

The Diet Adherence in Cardiovascular Disease Risk Factors Patients in the North of Iran Based on the Mediterranean Diet Adherence

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Abstract—Background and objectives: Before any nutritional intervention, it is necessary to have the prospect of eating habits of people with cardiovascular risk factors. In this study, we assessed the adherence of healthy diet based on Mediterranean dietary pattern and related factors in adults in the north of Iran. Methods: This study was conducted on 550 men and women with cardiovascular risk factors that referred to Heshmat hospital in Rasht, northern Iran. Information was collected by interview and reading medical history and measuring anthropometric indexes. The Mediterranean Diet Adherence Screener was used for assessing dietary adherence, this screener was modified according to religious beliefs and culture of Iran. Results: The mean age of participants was 58 ± 0.38 years. The mean of body mass index was 27 ± 0.01 kg/m², and the mean of waist circumference was 98 ± 0.2 cm. The mean of dietary adherence was 5.76 ± 0.07 . 45% of participants had low adherence, and just 4% had suitable adherence. The mean of dietary adherence in men was significantly higher than women ($p=0.07$). Participants in rural area and high educational participants insignificantly had an unsuitable dietary Adherence. There was no significant association between some cardiovascular disease risk factors and dietary adherence. Conclusion: Education to different group about dietary intake correction and using a Mediterranean dietary pattern that is similar to dietary intake in the north of Iran, for controlling cardiovascular disease is necessary.

Keywords—Dietary adherence, Mediterranean dietary pattern, cardiovascular disease, north of Iran.

I. INTRODUCTION

THE Mediterranean dietary pattern is based on the traditional foods that people used to eat in countries like Italy and Greece. The Mediterranean dietary pattern is daily intake of whole grain, vegetables, fruits, olive oil and low-fat dairy products, and weekly intake of potatoes, olives, sea products, nuts and poultry and monthly consumption of red meat. Olive oil is the main source of dietary fat in this dietary pattern. This diet emphasizes: eating plant-based foods, using herbs and spices instead of salt to flavor foods [1], [2].

Previous studies have shown that increasing adherence to the Mediterranean diet is associated with desirable physical and mental health outcomes [3]. The beneficial role of Mediterranean dietary pattern on lipid profile and lipid metabolism, blood pressure levels and preventing from hypertension [4], body mass index and weight controlling [5],

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inflammation and coagulation process [6] is proven.

Several studies have shown that the adherence to the Mediterranean diet has been associated with reduced risk of cardiovascular diseases, and, this suggests that Mediterranean diet had cardioprotective role [7]-[9].

The prevalence and incidence of cardiovascular disease such as coronary artery disease, myocardial infarction, heart failure, hyperlipidemia, varies between different cultures, different geographic area and from country to country.

Iran possibly has a higher burden relative to other countries in this region. Unfortunately, cardiovascular disease is a leading cause of mortality and disability in the Iranian population.

Based on previous studies, many risk factors have been identified for cardiovascular disease. Diet and body mass indices are the most important cardiovascular disease risk factors.

Because of the high prevalence of cardiovascular disease in Iran and cardioprotective role of Mediterranean diet, it is necessary to conduct some studies to determine whether the dietary habits of Iranians, according to their culture, are similar to Mediterranean diet or not.

For these reasons, the objective of the present study was to determine the adherence of healthy diet and related factors.

II. MATERIAL AND METHOD

This cross-sectional study was performed on 550 participants, whose age ranged 20 to 75 years and who were admitted to a tertiary hospital in Rasht (center of Guilan Province in the north of Iran) between December 22, 2015 and April 20, 2016.

All participants gave informed consent for the study, which was approved by the Ethics Committee of Guilan University of Medical Sciences, Rasht, Iran. Demographic characteristics were collected by a questionnaire.

Weight of participants was measured after removal of excess clothes and shoes. Height was measured while the participants were standing against a wall with their heels and buttocks in contact with the wall. Waist circumference was determined, in duplicate, at the midpoint between the lowest costal ridge and the upper border of the iliac crest. Waist circumference was done with a non-stretchable and accurately calibrated scale with 0.5-cm precision.

