Original Article

Evaluation of Atherosclerotic Cardiovascular Disease Risk Score in Medical Residents of Imam Hossein Hospital: A Cross-Sectional Study

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Abstract

Background: Cardiovascular disorders are the most common cause of death in the world. It seems that doctors are usually at high cardiovascular risk due to high stress and anxiety, high work pressure, and an inactive lifestyle. Therefore, this study aimed to evaluate the residents' atherosclerotic cardiovascular disease (ASCVD) risk score.

Materials and Methods: This cross-sectional study was conducted on Imam Hosein Hospital's residents to evaluate their ASCVD risk score in 2022. Participants filled out a general checklist to obtain baseline features, and a blood sample was taken to measure biochemical factors. The 10-year cardiovascular risk was estimated by the Framingham Risk Score (FRS), and depression severity was determined using the Patient Health Questionnaire-9.

Results: In this study, 150 medical residents were evaluated whose mean age was 30.94 ± 3.26, and 50% were male (n=75). Obesity, smoking, and alcohol were more common in male compared to female residents (P<0.05). Also, laboratory abnormalities were more common in men (P<0.05). Additionally, it was observed that the overall mean score FRS was 1.44±1.31%, while this figure in men (2.23 ± 1.44%) was higher than that of women (0.65±0.35%). In terms of mental health, the prevalence of major depression in women (37.33%) was higher than in men (21.33%) (P = 0.178).

Conclusion: Medical residents are at low risk of ASCVD, but risk factors such as obesity, alcohol consumption, smoking, and depression are remarkably high in them.

Keywords: Cardiovascular disease, Atherosclerotic disease, Physician, Residents, Framingham risk score

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Introduction

Over the past few decades, the global prevalence and mortality of atherosclerotic cardiovascular disease (ASCVD) have increased, and 23.6 million deaths from cardiovascular disease (CVD) are projected to occur annually by 2030. In high-income countries, mortality from ASCVD has decreased due to advances in

treatment and preventive procedures. However, ASCVD is the leading cause of death worldwide. In addition, age-standardized ASCVD mortality rates have recently increased in some regions of high-income countries. The substantial prevalence of ASCVD carries considerable economic implications, with projections indicating that costs associated with ASCVD in the United States are expected to rise by $183 billion between 2015 and 2035. Consequently, there is a significant opportunity for effective risk evaluation and the prevention of ASCVD[1-4].

Identifying risk factors associated with ASCVD is important to inform public health policies and interventions to reduce ASCVD risk. One study found that 44% of the reduction in coronary heart disease deaths in the United States from 1980 to 2000 was due to the optimization of several CVD risk factors, including high cholesterol, high blood pressure, smoking, and lack of physical activity[5, 6]. ASCVD risk assessment based on these CVD risk factors guides the therapeutic recommendations, which are primarily aimed at lowering low-density lipoprotein-cholesterol (LDL-C) in primary prevention because cumulative exposure to LDL-C provokes ASCVD[7, 8].

It is believed that the incidence of cardiovascular diseases and their modifiable risk factors in healthcare workers is relatively low. However, some work-related risk factors, such as long shifts *and* mental and physical stress created by the hospital environment, place health workers in the category of high occupational risk for certain diseases. For example, cardiologists often are busy and have unbalanced work lives, and their lifestyles are usually sedentary. All these factors contribute to the deterioration of conditions and obesity in cardiologists[9, 10]. Therefore, detecting cardiac risk is important for establishing and implementing specific changes to reduce cardiovascular risk among healthcare professionals[11]. Considering this issue and the lack of similar studies in this area, we aimed to assess the ASCVD risk score in the residents of Imam Hossein Hospital in 2022.

Methods

Study design and participants: This was a cross-sectional study conducted on medical residents of Imam Hosein Hospital, one of the educational hospitals in east of Tehran, Iran, under the supervision of Shahid-Behehshti University of Medical Sciences (SBMU) to evaluate their ASCVD risk scores. The review board of the ethics committee of Shahid Beheshti Medical University approved the study (IR.SBMU.MSP.REC.1401.595).

