Risk Factors of Ischemic Heart Disease and Risk-Related Awareness in University Students

Üniversite Öğrencilerinde İskemik Kalp Hastalığı Risk Faktörleri ve Farkındalık Düzeyi

Araştırma
Research

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DOI: 10.17942/sted.1430834

Geliş/Received: 24.02.2024
Kabul/Accepted: 16.07.2024

Abstract

Objective: Ischemic heart disease (IHD) is the most fatal disease in Turkey. The present study attempted to explore IHD risk factors and risk-related awareness among university students.

Materials and Methods: We took the height, weight, waist circumference, and blood pressure measurements of 786 university students and tried to identify their IHD risk factors and risk-related awareness through a survey. The study was carried out on a public university campus over three weekends in October 2022.

Results: The findings showed that the most common modifiable IHD risk factors were poor physical activity (48.9%), smoking (30.5%), and overweight/obesity (21.5%) in our sample aged 18-35 years. Yet, the most prevalent non-modifiable risk factor was found to be familial chronic diseases (29.9%). Besides, the participants were found to have poor knowledge of IHD risk factors (8.9±2.5). Our other remarkable finding demonstrated that the male students' knowledge of CVD was poorer than their female counterparts, although the male gender is a non-modifiable CVD risk factor.

Conclusion: Participants with a relatively high level of education, interestingly, had poor knowledge and risk awareness of IHD despite bearing a higher rate of IHD risk factors.

Keywords: heart disease risk factors; myocardial ischemia; cardiovascular diseases; university; student; healthy lifestyle

Özet

Amaç: Türkiye'de iskemik kalp hastalığı en çok ölüme yol açan hastalıktır. Bu çalışmada üniversite öğrencilerinin İskemik Kalp Hastalığı (İKH) risk faktörleri ve farkındalık düzeylerinin saptanması amaçlanmıştır.

Gereç ve Yöntem: Çalışma 786 üniversite öğrencisi ile yürütülmüş, öğrencilerin boy, ağırlık, bel çevresi ve kan basıncı ölçümleri yapılmış ardından riskleri ve risk farkındalığını saptamaya yönelik anket formu uygulanmıştır.

Bulgular: Yaşları 18-35 (20,8±2,4) arasında değişen 786 üniversite öğrencisinden oluşan bu örneklemde, en sık görülen düzeltilebilir risk faktörleri yetersiz fiziksel aktivite (%48,9), sigara kullanımı (%30,5) ve aşırı kilolu/obez olma (%21,5) idi. Değiştirilemez faktörler açısından da ailede kronik hastalık varlığı %29,9 idi. Ayrıca katılımcıların iskemik kalp hastalığı risk faktörleri bilgi düzeyleri düşüktü (8,9±2,5). Dikkat çeken bir başka sonuç da erkek cinsiyet kalp hastalıkları açısından değiştirilemez bir risk faktörü olmasına karşın, erkek öğrencilerin kalp hastalıkları ile ilgili bilgi düzeyleri kız öğrencilerden daha düşüktü.

Sonuç: Nispeten yüksek eğitim düzeyine sahip üniversite öğrencileri, yüksek oranda risk faktörü taşımalarına rağmen, düşük bilgi seviyesi ve risk farkındalığına sahipti.

Anahtar Sözcükler: kalp hastalığı risk faktörleri; miyokard iskemisi; kardiyovasküler hastalıklar; üniversite; öğrenci; sağlıklı yaşam tarzı

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Introduction

Among non-communicable disorders, cardiovascular diseases (CVD) are known to lead to about one-third of mortality worldwide (1). Ischemic heart disease (IHD) is the most prevalent type of CVD (2) and the leading cause of death worldwide, accounting for 16% of global mortality. Deaths due to IHD - considered a significant threat to sustainable development in the 21st century - increased by more than 2 million from 2000 to 2019, hitting 8.9 million (3). The case also applies to Türkiye; IHD is the major cause of mortality in our country (4). An elevating number of individuals with non-fatal IHD have to continue their lives with a chronic disability and impaired quality of life. The Global Burden of Disease data demonstrated that IHD resulted in > 182 million disability-adjusted life years (DALY) and > 176 million years of life lost due to premature deaths in 2019 (5). Besides, more than 70% of individuals at risk bear more than one IHD risk factor, and only 2–7% of the general population live without risk (6).

Data reported in different methodological research depict infancy, childhood, and early adulthood as significant periods of life for the development of IHD (7,8). Accordingly, subsequent IHD incidents were shown to be predicted by some IHD risk factors detected in childhood and early adulthood, including high blood pressure, unfavorable lipid profiles, overweight/obesity, short stature, low birth weight, smoking, and sedentary lifestyle (7). In this sense, it was shown that many risk factors 'track' one from childhood to early adulthood and that the levels of these risk factors in childhood tend to be associated with levels later in life (9). In addition, substantial evidence indicated that atherosclerosis is associated with adolescence (10) and even the intrauterine period (11). While some CVD-related risk factors (e.g., age, gender, and genetic and ethnic factors) are considered "non-modifiable risk factors", smoking cigarettes and other tobacco products, unhealthy eating habits, sedentary lifestyle, obesity, high blood fats, high blood pressure, and high blood glucose are "modifiable risk factors" (12).

The adverse impacts of chronic disorders on life expectancy and quality of life, their financial and moral burden, and the existence of at least one IHD-related risk factor in the general population highlight the significance of preventive programs aimed at changing one's lifestyle (13). The fundamental foundation for prevention strategies against IHD may be to initiate changes in lifestyle and disease-associated environmental factors and identify and take tailored precautions for high-risk individuals (14). Most CVD and other non-communicable diseases can, therefore, be prevented by minimizing or eliminating behavioral risk factors (e.g., tobacco use, unhealthy diet, insufficient physical activity, and alcohol use) (15). In this regard, the World Health Organization (WHO) reports that CVD incidences can be halved by controlling blood pressure, obesity, cholesterol, and smoking (16). In our country, a few comprehensive epidemiological studies (e.g., the TEKHARF (17), METSAR (18), and Turkiye Nutrition and Health Survey-2010 (Turkish Ministry of Health, 2014) previously aimed at identifying and bringing public recommendations for CVD risk factors.

The approach to preventing CVD should be multidisciplinary, not focusing on a single risk factor but reducing the overall risk upon multiple risk factors (13). Moreover, individuals can reduce their CVD risk by engaging in regular physical activity, avoiding tobacco use and second-hand smoking, choosing a diet rich in fruits and vegetables, avoiding foods rich in fat, salt, and sugar, and maintaining a healthy body weight (20). In particular, regular physical activity can effectively help improve and maintain one's physical, spiritual, intellectual, social, and environmental well-being. It may also be the most affordable method to protect against CVD, obesity, high blood pressure, diabetes, osteoporosis, and some types of cancer by helping one feel more energetic, lively, active, and peaceful and improving their quality of life (21).

