

## Dietary Adherence in People with Cardiovascular Risk Factors Living in Northern Iran

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### ABSTRACT

**BACKGROUND AND OBJECTIVE:** Incorrect nutrition is one of the risk factors for heart disease, and any change in dietary habits can be useful in preventing and controlling heart disease. However, before any nutritional intervention, we need to have an outlook of the dietary habits of the people. This study aims to determine the adherence to correct nutrition plan and some of its effective factors in people living in northern Iran.

**METHODS:** This cross-sectional study conducted among 550 individuals with cardiovascular risk factors referring to Heshmat Hospital in Rasht. Risk factors and indicators were collected using designed questionnaires, medical records review and assessment of dietary adherence with Mediterranean Diet Adherence Screener (MDAS) questionnaire, which was localized according to the Persian culture. The score of the nutrition questionnaire is zero–14. Zero – five is inappropriate adherence; 6–9 is moderate adherence and 10 and above is high dietary adherence (healthy food patterns).

**FINDINGS:** The mean age of subjects was 58±0.38 years. 71.4% of subjects suffered from overweight and obesity. Mean dietary adherence was 5.76±0.07. Forty three percent of subjects had inappropriate adherence, 55% had moderate adherence and only 2% had high dietary adherence. The dietary adherence in men was significantly higher than women (p=0.001). People living in rural areas and those with higher education had more inappropriate dietary adherence insignificantly.

**CONCLUSION:** Despite having access to appropriate and healthy food in northern Iran, people's food pattern was estimated to be inappropriate. Therefore, education about modified food program and a trend toward following the Mediterranean dietary pattern, which is similar to the dietary culture of the people in northern Iran, is suggested.

**KEY WORDS:** *Mediterranean Food Consumption Patterns, Cardiovascular Disease, Dietary Adherence, Northern Iran.*

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## Introduction

Cardiovascular disease is one of the main public health problems in Iran and worldwide (1). The assessment of food intake is important for several reasons, because controlling food intake according to dietary recommendations can reflect the health status of the community (2). Inappropriate diet is one of the risk factors for heart disease that can be corrected and any changes in dietary habits that may reduce future risks can be useful in the prevention and control of heart disease (3).

There are different ways to assess diet and each method should be chosen in accordance with the purpose of the study and the culture of each society. The diet includes many components that can contribute to preventing or increasing the risk of diseases. Therefore, a comprehensive diet assessment provides more comprehensive information. For this reason, instead of reporting nutrition or micronutrients, the food patterns are considered in modern studies of dietary habits (4 – 7).

A Mediterranean diet is inspired by the nutrition of the people of Greece, Spain and Italy. This diet is based on the consumption of olive oil, grains, cereals, fruits and vegetables, fish and dairy products, and very low consumption of red meat and meat products (8). Studies have shown that adherence to the Mediterranean diet is particularly effective in preventing the progression of cardiovascular disease (9, 10). In a study in the north of the United States, Bulter et al. examined patients with heart failure, patients who had angioplasty, and patients who had open – heart surgery in terms of compliance with the Mediterranean diet. The results of the study indicated that the rate of compliance to the Mediterranean diet was low in these patients, and the compliance rate in men was significantly lower than that of women (11). Marventano et al. examined the rate of following the Mediterranean diet (12).

The compliance rate was reported to be satisfactory. High nutritional compliance was associated with physical activity, smoking and education. In Iran, only one study evaluated the rate of compliance with the Mediterranean pattern of food in Tehran residents and showed that 34% of patients had a healthy diet based on the Mediterranean pattern (13). A look at the Mediterranean dietary pattern shows that this dietary food is not alien to the culture of the people of Guilan province because of the geographical and climatic conditions, foodstuffs such as olive, olive

oil, fish and marine products, fruits and vegetables available to people in this area.

Despite the availability of good food in the province, there is a high incidence of heart disease, and since the study of dietary habits has not been done in the region so far, it is still not possible to determine whether the pattern of food is appropriate or inappropriate or whether it is associated with high incidence of heart disease or conduct nutritional interventions, because before any nutritional interventions, often in the form of trainings, it is necessary to have an outlook of the current status and dietary habits of these patients.