The inclusion criterion was being a full-time medical resident at Imam Hosein Hospital in 2022. Medical resident refers to individuals enrolled in a medical specialty training program (residency).

The exclusion criteria were previous history of ischemic heart disease, heart failure, cardiac arrhythmias, history of any diagnostic intervention or aggressive cardiac treatment, history of taking heart medications within three months ago, and lack of consent to participate in the study.

Data gathering: A questionnaire, consisting of two parts, was used for each resident. The first part is the checklist questionnaire made by the researcher under the research objectives, and the second part is called the patient health questionnaire. This standard questionnaire is valid and reliable. After obtaining the permission of the Medical Ethics Committee from the Faculty of Medical Sciences and obtaining informed consent from the participants, the questionnaire was completed in the presence of respected residents. The participants were asked to perform the tests mentioned in the questionnaire by referring to the hospital's diagnostic laboratory, and the results were attached to the questionnaire.

ASCVD risk calculation: ASCVD risk was estimated based on the Framingham risk score (FRS)[12]. FRS was calculated using the method developed by D'Agostino et al[13]. This method takes into account several factors, including the individual's sex, age, blood pressure, smoking status, onset of diabetes, total cholesterol (TC) levels, and high-density lipoprotein-cholesterol (HDL-C) levels. FRS is calculated using a scoring system that assigns points to the aforementioned factors. The total FRS score can range from 0 to 25 points. Depending on the individual's FRS score, their 10-year risk of CVD is then categorized as follows: a score below 10% indicates a low risk, a score between 10% and 20% indicates moderate risk, and a score above 20% indicates a high risk of developing CVD within the next 10 years. This risk assessment is applicable for both men and women.

Mental health assessment: The Patient Health Questionnaire-9 (PHQ-9), a 9-item self-administered questionnaire, was used to measure depression severity. The assessment utilizes a 4-point rating scale to score each item, with options ranging from 0 (not at all) to 3 (nearly every day). The total score for the nine items on the assessment can range from 0 to 27. A score of 15 or higher is considered to indicate the presence of major depressive disorder, while a score of below is classified as no depression. A score between 5-9 and 10-14 was considered as low and moderate depression risk, respectively[14]. In this study, the Persian version of this questionnaire, which has been validated and has a Cronbach's alpha of 0.86, was used.

Sampling method and Sample size estimation: Random sample selection was conducted using the simple randomization method for male and female residents, utilizing a series of random numbers generated with the RND function of Excel software (Microsoft Office 2016) from the list of all medical residents working full-time in 2022 at Imam Hossein Educational Hospital. Considering an 11% prevalence (moderate prevalence) of smoking among young medical residents, a type I error rate of 5% (α=0.05), and a precision (margin of error) of 0.05 (d=0.05), the minimum sample size required, according to Cochran's formula, has been calculated to be 150 individuals. Finally, an equal ratio of female and male (1:1) participants was examined to investigate cardiovascular risk factors.

Statistical analysis: At first, the normality of quantitative variables was evaluated using the Shapiro-Wilk Test and Q-Q plot. Mean and standard deviation (SD) or median and interquartile range (Q1-Q3) were used to describe quantitative variables, and frequency and percentage (%) were used to describe grouped variables. To compare the difference in the mean of quantitative variables between the two groups, the parametric Student's t-test or the nonparametric Mann-Whitney U test was used. Levene's test measured the assumption of equality of variances in quantitative variables with normal distribution. The chi-square test or Fisher's exact test was used to compare the distribution of qualitative variables. The 10-year risk percentage calculations for cardiovascular diseases were calculated using the "Framingham" package in STATA 14 software for all participants. Finally, Spearman's correlation test was used to assess the correlation between the 10-year risk of cardiovascular disease (according to the Framingham criteria) and other variables. According to the interpretation, the intensity of correlation by considering the value of correlation coefficient (rho) with spectrum ($\geq$ 0.70) as *a* strong correlation, with spectrum (0.4-0.7) as moderate correlation, and $\leq$ 0.4 as correlation is considered weak. All statistical analyses are reported as two-sided with a significance level of less than 0.05. The software used for data analysis was STATA version 14.

