Reliability and Validity of the 14-point mediterranean diet adherence screener among the Iranian high risk population

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Abstract.
INTRODUCTION: The aim of study was to assess the reliability and validity of the14-point Mediterranean Diet Adherence Screener (MEDAS) among Iranian high risk population.
METHODS: Study was conducted in north of Iran a country with a Shiite majority with religious constraints, so we modified the MEDAS in the Farsi version. We applied reliability analysis using the Kuder – Richardson 20 and the alpha coefficient of Cronbach, with SPSS to interpret the effects of each item of MEDAS in its internal consistency.
RESULTS: After correcting the item scores, coefficients of Kuder-Richardson-20 was calculated 0.559. The mean $\pm$ SD of 13 items MEDAS was 5.73 ± 1.88. None of Corrected Item-Total Correlation coefficients were negative. 43%, 53% and 4% participants had low, medium and high adherence to a Mediterranean diet respectively.
CONCLUSION: In spite of making a few changes in questions, the coefficients of Kuder-Richardson-20 did not decrease in reliability analysis. The MEDAS was translated for the first time into Farsi. Administering this tool in future researches will help to understand how Iranian adhere to the mediterranean diet, aiming at improving cardiovascular health.

Keywords: Reliability, validity, mediterranean diet adherence screener, iranian adults

1. Introduction

Cardio vascular diseases (CVD) are the most important cause of the burden of diseases globally [1]. Also, CVD is the first reason of death in the Iran because of huge demographic changes and epidemiological transition [2]. Despite, preventive intervention have reduced age adjusted mortality rate of CVD in developed countries [3]. But, neglecting of such programs in developing country cause premature deaths and loss of active years of life [2].

Cardio protective effects of a few specific foods have been established by numerous researches [4]. The Mediterranean dietary pattern consists of daily consumption of non-refined products, vegetables, fruits, olive oil and low-fat dairy products, weekly consumption of potatoes, olives, fish, nuts and poultry and

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monthly consumption of red meat and meat products. Essential components of the Mediterranean diet are wheat, olives and their various derivative products. Olive oil is the principal source of dietary fat in this pattern [5, 6].

Studies have shown that increasing adherence to the Mediterranean diet is associated with desirable effects on several cardiovascular risk factors [7, 8]. A systematic review and meta-analysis revealed that Mediterranean diet may have beneficial effects respect to CVD. However, the results must be interpreted with caution due to restraint and variety of available evidences [9]. However diet does not act in isolate and multiple risk factors such as socio economic status can effect on CVD [10], but Estimating diet quality and determining its association with health factors is a key challenge in nutrition. and various indices of diet quality have been proposed [11]. In epidemiological studies, food frequency questionnaire (FFQ) is the most used method for estimating an individual's adherence to a healthy eating pattern. However, the full-length FFQ is time consuming for participants and not an optimal option in busy and crowded settings. A short instrument, capable of correctly estimating adherence to the Mediterranean diet would be useful to control for adherence [12].

A 14-point Mediterranean Diet Adherence Screener (MEDAS) [13] was developed to rapidly control for compliance with the dietary intervention of the Prevencio´n con Dieta Mediterranean (PREDIMED) study, a multicenter clinical trial aimed at assessing the effects of the traditional Mediterranean diet on the primary prevention of cardiovascular disease [12]. This screener can also be used to assess dietary compliance in epidemiological studies [14, 15]. Because of the high prevalence of cardiovascular disease in Iran and cardio protective role of Mediterranean diet, it is necessary to conduct some studies to determine whether the dietary habits of some Iranians, according to their culture, are similar to mediterranean diet or not. To the authors' knowledge, 14-point Mediterranean diet adherence screener has not been used for assessing dietary compliance in Iranian population. For these reasons, the objective of the present study was to determine reliability and validity of the 14-point Mediterranean diet adherence instrument among the Iranian high risk population participants.

2. Methods

The 14-point Mediterranean Diet Adherence Screener (MEDAS) is a valid instrument developed in a study with adult patients under 80 years old who had a definite diagnosis of acute myocardial infarction and were admitted to a tertiary hospital in the Pamplona (Spain) [16]. The MEDAS consist of 12 questions on food consumption frequency and 2 questions about food intake habits based on Spanish Mediterranean diet.

Each question was scored 0 or 1 (Table 1). If a respondent adhered to the condition described in each question, he/she would score one. So the total score of the questionnaire ranged from 0 to 14 [11]. 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?). Also we omitted (ham) from meat products, shellfish and pork in the questions 5, 10 and 13 respectively due to the similar reason expressed for the eighth question. And as this study was conducted in a country with a Shiite majority, then we eliminated the question related to rabbit meat consumption (question number 13) because of religious restrictions; however, this kind of meat is not consumed in Iran overall. Moreover, since custard is not popular in Iran and many of our participants may not be familiar with it, we delete it from the Farsi version of MEDAS. Also, in Iranian cuisine sofrito is not well-known, but every ingredient of this sauce is considered as a popular flavor. So we replaced flavoring such as (tomato, onion, leek, garlic and olive oil) with sofrito. Then we translated, native MEDAS to Persian by backward -forward method and two registered dietitian qualitatively approved the final Persian version content and face validity.

