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ASSESSMENT OF CARDIOVASCULAR RISK OF ADOLESCENTS- A PILOT STUDY

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ABSTRACT

Introduction
It is established that atherosclerosis begins in childhood and adolescence.

Objectives
The objective of the study was to assess the cardiovascular risk of adolescents.

Methods
A descriptive survey design was conducted among 210 adolescents aged 10 to 14 years studying in Classes V to IX. The socio personal data sheet and 24 hours recall sheet was completed by mothers. Physical Activity questionnaire- C was completed by the adolescents. The Height, Weight, Blood Pressure and Waist circumference were taken as per standard procedures. The 20 meter shuttle run test was carried out. Body Mass Index was calculated. Total kilocalories per day were calculated. The cardiovascular risk score was computed (Range 7-27).

Results
The mean cardiovascular risk score was 11.36 with a SD of 2.26. In the present study, 52.9% of the adolescents had at least one risk factor.

Conclusion
The study was feasible and sample size was calculated as 380.

KEYWORDS : Cardiovascular risk; adolescents; obesity; school based

Introduction

Adolescence is a sensitive and important phase. Adolescents in India are more than one fifth of the total population. There is no dedicated adolescent health care provider for such a huge section of the population. [1]

It is well established that atherosclerosis begins in childhood and adolescence and that cardiovascular risk in early years can be tracked into adulthood cardiovascular disease (CVD). [2]

The high risk behaviors include physical inactivity, dietary inadequacies, inadequate leisure activities, alcoholism and tobacco use. [3, 4]

The researcher could not find a comprehensive risk scoring system for measuring the cardiovascular risk of adolescents as it was difficult to find the hard outcomes like death, stroke, and myocardial infarction in children.

SBP, DBP, BMI, physical activity and cardiovascular fitness were used to create a Health Heart score for children. This scoring could be done by a school nurse or a trained classroom teacher. A simple Cardiovascular Risk Assessment format which can be utilised by either a School Health Nurse or a trained teacher can identify the high risk group and institute early intervention. [5]

The researcher included waist circumference and kilocalories per day along with the Healthy Heart Score to make it more comprehensive in terms of the risk factors.

The objective of the pilot study was to assess the cardiovascular risk of adolescents and determine the sample size for the main study.

Materials and Methods

A quantitative research approach and a descriptive survey design were used. Ethical permissions were obtained from the Scientific Review Committee of the institution, Institutional Ethics committee of Govt TD Medical College, Alappuzha, District Educational Officer, Principals of the schools. Signed consent from mothers and assent from the children were taken. A total of 210 adolescents aged 10 to 14 years studying in Classes V to IX from two schools – one governmental and one private- were included as per the inclusion and exclusion criteria.

The socio personal data sheet and the 24 hours recall sheet were sent with the children to their homes. The Physical Activity questionnaire and Tobacco, alcohol and drug questionnaire in the local language were given to the students in their classes for self reporting. The researcher went to each class and distributed the questionnaire. In standards V and VI the researcher read out the sentences and the options. It took about 20- 30 minutes for completing the questionnaire. The Height, Weight, Blood Pressure and Waist circumference were taken as per standard procedures (Indian Council Medical Research guidelines). The 20 meter shuttle run test was carried out for the adolescents as groups of 10 in the school ground during the morning hours from 10 am to 12 noon. It took about one hour to complete the test for 30 adolescents.