Experiencing continuing physical, psychological, social, and sexual development and assuming newfound responsibilities, university students have more autonomy and control over their lives than adolescents. Higher education years can also be considered a transition period where healthy lifestyle behaviors can be reinforced. Hence, adolescents and younger adults seem to be under the spotlight as the target populations

for the protection and promotion of health (22). Besides, one's perception of CVD not only determines their reaction to diseases but also affects their chance of initiating preventive interventions against risks. In this sense, a basic level of awareness of diseases is critical for planning effective interventions (23). Considering the importance of IHD regarding its impact on health, high prevalence, and burden on a healthcare system, we designed the present study to explore university students' awareness of IHD risk factors and to identify the prevalence of IHD risk factors among them.

Methods

The target population size was 28,477 students. Accordingly, the minimum sample size with the known population was calculated to be 649 students with a 99% confidence interval on the OpenEpi program (Dean AG, Sullivan KM, Soe MM. OpenEpi: Open Source Epidemiologic Statistics for Public Health, Version. www.ppenepi.com, updated 2013/04/06, accessed 2021/11/28).

In this cross-sectional study with 786 students, participants' height, weight, waist circumference, and blood pressure measurements were taken, and it was attempted to identify possible IHD risk factors among them. Initially, we selected a volunteer assistant group of 72 students (no prior knowledge or experience demanded) to assist in taking the said measurements through announcements via class WhatsApp groups of the departments of medicine, dentistry, nursing, and midwifery. Next, we designed a training and rotation plan for these volunteer students to execute measurements and screenings that would last for three subsequent weekends in October 2022. The volunteer assistants were recruited for theoretical and practical training for taking measurements and administering the survey between 08.00-09.00 on Saturdays and Sundays. Then, a total of 72 assistant students (12 students in 6 groups) carried out height-weight, body mass index (BMI), waist circumference, and blood pressure measurements and survey administration at cabinets and desks set up in the campus shopping center area between 09.00-13.00 and 13.00-17.00 during three weekends. The layout of the research booths is depicted in Figure 1.

We took height measurements with a portable stadiometer and weight measurements with a sensitivity-adjusted electronic scale. Then, we calculated and classified the participants' BMI considering the relevant criteria set forth by the WHO as follows: underweight (below 18.5 kg/m^2), normal weight (18.5kg/m^2- 22.9kg/m^2), pre-obese (23.0kg/m^2 - 24.9kg/m^2), and obese (25.0kg/m^2 and above) (24). Besides, the same person took waist circumference measurements twice using a non-stretchable tape measure, and the average values were recorded. Blood pressure measurements were taken using a digital blood pressure monitor on the right arm after 15 minutes of rest in a sitting position. The measurement was replicated after another 15 minutes of resting for those with blood pressure above 140/90 mmHg.

We obtained the necessary permission from the presidency of the university prior to the study (No:2021/12-158), explained the nature and purpose of the research to the potential participants, and recruited those providing their written consent for study participation. Following measurements, we administered a survey to the voluntary participants. The survey includes questions about the participants' (self and familial) health status, smoking, alcohol use, physical activity levels, stress

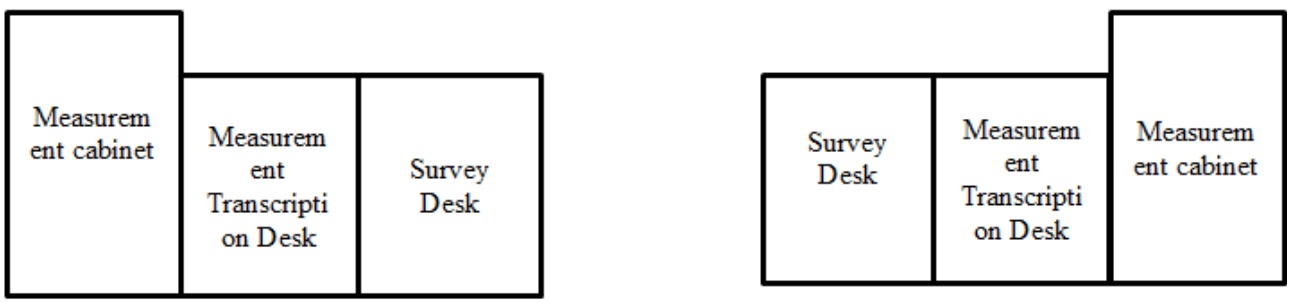

Figure 1. Layout of the Research Booths

management, and healthy lifestyle behaviors, as well as demographics. In addition, it comprises 14 knowledge questions about IHD (e.g., symptoms, global prevalence, etc.) and risk factors (e.g., nutrition, obesity, physical activity, smoking, etc.). A pilot study was performed with 20 students to test the validity of the survey forms. The findings required no change to the survey questions, and the pilot data were not included in the study. We scored knowledge questions as one point for each correct answer and categorized the total IHD knowledge score as high (≥ 11 correct answers) and low (≤ 10 correct answers).

The Research Ethics Committee of Nigde Omer Halisdemir University granted ethical approval to our study (No: 2022/07-01) and conforms to the ethical guidelines of the 1975 Declaration of Helsinki. In addition, we obtained the participants' informed consent for voluntary participation in the study.

We analyzed the data using IBM SPSS Statistics Standard Concurrent User V 26.0 (IBM Corp., Armonk, New York, USA). Descriptive statistics are denoted as numbers (n), percentages (%), means±standard deviations (M±SD), medians (Median), minimums (min), and maximums (max). The data were initially examined for outliers and normality. While the appearance of boxplots implied the absence of outliers, skewness and kurtosis values of the data were found to be within acceptable limits (-1.5 - +1.5) (25). Then, we compared the categorical variables using the chi-square test and the participants' IHD knowledge scores using the independent samples t-test. We considered a p-value of < 0.05 to be statistically significant.

Results

Initial analyses showed the mean age of the participants to be 20.8± 2.4 years and that 50.8% were 20 years and younger. While 52.2% were females, 83.2% stayed in dormitories, and 21.5% were pre-obese or obese. Table 1 presents the participants' demographic and anthropometric characteristics.

The findings demonstrated that 40.9% of the participants (n=322) thought eating healthy, 59.7% (n=469) took care of their health, 73.7% (n=579) could cope with stress, 50.1% (n=394) exercised at least 30 minutes a day, 13.6% (n=107) used alcohol, 55.7% (n=434) were always/often exposed to smoking, 30.5% (n=240) smoked, 24.0% (n=189) had their cholesterol measured before, 37.9% (n=298) had their blood glucose measured before, 68.3% (n=537) had their blood pressure measured before, and 36.6% (n=288) regularly weighed themselves (Figure 2)

While the mean smoking duration of quitters was 4.6±3.5 years, the smokers used an average of 13.9±9.7 cigarettes daily. Besides, the mean duration of alcohol use of quitters was 3.1±1.4 years. About one-third and two-thirds of the students never had their blood pressure and blood glucose measured before, respectively. Only about a quarter of the participants had their cholesterol measured before. We realized that one in every three students (30.4%) smoked, that more than half of the smokers (52.9%) had tried to quit smoking before, and that more than a quarter of those having tried to quit smoking (29.9%) had four or more quit attempts. More than half of the students (55.7%) were always/often exposed to others' smoking, and about half of smokers (46.7%) had no information about smoking cessation clinics. More than one-third of the students (36.5%) reported being physically inactive for five hours or more a day, but nearly half (48.9%) engaged in exercise for less than 30 minutes a day. More than a quarter of the participants (26.8%) reported being very and extremely stressed and could not cope with it (26.3%).