After getting permission from the research council of Guilan University of Medical Sciences, a registered dietitian fulfilled MEDAS by face to face interview with a convenience sample of 100 patients who were

Table 1
The 14-point Mediterranean Diet Adherence Screener (MEDAS)

	Questions	Criteria for 1 point	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	Do you use olive oil as main culinary fat?	Yes	0.357	0.482
2	How much olive oil do you consume in a given day (including oil used for frying, salads, out-of-house meals, etc.)?	≥4 tbsp*	0.365	0.475
3	How many vegetable servings do you consume per day? (1 serving: 200 g [consider side dishes as half a serving])	≥2 (≥1 portion raw or as a salad)	0.309	0.479
4	How many fruit units (including natural fruit juices) do you consume per day?	≥3	0.278	0.490
5	How many servings of red meat, hamburger, or meat products (ham***, sausage, etc.) do you consume per day? (1 serving: 100–150 g)	<1	0.152	0.521
6	How many servings of butter, margarine, or cream do you consume per day? (1 serving: 12 g)	<1	0.159	0.519
7	How many sweet or carbonated beverages do you drink per day?	<1	0.257	0.506
8**	How much wine do you drink per week?	≥7 glasses	–	–
9	How many servings of legumes do you consume per week? (1 serving: 150 g)	≥3	0.137	0.526
10	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)	≥3	0.198	0.515
11	How many times per week do you consume commercial sweets or pastries (not homemade), such as cakes, cookies, biscuits, or custard***?	<3	0.054	0.557
12	How many servings of nuts (including peanuts) do you consume per week? (1 serving 30 g)	≥3	0.200	0.513
13	Do you preferentially consume chicken, turkey, or rabbit ***meat instead of veal, pork***, hamburger, or sausage?	Yes	0.122	0.526
14	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)?	≥2	0.198	0.517

*tbsp(tablespoon ≈15 milliliter). **this item has been deleted from Farsi version. ***This word has been deleted from Farsi version. †this word has been changed in Farsi version.

admitted to a tertiary hospital in Rasht (center of Guilan province in the North of Iran) because they were chosen for elective angiography, between June 1 and July 31, 2015. The patients who were diagnosed with renal or inflammatory diseases such as rheumatoid arthritis were excluded from the study. The object of the study was explained to the participants and an oral informed consent was taken from them. Kuder-Richardson 20 formula was used for calculating the internal consistency. As Cronbach's α is analogous to Kuder-Richardson 20 [17], we applied reliability analysis using model alpha, with SPSS Ver (11.5) to interpret the effects of each item of MEDAS in its internal consistency.

3. Results

The interview was presented for 110 participants and 100 of them accepted it (90%response rate). The significant difference between respondents and non-respondents was not detected. 49% of participants were women. Demographic characteristics of the participants are shown in (Table 2). After correcting the item scores, coefficients of Kuder-Richardson-20 was calculated 0.559. Question number 2 (How much olive oil do you consume in a given day (including oil used for frying, salads, out-of-house meals, etc.?) and 11 (How many times per week do you consume commercial sweets or pastries (not homemade), such as cakes, cookies, biscuits, or custard?) had the best and the worst correlation with the rest of items respectively (Table 1). Also, deleting question 11 caused a maximum increase in the value of Cronbach's alpha (Table 1). The mean (SD) of 13 items MEDAS was 5.73 (1.88). According to three categories of adherence to the Mediterranean diet, (≤ 5, 6–9 and ≥ 10 points of the 13-item revised questionnaire) 43 (43%), 53 (53%) and 4 (4%) participants had low, medium and high adherence to a Mediterranean diet respectively. The Table 3 shows the frequency of one point (yes answer) for each item of MEDAS questionnaire according to participants' responses. Majority of the participants responded "yes" to question 14 (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)?). And most "no" responses were equally given to the questions 7 (How many sweet or carbonated beverages do you drink per day?).

4. Discussion

In spite of removing question 8 and making a few changes in questions 5, 10, 11, 13 and 14 due to religious reasons, the coefficients of Kuder-Richardson-20 did not decrease by 0.5 or below in reliability analysis. None of Corrected Item-Total Correlation coefficients were negative. The low agreement(0.559) in our study is probably due to homogenous sample of patients, however our result in calculation of internal consistency is very similar to Schroder, H. et al. (ICC = 0.51) [18]. It seems there is a tremendous diversity in the pattern of adherence to Mediterranean diet according to results of MEDAS questionnaire in different regions. As UNESCO (United Nations Educational, Scientific and Cultural Organization) 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

Table 2
Demographic characteristics of the participants

Characteristics	
Age [mean (SD) years]	58.3 (8.9)
Gender [number (%)]	
Male	51 (51.0)
Female	49 (49.0)
Educational Level [number (%)]	
Illiterate	37 (37.0)
Below diploma	42 (42.0)
Diploma	18 (18.0)
Bachelor and higher	3 (3.0)
Residence Characteristic [number (%)]	
Urban	62 (62.0)
Rural	38 (38.0)

