Research Article

Assessment of cardiovascular risk factors among youths in Bengaluru urban district, India

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ABSTRACT

Background: Cardiovascular disease (CVD) is one among the leading causes of death world over and in India. Risk factors for CVD have their beginnings early in life, and early detection and correction could have far-reaching implications in arresting the rising trend of mortality and morbidity due to CVD. **Objectives:** This study was done with the objective of assessing the prevalence of cardiovascular risk factors among college attending youths in Bengaluru urban district and to study the factors associated with these risks. **Materials and Methods:** A cross-sectional study among 1267 college students, aged 15-24 years in five colleges of Bengaluru urban district. Modified National Health and Nutrition Examination Survey questionnaire and glazer stress scale were administered to elicit prevalence of risk factors. Height, weight, and blood pressure were measured. Data were analyzed for frequencies, means and standard deviations and proportions compared using Chi-square test. **Results:** The prevalence of physical inactivity was 82%, stress was 56%, and that of unhealthy dietary habits was 42%. Alcohol consumption was reported by 25% of the students, tobacco consumption by 14%, both in the smoked and smokeless forms. On examination, 11.4% of the students were hypertensive, 24.9% underweight, and 6.1% overweight of them 0.4% were obese. A positive family history of CVD or death was positive among 50.4% of young adults. **Conclusions:** The present study shows the presence of several cardiovascular risk factors among college students. Interventions in the form of health education among youth adults regarding the need for adopting healthy lifestyles as well as regarding the ill effects of smoking, alcohol, physical inactivity, unhealthy dietary habits, and managing stress could help address the burden of modifiable risk factors.

KEY WORDS: Youth; Cardiovascular Risk Factors; Alcohol; Tobacco; Diet; Physical Inactivity; Body Mass Index; Hypertension

INTRODUCTION

The cardiovascular diseases (CVDs) will be the largest cause of disability and death by 2020 in India according to the World Health Report 2002. It is predicted that by 2020 AD, 2.6 million Indians would die due to coronary heart disease which constitutes 54.1% of all CVD deaths. The young and middle-aged group (30-69 years) would contribute to half of these deaths.[1-3] The CVD-related deaths in India are at least a decade earlier when compared to the countries with established market economies (EME) which increases the burden and number of people living with CVD.[1,4,5] The CVD deaths also have an adverse impact on the India economy, because 52% of CVD deaths occur below the age of 70 years as compared to 23% in EME according to the estimate by Global Burden of Disease study.[1]

Risk factors for heart disease can be grouped under non-modifiable (age, sex, family history of CVD, personality) and modifiable (tobacco use, hypertension, hypercholesterolemia, diabetes mellitus, dietary factors). The presence of risk factors

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and greater the level of the risk factor puts an individual at a greater risk of CVD.[6]

Health behaviors and attitudes formed early in life lay a strong foundation for lifetime related behavior.[7] Modifiable risk factors like smoking and alcohol consumption have been associated with adolescents' peer group affiliations.[8-10] A decrease in physical activity patterns has been seen during the transition from adolescence to adulthood.[11]

The increasing prevalence of adolescent obesity is one of the major causes to be hypertensive in adulthood. Studies have found a relationship between genes, body mass index (BMI), waist circumference and skinfold thickness with hypertension, dyslipidemia, and ischemic heart disease in Indian population.[12-19] Ethnicity is also a risk factor for hypertension has been documented.[20]

As evidenced by many pathological specimens the destructive process of abnormal lipid deposition in vessel walls leading to clot formation and other sequelae starts early in life. Furthermore, it is easier to inculcate healthy behavior at a young age, rather than to modify behaviors at later ages or after the onset of disease.[21]

This study among youths was undertaken with an aim to document risk factors for CVD and establish the need to initiate early preventive measures for the same.

Objectives

1. To assess the prevalence of cardiovascular risk factors among youths attending college in Bengaluru urban district of India
2. To study the factors associated with these risks elicited among the students.

MATERIALS AND METHODS

This cross-sectional study was conducted among youths/students pursuing pre-university and degree courses aged 15-24 years and studying in five colleges located in south Bengaluru zone.

All the students who were present on the day of the interview were included in the study. A total of 1267 students participated in the study.

A questionnaire, developed using the National Health and Nutrition Examination Survey questionnaire[22] as a reference, was administered to all participants. The questionnaire included demographic details, family history of CVD and details on smoking, alcohol use, dietary habits, and physical activity. The type of personality of the participants was assessed using the glazer-stress control-lifestyle questionnaire.[23] Weight and height were measured using a standardized weighing scale and an inelastic measuring tape, respectively. Blood pressure (BP) was measured by a medical doctor using the JNC VIII criteria and mercury sphygmomanometer with manually inflatable cuff was used on the right arm in sitting position. Adequate physical activity in this study was defined as at least 30 min or more of moderate-intensity physical activity on 5 or more days per week based on National Heart, Lung, and Blood Institute.[24]

Data were analyzed, using standard statistical packages, for frequencies, means, and standard deviations and proportions compared using Chi-square test.

