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Comparison of Routine Risk Factors for Atherosclerosis in Arab and Lor Patients

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Abstract

Background: The awareness of the risk factors of atherosclerosis and attempts to correct and control them can effectively reduce the risk of complications.
Objectives: This study was performed to evaluate the risk factors for routine atherosclerosis in patients with symptoms of heart disease in the Arab race, compared to those of Lor patients.
Methods: This descriptive-analytical study was conducted on 200 patients with symptoms of heart disease. A food frequency questionnaire was used for data collection.
Results: Out of 200 patients, 101 (51.5%) and 99 (48.5%) participants were Lor and Arab, respectively. Significant differences were observed between the two races for cholesterol and fasting blood sugar levels ($P < 0.05$). Additionally, no significant difference was observed between different quarters of following dietary patterns and lipid-glucose factors ($P > 0.05$).
Conclusions: Risk factors for cardiovascular diseases, such as atherosclerosis, are multifactorial. Various factors can effectively affect the prevalence of this disease in each region, which necessitates the identification of risk factors to take steps to correct risk factors and improve the quality of patients' life.

Keywords: Atherosclerosis, Risk Factors, Dietary Patterns

1. Background

Cardiovascular diseases (CVD) are among the leading causes of death worldwide (1). According to the available statistics, about 17.3 million individuals died in 2017 due to CVD, representing 30% of all mortalities worldwide. The CVD is affected by obesity in low- and middle-income countries. Furthermore, 80% of mortalities due to CVD occur in low- and middle-income countries (2).

In Iran, based on the National Study of Disease and Injury Load in 1996, it was shown that CVD as the third leading cause of death accounted for 17.9% of the disease burden. According to the World Health Organization report, approximately 41.3% of all mortalities in Iran in 2018 were due to CVD that is expected to reach 44.8% by 2030 (3). The CVD include various forms, such as hypertension, coronary artery disease (CAD) or atherosclerosis, heart attack, heart failure, and clogging of other organs arteries (2).

The deposition of lipids causes atherosclerosis in the endothelium of large and medium-sized arteries; the disease is associated with the excessive inflammation of the vascular wall, the formation of fat veins, the proliferation, and alteration of several groups of vascular wall cells, such as smooth muscle cells, monocytes, T lymphocytes, and platelets, which respond to inflammation (4). The process of atherosclerosis is progressive and usually begins in childhood, and the clinical manifestations occur in middle age (5).

Epidemiological studies have shown a clear association of some factors with coronary artery atherosclerosis, called CAD risk factors, including hypercholesterolemia, smoking, hypertension, diabetes, old age, male gender, and family history of CAD (6). Other risk factors for atherosclerosis include inactivity, obesity, increased blood coagulation, alcohol, and psychological factors. Numerous studies have been performed with

pharmacological interventions (e.g., lipid-lowering drugs), diets, lifestyle changes or surgery, and using coronary angiography to evaluate the course of coronary artery atherosclerotic lesions (7).

There is considerable evidence that atherosclerosis and CVD have a nutritional basis. The relationship between diet and coronary heart disease has been extensively studied in the last century (8, 9). According to a published study in 2010, more than three-quarters of mortalities from CVD might be prevented by adequate lifestyle changes (10).

The issue of dietary patterns is a topic that has recently been considered by nutrition epidemiologists but has not yet received attention as much as nutrients or foods. The evaluation of dietary patterns is an important point, which is more in line with the real world. Individuals do not consume nutrients individually, and the diet consists of a variety of foods with complex combinations of nutrients that might interact with each other. Eating habits affect the risk of CVD by influencing risk factors, such as serum cholesterol, blood pressure, body weight, and diabetes or independently of these factors (11).

Some analyses have also shown relationships between dietary patterns, health outcomes, and risk factors, including body mass index (BMI), serum cholesterol, and blood pressure. A study conducted in Tehran, Iran, showed that healthy eating patterns play an essential role in reducing the risk factors for obesity, hypertension, and high blood cholesterol (12).

2. Objectives

Considering what has been said, the increase in CVD (e.g., atherosclerosis) in the community, and the reduction of the age of disease onset, the present study aimed to compare the routine risk factors for atherosclerosis, including lifestyle, family history, hypertension, metabolic disorder, and dyslipidemia, between Arab and Lor patients with atherosclerosis.

