

Original article

Is there difference between cardiovascular disease risk factors in medical and nonmedical students?

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Abstract:

Background: The prevalence of cardiovascular diseases(CVD) in Iran has been increasing rapidly. Previous studies indicated the frequency of risk factors of CVD in general population, but inadequate research survey the frequency of CVD risk factors in medical students. So we performed this study to survey CVD risk factors in female medical students of Isfahan universities.

Methods: we performed a descriptive study on 266 female participants comprising 133 medical students and 133 non-medical students (controls individuals). CVD risk factors include of body mass index(BMI), waist circumference(WC), smoking status, physical activity, nutrition status, stress score, systolic and diastolic blood pressures were measured.

Results: Results showed 35(26.5%) of medical and 34(25.8%) of non-medical students had BMI ≥ 25 kg/m² (p=0.889). 21(15.8%) of medical and 28(21.1%) of non-medical students were passive smokers (p=0.26). 49 (36.8%) of medical and 81(60.9%) of non medical students had abnormal blood pressure (p<0.001). 9(6.8%) of medical and 22(16.5%) of non-medical students had abnormal WC (P=0.013). 12(9%) of medical and 18(13.5%) of non-medical students had an unfavorable nutrition status (p<0.001). Mean of stress number was 34.11 \pm 6.61 in medical and 26.06 \pm 7.07 in non-medical students(p<0.001). Mean of physical activity level was 1168.31 minutes per week in non medical students and 1159.99 in medical students but these difference was not statically significant(p= 0.134).

Conclusion: Although medical students have less risk factors but lower physical activity, more stress and abnormal BMI in them indicate that studying medicine alone can not guarantees healthy life style and we need practical plans to change their performance.

Key-words: Cardiovascular disease _ Medical students _ Risk factor

Introduction:

Cardiovascular diseases (CVD) are the are the most common cause of death and morbidity ¹ and they are also the major cause of lost life-years until at least 2020 ². Iranian adult population have a high level of CVD risk factors, which may require urgent decision making to address national control measures ³. Proportional mortality of cardiovascular disease was 46% in Iran in 2014⁴.

CVD has several risk factors include of hyperlipidemia, hypertension, smoking, overweight, obesity , low physical activity, diabetes and metabolic syndrome⁵.

Overweight and obesity as a key feature of the epidemiological transition have increased in developing countries over the past two decades ⁶. prevalence of obesity in Iran is equal to or higher than Europe and the United States and it is the primary cause of the rising prevalence of important

comorbid states such as hypertension and CVD.⁷ Obesity and body fat distribution are important predictive factors for coronary heart disease^{8,9}. High blood pressure is most important cause of death in patients with CVD¹⁰. Lifestyle modification through changes in eating patterns, moderating alcohol intake, weight loss, and regular physical activity forms part of an important and effective first-line treatment strategy for hypertension¹¹. Several epidemiological studies have also shown, low physical activity as a strong and independent risk factor for CVD¹². In other hand, smoking in combination to other risk factors can increase prevalence and severity of coronary heart disease¹³.

Concern about adverse effects of stress at work and chronic stress are increasing due to their risk factors for heart disease morbidity and mortality^{14,15}. Nutrition-related chronic diseases specially cardiovascular disease are the most cause of death and disability in the countries of the Eastern Mediterranean¹⁶.

According to previous studies in 2009 in Iran 14.2 percent of the adult population were current smokers. 32.5% of the individuals aged 15 -64 years had a physical activity of at least 10 minutes in their spare time. 14.8% and 28.8% of the Iranians aged 15-64 years were obese and overweight¹⁷ and in 2006 abdominal obesity was present in 43.4% of women and 9.7% of men¹⁸. The prevalence of pre-hypertension in 2008 was 59.6% in men and 44.5% in women; and 19.8% of men and 26.9% of women were hypertensive¹⁹.

Studying medicine is stressful and with a high physical and psychological pressure, so many of the medical students have an unhealthy lifestyle habit although they are aware of cardiovascular diseases and their modifiable risk factors. Rustagi et al suggested that modifiable risk factors of CVD have a high prevalence among medical students

and it becomes higher with more years spent in university²⁰. Bertias et al showed that many of the students of first and third year of medicine are overweight and obese and this condition is related with hypertension and dyslipidemia²¹.

