

Original article

A comparison of the risk factors for the coronary artery diseases among the rural and urban male high school students in Vellore district, Tamilnadu: A school based cross sectional study.

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Abstract:

Background: Cardiovascular diseases are very important causes of mortality and morbidity in developed as well as developing countries including India. The coronary artery diseases (CAD) tend to occur earlier in life in Indians and more commonly among urban dwellers.

Objective: To determine the prevalence of risk factors for CAD among adolescent males and also to look out for the rural-urban differences in the same if any.

Study design and setting: A school based cross sectional study in Kaniyambadi block and Vellore town in Tamilnadu, India

Methodology: A total of 250 students each from rural areas of Kaniyambadi block and Vellore town were studied using a questionnaire, from May to Aug 2007. All measurements were made using a standardized protocol.

Results: The study groups had low CAD risk in terms of BMI, overweight, blood pressure levels, and tobacco and alcohol consumption habits. They had high familial risk factors and conditions in family which make them susceptible to developing CAD, later in life. The urban students were less physically active and led a more competitive life. TV watching was being resorted to as the main relaxation which compromised on the physical activities. The students with parental history of diabetes mellitus had tendency to be overweight and overweight children had elevated blood pressure.

Conclusions: The students in both the rural and urban area had various CAD risk factors with the rural students having more physically active lifestyle.

Key words: Male adolescents, Cardiovascular disease risk factors, Overweight, Stress, Television watching.

Introduction:

Cardiovascular diseases (CVD) form one of the significant causes of mortality and morbidity in developed as well as developing countries. India has one of largest numbers of patients with

CVDs including coronary artery disease (CAD) and is in the midst of a rapidly escalating 'epidemic' of Diabetes Mellitus and Coronary Heart Diseases (CHD). Projections based on the Global Burden of Disease study indicate that the burden of athero-thrombotic CVD in India will surpass that in any other region in the world by 2020¹. It is now well known that CAD tends to occur earlier in life in Indians than in other ethnic groups. In both rural and urban areas there is a significant increase in the prevalence of CHD, more so among young men². This study aims to find the prevalence of these risk factors in early adolescent boys in both rural and urban set up, that may pave way for planning an early intervention.

Material and Methods:

This is a cross-sectional study carried out in Kaniyambadi block and Vellore town of Tamilnadu in South India. All the schools providing 8th to 10th grade education in Kaniyambadi block were listed and three large rural schools which were farthest from city were selected. The schools in the urban service area were similarly selected. Sample size was calculated so as to power the study to pick the difference in the prevalence of overweight among rural (12%) and urban (5%) school going children³. The sample size so calculated was 242 in each arm. All the students in the schools were invited to participate after obtaining permission from the local authorities and explaining to them about the study. Verbal consent was taken from the students.

The students were interviewed using a pre-tested questionnaire. Weight was recorded to nearest 100 gram, and, height and waist circumference to nearest 0.1 cm as per the standardized protocols. Two readings of blood pressure (BP) were recorded in sitting position over left brachial artery before and after the interview and the average of the two readings was taken. Weighing machine and sphygmomanometer were standardized and same set of instruments were used for the entire study. Overweight was defined as weight above 90th percentile of the Indian Council for Medical

Research charts for rural boys⁴. Elevated BP was defined as BP levels greater than 95th percentile by gender, age, and height based on tables for Indian children⁵. We used the term elevated BP as we could not take 3 consecutive measurements as per the standard definitions. Information regarding family history was confirmed with the local health worker for rural students. As regarding the urban students, an attempt was made to confirm the family history by further probing as local health workers were not available. Information about physical activity was collected for a typical day. Similar information was collected separately for weekends (Saturday and Sunday) as physical activities on these days was found to be significantly different during piloting the questionnaire. The children with identified risk factors were told about the risk factors of the same and adequate interventions were suggested, wherever possible. The data was entered on a Microsoft Excel spread sheet and analyzed using SPSS for Windows 12.0 software.

Results:

The urban group was comparatively younger [mean age (in years) urban 13.9 vs. rural 14.6, p<0.001]. The mean values of systolic blood pressure and body-mass index were greater for the rural students whereas waist circumference and diastolic blood pressure were more among the urban students as depicted in the table 1. However only waist circumference was statistically different between the two groups (p=0.003).The prevalence of overweight [urban 30 (12%) vs rural 22(8.8%), p=0.305] and elevated blood pressure [urban 25(10%) vs rural 23(9.2%),p=0.764] was more among urban students though the difference was not statistically significant.

Table 1-Distribution of different physical measurements in the study population

Risk factor	Rural (N=250)	Urban (N=250)	Mean difference	S.E of mean difference	p value
	Mean	Mean			
Waist circumference (cm)	61.25	63.35	2.10	0.707	0.03
Systolic BP (mmHg)	98.6	100.64	2.04	1.126	0.07
Diastolic BP(mmHg)	61.27	60.99	0.28	0.897	0.758
BMI (kg/m ²)	16.58	16.78	0.20	0.269	0.448

None of the students reported the use of tobacco or alcohol in any form. All the schools provided 2 play periods of 45 minutes each every week. More rural students played daily during non

school hours and were engaged in daily physical activity other than sports compared to their urban counterparts. Television (TV) watching and going to tuitions was more common among urban students as shown in table 2.