3. Patients and Methods

3.1. Study Design

The present descriptive-analytical study was approved by the Medical Ethics Committee of Ahvaz Jundishapur University of Medical Sciences, Khuzestan, Iran (reference no.: IR.AJUMS.REC.1399.399). All participants signed the consent form.

3.2. Study Population

The inclusion criteria of the current study were from the Lor or Arab race, definitive diagnosis of atherosclerosis, and history of elective angiography or acute coronary syndrome. Patients with several characteristics were excluded from the study, namely pregnancy, races except for Arab or Lor, a history of myocardial infarction in the past 2 weeks, and mental and metabolic disorders. After selecting the participants, all subjects were evaluated for the routine risk factors, including lifestyle, smoking, family history, hypertension, metabolic disorder, and dyslipidemia.

3.3. Instruments

The BMI was calculated for each participant. The metabolic equivalent of task was used to calculate physical activity, which is applicable in vascular health care plans. Participants' food intake was collected using a food frequency questionnaire. This questionnaire measures the frequency of consumption of six food groups (i.e., bread and cereals, vegetables, fruits, milk and dairy, meat, eggs and legumes, and miscellaneous groups). The participants were asked to report their consumption frequency for each food item in the questionnaire by day, week, month, or year. The reported frequency was converted to the daily intake in grams, according to the desired unit size for each item.

The factor analysis (i.e., principal component analysis [PCA]) method was used to extract and determine the dietary patterns of patients. The received food groups were adjusted for the received energy via residual regression. For the determination of dietary patterns, PCA was performed using the PCA method with Varimax period, Kaiser-Meyer-Olkin test, and adjusted food groups in terms of calorie intake. Each individual's score for the degree of adherence to each dietary pattern was obtained by calculating the linear combination of standard values of five food groups with coefficients obtained from factor analysis. A higher score per individual in each dietary pattern indicated higher adherence to the pattern. Healthy eating patterns with high factor loading characteristics in food groups of vegetables (starchy and non-starchy), low-fat dairy products, and nuts and unhealthy eating patterns with high functional load in oils (liquid and solid), mayonnaise, and refined grains were defined. According to the analysis of community food patterns, which were collected by the aforementioned checklists and analyzed using nutrition software, the dominant healthy and unhealthy food patterns of each community were determined.

3.4. Statistical Analysis

Data normality was checked by the Kolmogorov-Smirnov test. A *t*-test was used to compare baseline parameters after follow-up. Analysis of variance was used to compare the outcome of transplantation with time. The Mann-Whitney U test was used to compare means. The significant p-value was considered less than 0.05. All data were analyzed by SPSS software (version 24, 2017, USA).

4. Results

This study aimed to compare Lor and Arab atherosclerosis patients for the routine risk factors. A total of 200 patients participated in the study, of which 101 (51.5%) and 99 (48.5%) subjects were Lor and Arab, respectively. In terms of gender distribution, 52.5% and 56.6% of Lor and Arab races were female, respectively. Among studied individuals, (79.2%) and (76.77%) of Lor and Arab patients were married, respectively. Additionally, 49.51% and 46.53% of Lor and Arab patients had a family history of heart disease, respectively. Furthermore, 54.5% and 42.4% of Lor and Arab patients had a history of underlying diseases, respectively. Moreover, 5% and 9.9% of Lor and Arab patients had a history of alcohol consumption, respectively (Table 1).

The mean age values of Lor and Arab patients were 60.16 ± 11.62 and 61.35 ± 9.80 years, respectively. In general, the Chi-square test results did not show any significant differences between the two races in terms of characteristics. In addition, the mean BMI in all atherosclerosis patients participating in this study was 28.86 ± 4.86 kg/m^2, and no significant difference was observed in mean BMI between both races ($P > 0.05$; Table 1).

Table 2 tabulates food grouping in this study. The first dietary pattern as a healthy eating pattern included a high intake of low-fat dairy, condiments, vegetables, and nuts and a low intake of red meat, refined meats, and high-fat dairy. The second dietary pattern as unhealthy eating patterns included a high intake of mayonnaise, liquid and solid oils, and refined grains, and a low intake of fruits and potato beans.

