Assessment of Preventable Risk Factors of Cardiovascular Diseases among Junior College Students: A Cross-Sectional Study

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Abstract

Context: Lifestyle-associated risk factors may begin during childhood and result into cardiovascular diseases in adult life. Thus, a study was conducted among junior college students to assess these preventable risk factors among them. **Aims:** To estimate (1) Prevalence of risk factors namely physical inactivity, unhealthy dietary habits, tobacco, and alcohol use among them and (2) The proportion of hypertension. **Settings and Design:** A cross-sectional study was done among 416 11th and 12th standard students from a school of a metropolitan city. **Subjects and Methods:** Two steps were conducted. Step 1 included an interview schedule and Step 2 involved anthropometry, pulse, and blood pressure of all the participants. Statistical analysis was done using SPSS 21. Chi-square test was applied. **Results:** The prevalence of tobacco and alcohol consumption, physical inactivity, and unhealthy dietary habits were 5.5%, 5%, 74.5%, and 52.1%, respectively. The prevalence of overweight students was 13.9%. The prevalence of prehypertension and hypertension was 26.9% and 12.7%, respectively. **Conclusions:** It was concluded that these risk factors namely, physical inactivity, unhealthy dietary habits, tobacco, and alcohol consumption commence during adolescence.

Keywords: Adolescence, cardiovascular diseases, risk factors

Introduction

According to the World Health Organization (WHO), noncommunicable disease (NCD) can be defined as a disease or a condition that occurs in the individuals over an extensive period and for which there are no known causative agents that can be transmitted from one affected individual to another.[1] The four main types of NCD are cardiovascular diseases, chronic respiratory diseases, cancer, and diabetes.[2]

According to the WHO, 67% of premature deaths and 33% of the disease burden among adults is due to unhealthy behavioral patterns that commence during an early age.[3] A recent study revealed that the high prevalence of tobacco use among Indians beginning at the age of 15 years may contribute to 13.3% of total deaths by 2020.[4] Other risk factors related to poor diet and insufficient physical activity may begin during childhood which becomes difficult to change as adulthood approaches. Increased body mass index (BMI) highlights the fact that obesity is the key cause

to the problems such as hypertension, diabetes, and coronary heart diseases.[5]

This study was conducted among the 11th and 12th standard students studying in a school of a metropolitan city as the urban life has been proved to be stressful which might aggravate the risk factors of cardiovascular diseases among the students. However, as at this age, it is still not late to improve the lifestyle and reverse the adverse effects of these risk factors, thus, this study was conducted among the junior college students, so that certain strategies can be devised to prevent the risk factors of cardiovascular diseases which occur later in life.

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SUBJECTS AND METHODS

Ethical clearance was obtained from the Institutional Ethics Committee of Seth G.S Medical College and K.E.M Hospital. This observational cross-sectional study was conducted for 2 years (December 2016–December 2018). It was carried out in a junior college of a metropolitan city and included 15–18-year-old students.

Considering the prevalence rate of any of the cardiovascular factors that is physical inactivity and unhealthy dietary habits based on two previous studies, the prevalence of the risk factors for the present study was taken to be approximately as 35%.[6,7] A total number of students in junior college was 1000 and the sample size was calculated by the following formula, $n = Z^2 pq N/e^2(N-1)+Z^2pq$, taking confidence interval (C.I.) as 95%. Using this formula, the sample size came out to be 416.

Systematic random sampling method was used to collect the data. A list of all the students was made. To start the selection of participants, a random number, 6 was chosen using a currency note. As total number of students were 1000, it was divided by 416 which resulted in 2.4 (sampling interval). Then, starting from the number 6, every 2nd student was included in the study till the target of 416 students was attained.

Data collection

Written informed consent of the study participants was obtained at the time of the interview. Data was collected by performing two steps.

Step 1: A semi-structured, validated interview schedule consisting of sociodemographic details and modifiable determinants such as physical inactivity, unhealthy dietary habits, and personal habits of smoking and alcohol was used.

Step 2: Anthropometry and parameters of pulse and blood pressure (BP) was measured. Weight and height were measured and recorded. BMI was calculated as weight in kilograms divided by the square of individual's height in meters (kg/m^2). BP was measured by Mercury sphygmomanometer (Company-Diamond deluxe, CM/I/01/96043). BP was measured thrice at an interval of 10 minutes. This step was carried out in a separate room provided by the institution to maintain the privacy of the students.

