Comparison of the cardiovascular risk profile of young Egyptian and Saudi medical students

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Background
Mortality and morbidity from chronic heart disease are increasing markedly worldwide. This significant increase was also observed in young adults. Studies carried out in Saudi Arabia have shown that the prevalence of cardiovascular risk factors is high in the young Saudi population.
Objective
Our objective was to compare the prevalence of cardiovascular risk factors in young Middle Eastern medical students aged 18–25 years (Egyptian and Saudi students).
Results
The prevalence of cardiovascular risk factors was high among both Saudi and Egyptian medical students, particularly sedentary life style, obesity, and abdominal obesity. The prevalence of smoking was 29.7% in the two population. Besides a significantly higher prevalence of obesity, abdominal obesity, and reported family history of premature coronary heart disease among the Saudi sample and a significantly higher prevalence of hypertension among Egyptian men compared with Saudi men, the prevalence of risk factors among the two samples did not differ significantly. A relatively high proportion of both samples (23.9% of the Saudi sample and 16.7% of the Egyptian sample) was at an increased risk of developing fatal cardiovascular disease within 10 years.
Conclusion
Besides the higher prevalence of obesity and reported family history of premature coronary heart disease, there was no statistically significant difference between the risk profiles of both samples.

Keywords:
cardiovascular disease, medical students, risk profile

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Introduction

Nowadays, cardiovascular diseases are the leading cause of death worldwide and they have become a true pandemic [1].

Chronic heart disease has reached enormous proportions in young adults.

Cardiovascular disease is strongly determined by personal lifestyle, especially smoking tobacco, unhealthy diet habits, and lack of physical activity [2,3]. Studies carried out in Saudi Arabia have high shown that the prevalence of lifestyle-related factors such as a sedentary lifestyle, unhealthy eating habits, and overweight and obesity is high [4–6]. Despite awareness of these risk factors among medical students, some factors showed a high prevalence among this population, especially smoking [7].

Although Saudi Arabia and Egypt are two Middle Eastern countries with a similar cultural background, the standards of living and the quality of life in the two countries are not similar. Therefore, we expect that the distribution of the cardiovascular risk factors among young adults in the two countries will vary [8,9]. Hence, our aim in this study was to compare the prevalence of cardiovascular risk factors in young medical students from the two countries.

Aim

The aim of this study was to compare the prevalence of cardiovascular risk factors among young medical students aged 18–25 years in two Middle East countries (Egypt and Saudi Arabia).

Participants and methods

Study population

The study population included all students enrolled in the Ibn Sina National College for Medical Sciences (Jeddah, Kingdom of Saudi Arabia) and all students enrolled in the Faculty of Medicine, Menoufia University, during the academic year 2013–2014 of both sexes aged 18–25 years.

Sample size

A sample size of 161 students in each group was needed to detect a difference of 15% in the prevalence of risk factors at a power of 90% and a probability of type I error of 0.05, assuming the prevalence of cardiovascular risk factors among the Saudi population to be 15% [5]. A total of 180 participants were recruited from each country to ensure evaluable data for a minimum of 161 participants from each arm.

Sampling method

A simple random sample was selected using the random number generator of SPSS (version 15; SPSS Inc., Chicago, Illinois, USA) software. Selected students were provided an explanation of the study objectives and methodologies. They were included in the study if they fulfilled the inclusion criteria and signed the informed consent.

Inclusion and exclusion criteria

A student was eligible to participate if he/she had registered in the Ibn Sina National College for Medical Sciences and the Faculty of Medicine, Menoufia University during the academic year 2013–2014, were 18–25 years of age, of either sex, and was willing to participate in the study as evidenced by signing the informed consent.

Ethical considerations

Approval of the ethical committees in both institutions was obtained and all students enrolled in the study were required to read and sign an informed consent form in the Arabic language.

Data collection

Demographic data were collected from the study participants during a face-to-face interview conducted by trained investigators. Anthropometric measurements and blood pressure readings were collected according to a standard protocol. All blood pressure measurements were taken twice and the average of the two readings was calculated. Blood samples were collected from students to determine their lipid profile, which included total cholesterol, high-density lipoprotein-cholesterol, low-density lipoprotein-cholesterol, and triglycerides. The samples were sent to the central teaching hospital laboratory in Ibn Sina National College Hospital and contracted private laboratories in Egypt for analysis. The 10-year cardiovascular risk score was calculated for each study participant. An open-source interactive tool to predict and manage the risk of heart attack and stroke available from the European Society of Cardiology website was used for this purpose [3].