Body mass index was calculated as weight (in kilogram) divided by height squared (in m²). A body mass index of 25 or more is defined as overweight, while a body mass index of 30

or more is characterized as obese. In our study for assessing dietary adherence, we used the 14-point Mediterranean Diet Adherence Screener (MEDAS) which is a valid instrument. The MEDAS consist of 12 questions on food intake frequency and two questions about dietary habits.

Each question scored 0 or 1. Based on this questioner, dietary score between 0-5 is considered low dietary adherence, dietary score between 6-9 is considered moderate dietary adherence, and dietary score 10 and upper is considered suitable dietary adherence.

Since we wanted to use MEDAS among the people who were 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 and two registered dietitians 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.

III. RESULTS

Patients' characteristics are shown in Table I. The mean age of participants was 58 ± 0.38 years (between 29-75 years). The mean of body mass index was 27 ± 0.01 kg/m², and the mean of waist circumference was 98 ± 0.2 cm.

The mean of waist circumference in men and women was 94.71 and 102.22 cm, respectively. 71.4% of participants were obese or over weight. The mean of dietary adherence in our participants was 5.76 ± 0.07 (between 0-11 score). 45% of participants had low dietary adherence, 51% had moderate dietary adherence, and just 4% had suitable dietary adherence.

The frequency of answers to the Mediterranean Diet Adherence Screener (MEDAS) according to participants' responses is shown in Table II.

TABLE I
DEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANTS

Characteristics	Male (n=309)	Female (n=241)	
Smoking (yes%)	30.4	3.7	
Illiterate (%)	26.5	50.6	
Educational Level	Below diploma (%)	50.2	40.2
	Diploma and upper (%)	23.3	9.2
Residence Characteristic	Urban (%)	64.1	46.1
	Rural (%)	35.9	53.1
Having hypertension (%)	34	54.8	
Having diabetes (%)	30.1	46.5	
Family history of cardiovascular disease (%)	42.7	48.5	

In this population, men had better dietary adherence than women ($p=0.01$). The mean of dietary adherence in men was 5.93 ± 0.10 , and it was 5.53 ± 0.09 in women.

There was no significant association between smoking and body mass index with Mediterranean dietary adherence. Participants living in rural area and high educational participants insignificantly had an unsuitable dietary Adherence.

Majority of the participants responded "yes" to question 12 (Do you preferentially consume chicken, turkey meat instead of hamburger or sausage?). And the most "no" responses were given to the questions 7 (How many sweet or carbonated beverages do you drink per day?)

TABLE II
THE FREQUENCY OF YES (1-POINT) ANSWERS TO THE MEDITERRANEAN DIET ADHERENCE SCREENER (MEDAS) ACCORDING TO PARTICIPANTS' RESPONSES

Questions	Adherence
1 Do you use olive oil as main culinary fat?	14(24%)
2 How much olive oil do you consume in a given day (including oil used for frying, salads, out-of-house meals, etc.)?	38(6%)
3 How many vegetable servings do you consume per day? (1 serving: 200 g [consider side dishes as half a serving])	331(60%)
4 How many fruit units (including natural fruit juices) do you consume per day?	449(81%)
5 How many servings of red meat, hamburger, or meat products (ham***, sausage, etc.) do you consume per day? (1 serving: 100-150 g)	59(10%)
6 How many servings of butter, margarine, or cream do you consume per day? (1 serving: 12 g)	64(11%)
7 How many sweet or carbonated beverages do you drink per day?	39(7.1%)
8 How many servings of legumes do you consume per week? (1 serving: 150 g)	443(80%)
9 How many servings of fish or shellfish*** do you consume per week? (1 serving 100-150 g of fish or 4-5 units or 200 g of shellfish)	351(63%)
10 How many times per week do you consume commercial sweets or pastries (not homemade), such as cakes, cookies, biscuits, or custard***?	181(33%)
11 How many servings of nuts (including peanuts) do you consume per week? (1 serving 30 g)	143(26%)
12 Do you preferentially consume chicken, turkey, or rabbit ***meat instead of veal, pork***, hamburger, or sausage?	521(94%)
13 How many times per week do you consume vegetables, pasta, rice, or other dishes seasoned with sofrito† (sauce made with tomato and onion, leek, or garlic and simmered with olive oil)?	519(92%)