Statistical analysis

Analysis was performed by SPSS version 21, (IBM, Chicago, USA). The descriptive and analytical tests like mean, standard deviation (SD), proportions, percentages, and Chi-square test were applied.

OPERATIONAL DEFINITIONS

Ever tobacco users

The people who had consumed tobacco products at some point of time in their life.[8]

Ever alcohol users

The people who had consumed alcohol at some point of time in their life.[8]

Physical inactivity

Sedentary activity (sitting or resting) continuously for more than 6 hours a day has been termed as physical inactivity.[9]

Unhealthy dietary habit

Outside meals (Fast food) intake for more than 3 days a week has been termed as unhealthy dietary habit.[9]

Hypertension

According to JNC VII criteria, systolic BP more than 140 mm hg and diastolic BP more than 90 mm Hg.[10]

Prehypertension

For adolescents, systolic BP more than 120 mm Hg but less than 139 mm Hg, and diastolic BP more than 80 mm Hg is defined as Pre-Hypertension.[11]

RESULTS

In the present study, 53.1% were boys and 46.9% were girls. Overall mean age + S.D of the students was found to be 16.56 ± 1.131 years. 34.37%, 33.4%, and 32.2% of the students belonged to Science, Arts, and Commerce stream, respectively. Majority of the study subjects (59.8%) belonged to the upper-middle class.

It was observed that the prevalence of tobacco and alcohol consumption among the study subjects was 5.5% and 5%. Physical inactivity was observed in 74.5% of the students. The prevalence of unhealthy dietary habits was found out to be 52.1%. The prevalence of overweight/obese students was found to be 13.84%. Undernutrition was observed to be in 34.9% of the students. The prevalence of prehypertension and hypertension was found to be 26.9% and 12.7%, respectively [Table 1].

By using Chi-square test, it was observed that sex, physical inactivity, unhealthy dietary habits, and family history of hypertension were significantly associated with the BP of the study participants. All the remaining determinants were insignificant [Table 2].

DISCUSSION

The present study shows that 5.5% and 5% of the students were indulged in ever tobacco use and alcohol use, respectively. This could be due to peer-pressure as adolescents are quite susceptible to attain such habits. Similar findings were observed in the studies conducted.[10,12] In the present study, 74.5.% of the students were physically inactive. This might be because, the students are addicted to social media and electronic gadgets, and they do not give importance to any form of physical exercise and sports. This was in accordance with the study conducted by Balaji *et al*.[13] Our study depicts that, around 52.1% had unhealthy dietary habits. This could be because most of the parents are working and they might not get ample time to cook home-cooked meals for their children. Similar findings were observed in the study conducted by Bukel *et al*.[11] where 56% of the participants had unhealthy dietary habits. In the present study, it was observed that 11.3%

Table 1: Prevalence of modifiable and nonmodifiable risk factors of cardiovascular diseases among the study participants

Risk factors	Boys (n=221), n (%)	Girls (n=195), n (%)	Total (n=416)*, n (%)
Modifiable risk factors			
Ever tobacco users	13 (5.8)	10 (5.1)	23 (5.5)
Ever alcohol users	14 (6.3)	7 (3.5)	21 (5)
Physical inactivity	149 (67.4)	161 (82.5)	310 (74.5)
Unhealthy dietary habits	116 (52.4)	101 (51.7)	217 (52.1)
BMI			
Underweight	73 (33.0)	72 (36.9)	145 (34.9)
Overweight	30 (13.5)	17 (8.7)	47 (11.2)
Obese	7 (3.1)	4 (2.0)	11 (2.6)
Blood pressure			
Prehypertension	74 (33.4)	38 (19.4)	112 (26.9)
Hypertension	35 (15.8)	18 (9.2)	53 (12.7)
Nonmodifiable risk factors			
Family history of hypertension	54 (24.4)	53 (27.1)	107 (25.7)
Family history of diabetes	85 (38.4)	46 (23.5)	131 (31.4)

*n (416)=Boys (221) + Girls (195). BMI: Body mass index

Table 2: Relationship of the risk factors with the blood pressure of the study participants