Considering the fact that no study has been conducted before in Guilan province about the dietary habits of patients with cardiovascular disease and the factors affecting the quality of diet in this group of patients, and considering the beneficial effects of the Mediterranean diet on heart health, this research was conducted to study the dietary habits of this group of patients.

## Methods

This cross-sectional study was conducted after obtaining permission from the Ethics Committee of Guilan University of Medical Sciences (IR.GUMS.REC.1394.184) on 550 men and women aged 30 – 70 years with cardiac risk factors for elective angiography during the second half of 2015 in Heshmat Heart Hospital in Rasht as the only specialized heart hospital in Guilan.

Candidates for elective angiography, lack of infectious diseases, lack of rheumatoid arthritis, lack of chronic renal failure and inflammatory diseases, lack of corticosteroid use were included in the study. In case of reluctance to cooperate in the project and answering questions, patients were excluded from the study. Convenience sampling was used based on inclusion criteria.

A trained nurse selected the patients every day in angiography section based on inclusion criteria. Written informed consent was obtained from all participants. Personal information and relevant variables including education level, place of residence (city or village), smoking, a family history of heart disease were collected by asking questions from individuals and completing the designed forms. To collect data about the disease and other medical information such as hypertension and diabetes,

patient's medical and health records was used. To measure height and weight, a lever scale with a precision of 0.1 kg was connected to a graded stadiometer with a precision of 0.1 cm. Measurements were done without shoes and with minimal dress. BMI was calculated based on the formula. Waist circumference was measured using strip meter. To assess the compliance with the Mediterranean dietary pattern, a valid 14 – item Mediterranean Diet Adherence Screener questionnaire was used (13–17).

This questionnaire was localized according to the culture and religion of the Iranian people. One item related to drinking wine (Drinking is prohibited in Iranian people's religion-Islam) was removed from the questionnaire. The translated content and face validity of the questionnaire was qualitatively evaluated by two experts in the field of nutrition.

In the initial pilot study, after completing 60 questionnaires using the Kuder–Richardson Formula 20 (KR-20), the internal reliability of the questionnaire was calculated. The score of the nutrition questionnaire is 0–14. 0–5 indicates low compliance (inappropriate dietary patterns); 6 – 9 indicates moderate compliance and 10 and above indicates high dietary compliance (healthy dietary pattern) (16, 18,19). For statistical analysis, the SPSS software version 19 was used and  $p < 0.05$  was considered significant.

T-student test was used to compare the privileges of compliance with the diet in patient-specific categories. Chi-Square test was used to examine the relationship between qualitative characteristics of patients and dietary compliance scores.

## Results

The mean age was  $58 \pm 0.38$  years (age range of 29 – 75 years). The mean age of men was  $57.6 \pm 0.53$  years and the mean age of women was  $58.6 \pm 0.57$  years. Of 550 included patients, 309 were male and 241 were female. 56% of the subjects were residents of urban areas of Guilan province (table 1). The mean body mass index (BMI) was estimated to be  $27 \pm 0.01$  kg/m<sup>2</sup> ( $26.99 \pm 0.06$  kg/m<sup>2</sup> in men and  $28.59 \pm 0.12$  kg/m<sup>2</sup> in women, respectively). 71.4% of the patients were overweight and obese. The mean waist circumference was  $98 \pm 0.2$ . The mean waist circumference in men was 94.71 cm and was 102.22 cm in women. Regarding the dietary compliance, the mean compliance rate of the studied population was  $5.76 \pm 0.07$ . Among the participants, the lowest score

was 0 and the highest score was 11. Mean compliance rate in women was  $5.53 \pm 0.09$  and in men was  $5.93 \pm 1.0$ . The compliance rate in men was significantly higher than women ( $p = 0.001$ ).