TABLE III
ASSOCIATION BETWEEN DIET ADHERENCE SCORE AND FACTORS

Adherence score	0-5	6-9	10 & upper
Sex			
Men (%)	39.5	57	3.9
Women (%)	49	51	0
Smoking (%)	15.9	20.4	33.3
Residence			
Urban (%)	25.3	8.2	66.5
Rural (%)	47.2	31	23

IV. DISCUSSION

In the present study, dietary non-adherence was common in men and women with cardiovascular disease risk factors in the north of Iran.

In our study, to assess dietary adherence, we used Mediterranean diet as a healthy dietary pattern. The Mediterranean dietary pattern consists of daily consumption of whole grain products, vegetables, fruits, olive, olive oil, and low-fat dairy products.

Olive oil is the main source of dietary fat in this dietary pattern. This dietary pattern consists of high amounts of potassium, magnesium, calcium, unsaturated fatty acids and

fiber and low amount of saturated fatty acid, salt, trans fats and cholesterol [10].

The beneficial role of this dietary pattern on lipid metabolism and lipid profile, blood pressure levels and controlling hypertension [11], inflammation and coagulation process [12] and depression and nervous disorders [13] has been proved. Several studies have revealed that the adherence to the Mediterranean diet is significantly associated with reduced risk of cardiovascular diseases especially coronary artery disease, and this suggests that among the dietary pattern, Mediterranean diet had cardioprotective role [14]-[18].

In the present study, dietary non-adherence was common among adults. Participants in rural area and high educational participants insignificantly had lower diet adherence compared to the other groups.

Although Iran and specially Guilan province produces significant amounts of olive and olive oil, the intake of olive oil compared with other countries in the Mediterranean region is lower in the north of Iran.

Based on the results, only 24% of our participants was using olive oil as a main culinary fat. Aside from olive oil, we found that the pattern of the Mediterranean diet was different 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 [19]. Therefore, it was predictable that the pattern of the consumption of Mediterranean dietary components among our participants is different from those of other people and cultures.

Like any other study, our study suffers from some limitations. The cross-sectional design of study prohibits temporal assessment of the association between dietary adherence and related factors. In addition, we did not measure confounders such as economic status.

Campbell et al. [20] 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.

V. CONCLUSION

In conclusion, this study showed that dietary non-adherence was prevalent in men and women with cardiovascular disease risk factors.

Because of high prevalence of cardiovascular disease in the north of Iran and cardioprotective role of Mediterranean dietary pattern, education to different groups of adults about dietary intake correction and using a Mediterranean dietary pattern that is similar to dietary intake and food products in the north of Iran, for controlling cardiovascular disease seems to be necessary. More studies are needed to consolidate our understanding about dietary adherence and related factors.

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DECLARATION OF CONFLICTING INTERESTS

The authors of this manuscript have expressed There is no conflict of interest in this study