Risk factors	Normal BP, n (%)	Pre-HTN, n (%)	HTN, n (%)	Total, n (%)	P and χ2
Age (years)					
15	62 (60.1)	26 (25.2)	15 (14.5)	103 (24.8)	>0.05
16	55 (61.1)	23 (25.5)	12 (13.3)	90 (21.6)	3.911
17	68 (60.7)	35 (31.3)	9 (8.1)	112 (26.9)	
18	66 (59.4)	28 (25.2)	17 (15.3)	111 (26.7)	
Sex					
Boys	112 (50.6)	74 (33.4)	35 (15.8)	221 (53.1)	<0.001
Girls	139 (71.2)	38 (19.5)	18 (9.2)	195 (46.9)	18.375
Socioeconomic status					
Upper	29 (70.7)	6 (14.6)	6 (14.6)	41 (9.8)	0.201
Upper-middle	156 (61.4)	69 (27.1)	29 (11.4)	254 (61.0)	12.218
Lower-middle	76 (69.0)	16 (14.5)	18 (16.3)	110 (26.4)	
Upper-lower	5 (45.4)	5 (45.4)	1 (9.09)	11 (2.6)	
Unhealthy dietary habits					
No outside meals	72 (84.7)	11 (12.9)	2 (2.3)	85 (20.4)	<0.001
Outside meals	179 (54.1)	101 (30.5)	51 (15.4)	331 (79.5)	27.634
Physical inactivity					
Duration of sitting in a day (h)					
<6	79 (74.5)	15 (14.1)	12 (11.3)	106 (25.5)	<0.001
>6 h	172 (55.4)	97 (31.2)	41 (13.2)	310 (74.5)	30.240
History of tobacco consumption	17 (73.9)	5 (21.7)	1 (4.3)	23 (5.5)	0.311
					2.33
History of alcohol consumption	10 (47.6)	6 (28.5)	5 (23.8)	21 (5)	0.254
					2.742
Family history of HTN	65 (60.7)	38 (35.5)	4 (3.7)	107 (25.7)	0.001
					13.116
Family history of diabetes	79 (60.3)	30 (22.9)	22 (16.7)	131 (31.5)	0.164
					3.615
BMI					
<18.5	89 (61.3)	35 (24.1)	21 (14.4)	145 (34.9)	0.262
18.5-24.5	128 (60)	56 (26.2)	29 (13.6)	213 (51.2)	7.686
25-29.9	28 (59.5)	18 (59.5)	1 (2.12)	47 (11.3)	
>30	6 (54.5)	3 (27.3)	2 (18.2)	11 (2.6)	

First three-column cells-row percentages, Last column cells-column percentage. BMI: Body mass index, HTN: Hypertension, BP: Blood pressure

of the total participants were overweight and 2.6% were obese. These findings were similar to the study conducted by Sarkar *et al.*[14] in West Bengal. The present study shows that 60.3% of the total population had normal BP. At least 26.9% of the

total participants were Pre-hypertensives which included 66% boys and 12.7% were observed to be hypertensives. Adhikari et al.[8] and Manita et al.[10] conducted similar studies showing hypertension as more prevalent in males than females. Similar findings were observed in a study[15] where 10.6% of the study participants were found hypertensives.

The association between the age of the students and their BP was insignificant ($P = 0.689$) in the present study. However, the study by Bute et al[16] and Sutradhar et al[17] showed that the risk of high BP significantly increased with age ($P < 0.0001$). It was observed that most of the students who had unhealthy dietary habits and were physically inactive had prehypertension or hypertension in the present study. It might be because the outside meals contain high amount of saturated fats which might lead to dyslipidemia which in turn can lead to high BP. Both of these associations were found to be significant ($P < 0.001$). These findings were in accordance with another study[18] where frequent junk food intake and physical inactivity independently increased the chances of elevated BP.

The most striking fact in the study was the high prevalence of under-nutrition among the students (34.9%). Though under-nutrition is not a risk factor of cardiovascular diseases, it has to be given importance as large number of students were underweight in the study. This might be because, students of this age are concerned about their body image and they might starve themselves, thus leading to under-nutrition. Similar findings were observed in the study conducted by Evageline Mary et al.[19] where 23% of the participants were found to be Underweight.

Thus, it can be concluded that the risk factors such as tobacco and alcohol use, physical inactivity, and unhealthy dietary habits commence during adolescence and their consequences might be seen in adulthood. Thus, concrete strategies must be devised in schools and colleges to prevent the development of such risk factors. Proper counseling sessions should be organized by the concerned authorities to create awareness among the students regarding a healthy lifestyle. These steps can protect today's youth from the brunt of cardiovascular diseases and help them in leading a healthy and stress–free life.

Limitation
As the permission to do the biochemical investigations (fasting blood sugar and lipid profile) in the students was not granted, they could not be included in the study.

Conflicts of interest
There are no conflicts of interest.

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