Data analysis

Data were entered into SPSS (version 20) software data file by professional data entry specialists. Qualitative variables were summarized using percentages and 95% confidence limits; quantitative variables were summarized using mean, SD, and SEM. Quantitative data were compared between the two subpopulations using the pooled Student *t*-test and qualitative data were compared using the χ^2-test. Significance level was set at 0.05.

Results

The total sample size was 360 participants (180 participants were from Saudi Arabia and 180 participants were from Egypt). The male to female ratio in the samples was 1 : 1. Participants' ages ranged from 18 to 25 years. Their mean age, SD, and SE were 21.43, 2.29, and 0.866, respectively.

Table 1 shows the prevalence of cardiovascular risk factors in the Saudi and Egyptian medical students. The most prevalent risk factor in the total sample was a sedentary lifestyle. Its overall prevalence was 64.7%. The prevalence of a sedentary lifestyle in the Egyptian students was slightly higher than that of the Saudi students (66.1 vs. 63.3%); yet, the difference was not statistically significant at the 0.05 level.

The mean body weight of the Saudi sample and the SD were 85.9 and 14.7 kg, respectively. The mean body weight of the Saudi students was not significantly different from that of the Egyptian participants [84.4 (SD 16.1) kg]. The Saudi sample had a mean height of 165.4 (SD 8.2) cm. This was not significantly different from the mean height of the Egyptian sample (166.4 cm). The BMI of the two samples (calculated according to the formula: BMI = weight in kg/height in m^2) did not differ significantly at the 0.05 level. Table 2 shows the mean, SD, and SEM of weight, height, BMI, systolic, and diastolic blood pressures of the Saudi and Egyptian samples.

Table 1 Cardiovascular risk factors among Saudi and Egyptian students

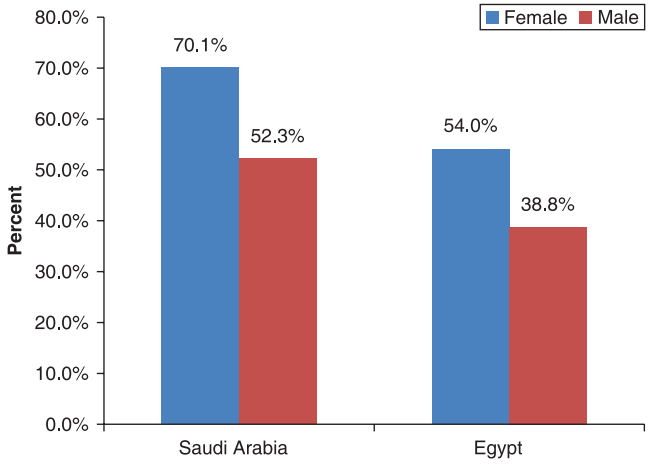
Risk factors	Frequency (%)		
	Saudi Arabia (*n* = 180)	Egypt (*n* = 180)	Total (*n* = 360)
Sedentary lifestyle	114 (63.3)	119 (66.1)	233 (64.7)
Obesity	107 (61.6)	80 (46.5)	187 (51.9)
Abdominal obesity	102 (56.7)	85 (47.2)	187 (51.9)
Smoking	52 (28.9)	55 (30.6)	107 (29.7)
Hypertension	26 (14.4)	15 (8.3)	41 (11.4)
Family history of PCHD	26 (14.4)	12 (6.7)	38 (10.6)
Dyslipidemia	12 (6.7)	10 (5.6)	22 (6.1)

PCHD, Premature coronary heart disease

Both samples were categorized on the basis of the WHO International Classification of adult underweight, overweight, and obesity according to BMI [10], which showed that 51.9% of both samples were obese (with a BMI of 30[3]). The prevalence of obesity was significantly higher among the Saudi sample (61.6%) than among the Egyptian sample (46.5%) ($\chi^2 = 8.2, P = 0.04$). Although the prevalence of obesity among Saudi women (70.1%) was significantly higher than among the Egyptian women (54.0%) ($\chi^2 = 7.8$, $P = 0.043$), the higher prevalence of obesity observed among Saudi men (52.3%) compared with Egyptian men (38.8%) was not statistically significant at the 0.05 level. Figure 1 shows the difference between the prevalence of obesity among Saudi and Egyptian male and female students.