Table 3

The frequency of yes (1-point) or no (0-point) answers to the 13-point Mediterranean Diet Adherence Screener (ME DAS)according to participants' responses

	Questions	Yes (1 point) Number (%)	No (0 point) Number (%)
1	Do you use olive oil as main culinary fat?	10 (10.0)	90 (90.0)
2	How much olive oil do you consume in a given day (including oil used for frying, salads, out-of-house meals, etc.)?	13 (13.0)	87 (87.0)
3	How many vegetable servings do you consume per day? (1 serving: 200 g [consider side dishes as half a serving])	46 (46.0)	54 (54.0)
4	How many fruit units (including natural fruit juices) do you consume per day?	77 (77.0)	23 (23.0)
5	How many servings of red meat, hamburger, or meat products (ham***, sausage, etc.) do you consume per day? (1 serving: 100–150 g)	13 (13.0)	87 (87.0)
6	How many servings of butter, margarine, or cream do you consume per day? (1 serving: 12 g)	8 (8.0)	92 (92.0)
7	How many sweet or carbonated beverages do you drink per day?	6 (6.0)	94 (94.0)
8**	How much wine do you drink per week?	–	–
9	How many servings of legumes do you consume per week? (1 serving: 150 g)	82 (82.0)	18 (18.0)
10	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)	59 (59.0)	41 (41.0)
11	How many times per week do you consume commercial sweets or pastries (not homemade), such as cakes, cookies, biscuits, or custard***?	37 (37.0)	63 (63.0)
12	How many servings of nuts (including peanuts) do you consume per week? (1 serving 30 g)	31 (31.0)	69 (69.0)
13	Do you preferentially consume chicken, turkey, or rabbit*** meat instead of veal, pork***, hamburger, or sausage?	95 (95.0)	5 (5.0)
14	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)?	96 (96.0)	4 (4.0)

*tbsp.(tablespoon ≈15 milliliter). **this item has been deleted from Farsi version. ***this word has been deleted from Farsi version. †this word has been changed in Farsi version.

Mediterranean [19]. Therefore, it was predictable that the patterns of the consumption of Mediterranean dietary components among our participants were different from those of other peoples and cultures.

Although Iran produces significant amounts of olive [20], the consumption of olive oil compared with other countries in the Mediterranean region is lower in this country. Only 5% of our participants use olive oil as a main culinary fat. And the amount of consumption of this nutrient in 95 percent of our respondents is lower than 60 milliliter (approximately 54 grams) [21] in a given day. While in other countries such as Morocco weekly consumption of olive oil for cooking and dressing was 59.7% up to 89.3% in people with low to high Mediterranean diet adherence respectively [22]. Also in the Framingham offspring cohort 36.9% of participants met the recommended intakes of olive oil [23] and among older Spanish men and women, according to MEDAS

screener 90.9 and 70.9 percent used olive oil as the principal source of fat for cooking and consumed 15 milliliter of olive oil or even more [11]. This pattern of high consumption of olive oil (89.9% positive in use of olive oil as main culinary lipid and 70.0 percent positive in >15 milliliter daily olive oil consumption) can be seen in another study with participants at high risk of cardiovascular diseases in Spain [24]. The daily use of olive oil in Greece and Italy is also high like Spain [14, 25]. Regardless of olive oil, we found that the pattern of the Mediterranean diet, according to MEDAS, was different among our participants.

According to MEDAS screener, consumption of legumes, poultry and especially sofrito was more among our participatnts compared with that in other studies [11, 14, 24]. In comparison, the lower use of vegetables and fruits on the one hand, and higher consumption of red/processed meat, butter, cream, margarine and soda drinks on the other hand were the negative points among our participants [11, 14, 24]. Also consumption of dietary components such as fish/seafood, commercial sweets/pastries and tree nuts among our participants was similar to that of others researches [11, 14, 24]. The cause of low Item-Total Correlation in questions can be due to the pattern of the answers to the MEDAS screener in our study. And this phenomenon is related to sociocultural elements that can affect people's choice of their food and diet. As a limitation of our study we did not evaluate dietery estimate of our participant by a instrumnt such as FFQ (food frequency questionarie), so further study is proposed to evaluate criterion validity of the Persian version of the MEDAS questionnaire.

5. Conclusion

In summary, the MEDAS questionnaire was translated into Persian and adjusted according to religious considerations for the first time and its reliability and validity was examined among people who were candidate of elective angiography. This questionnaire screens the adherence to a Mediterranean diet and application of this instrument can help dietician to understand how Iranian adhere to the Mediterranean diet quantitatively and qualitatively. However research on sufficent hetrogenous sample of population highly recommended.

Ethical approval

This paper is the product of a research proposal with the code number of IR. GUMS.REC.1394.184 approved by the research and technology directorate of Guilan University of Medical Sciences.

Competing Interests

Authors declare that they have no competing interests.

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