Ethical approval and consent for publication: This article is extracted from the thesis for the Cardiology residency program with registration number 43003619 affiliated with Shahid Beheshti University of Medical Sciences, Tehran, Iran. The ethics committee approved this study and reviewed the board of faculty of medicine, Shahid Beheshti University of Medical Sciences, with the number of IR.SBMU.MSP.REC.1401.595.

Results

A total of 150 medical residents in different fields participated in this study. The mean age of the residents was 30.94±3.26 years; 50% of the people were male (n=75), and 50% (n=75) were female. The basic data of medical residents are seen in Table 1. After comparing socio-economic and individual factors between men and women, except their type of specialty (P<0.001), no significant difference was observed between these factors between men and women (P>0.05).

Clinical cardiovascular risk factors were assessed in the residents and presented in Table 2. It was observed that the prevalence of obesity was higher in males compared to females (P<0.001). Also, the ratio of waist circumference to hip circumference (WHR), smoking, and alcohol consumption were higher in men than women (P< 0.05).

We assessed laboratory risk factors, and it was observed that vitamin D deficiency (38.78%), abnormal hemoglobin level (20.41%), high triglyceride (19.59%), abnormal thyroid hormone (TSH) levels (15.07%), high cholesterol (12%), and

abnormal bilirubin (10.96%) were among the most common disorders in residents' laboratory factors.

Table 1. General and demographic characteristics of participants.

Variables	Female (n=75)	Male (n=75)	Total (n=150)	P Value
Age (years)	31.09 ± 2.77	30.80 ± 3.70	30.94 ± 3.26	0.207
Marital status				
Divorced	2 (2.67)	1 (1.35)	3 (2.01)	0.757
Married	31 (41.33)	34 (45.95)	65 (43.62)	
Single	42 (56.00)	39 (52.70)	81 (54.36)	
Number of children				
Does not have	70 (93.33)	69 (92.00)	139 (92.67)	1.000
One	4 (5.33)	4 (5.33)	8 (5.33)	
Two	1 (1.33)	2 (2.67)	3 (2.00)	
Accommodation status				
Dormitory	1 (1.33)	0 (0.0)	1 (0.67)	0.518
Rental home	60 (80.00)	64 (85.33)	124 (82.67)	
Private home	14 (18.67)	11 (14.67)	25 (16.67)	
Income (per month)				
≤ 100 million (Iranian Rial)	32 (43.84)	39 (52.00)	71 (47.97)	0.320
>100 million (Iranian Rial)	41 (56.16)	36 (48.00)	77 (52.03)	
30 minutes of physical activity				
0 – 1 time in a week	1 (1.33)	1 (1.33)	2 (1.33)	0.796
2 – 5 times in a week	53 (70.67)	49 (65.33)	102 (68.00)	
>5 times in a week	21 (28.00)	25 (33.33)	46 (30.67)	
Medical expertise				
Anesthesia	3 (4.00)	2 (2.67)	5 (3.33)	**<0.001***
Cardiology	7 (9.33)	6 (8.00)	13 (8.67)	
Infectious diseases	8 (10.67)	2 (2.67)	10 (6.67)	
Internal medicine	18 (24.00)	14 (18.67)	32 (21.33)	
Emergency medicine	0 (0.0)	4 (5.33)	4 (2.67)	
Psychiatry	8 (10.67)	3 (4.00)	11 (7.33)	
Neurology	9 (12.00)	0 (0.0)	9 (6.00)	
Pathology	8 (10.67)	0 (0.0)	8 (5.33)	
Radiology	8 (10.67)	2 (2.67)	10 (6.67)	
Orthognathic surgery	2 (2.67)	8 (10.67)	10 (6.67)	
Orthopedics	0 (0.0)	12 (16.00)	12 (8.00)	
Neurosurgery	2 (2.67)	11 (14.67)	13 (8.67)	
Residency stage				
First-year	14 (18.67)	17 (22.67)	31 (20.67)	0.490
Second year	21 (28.00)	27 (36.00)	48 (32.00)	
Third year	23 (30.67)	16 (21.33)	39 (26.00)	
Fourth-year	17 (22.67)	15 (20.00)	32 (21.33)	

Data described as mean ± standard deviation or frequency and percentage
*statistical significant, P.value<0.05

After comparing all the laboratory factors, it was observed that abnormal values of laboratory factors were more common in men than in women in most of the tests. The details are reported in Table 3.

