Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/hw1frp91

A CROSS-SECTIONAL ANALYSIS OF RISK FACTORS OF CARDIOVASCULAR DISORDERS IN YOUNG ADULTS

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ABSTRACT
This study was conducted to analyze the risk factors of cardiovascular disorders in young people aged (18 to 25) years studying at the Medical University of South Punjab. The present study was a descriptive cross-sectional study conducted in the Cardiology Department of Nishtar Medical University and Hospital, Multan from January 2024 to December 2024. A total of 1000 MBBS students aged from 18-25 years studying at the university were included in the study. Participants' data was collected through a questionnaire divided into four sections; demographics, clinical data, diet habits and physical activity, and knowledge about cardiovascular diseases. The results showed that among 966 students included, a majority (98.9%) were aged 18 -25 years, 60.8% had normal BMI, and 76.3% with bachelor's education. The mean systolic blood pressure of samples was 113.2±14.42, the mean diastolic blood pressure was 79.38 ±10.26, and male samples were found with significantly higher SBP and DBP in comparison to female samples ($p<0.05$). Nearly more than half (68.4%) were physically active, fewer samples were found with daily routines of fruits and vegetables, 47.3% were found with processes or fast food on a regular basis, more than 90% were found with consuming beverages, 20.6% were reported family history of CVD, approximate 79% were reported awareness of CVD risk factors. Outcomes on physical activity, use of beverages, and screen time were significantly associated with gender ($p<0.05$).On the basis of the statistical findings of this survey, we can conclude that SBP, DBP, physical activity, frequency of fast food, and beverages, screen time, and smoke/sheesha addiction were significant predictors of CVD risk factors among the young population.

Keywords: Adults, Cardiovascular disease, CVD

INTRODUCTION
Cardiovascular diseases are the number one cause of mortality in the world with almost 18 million people deaths annually.[1] A steady rise in cardiovascular morbidity and mortality has been observed in young adults within the last decades. This trend corresponds to an increasing prevalence of traditional CV risk factors, such as obesity and DM type 2 among young adults living in developed

countries.[2] Plague formation leading to atherosclerosis also begins at young ages which serves as a risk factor for coronary heart disease.

Among younger individuals (age 18-50) years, the incidence of CV diseases over the same period has either been steady or has increased in contrast to the trend towards a lower incidence of CV diseases in adults aged >50 years.[3]The progression of atherosclerosis leads to cardiovascular accidents that can result in disabilities with increasing mortality.[4] CVDs have shown a life course evaluation with an increasing risk of developing those diseases if start at an early age. Therefore, targeting young adults for primary prevention of CVD is essential to reduce CVD in later life.

South Punjab region in Pakistan is undergoing many transitions with respect to epidemiology and there are very challenging effects of smog and pollution in this region. No previous study was conducted in our geographical area to find out the prevalence of CV risk factors in younger & adults (18 to 25) years. Our study will fill this geographical gap and will help society towards early detection and treatment of diseases related to the presence of the above factors.

This study was conducted to analyze the risk factors of cardiovascular disorders in young people aged (18 to 25) years studying atthe Medical University of South Punjab.

METHODOLOGY

A descriptive cross-sectional study was conducted in the Cardiology Department of Nishtar Medical University and Hospital, Multan from January 2024 to December 2024. A total of 1000 MBBS students aged from 18-25 years studying at the university were included in the study. Participants older than 25 years and younger than 18 years or already diagnosed with one of the risk factors of CVD were excluded from the study. All participants provided their informed consent to become a part of the study. The study was conducted after approval from the ethical committee of the medical university.

Participants' data was collected through a questionnaire divided into four sections. The first section inquired about demographic information including age, BMI, education level, and previous medical history (hypertension, diabetes, CVDs). The second section included questions about baseline clinical parameters including blood pressure, cholesterol, and blood sugar. The third section included questions about diet habits (beverages, fruits and vegetables, smoking, meat, etc.) and physical activity (frequency and intensity) of participants. The last section included two questions about the knowledge of participants about CVDs.