While 59.7% of the participants reported taking care of their health, 40.9% thought they eat healthy. We also found that two-thirds (63.6%) used vegetable oil in meals, that more than a quarter added salt without tasting the food, and that more than a third always used salt. The rate of those minding the fatty acid content of foods was found to be 23.8%. Spending on fast food dominated the food budget of more than one-third of the students (35.6%). Moreover, one-fifth did not consume physiologically-sufficient water daily (Table 3). On the other hand, approximately one-third expected to be knowledgeable about cholesterol and its cardiovascular impacts and CVD risk factors.

Table 1. Participants' demographic and anthropometric characteristics (n = 786)	
Demographic characteristics Age (years; M±SD) 20.8±2.4 (min-max = 18-35)	**n (%)**
Gender	
Female	410 (52.2)
Male	376 (47.8)
Place of residence	
Home	132 (16.8)
Dormitory	654 (83.2)
BMI	
Underweight (<18.5)	102 (13.0)
Normal (18.5-24.9)	515 (65.5)
Pre-obese (25.0-29.9)	131 (16.7)
Obese (>30.0)	38 (4.8)
Waist circumference	
Female (≥88 cm)	169 (21.5)
Male (≥102 cm)	22 (2.8)
Systolic Blood Pressure	
Normal (<130 mmHg)	645 (82.1)
High-Normal (130-139 mmHg)	74 (9.4)
Hypertension (140 mmHg and above)	67 (8.5)
Diastolic Blood Pressure	
Normal (<85 mmHg)	670 (85.2)
High-Normal (85-89 mmHg)	54 (6.9)
Hypertension (90 mmHg and above)	62 (7.9)
Chronic Disease	
Yes	14 (1.8)
No	772 (98.2)
Type of Chronic Disease*	
CVD	7 (50.0)
Hypertension	2 (14.3)
Hyperlipidemia	3 (21.4)
Diabetes	5 (35.7)
Familial Chronic Disease	
Yes	235 (29.9)
No	551 (70.1)
Type of Familial Chronic Disease *	
CVD	96 (40.9)
Hypertension	96 (40.9)
Obesity	26 (11.1)
Hyperlipidemia	32 (13.6)
Diabetes	132 (56.2)
Familial sudden death	
Yes	27 (3.4)
No	759 (96.6)
*More than one item was marked.	

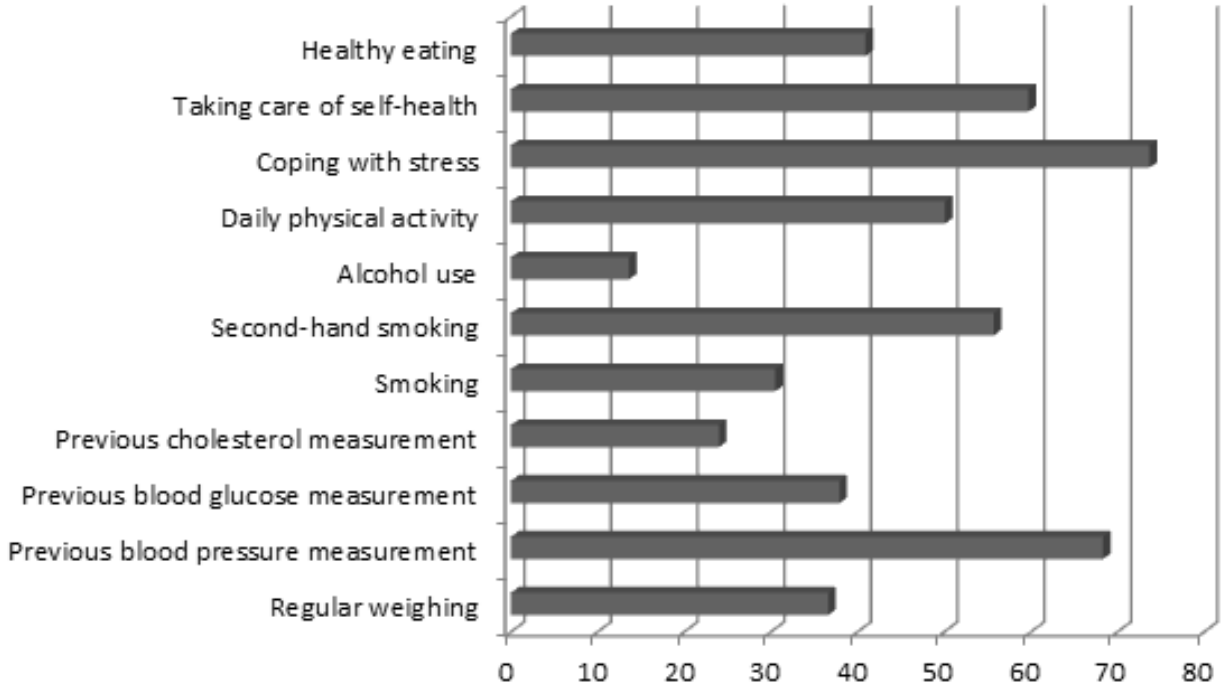

Figure 2. Participants' IHD-related practices and attitudes (n = 786).

More than half of the participants reported encouraging their friends to avoid harmful habits (66.7%), eat healthy (57.5%), and engage in physical activity (64.9%). Most of the participants (70.9%) reported they could notice any abnormal situation in their bodies. While nearly half of the participants (48.1%) were satisfied with their current lifestyle, the rate of those feeling ready to take action to improve their current lifestyle was found to be 65.4% (Table 2).

Table 2. Participants' knowledge levels and attitudes regarding CVD and its risk factors

Variables n=786	Yes (%)	No (%)	Undecided (%)
I add salt to food before tasting it.	26.2	67.0	6.6
I use added salt daily.	33.5	49.2	17.3
I mind the fatty acid content of foods.	23.8	64.2	12.0
I avoid consuming fat-rich foods.	59.4	28.1	12.5
I reserve a sufficient budget for food.	59.6	27.8	12.6
Spending on fast food dominates my food budget.	35.6	47.6	16.8
Spending on healthy foods dominates my food budget.	45.8	32.1	22.1
I am knowledgeable about cholesterol types and their cardiovascular effects.	31.9	41.6	26.5
I am knowledgeable about the risk factors leading to CVD.	34.7	35.4	29.9
I encourage my friends to eat healthy.	57.5	28.5	14.0
I encourage my friends to engage in physical activity.	64.9	23.0	12.1
I encourage my friends to avoid smoking, alcohol use, and similar harmful habits.	66.8	23.1	10.1
I immediately notice abnormal signals (e.g., illness, pain) in my body.	70.9	12.7	16.4
I am satisfied with my current lifestyle (i.e., my eating habits, physical activity status, habits, etc.)	48.2	29.9	21.9
I feel ready to take action to improve/change my current lifestyle.	65.4	15.5	19.1