After estimating the 10-year risk of developing cardiovascular diseases based on the Framingham criteria for all participants, it was observed that the overall mean score was 1.44±1.31%, and the mean score in men (2.23±1.44%) was higher than that of women (0.65±0.35%)(P<0.001). After dividing all the participants based on the risk rating spectrum, it was observed that all the residents are in the low-risk

spectrum (below 10% of the 10-year risk of cardiovascular diseases)[15].

Table 2. Clinical assessment, habits, and history of participants.

Variables	Female (n=75)	Male (n=75)	Total (n=150)	P.value
Anthropometric assessment				
Weight (kg)	65.20 ± 5.83	82.74 ± 8.32	73.91 ± 11.34	**<0.001***
Height (cm)	164.57 ± 4.73	176.28 ± 11.03	170.38 ± 10.28	**<0.001***
Body Mass Index (BMI, kg/m^2)	24.06 ± 1.78	26.23 ± 2.57	25.14 ± 2.46	**<0.001***
BMI category				
Normal	61 (81.33)	30 (40.0)	91 (60.66)	**<0.001***
Overweight	13 (17.33)	36 (48.0)	49 (32.67)	
Obese (grade I)	1 (1.33)	9 (12.0)	10 (6.67)	
Waist to Hip ratio (WHR, cm)	0.77 ± 0.03	0.95 ± 0.05	0.86 ± 0.09	**<0.001***
WHR category				
Low risk (male ≤0.95 , female ≤0.80)	59 (78.67)	50 (66.67)	109 (72.67)	**0.017***
Moderate (male: 0.96 – 1, female: 0.81 – 0.85)	15 (20.00)	15 (20.00)	30 (20.00)	
High risk (male ≥1, female ≥0.86)	1 (1.33)	10 (13.33)	11 (7.33)	
Hemodynamic assessment				
Systolic blood pressure (mmHg)	101.32 ± 7.54	118.32 ± 5.46	109.82 ± 10.76	**<0.001***
Diastolic blood pressure (mmHg)	65.76 ± 9.60	75.37 ± 5.55	70.56 ± 9.18	**<0.001***
Habits				
Current smoker				
No	64 (85.33)	49 (65.33)	113 (75.33)	**0.004***
Yes	11 (14.67)	26 (34.67)	37 (24.67)	
Smoking Pack/year	3 (2 – 1)	4.5 (3 – 5)	4 (3 – 5)	0.050
Other types of tobacco or substance use				
None	66 (88.00)	54 (72.00)	120 (80.00)	**0.004***
Opium	0 (0.0)	0 (0.0)	0 (0.0)	
Water pipe	0 (0.0)	5 (6.67)	5 (3.33)	
Water pipe and drinking alcohol	0 (0.0)	5 (6.67)	5 (3.33)	
Drinking alcohol	8 (10.67)	11 (14.67)	19 (12.67)	
Amphetamine	1 (1.33)	0 (0.00)	1 (0.67)	
Medical history				
Positive family history of cardiovascular disease (Yes)	15(20.00)	28 (37.33)	43 (28.67)	**0.019***
Thyroid function				
Normal	69 (92.00)	72 (96.00)	141 (94.00)	0.494
Hyperthyroidism	1 (1.33)	0 (0.0)	1 (0.67)	
Hypothyroidism	5 (6.67)	3 (4.00)	8 (5.33)	
Diabetes (Yes)	4 (5.33)	2 (2.67)	6 (4.00)	0.681
Hypertension (Yes)	0 (0.0)	0 (0.0)	0 (0.0)	-
History of CVD, MI, or CABG (Yes)	0 (0.0)	0 (0.0)	0 (0.0)	-
Drug history (Yes)				
Anti-hypertensive agents	0 (0.0)	0 (0.0)	0 (0.0)	-
Lipid-lowering agents	0 (0.0)	1 (1.33)	1 (0.67)	1.000
Insulin	1 (1.33)	0(0.0)	1 (0.67)	1.000
Anti-diabetic agents	0 (0.0)	2 (2.67)	2 (1.33)	0.497