Table 3 shows the patients' general characteristics in the quarters of healthy and unhealthy diets. Based on the one-way analysis of variance, no significant relationship was observed between the quarters of healthy and unhealthy diets. Covariance analysis was used to investigate the relationship between dietary patterns and routine risk factors (i.e., lipid and glucose profiles) by adjusting for confounding variables (i.e., energy intake, gender, age, and BMI). There was no significant difference between the scores of adherences to dietary patterns with high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), cholesterol, triglyceride, and fasting blood sugar (FBS) in the two studied groups ($P > 0.05$; Table 4).

The results (Table 5) based on the independent t-test showed that there was no significant difference between the two races in the mean serum levels of triglycerides, HDL-C, and LDL-C ($P > 0.05$). Mean cholesterol levels and FBS were significantly correlated ($P < 0.05$), and the mean values of these two factors were higher in the Lor race than in the Arab race.

5. Discussion

According to the present study results, the BMI in both races was overweight, and this index is considered a risk factor for heart disease. In different societies, obesity depends on lifestyle, race, and diet. The differences between the two genders in obesity were probably due to male subjects' increased desire for smoking and physical activity. Other cultural issues also reduce the frequency of obesity in men that can also be related to the psychological pressures caused by individuals' economic and social status (13).

The present study findings indicated no association between CVD risk factor frequency among Lor and Arab populations. Although the prevalence of family history and underlying disease were more frequent in the Lor population, this was not significant that can be interpreted by the low sample size. In a study performed by Pranata et al., although no significant relationship was observed between race and a family history of heart diseases, a significant relationship was reported between positive family history and risk factors for cholesterol, hypertension, and LDL-C. Pranata et al. suggested that family history can be a good predictor for screening and identifying individuals at risk (14).

In addition, in a study conducted by Chaman et al. (15), the history of hypertension in Turkmen ethnicity was higher than Sistani and Baluch ethnic groups. The prevalence of obesity in Turkmen was higher than other ethnicities, and no significant relationship was observed between the ethnicity and underlying disease (i.e., hypertension) (16). It seems that the culture and diet of Turkmen and Baloch individuals affect the results.

Biochemical factors for atherosclerosis were assessed based on race. The results showed that the mean values of cholesterol and FBS in Lor participants were significantly higher than the Arab ones. In a USA study of Asian Americans, the different prevalence of CVD risk factors

Table 1. Demographic Characteristics of Patients with Atherosclerosis [a]

Variables	Lor	Arab	P-Value [b]
Marital status			0.668
Single	21 (20.80)	23 (23.23)	
Married	80 (79.20)	76 (76.77)	
Gender			0.663
Male	48 (47.5)	44 (44.4)	
Female	53 (52.5)	55 (56.6)	
Family history of heart diseases			0.572
Positive	50 (49.51)	47 (46.53)	
Negative	51 (50.49)	52 (53.47)	
History of underlying diseases			0.092
Positive	55 (54.5)	42 (42.4)	
Negative	46 (45.5)	57 (57.6)	
History of smoking			0.72
Positive	24 (23.7)	35 (35.3)	
Negative	77 (76.3)	64 (64.7)	
History of alcohol consumption			0.16
Positive	5 (5)	10 (9.9)	
Negative	96 (51.9)	89 (88.11)	
History of high blood pressure			0.42
Positive	37 (36.6)	31 (31.3)	
Negative	64 (63.4)	68 (68.7)	
Age (y)	60.16 ± 11.62	61.35 ± 9.80	0.219

[a] Values are expressed as mean ± SD or No. (%).
[b] Chi-square test.

Table 2. Extracted Dominant Food Patterns [a]

Healthy Eating Pattern	Unhealthy Eating Pattern
High intake: Low-fat dairy, condiments, vegetables, and nuts	High intake: Mayonnaise, liquid and solid oils, and refined grains
Low intake: Red meat, refined meats, and high-fat dairy	Low intake: Fruits, beans, and potatoes

[a] This table shows the results of the factor analysis test. Based on principal component analysis and 25 defined food groups, two healthy and unhealthy food patterns were extracted. The table shows a healthy diet with a high factor loading characteristic in vegetables (starchy and non-starchy), low-fat dairy products, and nuts and an unhealthy high-loading pattern of oils (liquid and solid), mayonnaise, and refined grains. These two patterns together accounted for 52% of the variance obtained from factor analysis.

was reported in different races; for example, the higher prevalence of hypercholesterolemia in the Japanese and hypertension in the Philippines. Finally, the focus of regional health systems on common problems in each region showed the existing racial differences (17). Some studies have shown that racial and ethnic differences have effectively increased the risk of numerous abnormalities, including some types of heart abnormalities (18).