Aims & Objectives :

The aim of this study is to assess the prevalence of modifiable cardiovascular risk factors such as BMI , smoking, stress, nutrition status, physical activity and hypertension in medical students and to compare their results with non-medical students.

Material & Methods:

This was a cross sectional study performed on 266 medical and non-medical female students of entering class of 2011 in Isfahan University of medical sciences and Isfahan technical University in July to October 2015. At the time of our study, Isfahan medical school had a 7-year study programme. The first 2.5 years are mainly pre-clinical years (basic and theoretical sciences) while the later years are clinical rotations in health care facilities . All students we chose were at the end of fourth year of studying because in medical group theoretical courses have been completed and it was the second year of clinical course and in non medical group it was last year of studying and two groups were similar in average of age . In non medical group we chose all of female students studying 5 major fields of Isfahan technical university : 35 students from physics field, 18 students from statistics field, 27 students from mathematics field , 18 students from computer field and 35 students from chemistry field. In medical group lists of students in each class were obtained from all departments of the medical school and we chose all of 163 female medical students. The informed consent was obtained from all participants. Students who did not answer half of the questions of questionnaires were excluded . 30 medical students refused to participate in the

study. Non of the questionnaires were answered less than half of the questions, so we did not exclude any participants from our study.

Physical characteristics:

A standard mercury sphygmomanometer was used to determine blood pressure. Blood pressure measurement was performed two times from the right arm after at least 5 minutes of rest and not drinking tea or coffee. The average of the two measurements were reported.

Students were weighed with a digital scale and without heavy clothing and shoes. Height was measured without shoes. Body mass index (BMI) was calculated as weight divided by the square of height (kg/m²). Waist circumference (WC) was measured with a metric tape at the level of umbilicus between iliac crest and the inferior margin of the 12th rib.

Questionnaires:

Demographic data such as age, housing, marital status, history of cardiovascular disease, medication for cardiovascular disease and family history of CVD were collected by a checklist.

Short form of International Physical Activity Questionnaire (IPAQ) was used to determine the level of physical activity by self report. This questionnaire measures physical activity of the last 7 days and classifies physical activity status in three level of low, moderate and high. Results of the questionnaire is calculated in two forms of quantitative and grading variables. IPAQ questionnaire is used by WHO and in several studies in different countries and validity and reliability of that is proved²².

Physical activity score Expressed as :Metabolic Equivalent of Task (MET) level x minutes of activity x events per week.

MET levels:

Walking = 3.3 METs

Moderate Intensity like carrying light loads, sweeping, washing windows, rakings, scrubbing floors, bicycling at a regular pace, swimming at a regular pace = 4.0 METs

Vigorous Intensity like heavy lifting, digging, heavy construction, climbing up stairs, aerobics, running, fast bicycling, or fast swimming = 8.0 METs

Sitting time = mean minutes of sitting per day x 7

Perceived stress was considered by Persian translation of the Cohen perceived stress scale. Internal validity of this scales is assessed. (Cronbach's alpha=0.78-0.81). This scale includes 14 items with likert scale with range of 0 (never) to 4 (very often) and total score is between 0 to 56²³.

Nutrition status and smoking status were determined with a checklist. Our smoking status checklist had 4 main questions about current smoking, past smoking, passive smoking and number of active smokers around each person.

Our nutrition status checklist had 11 questions about consumption frequency of dairy, fast foods, fried foods, fruits, vegetables, salt, cereals and grain, how to cook rice, remove chicken skin or not, using frying oil to cook fried foods or not.

Definition of risk factors:

BMI <25 was defined as normal and BMI ≥25 defined as abnormal²⁴.

WC ≥88 centimeters was determined abnormal²⁵.

Systolic blood pressure (SBP) <120 mmHg and diastolic blood pressure (DBP) <80 mmHg was defined normal and SBP ≥120 mmHg or DBP ≥80 mmHg was defined as abnormal²⁶.

Favorable: More than 8 answers are related with healthy diet.

Semi favorable: Between 4 to 8 answers are related with healthy diet.

Unfavorable: Less than 4 answers are related with healthy diet.

High blood sugar and dyslipidemia are also CVD risk factors but we did not investigate them because these risk factors are actually the result of other amendable risk factors that some of them have been investigated in our study like physical inactivity, nutrition status and BMI, in addition our target group were youth and changing in BS and lipid profile may take up a lot of time.