Data described as mean ± standard deviation or median and interquartile range (Q1 – Q3) or frequency and percentage
*statistical significant, P.value<0.05

In addition, in terms of depression, about 66% of participants had a mean PHQ-9 score of more than 9, which indicates moderate and major depression, while this figure was about 11% for no depression. Although the mean score in females (12.14±4.74) was more than in males (11.22±4.81), this difference was insignificant.

Table 3. Laboratory's finding of participants.

Variables	Female (n=75)	Male (n=75)	Total (n=150)	P.value
Hemoglobin (g/dl)	13.59 ± 1.95	15.50 ± 1.14	14.52 ± 1.87	**<0.001***
Normal (12 -16 g/dl)	66 (88.00)	51 (70.83)	117 (79.59)	**0.010***
Abnormal	9 (12.00)	21 (29.17)	30 (20.41)	
Platelet (10^9/L)	263.04 ± 65.48	246.02 ± 72.65	254.76 ± 69.35	0.149
Normal (150 – 450 × 10^9/L)	75 (100.0)	69 (97.18)	144 (98.63)	0.235
Abnormal	0 (0.0)	2 (2.82)	2 (1.37)	
Triglyceride (mg/dl)	147.45 ± 41.79	181.95 ± 45.94	164.47 ± 47.04	**<0.001***
Normal (<200 mg/dl)	65 (86.67)	54 (73.97)	119 (80.41)	0.052
≥200	10 (13.33)	19 (26.03)	29 (19.59)	
Total cholesterol (mg/dl)	136.33 ± 35.10	173.50 ± 34.49	154.92 ± 39.37	**<0.001***
Normal (<200 mg/dl)	70 (93.33)	62 (82.67)	132 (88.00)	**0.044***
≥200	5 (6.67)	13 (17.33)	18 (12.00)	
HDL-C (mg/dl)	47.69 ± 8.42	46.09 ± 10.06	46.89 ± 9.28	0.110
Normal (30 – 80 mg/dl)	75 (100.00)	73 (97.33)	148 (98.67)	0.497
Abnormal	0 (0.0)	2 (2.67)	2 (1.33)	
LDL-C (mg/dl)	72.32 ± 13.45	84.56 ± 15.67	78.40 ± 15.79	**<0.001***
Normal (≤100 mg/dl)	73 (97.33)	62 (84.93)	135 (91.22)	**0.009***
Abnormal (>100 mg/dl)	2 (2.67)	11 (15.07)	13 (8.78)	
FBS (mg/dl)	86.13 ± 17.45	88.32 ± 11.23	87.21 ± 14.71	**0.012***
Normal (≤100 mg/dl)	71 (94.67)	65 (89.04)	136 (91.89)	0.242
Abnormal (>100 mg/dl)	4 (5.33)	8 (10.96)	12 (8.11)	
HbA1c (%)	5.75 ± 0.37	5.79 ± 0.30	5.77 ± 0.33	0.131
Normal (<6.5%)	71 (94.67)	68 (95.77)	139 (95.21)	1.000
Abnormal (≥6.5%)	4 (5.33)	3 (4.23)	7 (4.79)	
Total bilirubin (mg/dl)	0.68 ± 0.71	0.63 ± 0.22	0.66 ± 0.53	0.646
Normal (0.5 – 1.5 mg/dl)	71 (94.67)	59 (83.10)	130 (89.04)	**0.033***
Abnormal	4 (5.33)	12 (16.90)	16 (10.96)	
AST (IU/L)	24.77 ± 8.15	24.97 ± 9.63	24.86 ± 8.87	0.813
Normal (5 – 38 IU/L)	73 (97.33)	63 (88.73)	136 (93.15)	0.051
Abnormal	2 (2.67)	8 (11.27)	10 (6.85)	
ALT(IU/L)	25.06 ± 8.56	25.78 ± 10.58	25.41 ± 9.57	0.826
Normal (5 – 42 IU/L)	73 (97.33)	63 (88.73)	136 (93.15)	0.051
Abnormal	2 (2.67)	8 (11.27)	10 (6.85)	
Alkaline phosphatase (IU/L)	177.80 ± 60.82	173.97 ± 47.0	175.93 ± 54.39	0.906
Normal (80 – 306 IU/L)	70 (93.33)	69 (97.18)	139 (95.21)	0.443
Abnormal	5 (6.67)	2 (2.82)	7 (4.79)	
TSH (mU/L)	2.86 ± 2.14	3.42 ± 2.96	3.14 ± 2.57	**0.017***
Normal (0.3 – 5 mU/L)	63 (84.00)	61 (85.92)	124 (84.93)	0.746
Abnormal	12 (16.00)	10 (14.08)	22 (15.07)	
T3 (mU/L)	1.29 ± 1.05	1.05 ± 0.94	1.17 ± 1.01	**<0.001***
Normal (0.6 – 2.1 mU/L)	68 (90.67)	56 (81.16)	124 (86.11)	0.099
Abnormal	7 (9.33)	13 (18.84)	20 (13.89)	
T4 (mU/L)	8.95 ± 7.79	7.61 ± 1.70	8.31 ± 5.78	**0.033***
Normal (4.5 – 12.5 mU/L)	66 (88.00)	66 (97.06)	132 (92.31)	0.059
Abnormal	9 (12.00)	2 (2.94)	11 (7.69)	
25-(OH) serum (Vitamin D, ng/ml)	32.06 ± 9.28	32.72 ± 8.49	32.38 ± 8.88	0.724
Normal (30 – 100 ng/ml)	45 (60.00)	45 (62.50)	90 (61.22)	0.756
Abnormal	30 (40.00)	27 (37.50)	57 (38.78)	

