People diagnosed with depression are less likely to adhere to lifestyle changes such as physical activity and diet recommendations.[4] Egede et al.[3] found that depressed mood inhibited adherence to self-care behavior by decreasing the desire to seek treatment. Research examining the association between psychological disorders and dietary adherence in cardiovascular patients is scarce. Ziegelstein et al.,[10] showed that depression symptoms were found to be related to poor adherence to a low-fat and low-cholesterol diet in patients recovering from a myocardial infarction. Depression and anxiety are prevalent in cardiovascular patients and may have important effects on patients' adherence to healthy diet that is necessary for their health.[9,11]

2. AIM

Because of the important role of dietary intake and adherence to healthy diet in the prevention from and treatment of cardiovascular disease and the prevalence of depression in this group of patients, we examined the association between depression and dietary adherence in adults with cardiovascular disease risk factors in the north of Iran.

3. MATERIAL AND METHODS

3.1. Participants

This cross-sectional study was performed on 344 participants, who were aged between 20 and 75 years and admitted to a tertiary hospital in Rasht (capital of Guilan Province in the north of Iran). They had undergone elective angiography between December 22, 2015 and April 20, 2016. The patients diagnosed with renal or inflammatory diseases such as rheumatoid arthritis were excluded from the study. All participants gave informed consent for the study, which was approved by the Ethics Committee of Guilan University of Medical Sciences. Demographic characteristics of the patients were collected by a questionnaire. Trained health care providers measured the patients' blood pressure. Blood pressure levels were measured using a gauge of the right arm and after 15 minutes rest with a mercury sphygmomanometer in a sitting position. Systolic blood pressure level more than 140 mm Hg and diastolic blood pressure level more than 90 mm Hg were considered hypertension.

3.2. Anthropometric assessment

Before measuring the participants, weight, calibration of weighing scales was performed with 5-kg weights. Moreover, the removal of excess clothes and shoes was recommended to assure accurate measurements. Height was measured while the participants were standing against a wall with their heels and buttocks in contact with the wall. Body mass index (BMI) was calculated as weight (in kg) divided by height squared (in m^2). A BMI of 25 or more is defined as overweight while a BMI of 30 or more is characterized as obese. Waist circumference (WC) was determined, in duplicate, at the midpoint between the lowest costal ridge and the upper border of the iliac crest. WC was done with a nonstretchable and accurately calibrated scale with 0.5-cm precision. In men, the WC of 102 cm was considered a high category of WC and in women a cutoff point of 88 cm was considered a high category of WC.[12]

3.3. Dietary assessment

In our study to assess dietary adherence, we used the 14-point MEDAS which is a valid instrument.[13] The MEDAS consist of 12 questions on food consumption frequency and 2 questions about food intake habits. Each question was scored 0 or 1.[14] Since we wanted to use MEDAS among the people not permitted to drink alcoholic beverages due to their religious beliefs, we deleted question 8 (Do you drink wine? How much do you consume per week?). Then we translated MEDAS to Persian by backward-forward method, two registered dietitian qualitatively approved of the content and face validity of the final Persian version, and a registered dietitian fulfilled MEDAS by face-to-face interview with 60 people for pilot study. To assess depression, we used BDI. Base on this screener, scores from 0 to 9 represent minimal depression, scores of 10 to 16 indicate mild depression, scores of 17 to 29 indicate moderate depression, and scores of 30 to 63 show severe depression.

3.4. Clinical assessment

A venous blood sample was drawn from each participant following 12-hour fasting to assess fasting blood sugar (FBS), hemoglobin A1c (HbA1c), triglycerides (TG), high-density lipoprotein cholesterol (HDLC), low-density lipoprotein cholesterol (LDL-C), total cholesterol, blood urea nitrogen (BUN), complete blood count (CBC) and creatinine. Normal hemoglobin level for males was 14–18 g/dL and for females was 12–16 g/dL. Normal hematocrit level in males and females was 40%–54% and 36%–48%, respectively. In all analyses, both depression and diet adherence variables were grouped in two categories: depressed versus non-depressed patients and mild level of adherence versus moderate to high level of adherence. Normal distribution of quantitative variables was checked by the Kolmogorov–Smirnov test or by skewness and Kurtosis values (with acceptance values for qualifying normal distribution lower than 2). Mean (SD) or median (range) (according to the normality), or frequency (percentage) was reported to describe the study population. Logistic regression analysis was used to determine the relationship between the depression and diet adherence level in the univariable and multivable analysis, respectively. All statistical tests were two-sided and $P < 0.1$ and $P < 0.05$ was used to indicate statistical significance in the univariable and multivable analysis, respectively.

Table 1. Patients' characteristics by diet adherence level.