Statistical analysis

We used Statistical Package for Social Science (SPSS 21, Inc, Chicago). Analysis of quantitative data was done by independent t test for normal variables and Mann-Wittney test for non-normal variables. ANCOVA was used to adjust confounder effect. Pearson Chi-Square Test and Fisher Exact test were used to analyse categorical data.

Observations & results:

We studied 266 participants with a mean age of 22.8 ± 0.81 years (age range of 21 to 29 years). 133 of the participants were medical students and 133 of them were in non medical fields. Some of the characteristics of the participants including their age, marital status, and siblings, current and previous history of heart disease and drug use are shown in Table 1. 10 (7.5%) of medical and 18 (13.5%) of non medical students were married ($p=0.11$). 6 (4.5%) of medical students and 4 (3%) of non medical students had no siblings. This number for 1, 2 and ≥ 3 siblings was 49 (36.8%) versus 42 (31.6%), 59 (44.4%) versus 59 (44.4%) and 19 (14.3%) versus 28 (21.1%) in medical and non medical students respectively ($p=0.13$). 1 (0.8%) student from each group had present CVD ($p=0.751$) and 1 (0.8%) student from each group had past CVD ($p=0.751$). 1 (0.8%) of medical students and none of non medical students had a history of using cardiovascular drugs ($p=0.5$). In these variables there was no significant difference

between the two groups except in their housing status ($p<0.001$).

In this study the distribution of risk factors for cardiovascular disease were examined. Levels of physical activity, sitting time, stress, nutrition and body mass index, waist circumference, smoking and systolic and diastolic blood pressure of the two groups of students are shown separately in table 2 and 3. Statistical analysis showed that there is no significant difference in physical activity, smoking, sitting time and body mass index between the two groups. Results showed 35 (26.5%) of medical students and 34 (25.8%) of non-medical students had abnormal BMI. Moreover, although it was no history of current or past smoking among students in the two groups, but 21 (15.8%) of medical students and 28 (21.1%) of non medical students were exposed to cigarette smoking ($p=0.268$).

Stress score was significantly higher among medical students ($p<0.001$).

The results showed that there is a significant correlation between the field of education and blood pressure. The mean blood pressure were significantly lower in medical students. 84 (63.2%) of medical students and 52 (39.1%) of non medical students had normal blood pressure ($p<0.001$). Also there was a significant relationship between nutrition status and field of education and medical students had a significantly better nutrition status ($p<0.001$), so that the rate of unfavorable nutrition in medical students was 12 (9%) and in non-medical students it was 18 (13.5%). In addition, the results revealed that mean waist circumference was not significantly different between the two groups ($p=0.378$), but waist circumference (normal or abnormal) and field of education is statistically significant different in the two groups ($p=0.013$). Percentage of students with abnormal waist circumference was 9 (6.8%) and 22 (16.5%) in medical and nonmedical group respectively.

Statistical analysis using ANCOVA with regard to confounding factor (Housing status) showed that there are different levels of stress score ($p < 0.001$). It was significant difference between two groups in blood pressure ($p < 0.001$). but this time, no significant difference was seen in nutritional status ($p = 0.262$).

Discussion:

This study was performed on 266 medical and non-medical students of Isfahan Universities to measure and compare the prevalence of some of the cardiovascular disease risk factors.

The results of this study revealed that there is no significant difference between the two groups in physical activity sitting time, smoking and body mass index.

There was no cigarette smoking or its history among students in the two groups but 21(15.8%) of medical students and 28(21.1%) of non-medical students were passive smokers.

The mean stress score among medical students was higher than non-medical students.

Mean blood pressure was significantly lower in medical students. There was a significant association between nutritional status and academic field and medical students had a better condition. Student percentage with undesirable waist circumference was significantly lower in medical students than non-medical students.

Our data showed that mean minutes of physical activity per week were similar in the two groups. More than half of the students in both groups had little or no activity.

Similar to our results Rezaie et al showed that 39.84% of medical and 37.24% of non-medical university students had risky physical activity status and only 6.51% of medical and 5.99% of non-medical university students had appropriate levels of physical activity. There was no statistically significant difference between the

mean scores of physical activity of the two groups²⁷.

Similar results were obtained during the investigation of first- and third-year students of the faculties of Medicine and Pharmacy. Nearly one-half of students did not exercise at all²⁸. In this research a lot of courses taken and lack of time was suggested as the causes of unhealthy behaviors among medical students.