Data described as mean ± standard deviation or frequency and percentage *statistically significant, P.value<0.05

Table 4. Results of Atherosclerotic cardiovascular disease risk score based on the Framingham scoring scale and mental disorders assessment.

Variables	Female (n=75)	Male (n=75)	Total (n=150)	Range (Minimum-Maximum)	P.value
10-year Framingham risk score of ASCVD (%)	0.65 ± 0.35	2.23 ± 1.44	1.44 ± 1.31	0.20 – 7.50	**<0.001***
Low risk (≤ 10%)	75 (100.00)	75 (100.00)	150 (100.00)	-	-
Intermediate risk (10-20%)	0 (0.0)	0 (0.0)	0 (0.0)	-	
High risk (≥20%)	0 (0.0)	0 (0.0)	0 (0.0)	-	
Patient Health Questionnaire-9	12.14 ± 4.74	11.22 ± 4.81	11.68 ± 4.78	0 – 27	0.240
No depression (≤5)	8 (10.67)	9 (12.00)	17 (11.33)	-	0.178
Low risk (5 – 9)	16 (21.33)	18 (24.00)	34 (22.67)	-	
Moderate depression (10–14)	23 (30.67)	32 (42.67)	55 (36.67)	-	
Major depression (>15)	28 (37.33)	16 (21.33)	44 (29.33)	-	

Data described as mean ± standard deviation or frequency and percentage
*statistically significant, P.value<0.05