Biometric parameters were measured according to AHA/ACC guidelines. Elevated BP was described as systolic blood pressure between 120-129 and diastolic blood pressure less than 80 mmHg. Hypertension was classified as SBP ≥130 mmHg or DBP ≥80 mmHg. A 126mg/dl level showed diabetes and a level of 100-125 mg/dl showed prediabetes. A lipid level of>240 Mg/dl was considered hyperlipidemia. A BMI of 18.5 to 25 kg per meter square was normal, 25-29.9 kg/meter square was overweight, 30 -34.9kg/meter square was considered obese, and <18.5 kg/meter square was considered underweight.

Data were stored and analyzed using IBM-SPSS version 23.0; mean with standard deviation was reported for age (years), BMI, SBP, DBP, RBS, and cholesterol of studied samples. Counts with percentages were given on demographic information, physical activity, diet habits, smoking, Vape/Sheesa, medical history, personal health history, knowledge, and awareness of cardiovascular disease risk factors in young individuals. The association of these parameters was tested with gender using the Pearson Chi Square test and the mean was compared using an independent sample t-test. P-values less than 0.05 were considered statistically significant.

RESULTS

Table I reports the descriptive demographic information of the studied samples. A total of 966 young adults were surveyed, among them 98.9% were aged 18 - 25 years, and 1.1% were aged 26-35 years. For BMI, 21.4% were underweight, 60.8% had normal BMI, 13.2% were overweight and 4.6% were obese. 76.3% had a bachelor’s degree,1.7% had a master’s degree and 14.7% had a doctorate degree. A comparison of these parameters was done with gender; the Pearson chi-square test showed a significant association between BMI levels and education ($p<0.05$). 20.6% had an

immediate family member diagnosed with CVD, and 8.2% experienced the sudden cardiac death of a young person in their family. 4.3% were diagnosed with hypertension and 1.8%with diabetes. There was no significant association of family or personal health history with gender ($p>0.05$).

Table II reports the mean and standard deviation on age, BMI, systolic blood pressure, diastolic blood pressure, blood sugar, and cholesterol of studied samples. The mean age was 20.74 ±1.76 years, the mean BMI was 21.79±4.28, the mean SBP was 113.26±14.42, the mean DBP was 78.38±10.26, the mean RBS was 97.99±17.22 and mean cholesterol was 160.5±21.7. Independent sample t-test was used to compare the mean of these parameters with gender, results showed female samples were found with significantly less BMI, SBP, and DBP on average in comparison to male samples ($p<0.05$).

Table III reports the diet habits and physical activity profile of study participants. Results showed that only 45% consumed fruits and vegetables regularly while 47.3% consumed processed food regularly. 48.6% consumed caffeinated or carbonated beverages daily. 0.9% had a sheesha or vape addiction and 10% consumed them daily. 68.4% of the sample engaged in any kind of physical activity among which 4.2% did high-intensity exercises. Table IV shows the awareness and knowledge of CVD among the participants. Only 10.8% were very well aware and 57.2% received education or information regarding CVD health in the past. There was no significant association between awareness and knowledge of CVD in young individuals with gender ($p>0.05$).

Table 1: Demographic Information and participants' personal and family medical history

Characteristics		**Total N=966**	**Male N=418**	**Female N=548**	**p-value**
		N (%)	**N(%)**	**N(%)**	
Age Group	18 - 25 years	937(98.9%)	403 (98.5%)	534 (99.3%)	0.28
	26 - 35 years	10 (1.1%)	6 (1.5%)	4 (0.7%)	
BMI Level	Underweight	199 (21.4%)	68 (17%)	131 (24.6%)	0.018*
	Normal	567 (60.8%)	252 (63%)	315 (59.2%)	
	Overweight	123 (13.2%)	56 (14%)	67 (12.6%)	
	Obese	43 (4.6%)	24 (6%)	19 (3.6%)	
Education	High School	38 (3.9%)	21 (5%)	17 (3.1%)	0.016*
	Bachelor's	737 (76.3%)	326 (78%)	411 (75%)	
	Master's	16 (1.7%)	5 (1.2%)	11 (2%)	
	Doctorate	142 (14.7%)	47 (11.2%)	95 (17.3%)	
	Other	8 (0.8%)	3 (0.7%)	5 (0.9%)	
	Uneducated	25 (2.6%)	16 (3.8%)	9 (1.6%)	
Family history of CVDs					
Have any of your immediate family members (parents or siblings) been diagnosed with cardiovascular diseases (e.g., heart attack, stroke)?	Yes	199 (20.6%)	87 (20.8%)	112 (20.4%)	0.42
	No	702 (72.7%)	298 (71.3%)	404 (73.7%)	
	Not Sure	65 (6.7%)	33 (7.9%)	32 (5.8%)	
Is there a history of sudden cardiac death in any young person in your family?	Yes	79 (8.2%)	29 (6.9%)	50 (9.1%)	0.18
	No	803 (83.1%)	358 (85.6%)	445 (81.2%)	
	Not Sure	84 (8.7%)	31 (7.4%)	53 (9.7%)	
Personal history of CVDs					
Have you ever been	Yes	42 (4.3%)	21 (5%)	21 (3.8%)	0.36