Table 2-Distribution of various activities in the study population:

Activity	Rural (N=250)	Urban (N=250)	p value*
Other daily physical activity	23 (9.2 %)	7 (2.8 %)	0.002
Daily TV watching	177 (71.0 %)	220 (88.0 %)	<0.001
Tuition going	89 (35.7 %)	146 (58.4 %)	<0.001
Playing daily	148 (59.4 %)	85 (34.0 %)	<0.001
Fetching water daily	104 (41.8 %)	90 (36.0 %)	0.199

*for chi-square test. * p values which are significant after applying Bonferroni correction¹⁴.The corrected p value is 0.005 for the same level of significance as uncorrected p=0.05.

Watching TV daily as well as over weekends was more common among urban students. The proportion of students playing daily was more among rural students. The duration among those who played was also more for the rural students, though the difference was not statistically significant (p=0.207). The association between various risk factors and the place of residence of the students in the study group is shown in table 3.

Table 3: Association of various risk factors to the place of residence in the study population:

Risk factor	Rural	Urban	Odds ratio	P value
History of parent using smokeless tobacco	32 12.8%	11 (4.4%)	3.2 (1.57-6.37)=	0.001*
History of parent using alcohol	100 40.1%	67 (26.8%)	1.83(1.26-.67)	0.002*
Parental history of hypertension	20 8.0%	50 (20.0%)	0.35 (0.2-0.61)	<0.001*
Parental history of Diabetes Mellitus	14 5.6%	32 (12.8%)	0.40(0.21-0.78)	0.008
History of other physical activity daily	23 9.2%	7 (2.8%)	3.53 (1.49-8.40)	0.002*
Playing daily after school hours	148 59.4%	85 (34.0%)	2.84 (1.97-4.09)	<0.001*
Playing over the weekend (sat and sun)	161 64.6%	207 (82.8%)	2.60 (1.71-3.95)	<0.001*
Going to tuition	89 35.7%	146 (58.4%)	0.39 (0.28-0.56)	<0.001*

The history of Diabetes Mellitus in any of the parents was a significant risk factor for the students to be overweight [Odds ratio = 2.30 (1.04-5.13), $p = 0.042$]. Being overweight was a risk factor for elevated blood pressure in the entire study group [Odds ratio = 3.43 (1.65-7.12), $p = 0.002$]. Playing daily after the school hours protected the students against becoming overweight [Odds ratio = 0.52 (0.28-0.95), $p = 0.039$]. The students who watched TV daily were less likely to play daily [Odds ratio = 0.488 (0.313-0.761), $p = 0.002$].

A large number of the rural students [68 (27.3%)] were also involved in grazing the cattle daily and the mean duration of grazing cattle was 1.56 hours day. In addition an even greater number [78 (31.3%)] of them went for cattle grazing over weekends and holidays for an average of 3.26 hours per day. Among rural students, 41 (16.5%) were also involved in other household activities like caring for the animals, cooking, getting firewood. Among the rural students 29 (11.2%) had to help in the family occupations like garland making, brick work, stone cutting, working in fields etc. Among the urban students 16 (6.5%) had to help in the family occupations like taking care of the shop, beedi making etc. The students in both the groups were also involved in daily errands like fetching water and groceries.

Discussion and conclusions:

This study was designed to determine the prevalence of risk factors for CAD and also to look out for the rural-urban differences, if any. The extra older students in the rural arm were due to more number of failures (25.6%) among the rural students. The prevalence of overweight and elevated blood pressure in our study is similar to those reported in other recent studies for urban area but somewhat higher for the rural area^{3, 6-10}. The presence of slightly older students among the rural students could have diluted the differences between various physical characters like BMI and blood pressure which are known to increase with age. The urban students were found to be less physically active and led a more competitive life, thereby increasing their CAD risk. The rural students were also more often involved in family occupations which involved physical work. The increasing competition among students very early in life is probably depriving many of the children of a healthy childhood as indicated by high proportion of students attending tuitions. As seen in the study, TV watching is a risk factor for decreased

physical activity. TV watching being resorted to as the main relaxation and in certain cases addictive TV watching is of concern. Playing daily after the school hours seems to protect the children from becoming overweight. The fact that students with parental history of Diabetes Mellitus were already overweight and many had elevated blood pressures reaffirms the childhood onset of CVDs and calls for urgent action.

The presence of parents using any form of tobacco and alcohol increases the risk of the children taking up these habits and hence their risks for CAD in long run. In general, research suggests that parental tobacco and drug use may have a considerable impact on the initiation and persistence of smoking in the adolescent child¹¹. Li et al, for example, found that parents' tobacco use was significantly associated with the later use of cigarettes, marijuana, and alcohol by their adolescent children, with the strongest influence found for smoking¹². Passive smoking itself known to be of considerable risk¹³.

Recommendations:

Many of the CAD risk factors are modifiable. The students, teacher and parents need to be made aware of this. The traditional concept of school health dealing mainly with communicable diseases need to be reoriented to meet the newer health challenges. The teachers need to be trained to incorporate healthy life style and stress management in their teaching sessions. The high school period probably is the best time to start any intervention to prevent non-communicable diseases as the high school students have some idea about the risk factors and start getting exposed to considerable amount of stress both in the school as well as in the home.

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Conflict of interest:

The study was carried out as MD (Community Medicine) dissertation. All the expenses of the study were borne by the author. The equipments for data collection and help in statistical analysis were provided by the community medicine department of Christian Medical College,

Vellore. The author was permitted to stay away from their duties so as to allow collection of data. There are no conflicts of interests, whatsoever.

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