REFERENCES

- [1] Bach-Faig A, Berry EM, Lairon D, Reguant J, Trichopoulos A, Dernini S, et al. Mediterranean diet pyramid today. Science and cultural updates. *Public Health Nutr.* 2011;14(12A):2274-84.
- [2] Panagiotakos DB, Pitsavos C, Stefanadis C. Dietary patterns: a Mediterranean diet score and its relation to clinical and biological markers of cardiovascular disease risk. *Nutr Metab Cardiovasc Dis.* 2006 Dec;16(8):559-68.
- [3] Schröder H, Fitó M, Estruch R, Martínez-González MA, Corella D, Salas-Salvadó J, et al. A short screener is valid for assessing Mediterranean diet adherence among older Spanish men and women. *The Journal of nutrition.* 2011;141(6):1140-5.
- [4] Martínez-González MÁ, Sanchez-Villegas A. Review: The emerging role of Mediterranean diets in cardiovascular epidemiology: Monounsaturated fats, olive oil, red wine or the whole pattern? *European journal of epidemiology.* 2004;19(1):9-13.
- [5] Schröder H, Marrugat J, Vila J, Covas MI, Elosua R. Adherence to the traditional Mediterranean diet is inversely associated with body mass index and obesity in a Spanish population. *The Journal of nutrition.* 2004;134(12):3355-61.
- [6] Chrysohoou C, Panagiotakos DB, Pitsavos C, Das UN, Stefanadis C. Adherence to the Mediterranean diet attenuates inflammation and coagulation process in healthy adults: The ATTICA Study. *Journal of the American College of Cardiology.* 2004;44(1):152-8.
- [7] Knuops KT, de Groot LC, Kromhout D, Perrin A-E, Moreiras-Varela O, Menotti A, et al. Mediterranean diet, lifestyle factors, and 10-year mortality in elderly European men and women: the HALE project. *Jama.* 2004;292(12):1433-9.
- [8] Robertson RM, Smaha L. Can a Mediterranean-style diet reduce heart disease? *Circulation.* 2001;103(13):1821-2
- [9] Bilenko N, Fraser D, Vardi H, Shai I, Shahar DR. Mediterranean diet and cardiovascular diseases in an Israeli population. *Preventive medicine.* 2005;40(3):299-305.
- [10] Martínez-González M, Fernandez-Jarne E, Serrano-Martinez M, Wright M, Gomez-Gracia E. Development of a short dietary intake questionnaire for the quantitative estimation of adherence to a cardioprotective Mediterranean diet. *European Journal of Clinical Nutrition.* 2004;58(11):1550-2.
- [11] Hatmi Z, Tahvildari S, Motlag AG, Kashani AS. Prevalence of coronary artery disease risk factors in Iran: a population based survey. *BMC Cardiovascular Disorders.* 2007;7(1):32.
- [12] di Giuseppe R, Bonanni A, Olivieri M, Di Castelnuovo A, Donati MB, de Gaetano G, et al. Adherence to Mediterranean diet and anthropometric and metabolic parameters in an observational study in the 'Alto Molise' region: the MOLI-SAL project. *Nutrition, Metabolism and Cardiovascular Diseases.* 2008;18(6):415-21.
- [13] Chrysohoou C, Panagiotakos DB, Pitsavos C, Das UN, Stefanadis C. Adherence to the Mediterranean depression: a meta-analysis. *Annals of neurology.* 2013;74(4):580-91.
- [14] Psaltopoulou T, Sergentanis TN, Panagiotakos DB, Sergentanis IN, Kostis R, Scarmeas N. Mediterranean diet, stroke, cognitive impairment, and diet attenuates inflammation and coagulation process in healthy adults: The ATTICA Study. *Journal of the American College of Cardiology.* 2004;44(1):152-158.
- [15] Fung TT, Rexrode KM, Mantzoros CS, Manson JE, Willett WC, Hu FB. Mediterranean diet and incidence of and mortality from coronary heart

- disease and stroke in women. *Circulation*. 2009;119(8):1093-100
- [16] Hu EA, Toledo E, Diez-Espino J, Estruch R, Corella D, Salas-Salva. 2013;8(4):e60166. Epub 2013/05/03.
- [17] Viscogliosi G, Cipriani E, Liguori ML, Marigliano B, Saliola M, Ettorre E, et al. Mediterranean dietary pattern adherence: associations with prediabetes ,metabolic syndrome, and related microinflammation. *Metabolic syndrome and related disorders*. 2013;11(3):210-6.
- [18] Jafari A, Asal, Najafi, Mehdi, Saeed, et al. Diet quality in patients undergoing coronary artery bypass surgery based on quality Mediterranean diet. *Journal of Diabetes and Metabolism*. 2008;7(4):407-18.
- [19] Dermeni S, Berry EM. Mediterranean diet: From a healthy diet to a sustainable dietary pattern. *Frontiers in nutrition*. 2015;2:15.
- [20] Campbell DJ, Ronsley PE, Manns BJ, Tonelli M, Sanmartin C, Weaver RG. The association of income with health behavior change and disease monitoring among patients with chronic disease. *PloS one*. 2014;9(4):e94.