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ORIGINAL ARTICLE

Risk Factors Distribution for Cardiovascular Diseases among High School Students

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ABSTRACT

Background and Aim: Cardiovascular diseases (CVDs) are the chronic non-communicable diseases and leading cause of mortality due to various risk factors such as diabetes, tobacco usage, hypertension, obesity, dyslipidemia, and physical inactivity. The incidence of CVDS is rising rapidly due to these risk factors. These risk factors track at different ages starting from childhood to adulthood and their distribution varies with gender. Therefore, the prevalence of these risk factors among high school students need to be determined. The present study aimed to assess the different risk factor's distribution for cardiovascular diseases.

Methodology: This cross-sectional study was carried out among 940 high school students (aged 12-18 years) of Nowshera Pakistan from September, 2020 to December, 2021. Random sampling technique and WHO steps methodology was used for the assessment of various risk factors. All the randomly selected participants were recruited conventionally. Descriptive statistics was used to measure the risk factors distribution among high school students. SPSS version 24 was used for data analysis.

Results: The overall mean age of the students was 15.8±1.4 years whereas age varied from 12 years to 18 years. Of the total 940 students, about 59% (n=555) were boys and 41% (n=385) were girls. The prevalence of tobacco, overweight, and hypertension among boys were 33.2%, 12.1%, 7.2%, and 17.6% (P< 0.001) respectively. However, their prevalence among girls were 7.1%, 1.4%, 12.2%, and 23.8% (P<0.001) respectively. The hypercholesterolemia was found higher among boys whereas girls had more prevalent high triglycerides levels compared to boys.

Conclusion: The present study found a higher incidence of risk factors for cardiovascular diseases among high school students. These risk factors need to be reduced to control cardiovascular diseases among the young population. Also, this study found a poor profile of various risk factors for cardiovascular disease that require future nation-wide investigation to clarify the precise findings.

Keywords: Cardiovascular disease, Risk factors, Hypertension

INTRODUCTION

Cardiovascular diseases are one of the leading causes of premature death causing major health emergencies worldwide. About 75% death rates caused by cardiovascular disease occur in developing countries [1, 2]. The significant contributing risk factors for insulin resistance are lipid profile of South Asian, atherogenic diet, and sedentary lifestyle which in turn leads to obesity, metabolic syndrome, diabetes, and eventually cardiovascular diseases [3, 4]. Lifestyle changes like unhealthy diet, physical inactivity, and tobacco usage and genetic factors mainly cause increases in global epidemic [5]. The risk factors for stroke and coronary heart disease start in childhood that progress with adulthood [6]. The World Health Organization (WHO) declared that cardiovascular disease is a modern epidemic that significantly affects populations attributed with ageing [7]. The cardiovascular disease major cause known as atherosclerosis clinically manifests in adulthood initiating from early childhood [8]. Lack of physical activities or poor dietary in early childhood leads to elevated levels of cholesterol and increased risk factors for developing cardiovascular diseases.

Genetic interaction, cultural and behavioral parameters, and genetic susceptibility are important factors that reflect familial history of cardiovascular diseases. Environment is one of the significant factors that contributes to atherosclerosis development as suggested by previous study [9]. The manipulated lives and built up environment for the children cause them their vulnerability to adverse health aspects related to urban life [10]. Children living in urban areas had higher risk for developing cardiovascular disease compared to rural populations due to increasing levels of overweight and obesity [11]. Evidence proved that childhood obesity epidemic led to increasing prevalence of risk factors for developing cardiovascular diseases [12]. In view of the current scenario, the present study aimed to evaluate the different risk factors distribution for cardiovascular diseases among high school students of Pakistan.

METHODOLOGY

This cross-sectional study was carried out among 940 high school students (aged 12-18 years) of Nowshera Pakistan from September, 2020 to December, 2021. Random sampling technique and WHO steps methodology was used for the assessment of various risk factors. All the randomly selected participants were recruited conventionally. Descriptive statistics was used to measure the risk factors distribution among high school students. Considering different prevalence of risk factors for CVDs (43.2%) among high school students and taking 95% confidence interval and 5% margin of error, the required sample size was estimated to be 378. The final sample size was 940 by considering multistage sampling technique as a design effect and round off 20% non-responsiveness. All those students who refused to take part in the study were excluded.