Participants' mean IHD knowledge score was found to be 8.9±2.5. Our results showed that the female participants (66.0%) had a statistically higher knowledge level of IHD ($p<0.001$). Only 31.7% of the students thought that IHD is a disease accounting for the most deaths globally. While 53.7% of the male students were not knowledgeable about fatty acids, the rate of the females avoiding fat-rich foods was found to be 55.7%. We also found a significant difference between the male (51.4%) and female students (48.6%) by sufficient water consumption. The female participants remained undecided more regarding taking care of self-health (60.6%). Besides, the males thought being too young to worry about CVD (51.7%) and that the young do not need to have regular check-ups (62.0%). They also remained more undecided than the female students that high blood pressure would not develop in the young (62.4%) and thought more that one would not be likely to have a heart attack in the case of no familial CVD history (59.2%). The male students were more undecided that cardiac patients should avoid exercise (52.7%) and answered "No" to the statement, "People who exercise regularly and are at ideal weight would not have a heart attack" at a lower rate than the females (43.3%) ($p<0.010$). The females, on the other hand, thought more that using rock salt and marine salt instead of table salt would reduce the risk of high blood pressure (59.2%) and did not consider heart disease specific to the male gender (54.7%) ($p<0.003$). In addition, the female participants thought more that they can be protected from IHD with just lifestyle changes (57.4%) ($p<0.006$). The females also thought more that quitting smoking would reduce the risk of CVD (54.9%) ($p<0.002$) and that exposure to smoking is as harmful as smoking (54.1%) ($p<0.006$). Moreover, they encouraged their friends to avoid harmful habits more (58.7%). While the male students were more satisfied with their current lifestyle (53.6%), the females reported feeling more ready to take action to change their lifestyle (55.8%; Table 3).

Table 4 shows the relationships between the participants' IHD knowledge scores and their IHD-related practices and attitudes. Accordingly, the knowledge scores of those weighing regularly, undergoing regular check-ups (e.g., having blood pressure, blood glucose, and cholesterol measurements), and taking care of their health were found to be significantly higher than those not having regular check-ups and not taking care of their health. Moreover, those not smoking, including second-hand smoking, had significantly higher IHD knowledge scores than those smoking. Yet, we could not conclude a significant relationship between IHD knowledge and alcohol use, healthy eating, physical activity, and ability to cope with stress.

Tablo 3. IHD risk factors and other variables by gender

Variables **Total (n = 786)**	**Female** **(n=410) (%)**	**Male** **(n=376) (%)**	χ^2	**p**
Knowledge level				
Low (10 ≤ correct answer)	45.9	54.1	**27.086**	**0.001**
High (11 ≥ correct answer)	66.0	34.0		
I am knowledgeable about fatty acids.				
Yes	56.1	43.9	**6.636**	**0.036**
No	46.3*	53.7*		
Undecided	54.9	45.1		
I avoid consuming high-fat foods.				
Yes	55.7*	44.3*	**6.670**	**0.036**
No	48.9	51.1		
Undecided	42.9*	57.1*		
I drink sufficient water daily.				
Yes	48.6*	51.4*	**9.440**	**0.009**
No	59.2	40.8		
Undecided	62.8*	37.2*		

I take care of my health.				
Yes	49.9	50.1	**6.632**	**0.036**
No	48.9	51.1		
Undecided	60.6*	39.4*		
I am too young to worry about my heart.				
Yes	48.3*	51.7*	**9.821**	**0.007**
No	61.2*	38.8*		
Undecided	50.4	49.6		
High blood pressure would not develop in the young.				
Yes	45.0	55.0	**29.605**	**0.001**
No	59.7*	40.3*		
Undecided	37.6*	62.4*		
Using rock salt and marine salt instead of table salt would reduce the risk of high blood pressure.				
Yes	59.2*	40.8*	**10.031**	**0.007**
No	46.5	53.5		
Undecided	48.4	51.6		
Cardiac patients should avoid exercise.				
Yes	46.3	53.7	**11.179**	**0.004**
No	56.5*	43.5*		
Undecided	42.8*	57.2*		
One would not be likely to have a heart attack in the case of no familial CVD history.				
Yes	40.8*	59.2*	**23.121**	**0.001**
No	56.8*	43.2*		
Undecided	34.2*	65.8*		
CVD is a health condition specific to the male gender.				
Yes	40.4	59.6	**11.922**	**0.003**
No	54.7*	45.3*		
Undecided	35.7*	64.3*		
People who exercise regularly and are at ideal weight would not have a heart attack.				
Yes	45.6	54.4	**9.309**	**0.010**
No	56.7*	43.3*		
Undecided	45.8	54.2		
I can protect myself from IHD by changing my lifestyle even if I have risk factors.				
Yes	57.4*	42.6*	**10.217**	**0.006**
No	45.9	54.1		
Undecided	46.0*	54.0*		
I encourage my friends to avoid smoking, alcohol use, and similar harmful habits.				
Yes	58.7*	41.3*	**30.513**	**0.001**
No	35.4*	64.6*		
Undecided	46.8	53.2		

Exposure to others' smoking is as harmful as first-hand smoking.			
Yes	54.1*	45.9*	**10.353 0.006**
No	35.2*	64.8*	
Undecided	35.7	64.39	
Quitting smoking would reduce the risk of CVD			
Yes	54.9*	45.1*	**12.028 0.002**
No	35.6*	64.4*	
Undecided	41.1*	58.9*	
The young do not need regular check-ups.			
Yes	38.0*	62.0*	**12.889 0.002**
No	55.3*	44.7*	
Undecided	41.0	59.0	
I am satisfied with my current lifestyle (my eating habits, physical activity status, habits, etc.).			
Yes	46.4*	53.6*	**11.120 0.004**
No	54.9	45.1	
Undecided	61.0	39.0	
I feel ready to take action to improve and change my current lifestyle.			
Yes	55.8*	44.2*	**13.041 0.001**
No	37.7*	62.3*	
Undecided	51.3	48.7	
Chi-square test: *significant at $p \leq 0.05$. *Significant difference by gender.			