diagnosed with hypertension (high blood pressure)?	No	924 (95.7%)	397 (95%)	527 (96.2%)	
Have you ever been diagnosed with diabetes?	Yes	17 (1.8%)	4 (1%)	13 (2.4%)	0.09
	No	949 (98.2%)	414 (99%)	535 (97.6%)	
Have you ever checked your sugar levels?	Yes	420 (43.5%)	189 (45.2%)	231 (42.2%)	0.34
	No	546 (56.5%)	229 (54.8%)	317 (57.8%)	
If yes, can you tell me how much it was?	Normal	329 (78.3%)	149 (78.8%)	180 (77.9%)	0.67
	Impaired	27 (6.4%)	10 (5.3%)	17 (7.4%)	
	Diabetic Range	64 (15.2%)	30 (15.9%)	34 (14.7%)	

*p<0.05 was considered statistically significant using the Pearson Chi-Square test

Table 2: Baseline Quantitative Characteristics of Studied Samples

Parameters	**Total N=966**		**Male n=418**		**Female N=548**		**p-value**
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	
Age (years)	20.74	1.76	20.81	1.89	20.69	1.65	0.31
BMI	21.79	4.28	22.33	4.49	21.39	4.08	0.001*
SBP	113.26	14.42	117.11	15.18	110.32	13.08	<0.01*
DBP	78.38	10.26	81.03	10.46	76.38	9.64	<0.01*
RBS	97.99	17.22	98.93	18.26	97.29	16.39	0.16
Cholesterol	160.50	21.70	161.06	23.95	160.09	19.97	0.59
*p<0.05 was considered statistically significant using an independent sample t-test							

Table III: Descriptive on Diet Habits, Lifestyle Parameters and Physical Activity

Variables		**Total N=966**		**P-value**
		n	**%**	
Diet habits				
How often do you consume fruits and vegetables?	Rarely	178	18.4	0.33
	Occasionally	256	26.5	
	Regularly	435	45.0	
	Daily	97	10.0	
How often do you consume processed or fast food?	Rarely	294	30.4	0.01*
	Occasionally	176	18.2	
	Regularly	457	47.3	
	Daily	39	4.0	
Do you consume beverages?	Caffeinated	342	35.4	<0.01*
	Carbonated	301	31.2	
	Other	305	31.6	
	None	18	1.9	
If yes, then how many days per week do you consume beverages?	Rarely	52	5.5	0.38
	Sometimes	76	8.0	
	Moderately	359	37.9	
	Daily	461	48.6	
What type of meat do you consume often?	Red Meat (beef, mutton)	108	11.3	0.43

	White Meat (Chicken, Fish)	840	88.0	
	None	7	0.7	
In what quantity do you consume meat per week?	1 - 2 times	83	8.7	0.68
	3 - 4 times	255	26.6	
	4 -5 times	618	64.4	
	6 - 7 times	3	0.3	
Lifestyle parameters				
What is your average screen time per day?	Less than 2 hours	59	6.1	0.026*
	Between 2 - 6 hours	700	72.5	
	More than 6 hours	207	21.4	
Do you smoke?	Yes, currently	9	0.9	<0.01*
	Occasionally	21	2.2	
	No, but I used to	18	1.9	
	Never	918	95.0	
Vape / Sheesha addiction	Yes	9	0.9	<0.01*
	No	957	99.1	
Have you ever used Vape / Sheesha products?	Yes	67	7.0	<0.01*
	No	887	93.0	
If yes, how frequently do you use them?	Rarely	35	50.0	0.039*
	Occasionally	27	38.6	
	Regularly	7	10.0	
	Daily	1	1.4	
Physical activity				
Do you engage in any kind of physical activity other than daily routine work?	Yes	661	68.4	<0.01*
	No	305	31.6	
If yes then what sort of physical activity it is?	Walking	447	67.6	<0.01*
	Moderate Intensity Exercise	186	28.1	
	High-Intensity Exercise	28	4.2	
How many times per week you engage in physical activity?	Occasionally (less than 3 times a week)	269	40.7	0.02*
	3 to 5 times	244	36.9	
	Daily (7 times per week)	148	22.4	