Prior to study conduction, ethical approval was taken from the respective institute ethical committee and written consent along with their parents' permission was obtained. WHO stepwise methodology and pre-designed questionnaire was used for data collection. Participant's information such as socio-demographic details and risk factors behavior for cardiovascular disease were collected based on the Global School Health Survey questionnaire [13]. Blood pressure and nutritional status was evaluated by mercury sphygmomanometer and anthropometric measurements respectively. Triglycerides, serum total cholesterol, serum glucose, and high‐density cholesterol (HDL) was determined with a fasting blood specimen taken to the laboratory. SPSS version 24 was used for data analysis. Descriptive statistics was done in terms of mean and standard deviations and percentages. Student's t-test was used for comparing the risk factors distribution among high school students based on their gender differences. All the data statistics were done with 95% confidence interval and 5% level of significance.

RESULTS

The overall mean age of the students was 15.8±1.4 years whereas age varied from 12 years to 18 years. Of the total 940 students,

about 59% (n=555) were boys and 41% (n=385) were girls. The prevalence of tobacco, overweight, and hypertension among boys were 33.2%, 12.1%, and 17.6% (P< 0.001) respectively. However, their prevalence among girls were 7.1%, 12.2%, and 23.8% (P<0.001) respectively. The hypercholesterolemia was found higher among boys whereas girls had more prevalent high triglycerides levels compared to boys. Table-I represent the socio-demographic details of the participants. Distribution of various risk factors for the development of cardiovascular diseases are shown in Table-II. Gender's distribution is shown in Figure-1. Anthropometry and blood pressure are risk factors for cardiovascular disease in boys and girls. Mean laboratory parameter distribution in boys and girls are shown in Table-III.

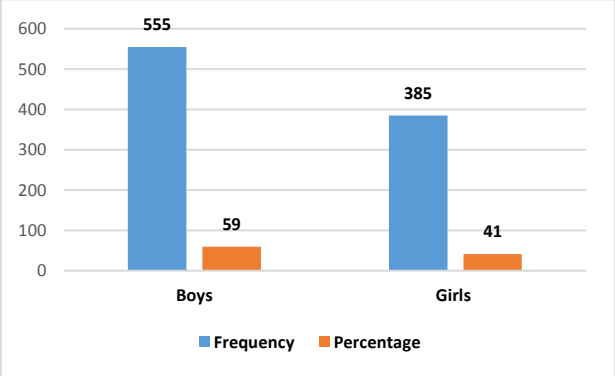

Figure-1: Gender's distribution

Table-1: socio-demographic details of the participants

Parameters	Boys n=555 (%)	Girls n=385 (%)
Father's Education Educated Illiterate	 458 (82.5) 97 (17.5)	 313 (81.3) 72 (18.7)
Mother's Education Literate Illiterate	 357 (64.3) 198 (35.7)	 292 (75.8) 93 (24.2)
Father's Occupation Employed Unemployed	 527 (95) 28 (5)	 362 (94) 23 (6)
Mother's occupation Employed Unemployed	 179 (32.3) 376 (67.7)	 167 (43.4) 218 (56.6)

Table-2: Distribution of various risk factors for the development of cardiovascular diseases

Risk Factors	Boys n=555 (%)	Girls n=385 (%)	Total n (%)	P-value
Familial history of CVDs	167 (30.1)	150 (39)	317 (33.7)	<0.001
Tobacco usage	312 (33.2)	27 (7.1)	339 (36.1)	<0.001
Stress	71 (13)	73 (19)	144 (15.3)	0.871
Overweight	67 (12.1)	47 (12.2)	114 (12.13)	<0.001
Hypertension	98 (17.6)	92 (23.8)	190 (20.2)	<0.001
Fast Food intakes >3/ week	387 (69.7)	243 (63.2)	630 (67.02)	0.734
Physical activities	219 (39.5)	146 (37.8)	365 (38.8)	0.837