Abdominal obesity (waist circumference>102 cm in men or >88 cm in women) was also highly prevalent among both samples, with an overall prevalence of 51.9%. Although the prevalence among Saudi students (56.7%) was higher than among Egyptian students, the difference was not statistically significant at the 0.05 level. The prevalence of abdominal obesity among Saudi women was 65.6% compared with 52.2% among Egyptian women, whereas the prevalence of risk factors among Saudi men was 47.8% compared with 42.2% among Egyptian men. Neither of the differences was statistically significant at the 0.05 level.

Figure 1



Prevalence of obesity among Saudi and Egyptian male and female students.

The prevalence of smoking (of any kind including cigarettes and/or shisha) among the two samples was 29.7%, being slightly higher among the Egyptian sample (30.6%) than the Saudi sample (28.9%). The prevalence of smoking among Egyptian and Saudi men was 48.9 and 50.0%, whereas among Egyptian and Saudi women, it was 7.8 and 12.2%, respectively. Differences were not statistically significant.

In terms of the blood pressure, the mean systolic blood pressure of the Egyptian and Saudi students did not differ significantly [115.54 (SD 14.79) and 118.29 (SD 14.63) mmHg, respectively] and neither did the mean diastolic blood pressure of the two samples [58.28 (SD 7.31) and 58.74 (SD 7.86) mmHg, respectively]. Hypertensive students with a systolic blood pressure of 140 mmHg or higher or a diastolic blood pressure of 90 mmHg or more or those who had been diagnosed by the treating physician as hypertensive and received an antihypertensive medication constituted 11.4% of the entire sample. The prevalence of hypertension was higher among Saudi students than among Egyptian students (14.4 vs. 8.3%, respectively); yet, the difference was not statistically significant. However, the prevalence of hypertension among Egyptian men (18.9%) was significantly higher than that among Saudi men (6.7%) ($\chi^2 = 6.03$, $P = 0.014$). In contrast, the prevalence of hypertension among Saudi and Egyptian women did not differ significantly (10.0 and 10.3%, respectively). Table 2 summarizes the mean, SD, and SEM for the samples' weight, height, BMI, and blood pressure.

A family history of premature coronary heart disease was reported by 10.6% of the study sample. Significantly more Saudi students reported a positive family history of premature coronary heart disease (14.4%) than Egyptian students (6.7%) ($\chi^2 = 5.77$, $P = 0.016$). On stratifying by sex, there was, however, no statistically significant difference between the prevalence of this particular risk factor among Saudi and Egyptian female students (13.3 and 5.6%, respectively) and, similarly, the difference between the prevalence of the risk factor among Saudi and Egyptian male students (14.4 and 7.8%, respectively) was not statistically significant at the 0.05 level.

Table 2 Mean and standard deviation of weight, height, BMI and blood pressure measurements of Saudi and Egyptian students

Measurements	Saudi Arabia (n = 180)			Egypt (n = 180)		
	Mean	SD	SE	Mean	SD	SE
Weight	85.94	14.71	1.10	84.43	16.08	1.20
Height	165.37	8.17	0.62	166.42	8.15	0.62
BMI	31.54	5.51	0.42	30.51	5.76	0.44
Systolic blood pressure	118.29	14.63	1.10	115.54	14.79	1.10
Diastolic blood pressure	58.74	7.86	0.59	58.28	7.31	0.54

Dyslipidemia, as defined by a total cholesterol level of 190 mg/dl or more, low-density lipoprotein-cholesterol of 115 mg/dl or more, high-density lipoprotein-cholesterol less than 40 mg/dl in men or less than 46 mg/dl in women, or a triglyceride level of 150 mg/dl, was the least common risk factor among the study sample, with an overall prevalence of 6.1%. The prevalence was higher among Saudi students than among Egyptian students (6.7 vs. 5.6%). The difference between the two samples was not statistically significant at the preset level.

