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Prevalence of cardiovascular disease risk factors among secondary school pupils in Sulaimani city Kurdistan-Iraq. A cross-sectional study

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Abstract:

Background: Cardiovascular diseases (CVDs) are responsible for a high proportion of deaths caused by non-communicable diseases (NCDs) worldwide. The incidence of CVDs is largely attributed to several risk factors.

Aim of the study: To estimate the prevalence of common risk factors of cardiovascular diseases among secondary school students in Sulaimani city / Kurdistan-Iraq.

Subjects and Methods: One thousand and two hundred secondary school students between 16-18 years of age from eight secondary schools in the city of Sulaimani were selected to participate in this study. Students were selected randomly. The questionnaire form, which includes information about risk factors related to cardiovascular diseases, was filled by these students, after which, weight and height were measure to calculate the body mass index (BMI) in addition to measuring blood pressure (BP). Permission to conduct the study was obtained from the principles of the participating schools. Consents were obtained from the parents of the students and the students themselves before data collection.

Results: Low physical activity was very high among both males (84%) and females (95.8%). Although the rate of smoking was low among both males (12%) and females (4.2%), the association was statistically significant. The rate of smoking tobacco products other than cigarettes (water pipe and vape) was 27.6% among males and 10.2% among females. The rate of high systolic blood pressure was 6.7% and 2.9% in males and females respectively while the rate of high diastolic blood pressure was 5% and 10.7% in males and females respectively. The rates of high systolic blood pressure among overweight, normal weight and underweight students were 8.3%, 4.0% and 1.6% respectively.

Conclusion: A significant prevalence of modifiable common risk factors such as low physical activity, smoking, hypertension, overweight and obesity were found among both male and female secondary school students in Sulaimani city.

Kew words: Cardiovascular risk factors, physical activity, smoking, BMI, Sulaimani, Iraq.

Introduction:

Cardiovascular diseases (CVDs) are responsible for a high proportion of deaths caused by non-communicable diseases (NCDs) worldwide and are responsible for the death of 17.7 million people annually. According to the World Health Organization (WHO) report, NCDs are responsible for the death of 40 million people a year, particularly in low- and middle-income countries (1, 2). The incidence of CVDs is largely attributed to several risk factors.

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These include unmodifiable risk factors such as sex, age and genetic factors and modifiable risk factors such as high blood pressure, smoking, diabetes, alcohol intake, physical inactivity, unhealthy diet, and overweight/obesity (3). Hypertension is one of the greatest health problems and is the leading risk factor for coronary artery disease, stroke, and heart failure (4). In 2015, hypertension contributed to 10.7 million deaths and nearly 212 million disability-adjusted life years (DALYs) globally (5). Overweight and obesity have adverse effects on both mortality and morbidity. In 1975 - 2014, the prevalence of obesity in the world was 10.8% and 14.9% among men and women respectively. However, in Iraq 2015 the rate of obesity is very high; in Erbil city, Northern Iraq it was 40.9% and in Basrah, southern Iraq it was 55.1% (6).

Smoking is probably the most important cause of atherosclerotic vascular disease. According to the report of WHO in 2012 worldwide smoking contributes to 10% of all cardiovascular diseases (CVDs) (7). In the United States of America, more than 50% of young adults aged between 18–24 years old have at least one CVDs risk factor (8). In Iraq the cardiovascular diseases are considered one of the main causes of disease-related deaths with high rates among young people (9). Coronary Heart Disease (CHD) is the commonest cause of death from CVDs. Determining the degree of CHDs and their risk factors among young adults is very important to prevent the development of the disease by encouraging lifestyle changes (10, 11).

Subjects and Methods:

Location and participants: This is a cross-sectional study and was carried out in Sulaimania city/ Kurdistan Region of Iraq. One thousand and two hundred secondary school students between 16-18 years of age from eight secondary schools (four for males and four for females) participated in this study. One hundred and fifty students were selected from each school.

Data collection: The students were registered between the first of December 2021 and first of March 2022. Participants were selected randomly and the questionnaire form, which covers information about risk factors associated with cardiovascular diseases, was filled by the student. The information-included student's age, sex, physical activity and smoking. After completing the questionnaire form, measurements were taken and included: Weight (Kg) and height (meters) for calculating (BMI) and Blood pressure (BP) using a mercury sphygmomanometer.

Definition of Terms: The participants were categorized into two groups in relation to physical activity (low or high). Low physical activity was defined by the score 1 – 2.99 and high physical activity was defined by the score 3 – 5 (12). a current smoker was defined as a person who have smoked 100 cigarettes in their lifetime and currently smoke cigarettes every day (daily) or some days (non-daily), a never-smoker is a person who has never smoked a cigarette, and an ex-smoker is defined as a person who had smoked at least 100 cigarettes in their lifetime, but say they currently do not smoke (13). A participant is considered overweight / obese when the BMI was greater than + 1SD for gender and age, a participant is considered normal when the BMI is -2SD to + 1SD for gender and age, and a participant considered underweight when the BMI is < - 2SD for age and gender (14). Hypertension is defined as systolic and diastolic blood pressure ≥ 95th percentile for gender, age and height (15).