Factor	Total $n = 344$	Diet adherence level		P
		low $n = 150$	moderate or high $n = 194$	
Sex, no. (%)				<0.001
male	190(55)	68(36)	122(64)	
female	154(45)	82(53)	72(47)	
Age (years), mean(SD)	58(8.91)	59(8.30)	58(9.36)	0.466
Education, *n*(%)				0.264
illiterate	133(39)	63(47)	70(53)	
educated	211(61)	87(41)	124(59)	
Smoker, *n*(%)	63(18)	22(35)	41(65)	0.124
Living location, *n*(%)				0.226
urban	187(54)	76(41)	111(59)	
rural	157(46)	74(47)	83(53)	
History of HTN (yes), *n*(%)	144(42)	67(46)	77(54)	0.354
History of DM (yes), *n*(%)	132(38)	71(54)	61(46)	0.003
History of HD (yes), *n*(%)	151(44)	69(46)	82(54)	0.705
BMI (kg/m^2), mean (SD)				0.624
underweight	4(1)	1(25)	3(75)	
normal	88(26)	43(49)	45(51)	
overweight	162(47)	67(41)	95(59)	
obese	90(26)	39(43)	51(57)	
WC, *n*(%)				0.029
low	149(43)	55(37)	94(63)	
high	195(57)	95(49)	100(51)	
Extent of CAD, *n*(%)				0.509
None	121(36)	53(44)	68(56)	
1-Vessel CAD	54(16)	20(37)	34(63)	
2-Vessel CAD	59(17)	23(39)	36(61)	
3 or 4-Vessel CAD	105(31)	52(50)	53(50)	
Depression status, *n*(%)				0.030*
none	197(57)	76(39)	121(61)	
mild	75(22)	33(44)	42(56)	
moderate	49(14)	26(53)	23(47)	
severe	23(7)	15(65)	8(35)	

Comments: HTN – hypertension; DM – diabetes; HD – heart disease; CAD – coronary artery disease; * P-value was reported for comparison of adherence between depressed and non-depressed patients groups.

4. RESULTS

Patients' characteristics are shown in Table 1 and Table 2. Of the 344 patients, depression was observed in 147 (43%) patients; whereas, 75 (22%), 49 (14%) and 23 (7%) of patients had mild, moderate and severe depression, respectively. Frequency of patients with low, moderate and good dietary adherence was 150 (44%), 186 (54%) and 8 (2%), respectively. In the univariate analysis, there was a relationship between depression and dietary adherence level, so lower level of adherence was likely to be more in the depressed compared to the non-depressed patients ($P = 0.030$). Also, being female ($P < 0.001$), being diabetic ($P = 0.003$), higher category of WC ($P = 0.029$), higher HbA1C test ($P = 0.095$) and lower level of hematocrit test ($P = 0.013$) were associated with lower dietary adherence. On the other hand, being female (OR = 3.636, 95%CI: 2.326–5.714, $P < 0.001$), rural living location (OR = 1.862, 95%CI: 1.208–2.865, $P = 0.005$),

Table 2. Laboratory tests by diet adherence level.

Factor	Total $n = 344$	Diet adherence level		P
		low $n = 150$	moderate or high $n = 194$	
HbA1C, %	6.53(2.01)	6.77(2.19)	6.34(1.83)	0.095
FBS, mg/dL*	102(9–426)	104(73–426)	99.50(9–369)	0.151
Hemoglobin, g/L	12.93(2.31)	12.80(2.80)	13.03(1.84)	0.374
Hematocrit, %	39.58(4.22)	38.93(4.02)	40.09(4.31)	0.013
Creatinine, mg/dL*	0.98(0.61–2.5)	0.96(0.61–2.5)	1.01(0.65–1.64)	0.941
TC, mg/dL	156.38(40.15)	156.88(41.56)	155.98(39.13)	0.845
TG, mg/dL	179.42(273.28)	209.61(399.33)	155.83(87.63)	0.125
LDL, mg/dL	81.42(29.68)	80.95(29.60)	81.77(29.82)	0.813
HDL, mg/dL	43.09(8.27)	42.81(8.34)	43.30(8.23)	0.604
BUN, mg/dL*	15(9–49)	15(9–49)	15(9–37)	0.438

Comments: Data represent mean(SD); * Median (minimum–maximum) was reported.