There was no significant difference between adherence to healthy and unhealthy diets in Arab and Lor breeds. Furthermore, no significant difference was observed between demographic information and different quarters of adherence to healthy and unhealthy eating patterns in Arab and Lor races. On the other hand, although dietary patterns were different and not comparable between different countries and cultures, the healthy and unhealthy dietary patterns in the present study are similar to worldwide patterns (19).

Sobhani et al.'s study showed a significant relationship between traditional and modern dietary patterns with

Table 3. Profiles of Patients Based on the Score of Adherence to Dominant Dietary Patterns [a]

Variables	Score of Following a Healthy Eating Pattern				P	Score of Following an Unhealthy Eating Pattern				P
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter		First Quarter	Second Quarter	Third Quarter	Fourth Quarter	
Gender					0.49					0.76
Female: Lor (52.5) vs. Arab (56.6)	28 (26.2)	21 (19.6)	30 (28)	28 (26.2)		27 (25.2)	27 (25.2)	27 (25.2)	26 (24.4)	
Male: Lor (47.5) vs. Arab (44.4)	21 (23.3)	31 (34.5)	16 (17.8)	22 (22.4)		19 (21.1)	27 (30)	21 (23.3)	23 (25.6)	
Nationality					0.82					0.57
Lor (101)	26 (26.3)	25 (25.3)	21 (21.1)	27 (27.3)		24 (24.2)	28 (28.3)	20 (20.2)	27 (27.3)	
Arab (99)	23 (23.5)	27 (27.5)	25 (25.5)	23 (23.5)		22 (22.4)	26 (26.5)	28 (28.7)	22 (22.4)	
Blood pressure					0.08					0.72
Yes: Lor (54.4) vs. Arab (45.6)	16 (23.9)	12 (17.9)	22 (32.8)	17 (25.4)		19 (28.4)	15 (22.4)	19 (28.4)	14 (20.8)	
No: Lor (48.5) vs. Arab (51.5)	33 (25.4)	40 (30.7)	24 (18.5)	33 (25.4)		32 (24.6)	32 (24.6)	31 (23.9)	35 (26.9)	
Smoking history					0.17					0.17
Yes: Lor (40.7) vs. Arab (59.3)	10 (17.5)	16 (28.1)	15 (26.3)	16 (28.1)		14 (24.6)	10 (17.5)	13 (22.1)	20 (35.1)	
No: Lor (54.6) vs. Arab (45.4)	37 (26.4)	36 (25.7)	31 (22.1)	34 (24.3)		37 (26.4)	37 (26.4)	37 (26.4)	29 (20.7)	
Marital status					0.97					0.77
Single Arab (53.5) vs. Single Lor (50.5)	25 (24.8)	26 (25.6)	25 (24.8)	25 (24.8)		25 (24.8)	28 (27.7)	26 (25.6)	22 (21.9)	
Married Arab (46.5) vs. Married Lor (49.5)	24 (25)	26 (27.1)	25 (26)	25 (26)		21 (21.9)	26 (27.1)	22 (22.9)	27 (28.1)	
Age (y) 60.75 ± 10.75	62 ± 11.32	60.6 ± 10.4	59.6 ± 10.9	60.68 ± 10.9	0.37	60.06 ± 10.4	62 ± 12.3	60.06 ± 10.4	60.06 ± 10.4	0.62
Body mass index (kg/m^2) 28.86 ± 4.86	28.9 ± 4.6	29.03 ± 4.9	29.5 ± 5.2	27.8 ± 4.6	0.54	28.1 ± 4.7	28.8 ± 4.5	28.6 ± 4.7	29.6 ± 5.4	0.51
Physical activity (MET/min/day)	20.35 ± 1.4	19.58 ± 4.23	19.74 ± 3.3	20.39 ± 1.29	0.37	20.38 ± 1.4	19.4 ± 4.98	20.1 ± 1.3	20.30 ± 1.4	0.93

Abbreviations: MET, metabolic equivalent of task.
[a] One-way analysis of variance.