*p<0.05 was considered statistically significant using the Pearson Chi-Square test

Table IV: Descriptive on Awareness and knowledge and its association with Gender

		Total N=966		Male n=418		Female N=548		p-value
		n	%	n	%	n	%	
How aware are you of the cardiovascular risk factors in young individuals?	Not at all aware	210	21.7	105	25.1	105	19.2	0.13
	Somewhat aware	368	38.1	148	35.4	220	40.1	
	Moderately Aware	284	29.4	123	29.4	161	29.4	
	Very well aware	104	10.8	42	10.0	62	11.3	
Have you received any education or information regarding cardiovascular health in the past year?	Yes	553	57.2	233	55.7	320	58.4	0.40
	No	413	42.8	185	44.3	228	41.6	
*p<0.05 was considered statistically significant using the Pearson Chi-Square test								

DISCUSSION

This study was conducted to assess the risk factors of cardiovascular disorders in young adults. The results showed that systolic & diastolic blood pressure, physical activity, frequency of fast food, and beverages, screen time, and smoke/sheesha addiction were significant predictors of CVD risk factors among the young population with respect to gender. Similar findings were reported by previous literature.[5, 6, 7]

Among 966 participants enrolled in the study, 4.6% were obese, 1.8% were diabetic and 4.3% were hypertensive although 68.4% were physically active. Blood pressure and physical activity were significant risk factors despite a small number of hypertensive subjects and a large number of active participants. 78.3% had good knowledge of cardiovascular disorders.

The risk factors in our study were also reported by previous studies. Hossain et al recorded obesity as the most common predictor of CVDs in addition to family history.[8] As recognized in our study, too, Dikaiou et al showed that systolic blood pressure ata young age serves as a predictor of coronary artery calcification and coronary heart disease in middle age.[9]Svane et al analyzed individuals aged 20-60 years with diabetes who were at greater risk of CVD risk factors as compared to non-diabetic individuals.[10]However, we did not find diabetes as a significant risk factor for CVD but the knowledge and attention of diabetes was only 43.5% in our study, similar to Svane et al.

Physical activity was a significant risk factor for CVD which was also reported in literature. Kim et al concluded that decreased physical activity increased the risk of CVDs.[11] Lu et al also reported physical activity as an independent risk factor of myocardial infarction.[12]Systolic and diastolic blood pressure was also a predictor, Nwabuo et al also reported that cumulative blood pressure was associated with stroke, coronary heart disease, and other cardiovascular diseases.[13] A lower systolic BP was associated with 4.1 years longer survival and 5.4 later onset of CVDs according to Reges et al.[14]

Fast food and carbonated & caffeinated beverages were risk factors for CVD in the present study. Shammi et al showed that consumers of fast food, red meat, cheese soft drinks, and eggs had higher LDL and TG levels which served as risk factors for cardiovascular diseases.[15]A systematic review of 24 studies reported that soft drinks elevated the risk of CVDs significantly.[16]Similar to our study, smoking has been reported to lower the incidence and risk of mortality related to STEMI in previous studies.[17, 18]

Our study has some limitations. The cross-sectional study design limited the generalizability of results to all young students. Secondly, the diet habits and physical activity were recorded by self-reporting from participants, so the results may have been influenced by personal bias.

CONCLUSION

On the basis of the statistical findings of this survey, we can conclude that SBP, DBP, physical activity, frequency of fast food, and beverages, screen time, and smoke/sheesha addiction were significant predictors of CVD risk factors among the young population.

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