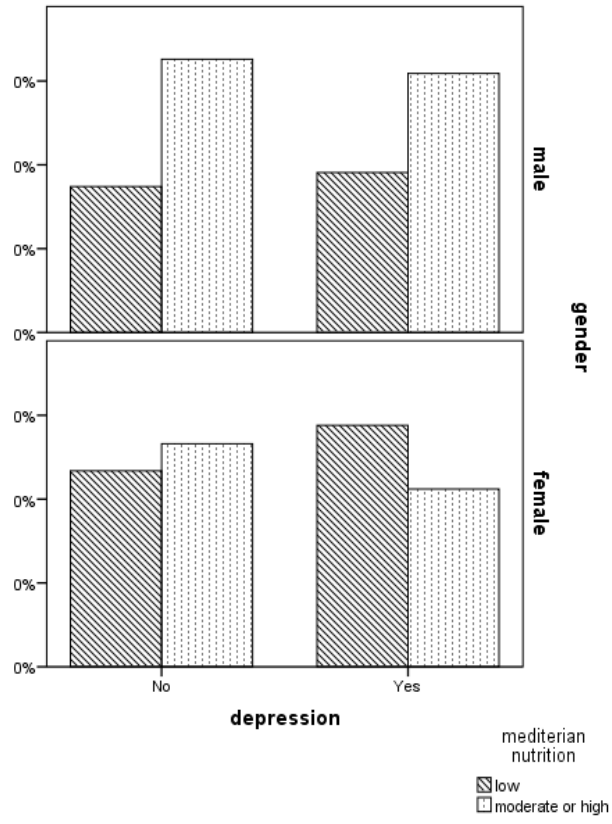

Figure 1. Diet adherence frequency by levels of patients' depression status and sex.

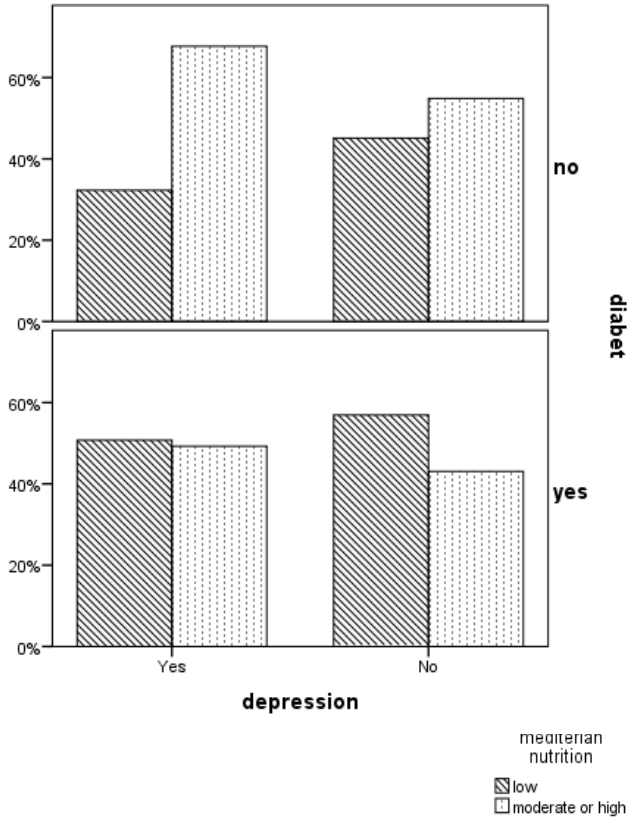

Figure 2. Diet adherence frequency by patient's depression and diabetes status.

Table 3. Results of univariable and multivariable logistic regression analysis for variables associated with lower diet adherence level.

Factor	Univariable analyses			Multivariable analysis		
	OR	95% CI	*P*	OR	95% CI	*P*
Sex, female vs. male	2.043	1.324–3.153	<0.001	1.708	1.075–2.716	0.024
History of DM, yes vs. no	1.961	1.261–3.046	0.003	1.731	1.100–2.723	0.018
Depression, yes vs. no	1.615	1.047–2.488	0.030	1.311	0.827–2.079	0.249
WC, high vs. low	1.624	1.051–2.509	0.029			
HbA1C, %	1.113	0.982–1.262	0.095			
Hematocrit, %	0.936	0.888–0.986	0.013			

lower level of education (OR = 2.034, 95%CI: 1.308–3.164, $P < 0.001$), diabetes (OR = 1.538, 95%CI: 0.991–2.386, $P = 0.055$), hypertension (OR = 1.839, 95%CI: 1.190–2.843, $P = 0.006$), having a history of cardiovascular disease (OR = 1.704, 95%CI: 1.106–2.626, $P = 0.015$) and higher category of WC (OR = 2.284, 95%CI: 1.464–3.566, $P < 0.001$) were associated with depression. In addition, some laboratory tests such as higher level of total cholesterol (TC) (OR = 1.007, 95%CI: 1.001–1.013, $P = 0.016$), lower level of hematocrit (OR = 0.877, 95%CI: 0.829–0.928, $P < 0.001$) and lower level of hemoglobin (OR = 0.736, 95%CI: 0.641–0.845, $P < 0.001$) were related to depression. After controlling for patients' sex and diabetes as confounders (Figures 1 and 2), there was no relation between depression and diet adherence level ($P = 0.249$). Moreover, odds ratio of the low adherence to the diet in patients with depression compared with patients without depression was 1.311 (95%CI: 0.827–2.079) (Table 3).