**Table 1. Demographic characteristics and cardiovascular risk factors in candidates for elective angiography based on gender**

Index	on gender		
	All patients N(%)	Men (n=390) N(%)	Women (n=241) N(%)
<b>Body mass index (kg/m<sup>2</sup>)</b>			
>18.5	11(1.5)	7(2)	3(0.8)
24.9–18.5	149(26.5)	94(30.5)	55(22.9)
25–29.9	244(44.8)	145(47.4)	99(41.5)
30≥	146(26.6)	63(20.2)	84(34.7)
<b>Level of Education</b>			
Illiterate	204(37.1)	82(26.5)	122(50.6)
Pre-High school	252(45)	155(50.2)	97(40.2)
Diploma and higher	94(17.9)	313(23.3)	22(9.2)
<b>Smoking</b>			
Yes	103(18)	94(30.4)	9(3.7)
No	447(81)	215(69.6)	232(96.3)
<b>Diabetes</b>			
Yes	205(37.3)	93(30.1)	112(46.5)
No	345(62.7)	216(69.9)	129(53.5)
<b>Having hypertension</b>			
Yes	237(43.1)	105(34)	132(54.8)
No	313(56)	204(66)	109(45.2)
<b>History of heart disease in the family</b>			
Yes	249(45.4)	132(42.7)	117(48.5)
No	301(54.6)	177(57.3)	124(51)
<b>Place of Residence</b>			
City	309(56.2)	198(64.1)	111(46.1)
Village	241(43.8)	111(35.9)	130(53.9)

In other words, the quality of a diet in men was more appropriate than women. Among the questions of the Mediterranean Diet Adherence Screener questionnaire, the most positive answer was to question 12 (Do you usually replace beef, hamburger or sausage with chicken, turkey or poultry meat?) And the least positive response to question 1 (Is olive oil the oil you use the most often?). Questions 6 and 7 on "less consumption of butter and cream" and "less consumption of industrial drinks" had the lowest response after olive oil (table 2). Of the 550 participants, 239 (43%) patients had low dietary compliance (inappropriate compliance rate), 299 (55%) patients had moderate, and only 12 (2%) had

high dietary compliance (healthy food pattern). There was a significant relationship between gender and dietary compliance status. In contrast, there was no

significant relationship between the status of compliance with Mediterranean diet and place of residence, education level, smoking and BMI (table 3).

**Table 2. Response to the questions of Mediterranean Diet Adherence Screener**

The general content of the questions	Compliance (positive answer)	Noncompliance (negative answer)
	N(%)	N(%)
Use of olive oil for cooking	14(24)	536(96)
The amount of used olive oil	38(6)	512(93.1)
Consumption of vegetables	331(60)	219(40)
Consuming fruits	449(81)	101(19)
Low consumption of red meat	59(10)	491(90)
Low consumption of butter and cream	64(11)	486(89)
Low consumption of sweet drinks	39(7.1)	511(92.9)
Consumption of legumes	443(80)	107(20)
Fish consumption	351(63)	199(37)
Low consumption of sweets	181(32.9)	369(67.1)
Nut consumption	143(26)	407(74)
Replacing red meat with chicken and poultry	521(94)	29(6)
Use of seasonings	519(92)	31(8)

**Table 3. Relationship between dietary compliance scores and the characteristics of candidates for elective angiography**

Index	Score 0 – 5	Score 6 – 9	Score 10 and above	p-value
	N(%)	N(%)	N(%)	
<b>Gender</b>				
Male	121(39.8)	176(57)	12(100)	0.001
Female	118(49)	123(41)	0	
<b>Education</b>				
Illiterate	96(40.2)	104(34.8)	4(33.3)	0.50
Pre-High school	114(47.7)	132(44.1)	6(50)	
Diploma and higher	29(12.1)	63(21.1)	2(16.7)	
<b>Place of residence</b>				
City	125(52.3)	176(58.9)	8(66.7)	0.23
Village	114(47.7)	123(41.1)	4(33.3)	
<b>Smoking</b>				
Yes	38(15.9)	61(204)	4(33.3)	0.17
No	201(84.1)	238(79.6)	8(66.7)	
<b>Body mass index (kg/m<sup>2</sup>)</b>				
Lower than 18.5	3(0.09)	7(2.1)	0(0)	0.15
18.5 – 24.9	78(32.9)	68(22.9)	2(16.7)	
25 – 29.9	94(39.7)	143(48.3)	7(58.3)	
30 and more	63(26.5)	79(26.7)	3(25)	