Table 4. Comparison of Lipid and Glucose Profiles and Adherence to Dominant Dietary Patterns in Lor and Arab Races [a]

Independent Variables	Lor P-Value		Arab P-Value	
	Healthy Eating Pattern	Unhealthy Eating Pattern	Healthy Eating Pattern	Unhealthy Eating Pattern
HDL-C	0.78	0.46	0.39	0.99
LDL-C	0.97	0.59	0.59	0.53
Cholesterol	0.82	0.85	0.07	0.34
Triglycerides	0.08	0.29	0.35	0.76
FBS	0.91	0.55	0.82	0.13

Abbreviations: HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; FBS, fasting blood sugar.
[a] By adjusting the variables of age, gender, body mass index, and received calories.

Table 5. Comparison of Some Risk Factors in Patients with Atherosclerosis Based on Race [a]

Race	Cholesterol	Triglycerides	HDL-C	LDL-C	FBS
Arab	154.34 ± 50	139.78 ± 73.18	46.15 ± 66.64	87.38 ± 72.72	122.4 ± 44.43
Lor	167.41 ± 55.71	155.91 ± 71.27	45.13 ± 60.73	94.46 ± 32.1	133.37 ± 53.59
Total	161.38 ± 09.94	147.85 ± 84.23	46.14 ± 12.67	91.42 ± 7.64	128.37 ± 4.59
P-value	0.025	0.23	0.87	0.35	0.012

Abbreviations: HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; FBS, fasting blood sugar.
[a] Independent *t*-test

variables, such as age, physical activity, race, height, and economic status (20), which contradicts the present study results. Sobhani et al.'s study was performed on rural children of school age; the differences in the results might be due to the differences in the studied groups.

The results of "Comprehensive Plan for the Study of Household Food Consumption Patterns and Nutritional Status of the Country" also showed that in the provinces with Azeri ethnicity (i.e., East Azerbaijan, West Azerbaijan, Zanjan, and Ardabil), fat and sugar consumption is more. Moreover, fruits and vegetable intake is less than provinces with Persian ethnicity (21).

There was no significant difference between dietary patterns (i.e., healthy and unhealthy diet) and routine risk factors for atherosclerosis. In this regard, Haghighatdoost et al.'s (22) study showed that a healthy diet was not significantly associated with most CVD risk factors, which is consistent with the present study results. Numerous factors, such as racial diversity and differences in eating habits and lifestyles, affect these results (23).

The relationship between dietary patterns and CVD risk factors has been reported in numerous countries; the dietary pattern has been suggested as one of the several factors involved in developing CVD (24, 25). In a study conducted by Sun et al. in China, the findings showed a significant association between unhealthy foods (e.g., fast food, snacks, and red meat) consumption and atherosclerosis. The positive relationship between an unhealthy diet and atherosclerosis is because unhealthy foods consumption, such as high levels of carbohydrates with a high glycemic index, leads to high glycemic response and increases carbohydrates oxidation and their conversion into fat, increasing weight, and BMI. It also increases cholesterol and triglycerides in the body and prepares the ground for CVD (26).

5.1. Conclusions

According to performed research, nutrition plays an essential role in maintaining health and preventing disease, and a healthy diet can reduce the risk of progressive CVD. In the present study, no significant relationship was observed between the dietary patterns and CVD risk factors that might be due to the sample size and the study design. On the other hand, in most studies, the diet was compared between the patient and control groups; however, in the present study, the Arab and Lor groups were compared; they were not compared to other groups in terms of atherosclerosis. On the other hand, CVD risk factors (e.g., atherosclerosis) are multifactorial. Various elements, including environmental and cultural factors, social etiquette, nutritional intakes, and racial differences, can affect the prevalence and growth of the disease in any region. It is necessary to identify the risk factors, step forward, correct the risk factors, and improve the quality of life in patients.

5.2. Limitations

The main limitation of the present survey is the small sample size; a larger sample size produces reliable results for comparing races. In this regard, it is highly recommended to carry out further investigations with larger sample size. It is worth noting that although different races were studied, living in the same region influences the lifestyle. Therefore, it is highly suggested to examine different races in various regions in future studies.

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Footnotes

Authors' Contribution: A.kh conceived and revised the manuscript. A. A and B. H wrote the manuscript. H. M, M. Z, and M. S. N provided the clinical data and information and performed the technical tests. All authors read and approved the final manuscript.

Conflict of Interests: The authors declare that they have no conflict of interest.

Data Reproducibility: The analyzed datasets during the current study are available from the corresponding author on reasonable request.

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