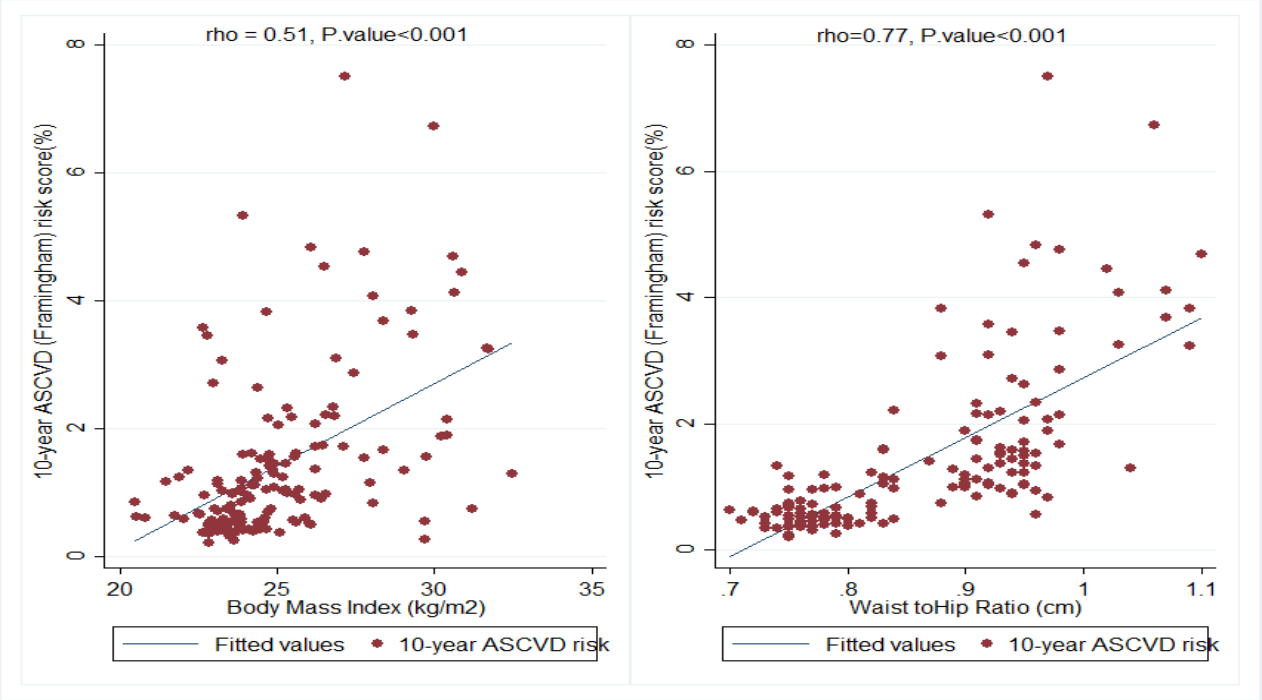

Figure 1. The correlation of 10-year ASCVD risk score with body mass index and waist-to-hip ratio.

According to Figure 1, after examining the correlation of Framingham's 10-year risk score with other variables, it was observed that only the body mass index (rho=0.51, P<0.001) had a positive and moderate correlation with the 10-year risk score of cardiovascular disease and the WHR (rho=0.77, P=0.007) had a positive and strong correlation with the 10-year risk of cardiovascular disease.

Discussion

This study evaluated 150 specialist residents from different fields in Imam Hossein Hospital. The prevalence of obesity, mean waist-to-hip ratio, smoking, and alcohol consumption were higher in men than women. Vitamin D deficiency, abnormal hemoglobin level, high cholesterol, high triglyceride, abnormal TSH, and abnormal bilirubin were the most common disorders found in residents' laboratory

factors, which were more common in men. All people's mean ASCVD risk score was 1.44±1.31 (%), indicating that the residents were in the low-risk spectrum. Although the prevalence of depression was higher in men (24%) than in women (21.33%), the prevalence of major depression in women (37.33%) was higher than in men (21.33%). BMI had a positive and moderate correlation with the 10-year risk score, and WHR had a positive and strong correlation with the 10-year risk of CVD. The amount of income had a statistically significant relationship with the depression.

Abadji et al. described the pattern of alcohol consumption and predictors of hazardous drinking among hospital physicians. They reported that out of 122 participants, 28 (23%) consumed alcohol moderately, and 9 (7.3%) were dangerous alcohol users. Experiencing stress or having a higher-than-average general health questionnaire (GHQ) score was significantly associated with hazardous drinking. It was concluded that the consumption of dangerous amounts of alcoholic beverages among hospital doctors is a problem, especially in people over 40 years old. Stress and other forms of psychological distress appear to play an important role in predicting hazardous drinking among physicians[16]. In the current study, it was seen that men had a higher alcohol consumption rate than women among residents. Thus, the alcohol consumption was 10.67% in women and 14.67% in men. In our study, the relationship between age and alcohol consumption was not investigated. Based on these two studies, it seems that alcohol consumption can be remarkable in doctors, especially men. It is also necessary to mention that this amount is probably underestimated in Iran due to the taboo of alcohol consumption in the culture.