Discussion

We discovered the most prevalent modifiable IHD risk factors in our sample of 786 university students to be insufficient physical activity (48.9%), smoking (30.5%), and overweight/obesity (21.5%). In parallel, waist circumference thickness posed a potential risk in 21.5% of the female students. A previous study concluded physical activity to be negatively correlated with BMI and waist circumference and positively linked with TV watching in adolescents (26). In our study, more than one-third of the students (36.5%) reported being physically inactive for five hours or more a day. Similarly, another study demonstrated lack of physical activity to be the leading risk factor for IHD among medical students (44.0%) (27). Besides, tobacco use among university students remains an alarming problem worldwide. In a systematic review, the authors showed that smoking rates of university students in some Arabic countries vary between 3.5% and 80.2%. When it comes to our findings, not only was smoking rather prevalent among the participants but also 55.7% reported being always/often exposed to second-hand smoking. Similar to our study, Kaya and Ergün reported that both smoking rates and second-hand smoking exposure were high among participating university students (28). It is widely acknowledged that the development of metabolic and cardiovascular risk factors in adulthood is accelerated, primarily in association with weight gain during childhood and adolescence (20). In this regard, a previous cross-sectional study evaluated 300 children and adolescents for cardiovascular health and reported those overweight/obese to have poorer cardiovascular health (29). Another study with overweight (BMI) children and adolescents discovered that the group with thicker waist circumference was ~two times more likely to have high triglyceride and insulin levels and metabolic syndrome than the group with thinner waist circumference (30). Although nutrition also assumes a key role in CVD (31), one's dietary patterns in modern times seem to remain far from balanced eating. In a study examining risky health behaviors of university students, only 17.1% of participants reported having a healthy diet pattern (32). Excessive consumption of ultra-processed foods means consumption of higher sodium, saturated fat, trans fat, and free sugar content and lower

Table 4. Relationships between the participants' IHD knowledge scores and their IHD-related practices and attitudes

Parameters (n = 786)	n	Total score±SD	t	p
Regular weighing				
Yes	288	9.3±2.4	2.935	0.003
No	497	8.7±2.6		
Previous blood pressure measurement				
Yes	537	9.2±2.5	4.618	0.000
No	249	8.3±2.6		
Previous blood glucose measurement				
Yes	298	9.5±2.4	4.899	0.000
No	488	8.6±2.6		
Previous cholesterol measurement				
Yes	189	9.7±2.3	4.468	0.000
No	597	8.7±2.6		
Smoking				
Yes	240	8.5±2.7	-3.456	0.001
No*	546	9.2±2.4		
Second-hand smoking				
Yes†	434	8.7±2.6	-2.775	0.006
No	348	9.2±2.4		
Alcohol use				
Yes	107	8.5±2.9	-1.742	0.082
No*	679	9.0±2.5		
Daily physical activity				
Yes	394	8.9±2.4	-0.697	0.486
No	369	9.0±2.6		
Coping with stress				
Yes	579	9.0±2.5	1.161	0.246
No	207	8.8±2.7		
Taking care of self-health				
Yes	469	9.1±2.4	2.664	0.008
No‡	317	8.7±2.7		
Healthy eating				
Yes	322	9.1±2.5	0.980	0.327
No‡	464	8.9±2.6		

Independent samples t-test. *Quitters were included. †Those being always/often exposed to smoking were included. ‡Those remaining undecided were included.

protein and potassium (33). Indeed, we found that nearly half of the participants in our study (47.6%) reported that fast food dominated their diet.

In this study, 16.4% of the participants had high blood pressure. The previous research estimated the prevalence of hypertension in adolescents to be about 10% due to weight gain, increased salt and sugar consumption, and a stressful/sedentary lifestyle (20). Similar to our study, a previous study found the hypertension rate to be 18.1-26.5% among students of two universities, respectively (34). A striking finding in our study may be that 31.7% of the participants had never had their blood pressure measured before. Although reducing salt intake is recommended as a simple measure in preventing hypertension (35), we found that 26.2% of the students added salt to their food without tasting it and that 33.5

consumed more than 5 g of additional salt daily. In addition, the rate of those failing to cope with their stress was 26.3%.

In terms of non-modifiable risk factors, the prevalence of familial chronic diseases (CVD, hypertension, obesity, hyperlipidemia, and diabetes) was found to be 29.9%, and the most common familial chronic disease was diabetes with a rate of 56.2%. A previous study adopting a similar design to our study found diabetes to be high among the participants as a familial risk factor (47.2%) (36). Another study re-analyzed the WHO data on global mortality in 2019, considered hypertension, smoking, obesity, and diabetes IHD risk factors, and concluded similar rates of risk factors in both high- and low-income countries, which may be explained by the idea that increasing adoption of western lifestyle in low-income countries contribute to these risk factors (37).

Our participants had relatively poor knowledge of IHD risk factors. Interestingly, the male participants' knowledge levels of CVD were lower than the females, although the male gender is a non-modifiable CVD risk factor. Similarly, a previous study reported a higher knowledge level of CVD among Turkish female participants (38). Moreover, another noteworthy finding in this study may be that only about a third of the participants thought that IHD accounts for the most deaths in the world. In parallel to this finding, a previous study on coronary artery disease (CAD) among the young aged 18-25 years reported that the majority of participants had not heard of CAD (82%) and were not informed about the risk factors (26.4%), symptoms (25.1%), and complications (72.7%) of the disease (39). Nevertheless, the literature hosts diverse findings on the knowledge level of CVD risk factors, possibly due to methodological and population-specific differences. For example, contrary to our findings, previous research documented that the participating university students had a high knowledge level of CAD risk factors (11.47±2.31 out of 16) and that 60% of the participants stated that CVD leads to the most deaths globally (40). Previous researches also reported that Turkish university students had above-average knowledge of CVD risk factors (38-41). When it comes to the risk perception of IHD, we found that while more than half of the participants thought being too young to worry about cardiovascular conditions, 15.4% remained undecided. In a study in Saudi Arabia with a population consisting mostly of university students, while the belief that one would not likely experience a cardiovascular condition under the age of 45 was 18.6%, the rate of those not knowledgeable about CVD was 34.8% (42). Besides, we found that about two-thirds of the students did not undergo regular check-ups (e.g., having blood pressure, blood glucose, and cholesterol measurements) and that this group had poorer knowledge of IHD. Since these participants might have had poor knowledge of IHD risk factors and might not have experienced the consequences of their IHD-related attitudes and practices, they seemed to likely have underestimated the risks of the disease. College students are considered young adults feeling some sense of invincibility despite widely accessible information about health-related risk factors inherent in their attitudes and practices (43). Yet, it is well known that proper knowledge and awareness of IHD risk factors are essential for preventing it and reducing IHD-leading mortality (44). Changing lifestyle may be a difficult-to-achieve goal in adulthood; therefore, it makes perfect sense to adopt a healthy lifestyle as early as possible to reduce the prevalence and future burden of CVD (45).