## Discussion

The results of the present study indicate inappropriate dietary habits of people with cardiac risk factors in northern Iran and low dietary compliance based on the Mediterranean diet. This is the first study to examine the dietary habits of individuals with risk

factors for coronary heart disease and candidates for elective angiography in northern Iran. The Mediterranean diet is rich in vegetarian food, olive oil and fish, and restricts the consumption of red meat and saturated fats. This diet plays a protective role against heart disease (14–20). Therefore, the rate of

compliance with this diet in patients undergoing elective angiography was studied. The results of this study showed that dietary compliance rate is inappropriate. Mean dietary compliance rate was  $5.76 \pm 0.07$ , indicating an unhealthy dietary pattern in the population under study. In this study, only 2% of patients were in the highest rating of the quality of the diet (score 10 and above) and 43% of patients were in the lowest rating (0 – 5 points), indicating an unhealthy diet in terms of Mediterranean diet.

Jafari et al. (19) in their study among patients with open heart surgery in Tehran showed that 34% of patients had a healthy diet based on the Mediterranean pattern. In the study of Hu et al. (20), the rate of compliance with the Mediterranean diet among the elderly was estimated to be 8.6 using a 14 – item questionnaire, and those with lower education, higher waist-to-height ratio, diabetics, those with less physical activity, single people and smokers had lower compliance rate. Viscogliosi et al. (14) investigated the association between the compliance with the Mediterranean diet and the metabolic syndrome and insulin resistance using this questionnaire in people without diabetes and heart disease. The mean dietary compliance was reported to be 6.6 in individuals. The results showed that those who had less compliance with the Mediterranean diet had a higher incidence of metabolic syndrome, and the level of hs-CRP and insulin resistance in these subjects was higher (14).

In the study of Grosso et al., subjects with higher compliance rate of the Mediterranean diet had lower metabolic syndrome, central obesity, hypertriglyceridemia, and hypertension (10). In the present study, there was a significant relationship between gender and dietary compliance status. In contrast, there was no significant relationship between dietary compliance and residence, education, smoking and BMI. Mean dietary compliance in men was significantly higher than women. In other words, the quality of men's diet was better than women. In a study on a healthy population in Italy, men followed a higher quality diet compared to women (11). In contrast, in the study of Jafari et al. (19), the quality of the Mediterranean diet in women was significantly higher than that of men. In the present study, those with higher education had more inappropriate dietary compliance insignificantly,

which was not consistent with the results of Jafari et al (19) and Boynton et al. (21). Perhaps one of the possible reasons for this is the busy life of educated people. These people often work in different businesses that do not allow them to eat healthy and homemade food and they use more ready-made and industrial foods. In the present study, the most positive response was to "replacing red meat with poultry meat" and the least positive answer was to "high consumption of olive oil".

Moreover, "less consumption of butter and cream" and "less consumption of industrial drinks" had the lowest response after olive oil. This suggests high consumption of harmful fats and sugars and low consumption of unsaturated fats in the diet of the individuals under study. In the study of Hu et al. (20), the option of "beans consumption" had the lowest response rate and the "less consumption of butter and margarine" option had the highest response. In this study, due to the unwillingness of many patients, information about the economic status of individuals was not provided. Therefore, the probable relationship between factors such as income level and economic status with diet quality and patients' awareness was not assessed. The results of the study showed that despite the availability of healthy food in this province, the pattern of food is inappropriate.

In this study, olive oil did not have much of a place in the diet, and in contrast to "consumption of butter and cream" and "industrial drinks", it has the highest status in the basket, which can reflect changes in lifestyle and tendency and it shows that people are becoming more inclined to unhealthy and industrial foods. Considering the high prevalence of heart disease in Guilan province, the need to educate different groups about dietary modification and the trend toward following the Mediterranean diet can play a significant role in reducing the incidence of heart disease.

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