Table-3: Mean laboratory parameter distribution in boys and girls

Parameters	Boys (Means± SD)	Girls (Means± SD)	P-value
Blood Sugar (mg/dl)	103.7±12.2	112.43±13.67	0.003
High density lipoproteins (mg/dl)	51.92±6.93	43.76±8.31	0.000
Low density lipoproteins (mg/dl)	106.72±23.73	64.32±23.12	0.000
Triglycerides (mg/dl)	139.56±14.89	151.26±27.95	0.040
TC : HDL	3.74±0.31	3.12±0.54	0.000
Total Cholesterol (mg/dl)	187.78±29.38	136.98±26.39	0.000

DISCUSSION

The present study focused on different risk factors distribution for cardiovascular diseases among high school students. The present study found a higher incidence of risk factors for cardiovascular diseases among high school students. These risk factors needs to be reduced to control the cardiovascular diseases among young population. The prevalence of tobacco usage was higher among boys as compared to girl's students. Additionally, LDL and high cholesterol levels like abnormalities of lipid profile were less prevalent in girls than boys. Compared to boys, it was reported that girls had a more sedentary lifestyle. Previous studies conducted by Majra and Basnet et al., [14] and Madan Kumar et al. [15] found similar findings in their investigation on high school students. Children belongs to rural area were more addicted to tobacco usage when compared with urban area. Tobacco consumption behavior and parents educational background could be the possible reasons for higher prevalence of tobacco among rural area students.

The prevalence of stress in boys and girls was found to be similar which implies that familial factors and academic pressure cause more stress equally among students regardless of gender distribution. The dietary intake pattern among boys and girls shown lower leafy vegetables and higher fast food intakes. However, no difference was observed between both genders.

The current study found that high school students were more susceptible to pre-hypertension and hypertension. The higher prevalence of obesity among girls could be explained by the higher hypertension among girls as compared to boys. A previous study conducted by Ahmad et al. [16] regarding higher obesity among girl's findings resembled our findings. The incidence of overweight and obesity among girls was higher as compared to boys due to their sedentary lifestyle which resemble the Ghabarah et al. [17] findings. A few studies conducted by Jain et al. [18], Marwah et al. [19], and Mahfouz et al. [20] reported similar findings.

Higher cholesterol and blood pressure are caused by obesity as an important risk factor for cardiovascular diseases and diabetes [21]. A study conducted by Oura et al. [22] found that overweight and obesity higher prevalence during childhood could be caused by physical environment, economical, and social status associated with nutritional transition. Another study found that higher risk of cardiovascular diseases and premature exist in obese children [23].

Cardiovascular diseases, diabetes, and premature death is significantly associated with higher body mass index. A Ghana based study found 2.9% and 11.7% prevalence of obese and overweight among students [24]. Another study reported 0.8% and 12.2% prevalence of obese and overweight students respectively [25].

A higher prevalence of HDL, LDL, TC, and cholesterol levels among boys than girls could be attributed to higher tobacco consumption by boys. A previous study by Gupta et al. reported similar findings according to which high LDL was more prevalent among boys as compared to girls [26]. Despite all the control measures and condition, cardiovascular diseases caused more deaths in recent few years and increasing among adults [27]. The CVDs should be control from childhood as the risk factors begins as early as in childhood and manifest through adulthood. Because CVDs are behavioural in nature, they can be avoided if secondary school students have access to cost-effective interventions that reduce disease risk factors [28]. It is also critical to address all of the disease's risk factors, as addressing only some of them may still predispose the student to CVDs in adulthood.

People suffering from hypertension are at higher risk for cardiovascular disease and can contributes to higher morbidity and mortality among adults [29]. The incidence of hypertension is 22% worldwide and is expected to increase within a two or three years [30]. The prevalence of hypertension has been increasing in children and adolescents, and this trend has continued into adulthood. However, there has been little research on

hypertension among secondary school students. A study of young people aged 12 to 24 discovered that 4% were hypertensive [31].

There were some limitations in the current study. Initially, food frequency questionnaire was used for assessing the diet history which is a qualitative assessment and could be biased. Secondary, Stress and physical activity was prompted through oral interviewed and could have subjective error. Lastly, sub-samples was used for estimating the prevalence of deranged lipid profile and fasting glucose.

CONCLUSION

The present study found a higher incidence of risk factors for cardiovascular diseases among high school students. These risk factors needs to be reduced to control the cardiovascular diseases among young population. Also, this study found poor profile of various risk factors for cardiovascular disease that require future nation-wide investigation to clarify the precise findings.

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