Overall, we concluded that our participants had poor knowledge of IHD despite having relatively high educational attainment. They even had a high rate of IHD risk factors, although they were mostly not aware of them. However, their perception seemed to focus on the idea that they were too young to be sick. In addition to our striking findings, we can confidently assert that the present study helped reinforce peer collaboration and solidarity and contribute to the development of professional and social relationships among peer health students. Moreover, the peers were able to convey their informal health recommendations (restricting the consumption of salt and fast food, quitting smoking, applying to a hospital for a comprehensive examination for high blood pressure, etc.) to the participants immediately following their participation in the study. Studies involving peer education were shown to be

influential on sexually transmitted diseases and safe sexual life, reducing HIV/AIDS risk behaviors, menstrual health, and overall health behaviors (46–48). Our experience also revealed the need for future research involving peers to further identify risk factors and design relevant interventions. Campus-located youth counseling centers/family health centers may offer more functional services to identify IHD risk factors. In addition, strategies to prevent IHD may need to be incorporated into the processes of primary healthcare services. In this regard, a protocol between the Ministry of Health and the Higher Education Council oriented to protect and promote "health on campus" may initiate regular check-ups and monitoring of IHD risk factors for newcomers and enrolled students through family health centers. Further research on IHD risk awareness among young people on campuses with the help of peer educators may be handy in improving training efficiency. Regular peer education-centered activities can be performed for all groups, particularly high-risk students, on active life on campus, healthy eating, and protection from addictions in cooperation with faculty members, Provincial Health Directorate, Provincial Directorate of Youth and Sports, and Green Crescent. Moreover, projects on training volunteer peer educators can be encouraged in universities. Students can also be encouraged to enroll in elective/compulsory courses to engage in peer education for health promotion. Organizational culture in higher education institutions should cover regular, accessible training for IHD risk factors. Besides, universities should offer students convenient access to healthy food through good practices (e.g., nutrition-friendly campus). Furthermore, it may be recommended to carry out programs for smoking prevention and cessation programs, including prevention of second-hand smoking exposure, starting from the first years of higher education. The young may be encouraged to participate in physical activity-promoting programs. Programs and training for all risk factors are likely to support protecting and promoting health from many chronic diseases, including IHD.

Limitations

The present study is not free of few limitations. Although it was initially designed as an intervention study, it was accomplished as a cross-sectional study due to the devastating earthquake disaster in our country. For this reason, participants' blood glucose and blood lipid measurements could not be taken, and risk awareness training and follow-ups could not be performed. It should also be noted that the cross-sectional design of the study hinders deducing causal inferences from the relationships between research variables.

Acknowledgments

We would like to thank all voluntary student colleagues who assisted in collecting paper-based and anthropometric data from the participants.

Declaration of interest statement

The authors report no relationships that could be construed as a conflict of interest.

Funding

This research was funded by Scientific and Technological Research Council of Turkey (TUBITAK) 2209–A Research Projects Support Program for Undergraduate Students (No: 1919B012107777).

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References

1. Sidney S, Rosamond WD, Howard VJ, Luepker R V. The heart disease and stroke statistics-2013 update and the need for a national cardiovascular surveillance system. Circulation. 2013 Jan 1;127(1):21–3.
2. Roth GA, Johnson C, Abajobir A, Abd-Allah F, Ferede Abera S, Abyu G, et al. Global, Regional, and National Burden of Cardiovascular Diseases for 10 Causes, 1990 to 2015. J Am Coll Cardiol [Internet]. 2017 Jul 4 [cited 2023 Jul 25];70(1):1–25. Available from: http://repositorio.insp.mx:8080/jspui/handle/20.500.12096/7883
3. Prabhakaran D, Jeemon P. The changing patterns of cardiovascular diseases and their risk factors in the states of India: The Global Burden of Disease Study 1990–2016. Lancet Glob Heal [Internet]. 2018 [cited 2023 Oct 10];6(12):e1339–51. Available from: https://www.thelancet.com/journals/langlo/article/

PIIS2214-109X1830407-8/fulltext
4. Turkish Statistical Institute. Death and Cause of Death Statistics, 2022 [Internet]. 49679. 2023 [cited 2023 Oct 24]. Available from: https://data.tuik.gov.tr/Bulten/Index?p=Olum-ve-Olum-Nedeni-Istatistikleri-2022-49679#:~:text=Ölümler nedenlerine göre incelendiğinde%2C 2022,ile solunum sistemi hastalıkları izledi.&text=Grafikteki rakamlar%2C yuvarlamadan dolayı toplamı vermeyebilir.
5. Roth GA, Mensah GA, Johnson CO, Addolorato G, Ammirati E, Baddour LM, et al. Global burden of cardiovascular diseases and risk factors, 1990-2019: Update from the GBD 2019 Study. J Am Coll Cardiol. 2020 Dec 22;76(25):2982–3021.
6. Khan MA, Hashim MJ, Mustafa H, Baniyas MY, Al Suwaidi SKBM, AlKatheeri R, et al. Global epidemiology of ıschemic heart disease: Results from the Global Burden of Disease Study. Cureus [Internet]. 2020 [cited 2023 Oct 10]; Available from: https://www.cureus.com/articles/36728-global-epidemiology-of-ischemic-heart-disease-results-from-the-global-burden-of-disease-study.pdf
7. Batty GD, Leon DA. Socio-economic position and coronary heart disease risk factors in children and young people: Evidence from UK epidemiological studies. Eur J Public Health [Internet]. 2002 [cited 2023 Oct 20];12(4):263–72. Available from: https://academic.oup.com/eurpub/article-abstract/12/4/263/487819
8. Leeder S, Raymond S, Greenberg H, Liu H, Esson K. A race against time: the challenge of cardiovascular disease in developping countries. Trustees of Columbia University [Internet]. 2004 [cited 2023 Oct 10];(May). Available from: https://scholar.google.com.tr/scholar?hl=tr&as_sdt=0%2C5&q=Leeder%2C+S%2C+Raymond%2C+S%2C+Greenberg%2C+H%2C+Liu%2C+H+and+Esson%2C+K+%282004%29+A+race+against+time%3A+the+challenge+of+cardiovascular+disease+in+developing+countries.+New+York%3A+Trustees+of+
9. Katzmarzyk PT, Pérusse L, Malina RM, Bergeron J, Després JP, Bouchard C. Stability of indicators of the metabolic syndrome from childhood and adolescence to young adulthood: The Quebec Family Study. J Clin Epidemiol [Internet]. 2001 [cited 2023 Oct 20];54(2):190–5. Available from: https://www.sciencedirect.com/science/article/pii/S0895435600003152
10. McGill HC, McMahan CA, Zieske AW, Malcom GT, Tracy RE, Strong JP. Effects of nonlipid risk factors on atherosclerosis in youth with a favorable lipoprotein profile. Circulation. 2001 Mar 20;103(11):1546–50.
11. Napoli C, Glass CK, Witztum JL, Deutsch R, D'Armiento FP, Palinski W. Influence of maternal hypercholesterolaemia during pregnancy on progression of early atherosclerotic lesions in childhood: Fate of Early Lesions in Children (FELIC) study. Lancet [Internet]. 1999 [cited 2023 Oct 20];354(9186):1234–41. Available from: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(99)02131-5/fulltext
12. Ather M, Khan AH, Bandeshah AA, Wajid H, Adnan S, Abbasi AS. Hypertension among general population visiting at South East Hospital and Research Center, Islamabad, Pakistan. Int J Curr Res Rev [Internet]. 2022 [cited 2023 Oct 24];14(10):09–14. Available from: https://www.researchgate.net/profile/Attiya-Hameed-Khan/publication/360725300_Hypertension_Among_General_Popultaion_Visiting/links/628730276e41e5002d33455f/Hypertension-Among-General-Popultaion-Visiting.pdf
13. T.C. Sağlık Bakanlığı. Türkiye Kalp ve Damar Hastalıklarını Önleme ve Kontrol Programı Birincil , İkincil ve Üçüncül Korumaya Yönelik Stratejik Plan ve Eylem Planı [Internet]. Temel Sağlık Hizmetleri Genel Müdürlüğü. 2010 [cited 2023 Jul 25]. 812 p. Available from: https://scholar.google.com/scholar?hl=tr&as_sdt=0%2C5&q=Türkiye+Kalp+Ve+Damar+Hastalıklarını+Önleme+Ve+Kontrol+Programı%2C+Sağlık+Bakanlığı&btnG=
14. TKD. Türk Kardiyoloji Derneği Koroner Kalp Hastalığı Korunma ve Tedavi Kılavuzu [Internet]. 2002 [cited 2023 Oct 10]. Available from: https://scholar.google.com.tr/scholar?hl=tr&as_sdt=0%2C5&q=8.%09Onat%2C+A.%2C+Büyüköztürk%2C+K.%2C+Sansoy%2C+V.%2C+Avcı%2C+Ş.+G.%2C+Akgün%2C+G.%2C+Tokgözoğlu%2C+L.%2C+...+%26+Ergene%-