Data analysis: All data was entered into the statistical package for social sciences "SPSS" version 26 for storage and analysis statistically. The Chi – square test was applied to test for associations between variables, with the P value of 0.05 or less to be considered significant.

Results:

Out of the 1200 selected students from eight secondary schools, 1046students participated with a response rate of 87% (ranged between 83.3% - 93.3% by school). The students that did not respond were either those who were absent from school on the day of data collection or those who did not agree to have their height or weight measured. The response rates by schools are shown in table 1.

Table 1: Distribution of the response rate by school

School	No. of selected students	No. of participating students	Response rate (%)
School 1	150	128	85.3
School 2	150	127	84.7
School 3	150	140	93.3
School 4	150	136	90.7
School 5	150	125	83.3
School 6	150	128	85.3
School 7	150	128	85.3
School 8	150	134	89.3
Total	1200	1046	87

Table 2 shows the distribution of various risk factors by gender of the participants. The prevalence of low physical activity was very high among both males (84%) and females (95.8%), with a statistically association. The prevalence of smoking was low among both males (12%) and females (4.2%), but the rate of ex-smoking was high among both males (22.3%) and females (12.1%), with a statistically significant association. Smoking other tobacco (water pipe and vape) was 27.6% among males and 10.2% among females with a statistically significant association. The percentage of being overweight or obese was high among both males (30.5%) and females (25%), with a statistically significant association. The rate of high systolic blood pressure was 6.7% and 2.9% in males and females respectively, with a statistically significant association. The rate of high diastolic blood pressure was 5% and 10.7% in males and females respectively, with a statistically significant association.

Table 2: The Distribution of the studied risk factors by gender of the participants

Risk factor	Categories	Gender		Total – No. (%)	P - Value
		Males – No. (%)	Females – No. (%)		
Physical activity	Low	441 (84.0)	499 (95.8)	938 (89.7)	0.001*
	High	84 (16.0)	22 (4.2)	106 (10.3)	
Smoking status	Never smoked	345 (65.7)	436 (83.7)	781 (74.7)	0.001*
	Ex-smoking	117 (22.3)	63 (12.1)	180 (17.2)	
	Currently smoking	63 (12.0).	22 (4.2)	85 (8.1)	
Smoking other tobacco (water pipe and vape)	No	380 (72.4)	468 (89.8)	848 (41)	0.001*
	Yes	145 (27.6)	53 (10.2)	198 (59)	
Body mass index (BMI)	Under weight	106 (20.2)	82 (15.7)	188 (18)	0.05*
	Normal weight	259 (49.3)	309 (59.3)	568 (54.3)	
	Overweight or Obese	160 (30.5)	130 (25.0)	290 (27.7)	
Systolic BP	Normal	490 (93.3)	506 (97.1)	996 (95.2)	0.05*
	High	35 (6.7)	15 (2.9)	50 (4.8)	
Diastolic BP	Normal	499 (95.0)	465 (89.3)	964 (92.2)	0.001*
	High	26 (5.0)	56 (10.7)	82 (7.8)	
Total (100.0%)		525	521	1046 (100.0)	

The distribution of the levels of systolic and diastolic blood pressure by the BMI groups is shown in table 3. The rate of high systolic blood pressure among overweight, normal weight and underweight students were 8.3%, 4.0% and 1.6% respectively. The rate of high diastolic blood pressure between overweight, normal weight and underweight were 9.0%, 6.0% and 11.7% respectively. The associations between BMI and high systolic and diastolic BP were statistically significant

Table 3: Distribution of the systolic and diastolic BP by BMI categories in the study group

Blood pressure	Underweight	Normal	Overweight or Obese	Statistical Test		
Systolic BP	N (%)	N (%)	N (%)	X^2	df	P
Normal	185 (98.4)	545 (96.0)	266 (91.7)	12.6	2	0.05*
High	3 (1.6)	23 (4.0)	24 (8.3)			
Diastolic BP	N (%)	N (%)	N (%)	X^2	df	P
Normal	166 (88.3)	534 (94.0)	264 (91.0)	7	2	0.05*
High	22 (11.7)	34 (6.0)	26 (9.0)			
Total - 1046 (100%)	188	568	290			

Discussion:

The current study had investigated 1046 male and female students from eight different secondary schools. The high prevalence of low physical activity among both males and females is consistent with the results of a review of many studies on (11-17 year olds) which showed the physical inactivity among adolescents to be 81% worldwide (16). The rate of low physical activity was higher among girls compared to boys, which may be due to the fact that girls prefer a sedentary lifestyle as compared to boys, with the boys being more involved in outdoor physical activities such as football and basketball than girls (17). A study from Nepal reported that the prevalence of low physical activity was 8% for male and 31% for female secondary school students (18). A community-based cross-sectional study from Nepal found that a high percentage of the studied community members were insufficiently involved in physical activities. These findings suggest that sedentary lifestyle can be a major risk factor for cardiovascular diseases and other public health problem (19). The rates of cigarette smoking and of other tobacco products was significantly higher in males than females in the current study, which is in agreement with a study conducted in Al-Hilla / Iraq, which found that more a third of secondary school students were currently smoking with more males than females (20). It is also in agreement with a study conducted in Duhok / Iraq, which reported that prevalence of smoking especially tobacco among youth was 20.3%, (25.4% in males and 15.2% in females). Males were 2.2 times more likely to smoke tobacco, the water-pipe was the most commonly used tobacco product (19.5%) followed by cigarettes (14.1%) (21). A study in Saudi Arabia reported that 40.8% of male secondary school students currently smoking (22). The prevalence of overweight and obesity in the present study was very high among males (30.5%) and females (25%) in contradiction to a study in Thi-Qar / Iraq, where the prevalence of overweight was higher among female (32%) than male (23%) university students (23). A study in Baghdad / Iraq reported that the prevalence of obesity was 35.2%