On the basis of the Heart Score software calculations (European Society of Cardiology, Sophia-Antipolis, France), the 10-year risk of fatal cardiovascular disease was 0% among healthy young women and actually the risk among healthy males is 1% and is 0% among healthy females. An overall 23.9% of the Saudi sample had an increased risk of fatal cardiovascular disease versus 16.7% of the Egyptian sample. The difference between the two samples was not statistically significant at the 0.05 level. Among Saudi female students, 18.9% were at an increased risk of fatal cardiovascular disease compared with 12.2% of Egyptian female students. Among Saudi male students, 28.9% were at an increased risk of fatal cardiovascular disease compared with 21.1% of Egyptian male students.

Discussion

The current study aimed at comparing the prevalence of cardiovascular disease risk factors among Saudi and Egyptian medical students aged 18–25 years. The findings of the study showed no significant differences between the two samples in the prevalence of the major risk factors.

A sedentary lifestyle was the most prevalent risk factor among the two samples. This finding was in accordance with a previous study carried out on medical students in Saudi Arabia, where the prevalence of physical inactivity reached 57.9% [4]. An earlier study carried out in Ain Shams University in Egypt, involving 382 physicians working in the University Hospital, also reported that 84% of the participants were sedentary [11]. Although the prevalence of inactivity among the students who participated in the current students was less that that observed among physicians in the previous work, it is clear that the prevalence is not decreasing to satisfactory levels.

Obesity with abdominal obesity was the second most commonly prevalent risk factors among the two samples. The work carried out by Ibrahim *et al*. [4] in King Abdul Aziz University showed that the prevalence of obesity and overweight among Saudi medical students was 31.2%, almost half the figure obtained during the current study (61.6%). This disparity may be partially attributed to the fact that the sample taken in the current study represents private medical college students with probably higher socioeconomic standards and therefore with a different dietary style, with more frequent consumption of junk restaurant food. However, the prevalence of obesity among the sample of Egyptian students (46.5%) was less than that observed by Rady and Sabbour [11] among a sample of physicians (59.9%); this difference may be attributed to the age difference between the two samples, where their sample had a higher mean age and more professional responsibilities leaving less leisure time to participate in physical activity, and hence a less active lifestyle.

The prevalence of smoking was 28.9% among the Saudi sample and 30.6% among the Egyptian sample. These figures compare with the figures found in 1997 among Egyptian physicians, where the prevalence of smoking was 26.6%. It is striking that smoking rates increased rather than decreased among medical professionals and students from 1997 to 2013. In contrast, the figures observed in the current study among the Saudi students were nearly ten times those observed by Ibrahim *et al.* [4] among King Abdul Aziz medical students in Saudi Arabia (2.8%). This disparity could be explained by the strict regulations banning smoking in the premises of King Abdul Aziz University, which might have led students to falsely report that they were nonsmokers.

The prevalence of hypertension among the Saudi students sample was 14.4%; this compares favorably with the Ibrahim *et al.*'s [4] work in King Abdul Aziz University, which found that 9.3% of students were hypertensive, and can be attributed to the high prevalence of obesity, which has been identified by Koura *et al.* [5] in their study on prehypertension among young women in Dammam Saudi Arabia as the strongest predictor of prehypertension.

The proportion of students at an increased risk of cardiovascular disease within the upcoming 10 years was alarmingly yet predictably high among the two samples, given the high prevalence of the risk factors measured.

It was interesting to find that apart from a higher prevalence of obesity and more reported family history of premature coronary heart disease among the Saudi sample compared with the Egyptian sample, there were no significant differences between

the risk profiles of young Saudi and Egyptian medical students.

Conclusion

The prevalence of cardiovascular risk factors was relatively higher among both Saudi and Egyptian medical students, particularly sedentary lifestyle, obesity, and abdominal obesity. Smoking was practiced by 29.7% of both samples, an alarming finding, particularly among medical students. Compared with the Egyptian students, the prevalence of obesity, abdominal obesity, and reported family history of premature coronary heart disease was higher in the Saudi students. Hypertension was more prevalent among the Egyptian men. The samples were at an increased risk of fatal cardiovascular disease within 10 years (23.9% of Saudi sample and 16.7% of the Egyptian sample).

Recommendations

This study shows that the prevalence of cardiovascular risk factors is high in medical students in Kingdom of Saudi Arabia and Egypt. Programs should be designed to increase awareness about cardiovascular diseases among students in the two countries. In addition, screening of this young population for the early detection of cardiovascular risk factors is recommended.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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