Hedge et al.'s study aimed to assess the risk of cardiovascular diseases related to lifestyle among doctors and nurses in a medical college hospital. In this cross-sectional study, 250 doctors and nurses working in a medical college hospital in Tamil Nadu were selected. After receiving consent, each participant answered a questionnaire regarding socio-demographic characteristics and lifestyle-related risk factors. Risk was classified as low, medium, and high based on general risk factors, physical activity risk factors, and diet risk factors separately. It was found that 31.2% of all subjects and 49.2% of physicians were at overall risk for CVD. 30.4% of all study subjects and 42.1% of physicians were at high physical activity-related risk for CVD. 14.4% of all study subjects and 19.8% of all physicians were at high risk associated with dietary patterns for CVD. Increasing age was a statistically significant risk factor in all risk groups. It was concluded that physicians are at higher risk for CVD compared to nurses as well as the general population[17]. In the current study, it was seen that all doctors were at low ASCVD risk, but the level of depression, especially major depression, was significant in this population. Based on our findings, depression in the population of residents had a positive and significant relationship with the salary received. In our study population, obesity did not have a high prevalence, which was one of the differences between the present study and the study by Hedge et al. These differences can be due to the larger sample size in Hedge et al.'s study, as well as the high workload of the residents. According to available studies and evidence, high workload, high stress, and low income are among the issues related to burnout of residents in Iran[18].

Satijit et al. aimed to find the relationship between psychological stress and cardiovascular disease. They observed that the risk of a cardiovascular event was higher in patients with a history of social isolation, marital stress, work stress, childhood abuse, or trauma. It was concluded that psychological stress is an important risk factor for cardiovascular diseases that is often overlooked[19]. In the current study, it was seen that depression has a significant prevalence among residents. Based on this finding and the findings of Satijit et al.'s study, it can be said that the continuation of doctors' workload process with high levels of stress, burnout, and depression can lead to an increased risk of ASCVD in the future. Of course, this issue needs further investigation.

Pah et al. compared the parameters of psychological stress in a population of coronary artery disease patients with and without cardiovascular reconstruction methods and analyzed lifestyle and socio-economic factors. The findings showed that male gender, age, and marital status were important predictors of psychological stress in the study population. It was concluded that psychological and behavioral stress responses in patients with CAD are significantly related

to cardiovascular risk factors and can influence the disease progression. In addition, it seems that other factors, such as gender, income, and marital status, play decisive roles[20]. In the current study, it was seen that the cardiovascular risk factors were higher in men, and the income status of residents was related to their level of depression. Based on these two studies, it can be said that improving the income status of residents will reduce their depression and, as a result, reduce cardiovascular complications in the future.

The purpose of Nourikhan et al.'s study was to investigate the correlation between job burnout and residents' quality of life and the factors related to job burnout in resident training. Out of 86 people, twenty-seven people (31.4%) had severe emotional exhaustion (EE), 22 people (25.6%) had severe depersonalization (DP), and 40 people (46.5%) had low personal achievement (PA). Quality of life was affected by burnout domains, marital status, education level, gender, age, type of residency, night shift, difficult/rare cases, working hours, and number of emergency cases[21]. In the current study, it was seen that gender and depression were important factors for cardiovascular risk in medical residents. It seems that by implementing the right policies, this situation can be improved.

This study has several limitations. First, it was conducted in a single center with a relatively small sample size of 150 participants, which may limit the generalizability of the findings. Second, data collection was based on self-reported questionnaires, which introduces the possibility of information bias. This is particularly relevant for sensitive behaviors such as smoking and substance use, where underreporting may occur.

Conclusion

Although medical residents are currently at low risk for ASCVD, the presence of risk factors such as obesity, alcohol consumption, smoking, and depression may impact their cardiovascular health as they age, especially considering the relatively young mean age of the participants (30.94 ± 3.26 years).

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Conflict of interest

The authors further declare that they have no conflict of interest.

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