2C+O.+%282002%29.+Türk+kardiyoloji+derneği+koroner+kalp+hastalığı+korunma
15. Barbaresko J, Rienks J, Nöthlings U. Lifestyle indices and cardiovascular disease risk: A meta-analysis [Internet]. Vol. 55, American Journal of Preventive Medicine. 2018 [cited 2023 Oct 24]. p. 555–64. Available from: https://www.sciencedirect.com/science/article/pii/S0749379718318877
16. World Health Organization. Cardiovascular death and disability can be reduced more than 50 percent. Indian J Med Sci [Internet]. 2003 [cited 2023 Oct 24];57(3):117–21. Available from: https://www.who.int/news/item/17-10-2002-cardiovascular-death-and-disability-can-be-reduced-more-than-50-percent
17. Onat A, Karakoyun S, Akbaş T, Karadeniz FÖ, Karadeniz Y, Çakir H, et al. Turkish Adult Risk Factor survey 2014: Overall mortality and coronary disease incidence in Turkey's geographic regions. Turk Kardiyol Dern Ars [Internet]. 2015 [cited 2023 Oct 10];43(4):326–32. Available from: https://jag.journalagent.com/tkd/pdfs/TKDA_43_4_326_332.pdf
18. Kozan O, Oguz A, Abaci A, Erol C, Ongen Z, Temizhan A, et al. Prevalence of the metabolic syndrome among Turkish adults. Eur J Clin Nutr [Internet]. 2007 [cited 2023 Oct 10];61(4):548–53. Available from: https://www.nature.com/articles/1602554
19. T.C. Sağlık Bakanlığı. Türkiye Beslenme ve Sağlık Araştırması, 2010 [Internet]. 2014. [cited 2023 Oct 10]. Available from: https://scholar.google.com.tr/scholar?hl=tr&as_sdt=0%2C5&q=türkiye+beslenme+ve+sağlık+araştırması&btnG=
20. Abrignani MG, Lucà F, Favilli S, Benvenuto M, Rao CM, Di Fusco SA, et al. Lifestyles and Cardiovascular Prevention in Childhood and Adolescence. Vol. 40, Pediatric Cardiology. Springer New York LLC; 2019. p. 1113–25.
21. Türkiye Fiziksel Aktivite Rehberi 2014. Türkiye Fiziksel Aktivite Rehberi [Internet]. Vols. 978-975–59, TC. Sağlık Bakanlığı. 2014 [cited 2023 Oct 10]. 1–120 p. Available from: https://www.google.com/search?q=Türkiye+Fiziksel+Aktivite+Rehberi&rlz=1C1SQJL_trTR782TR782&oq=-Türkiye+Fiziksel+Aktivite+Rehberi&gs_lcrp=EgZjaHJvbWUyBggAEEUYOTIGCAEQRRg70gEIMTIwNWowajmoAgCwAgA&sourceid=chrome&ie=UTF-8
22. Can G, Ozdilli K, Erol O, Unsar S, Tulek Z, Savaser S, et al. Comparison of the health-promoting lifestyles of nursing and non-nursing students in Istanbul, Turkey. Wiley Online Libr Nursing Heal Sci 2008•Wiley Online Libr [Internet]. 2008 [cited 2023 Oct 10];10(4):273–80. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1442-2018.2008.00405.x
23. Güneş FE, Bekiroglu N, Imeryuz N, Agirbasli M. Awareness of cardiovascular risk factors among university students in Turkey. Prim Health Care Res Dev [Internet]. 2019 [cited 2023 Oct 10];20:e127. Available from: https://www.cambridge.org/core/journals/primary-health-care-research-and-development/article/awareness-of-cardiovascular-risk-factors-among-university-students-in-turkey/05338BD1BBA9291045E46FE9637A4677
24. Status WHOP. The use and interpretation of anthropometry World Health Organization. WHO Expert Comm Geneva, Switz [Internet]. 1995 [cited 2023 Oct 12];1–186. Available from: https://scholar.google.com.tr/scholar?hl=tr&as_sdt=0%252C5&q=WHO.+Physical+status%253A+the+use+and+interpretation+of++anthropometry.+Report+of+a+WHO+Expert+Committee%2502tee%252C+Technical+Report+Series+No.+854%252C+World+-Health++Organization%252C+Geneva%252C+Switzerland%25
25. Tabachnick BG, Fidell LS. Using multivariate statistics. Harlow. Essex Pearson Educ Ltd [Internet]. 2014 [cited 2023 Oct 19]; Available from: https://www.pearsonhighered.com/assets/preface/0/1/3/4/0134790545.pdf
26. Barker AR, Gracia-Marco L, Ruiz JR, Castillo MJ, Aparicio-Ugarriza R, González-Gross M, et al. Physical activity, sedentary time, TV viewing, physical fitness and cardiovascular disease risk in adolescents: The HELENA study. Int J Cardiol [Internet]. 2018 [cited 2023 Oct 23];254:303–9. Available from: https://www.sciencedirect.com/science/article/pii/S0167527317335039
27. Gilani SI, Afridi S. Frequency of risk factors and awareness regarding ischemic heart diseases among medical students of a private