among women. These high rates can be explained by economic improvement in Iraq and better living conditions, which led to increased food consumption and sedentary lifestyle (24). The prevalence of high systolic pressure in the current study was higher among males than females but the opposite was true for high diastolic pressure. A study conducted in Nassiriya / Iraq concluded that the prevalence of isolated systolic hypertension was more common among females while males showed significantly more common prevalence of isolated diastolic hypertension (25). High blood pressure (systolic and diastolic) was significantly higher in overweight and obese students compared to normal weight and underweight students in the current study. Many studies agree with our results such as that conducted by Nur et al. which reported that hypertension was prevalent among students in the Middle Anatolian province of Turkey and there was a significant correlation between prevalence of hypertension and body mass index (26). Another study in Ramadi / Iraq reported that a higher prevalence of hypertension was found among obese participants (27).

Conclusion:

This study concluded that the prevalence rates of modifiable risk factors such as low physical activity, smoking, hypertension, overweight and obesity were high among both male and female secondary school students in Sulaimani city. This reflects an alarming public health problem and constitutes a threat to community health. Health promotion and awareness-raising programs should be introduced. Constant surveillance for CVD risk factors must be strengthened, with early detection and prevention programs.

Authors contributions:

Muhammed Q. Saaed: PhD student. Data collection, data analysis, and writing the paper.

Dr. Sardar M. Weli: Supervisor. Review the writing and helped the student with data collection and data analysis.

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إنتشار عوامل إختطار الإصابة بأمراض القلب والأوعية الدموية بين طلاب المدارس الثانوية في مدينة السليمانية كردستان العراق ـ دراسة مستعرضة

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الخلفية: تمثل أمراض القلب والأوعية الدموية معظم وفيات الأمراض غير المعدية في جميع أنحاء العالم، ويعزى حدوث الأمراض القلبية والأوعية الدموية إلى العديد من عوامل الإختطار.
الأهداف: تقدير إنتشار عوامل الإختطار الشائعة لأمراض القلب والأوعية الدموية بين طلاب المدارس الثانوية في مدينة السليمانية ـ كردستان العراق.
المشاركون والطرق: تم اختيار ألف ومائتي طالب ثانوي تتراوح أعمارهم بين 16-18 سنة من ثماني مدارس ثانوية للمشاركة في هذه الدراسة. تم اختيار المشاركين بشكل عشوائي وتم ملء استمارة الاستبيان التي تغطي معلومات حول عوامل الإختطار المرتبطة بأمراض القلب من قبل الطالب. بعد استكمال إستمارة الإستبيان تم قياس الوزن والطول لحساب مؤشر كتلة الجسم، وقياس ضغط الدم.
النتائج: كان معدل النشاط البدني المنخفض مرتفعا جدا بين كل من الذكور (84٪) والإناث (95.8٪). كان معدل التدخين منخفضاً بين الذكور (12٪) والإناث (4.2٪). لكن إحصائياً كانت هناك فروق ذات دلالة إحصائية بين الذكور والإناث. بينما منتجات التبغ المدخن غير السجائر (الشيشة والفيب) كانت النسبة 27.6٪ بين الطلاب و 10.2٪ بين الطالبات. وفيما يتعلق بضغط الدم، كان معدل إرتفاع ضغط الدم الإنقباضي 6.7٪ و 2.9٪ لدى الطلاب والطالبات على التوالي بينما كان معدل ارتفاع ضغط الدم الإنبساطي 5٪ و 10.7٪ عند الذكور والإناث على التوالي. فيما يتعلق بالعلاقة بين ارتفاع ضغط الدم ومؤشر كتلة الجسم، كان معدل ارتفاع ضغط الدم الانقباضي لدى الطلاب الذين يعانون من زيادة الوزن والوزن الطبيعي ونقص الوزن 8.3٪ و 4.0٪ و 1.6٪ على التوالي.
الإستنتاج: خلصت هذه الدراسة إلى أن الإنتشار الكبير لعوامل الإختطار المشتركة القابلة للتعديل مثل قلة النشاط البدني والتدخين وارتفاع ضغط الدم وزيادة الوزن والسمنة كانت عالية بين طلاب وطالبات المدارس الثانوية في مدينة السليمانية.
الكلمات المفتاحية: أمراض القلب والأوعية الدموية، عوامل الإختطار، النشاط البدني، التدخين، مؤشر كتلة الجسم.