Tayem et al reported that a large proportion of students, especially girls suffer from inactivity²⁹.

Also Khalaf et al in a study conducted on students with an average age of 20.9 years showed that a large percentage of the students had not much of physical activity levels³⁰. It is similar with our results and this lack of exercise is may be due to this reason that students have not enough leisure time, opportunity and incentive to engage in this. Moreover, inactivity and sedentary lifestyle is a general trend due to increased use of private vehicles and spending time at the computer or TV. BMI was not significantly different between the two groups and although the majority of students in both groups were within the normal range of body mass index, but little more than a quarter of the population of each group had abnormal BMI.

In contrast to our study Skemiene et al reported that 9% of third year female medical students were overweight²⁸. In our study this rate is about 3 times higher. This difference may be due to difference in dietary status of students in the two studies and the impact of environmental and cultural differences on the physical activity habits.

In the study that Pletzer et al conducted on the students of 22 countries 14% of female students were overweight and 5% were obese³¹. The average age in this study was similar to our study but this students were chosen from ten different academic fields and may be the difference between the

results was due to the differences in environment, culture and diet of the two target populations.

Our results showed however, that the percentage of students with abnormal waist circumference was significantly lower in the medical group.

In a study conducted by Rahimibashar et al on nursing students, 88% had normal waist circumference that is lower than the results obtained in our study³². One reason for this difference is that in this study, waist circumference of greater than 80 cm is considered abnormal.

In a study conducted by Seyedghaleh et al on female students of Isfahan Medical Sciences University with a similar sample size with us, the average waist circumference was 70.27 cm³³. In this study students were chosen from 5 fields with a wide age range (18-30) and the technique of waist circumference measurement was different with us.

Although no students were smokers or past smokers but 21 (15.8%) of medical students and 28 (21.1%) of non-medical students were passive smokers.

In a study conducted by Papathanasiou et al on health science students in Greece 37.6 were smokers³⁴. This obvious difference with our results is because of the cultural differences with European countries. The study did not calculate the percentage of passive smokers.

In our results stress levels were significantly higher in the medical group.

Koochaki et al in a study conducted on students of medical university of Isfahan showed that overall prevalence of stress among 222 students was 61.3%³⁵.

In a study by Patricia et al on students of medical school participants believed that they do not enjoy life as they could and they do not experience things appropriate for their age³⁶.

In another research done by Patricia et al on first year residents 23% exceeded the cut point on the

CES-D for risk of depression, about 14% were highly emotionally exhausted and about 24% felt very detached from their patients and their job³⁷.

It seems depression and feeling of have a poor quality of life is a common sense within medical students. Some of causes are competition, unprepared teachers, excessive activities, frequent contact with pain and death and suffering and lack of time for studying, leisure activities, relationships, and rest³⁷.

The mean blood pressure among medical students was lower than non-medical group.

The overall percentage of students with abnormal blood pressure was lower among medical students.

Similar to our study, In the study Dores et al conducted on the students of Faculty of Medical Sciences with similar mean age 65% of female students were normotensive and 25% were pre hypertensive and 10% were hypertensive³⁸.

Chaudri et al in the research done on female students of medical college with similar sample size and mean age showed 42% of subjects were normotensive and 58% were pre hypertensive and suggested overweight and obesity are major accompaniments before HTN³⁹.

Stress is one cause for hypertension, but we observed an inverse association in our study, maybe because medical students that are more stressful have higher knowledge about aspects of their health and have better nutritional status too and are lower passive smokers.

There was a significant relationship between nutrition status and academic field and medical students had a more favorable nutritional status and the percentage of students with poor nutrition in medical students was less than nonmedical.

In a study carried out by Agüero et al nutrition students had better nutritional status than other students and consumed more fish and milk⁴⁰. This study was conducted on male and female students

but probably similarity between medicine and nutrition in order to have more knowledge about healthy diet is the cause of the similarity of the results of this study with us.

Similar to our results Rahimibashar et al indicated that the majority of nursing students (70.5%) were in an average nutritional condition and 6.8% had bad condition and 27.7% had good condition³².

Appel et al found that a diet rich in fruits, vegetables, low-fat dairy and foods with lower saturated and total fat can substantially lower blood pressure⁴¹.

Lower levels of blood pressure in medical students can be related to better nutrition status in them.