5. DISCUSSION

In the present study, depression symptoms and dietary non-adherence were common in adults with cardiovascular disease risk factors in the north of Iran. In the univariate analysis, we found a relationship between depression and diet adherence level, as a result, lower level of adherence was likely to be more in depressed compared to non depressed patients. However, the significant association disappeared after adjustment of other risk factors. In our study, to assess dietary adherence, we used Mediterranean diet as a pattern. The Mediterranean dietary pattern consists of daily consumption of non-refined products, vegetables, fruits, olive oil and low-fat dairy products. Olive oil is the principal source of dietary fat in this pattern.[13,15] The beneficial role of this dietary pattern on lipid metabolism, blood pressure levels,[16] inflammation and coagulation process[17] and depression[18] has been proved. Several studies have revealed that the adherence to the Mediterranean diet is associated with reduced risk of cardiovascular diseases, and, this suggests the cardioprotective role of Mediterranean diets.[19–21] In this study, dietary non-adherence was common and only 2% of the patients demonstrated good adherence to the diet. Women, diabetic patients, depressed patients and people with abdominal obesity had lower diet adherence compared to the others group. Although Iran and specially Guilan province produces significant amounts of olive, the consumption of olive oil compared with other countries in the Mediterranean region is lower in the north of Iran. Aside from olive oil, we found that the pattern of the Mediterranean diet was different among our participants. In comparison, the lower use of vegetables and fruits and higher consumtion of processed meat, butter, cream, margarine and soda drinks were the negative points among our participants. As United Nations Educational, Scientific and Cultural Organization has accredited, the Mediterranean diet is not just the specific foods and nutrients, but a complex of social cultural expression of the different food culture of the Mediterranean.[22] Therefore, it was predictable that the pattern of the consumption of Mediterranean dietary components among our participants to be different from those of other people and cultures. In our study, 43% of the participants had depression symptoms. The proportion of patients with depression symptoms detected was similar to those reported by others using clinical interviews. As previous studies have shown that depression is more common in cardiovascular patients; therefore, it seems that either depression leads to cardiovascular disease or cardiovascular disease leads to depression. There are a number of mechanisms about this mutual relationship. These include alterations in the autonomic nervous system, platelet function, coagulopathic factors, proinflammatory cytokines, and neurohormonal factors. Moreover, it has been shown that depression is associated with lower adherence to self-care behavior and poor adherence to medical treatment. There is no doubt that depression is a risk factor for an increased incidence of cardiovascular problems and a worse outcome in existing cardiovascular disease.[5,23,24] For this reasons, the treatment of depression in patients with cardiovascular disease risk factors seems to be essential. In the present study, after the adjustment of the risk factors, the significant association between depression and diet adherence disappeared. Sumlin et al.[1] in a systematic review assessed the relationships between depression and adherence variables. Thirty-two percent of these studies proved the existence of a correlations between depression and dietary adherence, ranging from −0.21 to −0.53. In a review study[25] 16 studies were assessed, in which three main dietary patterns became apparent: healthy patterns, unhealthy patterns and Mediterranean patterns. The results are not entirely consistent; some

studies failed to detect a significant association. However, four of the five identified Mediterranean patterns showed a significant inverse association with depression. Another systematic review examining the relationship between depression and dietary patterns that was published by Quirk et al.[26] concluded that there is limited evidence for an association between depression and 'traditional' diets adherence (including Mediterranean and Nordic diets). Like any other study, our study suffers from some limitations. The cross-sectional design of study prohibits temporal assessment of the association between depression and dietary adherence. In addition, we did not measure confounders such as economic status. Campbell et al.[6] showed that there are major income-related differences in the patterns of health behavior change, as well as reasons for non-adherence. Among those with low income, adherence to health behavior change may be improved by addressing modifiable barriers such as cost and access.

6. CONCLUSIONS

In conclusion, this study showed that depression symptoms and lower adherence to Mediterranean diet were prevalent in our participants with cardiovascular disease risk factors. Also, however there were a significant association between depression symptoms and dietary non-adherence in the univariate analysis but after adjusting for confounders, the association was not found. Depression symptoms can be an predictor of dietary non-adherence. More studies with controlling for potential confounders are needed to consolidate our understanding of the association between depression symptoms and dietary adherence.

Conflict of interest

The authors of this manuscript have expressed no conflict of interests.

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