medical college, Peshawar, Pakistan. Khyber Med Univ J [Internet]. 2017 [cited 2023 Oct 23];9(4). Available from: https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=23052643&AN=127935985&h=-T7akkSGFoC5T%2BQI%2FovUl-4nu7XIp7Suc%2FojcFwta5PPAfiHmyQxFabW1t%2BDU7PMegK7jqWwrl0vMxY%2Bjzr5ZFHg%3D%3D&crl=c
28. Kaya M, Ergün A. Sağlık Bilimleri öğrencilerinin sigara içme durumu, etkileyen faktörler ve ikincil sigara dumanı ile ilgili farkındalık düzeyleri. J Acad Res Nurs [Internet]. 2020 [cited 2024 May 28];6(3):416–41. Available from: https://jag.journalagent.com/z4/download_fulltext.asp?pdir=jaren&plng=eng&un=JAREN-04696
29. Fyfe-Johnson AL, Ryder JR, Alonso A, Maclehose RF, Rudser KD, Fox CK, et al. Ideal cardiovascular health and adiposity: Implications in youth. J Am Heart Assoc. 2018 Apr 17;7(8).
30. Janssen I, Katzmarzyk PT, Srinivasan SR, Chen W, Malina RM, Bouchard C, et al. Combined influence of body mass index and waist circumference on coronary artery disease risk factors among children and adolescents. Pediatrics [Internet]. 2005 [cited 2023 Oct 20];115(6):1623–30. Available from: https://publications.aap.org/pediatrics/article-abstract/115/6/1623/67498
31. Guardamagna O, Abello F, Cagliero P, Lughetti L. Impact of nutrition since early life on cardiovascular prevention. Vol. 38, Italian Journal of Pediatrics. 2012.
32. Özpulat F, Erdem Y. Üniversite öğrencilerinin riskli sağlık davranışları ve etkileyen faktörlerin incelenmesi. Ankara Sağlık Bilim Derg [Internet]. 2019 [cited 2024 May 28];(1):110–26. Available from: https://dergipark.org.tr/en/pub/ausbid/issue/46310/527570
33. Theodore RF, Broadbent J, Nagin D, Ambler A, Hogan S, Ramrakha S, et al. Childhood to early-midlife systolic blood pressure trajectories: Early-life predictors, effect modifiers, and adult cardiovascular outcomes. Hypertension. 2015 Dec 1;66(6):1108–15.
34. Mohamed Moussa MM, El-mowafy RI, El-Ezaby HH. Prevalence of hypertension and associated risk factors among university students: Comparative study. J Nurs Educ Pract [Internet]. 2016 [cited 2023 Oct 23];6(5). Available from: https://www.researchgate.net/profile/Maha-Moussa/publication/290995470_Prevalence_of_hypertension_and_associated_risk_factors_among_university_students_Comparative_study/links/605e1b4b458515e83472e095/Prevalence-of-hypertension-and-associated-risk-factors
35. Campanozzi A, Avallone S, Barbato A, Iacone R, Russo O, De Filippo G, et al. High sodium and low potassium intake among Italian children: Relationship with age, body mass and blood pressure. PLoS One. 2015 Apr 8;10(4).
36. Almalki MA, Al MNJ, Khayat MA, Bokhari HF, Subki AH, Alzahrani AM, et al. Population awareness of coronary artery disease risk factors in Jeddah, Saudi Arabia: A crosssectional study. Int J Gen Med [Internet]. 2019 [cited 2023 Oct 23];12:63–70. Available from: https://www.tandfonline.com/doi/abs/10.2147/IJGM.S184732
37. Nowbar AN, Gitto M, Howard JP, Francis DP, Al-Lamee R. Mortality from ischemic heart disease: Analysis of data from the world health organization and coronary artery disease risk factors from NCD risk factor collaboration. Circ Cardiovasc Qual Outcomes. 2019 Jun 1;12(6).
38. Demir Doğan M, Elik B. University students' knowledge level about risk factors for cardiovascular diseases, their healthy life awareness, and the influencing factors. J Public Heal. 2023;
39. Alruways AH, Alotaibi N, Rashikh M, Alnufeie A, Alshammari YD, Alharthy M, et al. Awareness and prevalence of coronary artery disease risk factors among Saudi adults in Dawadmi, Riyadh province: A cross-sectional study. J Fam Med Prim Care [Internet]. 2020 [cited 2023 Oct 23];9(11):5629. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7842469/
40. Almas A, Hameed A, Sultan FAT. Knowledge of coronary artery disease (CAD) risk factors and coronary intervention among university students. J Pak Med Assoc [Internet]. 2008 [cited 2023 Oct 23];58(10):553–7. Available from: https://ecommons.aku.edu/pakistan_fhs_mc_med_med/250/
41. Oğuz S, Erguvan B, Ünal G, Bayrak B, Çamcı

G. Üniversite öğrencilerinde kardiyovasküler hastalıklar risk faktörleri bilgi düzeyinin belirlenmesi [Internet]. Vol. 26, MN kardiyoloji. 2019 [cited 2023 Oct 23]. p. 184–91. Available from: https://www.researchgate.net/profile/Sidika-Oguz/publication/335883267_Klinik_Arastirma_Determination_of_Klowledge_of_Cardiovasculer_Disease_Risk_Factors_Among_University_Students/links/5d81fd9f299bf1996f74e6fb/Klinik-Arastirma-Determination-of-Klowledge-

42. Al-khlaiwi T, Alshammari H, Habib SS, Alobaid R, Alrumaih L, Almojel A, et al. High prevalence of lack of knowledge and unhealthy lifestyle practices regarding premature coronary artery disease and its risk factors among the Saudi population. BMC Public Health. 2023 Dec 1;23(1).
43. Tran DMT, Zimmerman LM, Kupzyk KA, Shurmur SW, Pullen CH, Yates BC. Cardiovascular risk factors among college students: Knowledge, perception, and risk assessment. J Am Coll Heal [Internet]. 2017 Apr 3 [cited 2023 Oct 17];65(3):158–67. Available from: https://www.tandfonline.com/doi/abs/10.1080/07448481.2016.1266638
44. Khera AV, Emdin CA, Drake I, Natarajan P, Bick AG, Cook NR, et al. Genetic risk, adherence to a healthy lifestyle, and coronary disease. N Engl J Med. 2016 Dec 15;375(24):2349–58.
45. Steinberger J, Daniels SR, Hagberg N, Isasi CR, Kelly AS, Lloyd-Jones D, et al. Cardiovascular health promotion in children: Challenges and opportunities for 2020 and beyond: A Scientific statement from the American Heart Association. Circulation. 2016 Sep 20;134(12):e236–55.
46. Kırmızıtoprak E, Şimşek Z. Cinsel yolla bulaşan hastalıklar ve güvenli cinsel yaşam konusunda gençlerin bilgi ve davranışlarına akran eğitiminin etkisi. TAF Prev Med Bull [Internet]. 2011 [cited 2024 May 28];10(4):463–72. Available from: https://www.academia.edu/download/55138049/bulasici_hastaliklar_makale.pdf
47. White S, Park Y, Israel T, Cordero E. Longitudinal evaluation of peer health education on a college campus: Impact on health behaviors. J Am Coll Heal [Internet]. 2009 Mar 1 [cited 2024 May 28];57(5):497–506. Available from: https://www.tandfonline.com/doi/abs/10.3200/JACH.57.5.497-506
48. Gölbaşi Z, Doğaner G, Erbaş N. The effect of Menstrual Health education conducted with peer education method to adolescent girls in 6-8 classes on information and behaviors. TAF Prev Med Bull [Internet]. 2012 [cited 2024 May 28];11(2):189–96. Available from: https://www.researchgate.net/profile/Zehra-Golbasi/publication/288725052_The_Effect_of_Menstrual_Health_Education_Conducted_with_Peer_Education_Method_to_Adolescent_Girls_in_6-8_Classes_on_Information_and_Behaviors/links/593eb71aa6fdcc1b10947377/The-Effec