Written consent was taken from all the participants before including them in the study, after informing them of the nature of study and confidentiality thereof.

RESULTS

Demography

The study population comprised a total of 1267 students, of whom 672 (53%) were male and 595 (47%) were female. The mean age was 18.45 ± 1.76 years. Of the total number, 1119 (88.3%) belonged to nuclear families and 657 (52%) had a family income of >Rs. 2500/month. Students from urban background comprised 481 (38%) while 786 (62%) came from a rural background. Among the participants, 404 (32%) were studying in pre-university, and 863 (68.11%) were doing degree/diploma courses.

Tobacco

Among the study population, 177 (14%) consumed tobacco - of them, 115 (65%) consumed smoked forms like cigarettes or "bidis," 14 (8%) consumed smokeless forms like snuff or chewable form and 48 (27%) consumed both forms. Of those who smoked, 104 (64%) smoked daily, 28 (17%) smoked once a week, and 31 (19%) smoked less than once a week. The mean age of onset of smoking was 16.78 ± 1.95 years with 136 (83.44%) starting between the age of 15 and 19 years. The mean duration of smoking was 2.58 ± 1.77 years. It was found that use of tobacco was significantly higher in males (26%) compared to females (0.3%) ($P < 0.001$), in >18 years age group ($P < 0.001$), in those with higher income levels ($P < 0.01$), and in students of urban origin ($P < 0.05$). It was also found to be higher in those who had a history of friends or family members smoking ($P < 0.001$). Among the 1090 nonsmokers, 247 (23.3%) gave a history of passive smoking.

Alcohol Consumption

Alcohol consumption was noted among 316 (25%) students, with the mean age of onset being 16.81 ± 2.29 years (range: 8-22 years) and mean duration of consumption being 2.57 ± 2.05 years (range: 0.5-12 years). Most of them consumed

it once a month or occasionally (19 [6%] - more than once a week, 54 [17%] - once a week, 123 [39%] - once a month and 120 [38%] – occasionally). 106 (33.54%) gave a history of binge drinking. It was observed that alcohol consumption was significantly higher in students aged >18 years ($P < 0.001$), and males (42.4%) compared to females (5.2%) ($P < 0.001$), in those with a higher income ($P < 0.01$) and in those who used tobacco ($P < 0.001$). The onset of alcohol use before 16 years of age was significantly higher in those with a family history of alcohol use ($P < 0.001$).

Physical Activity

It was noted that 317 (25%) of the students performed physical activity. A significantly higher proportion of girls (92.9%) were found to be physically inactive as compared to boys (59.1%) ($P < 0.001$). Students with higher family income were more physically active (28%) ($P < 0.05$).

Diet Habits

The dietary patterns of the participants have been shown in Table 1.

Stress

It was found that 715 (56.43%) students had a Type A personality. Type A personality was observed to be more common in younger students ($P = 0.054$) and females ($P < 0.001$). Type A personality was also found to be higher in those who were married, lower family income, urban, and non-nuclear families; however, this difference was not significant.

Obesity

In the study population, 315 (24.9%) were underweight, 874 (69%) were of normal weight, and 78 (6.1%) were overweight (72 [5.7%] pre-obese and 6 [0.47%] Grade I obese). A higher proportion of students who were overweight or obese reported being physically inactive and using alcohol or tobacco. It was seen that the proportion of students who were overweight and obese was greater among those aged ≥18 years, males and those with higher family income. There was no significant association found between BMI and type of family, marital status or stress.

Table 1: Dietary patterns (*N*=1267)

Dietary pattern	*N* (%)
Vegetarians	148 (11.68)
Non vegetarians	1119 (88.32)
Butter/ghee daily	223 (17.6)
"Junk food" daily	531 (41.91)
Red meat daily	45 (3.55)
Egg daily	157 (12.39)
Aerated drinks daily	303 (23.91)
Added extra salt to food	419 (33.07)

Family History

A total of 639 (50.43%) of the students gave a family history of the presence of at least one risk factors for CVDs, most common being a history of diabetes mellitus followed by hypertension (Table 2). It was noted that family history of CVD had no significant association with the use of tobacco, alcohol, physical activity, and history of hypertension. However, those with family history of CVD significantly had a higher BMI, i.e., ≥25 ($P = 0.05$).

There was no significant association between BMI and habits such as the use of tobacco and alcohol, diet and physical activity as shown in Table 3.

BP

Mean systolic BP among the students was 115.42 ± 12.75 mmHg (86-168 mmHg), and the mean diastolic BP was 76.16 ± 8.56 mmHg (50-100 mmHg). Hypertension was seen in 145 (11.44%) of the participants. Systolic Hypertension was seen in 4.5% of the participants while diastolic hypertension was seen in 9.4% of the participants. The prevalence of hypertension in this study was (BP ≥140/90 mmHg) was noted in 12.5% of boys and 6.05% of girls. It was observed that prevalence of both systolic hypertension and diastolic hypertension was significantly higher in males ($P < 0.001$). Hypertension was more common in students who were more active when compared to the other youths in the study population, consumed alcohol and with Type A personality, but it was not significant.