The responses from the socio personal data sheet and the Tobacco, alcohol and drug questionnaire were entered in the Excel. The Weight and Height were entered and the BMI was calculated. The BMI was scored as 1 for <75 percentile, 2 for 75-85 percentile, 3 for 85-95 percentile and 4 for >95 percentile according to the age and sex specific CDC growth charts 2000. The height percentile was taken as per CDC growth charts. The systolic and diastolic BP percentiles were taken considering the age, sex and height percentiles from the CDC charts for systolic and diastolic BP for children. Systolic and diastolic BP was scored as 1 for < 50 percentile, 2 for 50-90 percentile, 3 for 90-95 percentile and 4 for > 95 percentile. The waist circumference was scored as 1 for < 50 percentile, 2 for 50-75 percentile, 3 for 76-85 percentile and 4 for > 85 percentile according to the age and sex specific percentile charts for Indian children and adolescents aged 2-18 years. The average score for the Physical Activity Questionnaire for each child was computed. The scores were reversed so that higher scores represent higher risk. The PAQ scores of 4-5 received a score of 1, 3-4 received a score of 2, 2-3 received a score of 3, 1-2 received a score of 4 and scores of 0-1 received a score of 1. The shuttles and levels of the 20 meter shuttle run test was compared to the age and sex specific grades of Total Physical Fitness Programme of Government of Kerala. The score of 1 was given for Grade A which represented cardiac endurance above the normal range. The score of 2 was given for Grades B and C which represented normal range and score of 3 was given for Grade D which represented cardiac endurance below the normal range. The total kilocalories was calculated by using the software Count what you eat from BioMedical Informatics Centre in National Institute of Nutrition, Hyderabad. The age and gender specific RDA energy as

per the ICMR report 2010 is compared with calculated kilocalories of the adolescent. For boys aged 10-12 years the recommendation is 2190 and for 13-15 years it is 2750 kilocalories per day. For girls aged 10-12 years the recommendation is 2010 and for 13-15 years it is 2330 kilocalories per day. The normal range is taken as the kilocalories mentioned for the age and gender plus an additional 200 kilocalories for half an hour of moderate physical activity. The score of 2 is given for that range. A score of 1 is given for below that range and a score of 3 is given for above that range of kilocalories per day. The total cardiovascular risk score was computed by summating the scores. (Range 7-27). Higher the scores higher is the cardiovascular risk. The scoring of each component of the cardiovascular risk scale is shown in Table 1.

Table 1 Scoring of Cardiovascular Risk scale (n=210)

	Scores	1	2	3	4	5
1	PAQ-C scores	4 to5	3 to 4	2 to 3	1 to 2	0 to 1
2	BMI(CDC) percentiles	<75	75-85	85-95	>95	
3	SBP(CDC) percentiles	<50	50-90	90-95	>95	
4	DBP(CDC) percentiles	<50	50-90	90-95	>95	
5	WC(Khadilkar et al)	< 50	50-75	76 - 85	>85	
6	CVF- 20 MSR test- TPFP Kerala	Above (Grade A)	Within (Grade B and C)	Below (Grade D)		
7	Total kilocalories per day (Nutrient requirements and RDA for Indians)	Below the range for age and gender	Normal range	Above the normal range		

Results
The mean age was 11.62 years and 52.9 % were girls. The mean cardiovascular risk score was 11.36 with a SD of 2.26. The percentage distribution of the adolescents in each component of the cardiovascular risk score is shown in the Table 2.

Table 2 Percentage distribution of adolescents in the components of PAQ-C scores, BMI, SBP, DBP, and Waist Circumference

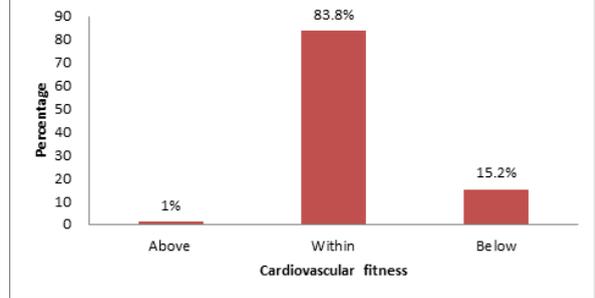|	Scores	1	2	3	4	5
1	PAQ-C scores	4 to5	3 to 4	2 to 3	1 to 2	0
	Percentage	23.8	23.3	37.7	15.2	0
2	BMI(CDC) percentiles	<75	75-85	85-95	>95	
	Percentage	87.7	5.2	5.2	1.9	
3	SBP(CDC)percentiles	<50	50-90	90-95	>95	
	Percentage	89	10	0.5	0.5	
4	DBP(CDC)percentiles	<50	50-90	90-95	>95	
	Percentage	51.4	41.4	6.7	0.5	
5	WC percentiles(Khadilkar et al)	< 50	50-75	76 - 85	>85	
	Percentage	84.7	12.9	1.4	1	