Conclusion:

This study examined the risk factors for cardiovascular disease in both medical and non-

medical group and results showed that although medical students have less risk factors compared to non-medical students but existence of a number of risk factors such as sedentary lifestyle, stress and overweight in this group indicate that studying medicine alone can not guarantees their healthy life style and maybe itself cause these risk factors . Some need practical plans to change behavior and performance of this group of society particularly as they are responsible for the health of other people.

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Table 1. Demographic and CVD history of the students according to their field of study (n=266)

variable	Medical student N=133	Non medical student N=133	Total student	P value
Age(year) Mean ±SD	22.9±0.91	22.7±0.69	22.8±0.81	0.05*
Marriage status .N (%)				
Married	10 (7.5%)	18 (13.5%)	28 (10.5%)	0.11*
Not married	123 (92.5%)	115 (86.5%)	238 (89.5%)	
Number of sibling				
0	6 (4.5%)	4 (3%)	10 (3.8%)	0.13***
1	49 (36.8%)	42 (31.6%)	91 (34.2%)	
2	59 (44.4%)	59 (44.4%)	118 (44.4%)	
3≤	19 (14.3%)	28 (21.1%)	47 (17.7%)	
Present CVD N (%)				
No	132 (99.2%)	132 (99.2%)	264 (99.2%)	0.751**
Yes	1 (0.08%)	1 (0.08%)	2 (0.08%)	
Past CVD N (%)				
No	132 (99.2%)	132 (99.2%)	264 (99.2%)	0.751**
Yes	1 (0.08%)	1 (0.08%)	2 (0.08%)	
Usage of medicine N (%)				
No				0.5**
Yes	132 (99.2%) 1 (0.08%)	133 (100%) 0 (0%)	265 (99.6%) 1 (0.04%)	

*Pearson Chi-Square Test

** Fisher's Exact Test , ***Mann-Whitney Test

Table 2. Mean measured waist circumference, BMI , stress score and median systolic and diastolic blood pressure, physical activity level and time setting among students according to their field of study (n=266)

variable	Medical Students N=133	Non medical students N=133	Total students	P value
Systolic blood pressure (mmHg) median ,Inter quartile range (IQR)	110.98, 20	115.26, 10	113.12, 10	<0.001*
Diastolic blood pressure (mmHg) Median, IQR	71.84, 12	75.53, 10	73.68, 10	<0.001*
Waist circumference (cm) mean ± SD	81.96±4.04	82.47±5.32	82.22±4.7	0.378**
Body mass index (kg/m ²) Mean ± SD	23.83±1.64	23.69±2.08	23.76±1.86	0.567**
Physical activity level (minutes per week) median, IQR	1159.99, 1144.13	1168.31, 960	1164.27, 1017	0.134*
Sitting time level (minutes per week) median,IQR	435.12, 233	447.94, 180	441.60, 180	0.290*
Stress score (total score:501) mean ± SD	34.11±6.61	26.06±7.07	30.09±7.92	<0.001**

*Mann-Whitney Test , ** Independent T Test

Table 3. Prevalence of CVD risk factors according to field of study among students (n=266).

variable	Medical student N=133	Non medical student N=133	Total student	P value*
Nutrition status N (%)				
Favorable	29 (21.8%)	7 (5.3%)	36 (13.6%)	<0.001
Semi favorable	92 (69.2%)	108 (81.2%)	200 (75.2%)	
unfavorable	12 (9%)	18 (13.5%)	30 (11.3%)	
Smoking status N (%)				
Passive smoker	21 (15.8%)	28 (21.1%)	49 (18.4%)	0.268
No smoker	112 (84.2%)	105 (78.9%)	217 (81.6%)	
Blood Pressure Normal(SBP<120 and DBP<80)	84(63.2%)	52(39.1%)	136(51.1%)	<0.001
Abnormal(SBP≥120 or DBP≥80)	49 (36.8%)	81(60.9%)	130(48.8%)	
Body mass index N (%)				
Normal(<25)	98(73.7%)	99 (74.5%)	197(74.1%)	0.889
Abnormal(≥25)	35(26.3%)	34(25.5%)	69(25.9%)	
Waist circumference status N (%)				
Normal (<88cm)	124 (93.2%)	111 (83.5%)	235 (88.3%)	0.013
Abnormal (≥88cm)	9 (6.8%)	22 (16.5%)	31(11.7%)	

*Pearson Chi-Square Test