DISCUSSION

This study presents the burden of risk factors for CVD in college students in Bengaluru urban district. It gives an overview into the different cardiovascular risk factors and its prevalence.

The stress level of an individual was assessed based on their personality types (A, AB, and B) with Type A having the highest risk of CVD. It was seen that 56% of the participants

Table 2: Prevalence of family history of CVD

Family history of CVD	*N* (%)
Family history of diabetes mellitus	363 (28.65)
Family history of hypertension	349 (27.54)
Family history of CVS	156 (12.31)
Family history of stroke	56 (4.41)
Family history of death due to CVD	178 (14.04)
Family history of any one of the above	639 (50.43)

CVD: Cardiovascular disease

Table 3: BMI among classes of tobacco and alcohol usage, diet and physical activity (*N*=1267)

BMI	Tobacco (%)		Alcohol (%)		Diet (%)		Physical activity (%)	
	Yes	No	Yes	No	Vegetarian	Non-vegetarian	Inactive	Active
<18.5	31 (17.5)	284 (26)	73 (23.1)	242 (25.4)	38 (25.7)	277 (24.8)	240 (25.3)	75 (23.7)
18.5-24.99	129 (72.9)	745 (68.4)	221 (69.9)	653 (68.7)	97 (65.5)	777 (69.4)	648 (68.2)	226 (71.3%)
≥25	17 (9.6)	61 (5.6)	22 (7)	56 (5.9)	13 (8.8)	65 (5.8)	62 (6.5)	16 (5)
Total	177	1090	316	951	148	1119	950	317

BMI: Body mass index

fell under Type A personality, most of whom were girls and younger participants. Type A personality is more common among males, college students who are at higher risk of stress and CVDs.[25]

Adequate physical activity was adopted by 25% of the study participants. The remaining 75% participants were at higher risk for CVD because of an inactive lifestyle. This is an indication that physical inactivity is an emerging cause of concern among youths, given the belief that physical activity levels due to social and cultural reasons are higher among those in rural areas. The prevalence of inadequate physical activity was 59.1% among boys and 92.9% among the girls. This could possibly be because girls spend most of their time indoors doing household activities and due to socio-cultural norms or beliefs.[26-28] This finding is also against the popular belief that youths in rural areas are more active compared to their urban counterparts.

When dietary habits were noted, it was found that 17.6% consumed butter/ghee daily, 41.91% consumed "junk food" daily and 33.07% added extra salt to their food. This finding reflects the changing dietary patterns in rural areas, probably due to increasing urban influence.[29-31] Aerated drinks were consumed daily by 23.91% of the participants. This finding was similar to a study done in Chandigarh.[7]

Among the study population, 50.43% gave a family history of risk factor for CVD or death due to CVD, whereas a similar study in Kolkata[32] and Andhra Pradesh[33] found that the family history was found in less than one-fifth of study participants. This indicates the epidemiological transition and dual burden of communicable and non-communicable disease pattern in India.[34,35]

A study conducted by Krishnan et al.[36] showed the prevalence of daily tobacco smoking in the same age group was 9.8% which is lower than the prevalence in this study (12.86%), while smokeless tobacco (6.9%) was higher than the present study and alcohol consumption was 9.4% which is lesser than in the present study of 25%. Peer pressure was the most common triggering factor for the use of tobacco and alcohol apart from use by a family member and stress. BMI was found to be higher in the study by Krishnan et al.[36] in both the overweight (8.2%) and obese (1.0%) category when compared to the present study (6.1% and 0.47%, respectively). This can be explained by the low socioeconomic status and rural background of the study population.

A study conducted in Delhi[37] (age group 21-30 years) showed a prevalence of 15.5% for smoking, hypertension in 18.1%, overweight in 18.1% which were higher than our study.

A study conducted in Chandigarh[7] on adolescents aged 11-16 years, when compared to the present study, showed a very high prevalence of underweight (81.2%) but the prevalence of systolic hypertension (1.2%) and diastolic hypertension (0.35%) were lower when compared to our study.

The prevalence of hypertension in this study was (BP ≥140/90 mmHg) was noted in 12.5% boys and 6.05% girls. When compared with studies done in Haryana[36] and Jaipur,[38] the prevalence on hypertension was lower especially among males when compared to this study population. In another study conducted by Singh et al.[39] found the prevalence of systolic hypertension was 11.82% among males and 3.03% among girls, which is higher in comparison to our study, hypertension was found in 3.58% among males and 0.43% among females. The prevalence of hypertension among female youths was much lesser when compared to that of the males, which can be explained by the beneficial vascular effect of estrogen.[40]

Though this study has a limitation of not being representative of all the students aged 15-24 years, we believe that the levels of risk factors among the larger student population would be no different, given similar findings in other studies done all over the country.

CONCLUSION

The risk factors such as physical inactivity, stress, unhealthy dietary habits, personal habits like smoking and alcohol consumption and obesity were prevalent in a large proportion of the participants included in the study. This study is thus reiterates the need for further research to be undertaken on a larger scale to design suitable interventions, both educational and legislative to decrease cardiovascular risk at an early stage.

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