Figure 1
Percentage distribution of adolescents based on the cardiovascular fitness

Figure 1 shows that 15.2% of adolescents were below normal in terms of their cardiovascular fitness.
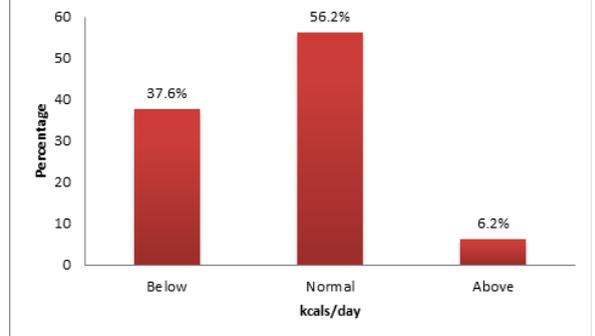

Figure 2
Percentage distribution of adolescents based on kilocalories consumed per day

It is seen from figure 2 that 6.2% of adolescents were consuming above the normal kilocalories per day. It is also seen that 37.6% of adolescents were having below the normal kilocalories per day.

The sample size was calculated to be 380 by using the formula N= $Z\alpha_2 \sigma_2/d_2$.

Discussion
In the present study 52.9% of the adolescents had at least one risk factor. A previous study done in Canada found that 58% of children had elevated levels of at least one CVD risk factor. They have developed a healthy heart score including BMI, SBP, DBP, 20 MSR test and PAQ-C.[5] In the present study, waist circumference and kilocalories taken per day were also included.

In the present study the prevalence of overweight and obesity was 5.2 and 1.9% respectively. Another study done among 1634 urban school children in Kerala showed the prevalence of overweight and obesity to be 4.6 and 11% respectively. [6] The present study population was semi urban in characteristics.

Prevalence of systolic and diastolic hypertension in this study was 0.5% and 0.5% respectively where as in a study done among 315 students in standards 9th and 11th in New Delhi, India, it was 1.6% and 5.4% respectively. [7]

Conclusion
It was concluded that the study was feasible in terms of the methodology. The cardiovascular risk scoring used in the study had a positive correlation (r=+0.92) with the healthy heart scoring

devised by Reed, Warburton and McKay in 2007. In their study the healthy heart score had significant correlation with serum Total Cholesterol: High Density Lipoprotein (HDL) cholesterol(r=0.30), HDL cholesterol(r=-0.32) and triglyceride concentration(r=0.23). The sample size was also calculated to be 380 using the formula N= $Z\alpha_2 \sigma_2/d_2$.

References

1. www.whqlibdoc.who.int/publication/2010
2. Heather Lee Kilty and Dawn Prentice (2012). Early Identification of Cardiovascular Risk Factors in Adolescents and Follow-Up Intervention Strategies, Cardiovascular Risk Factors, Prof. Armen Gasparyan (Ed.), ISBN: 978- 953-51-0240-3, InTech, Available from: http://www.intechopen.com/books/cardiovascular-risk-factors/earlyidentification-of-cardiovascular-risk-factors-in-adolescents-and-follow-up-intervention-strate
4. Ornelas, I.J., Perreira, K.M., Ayale, G.X.(2007). Motheral influences on adolescent physical activity: a longitudinal study. International Journal of Behavioural Nutrition and Physical activity, 4(3).
5. Makinen TE et al. (2010). The effects of adolescent sports and exercise on adulthood leisure time physical activity in educational groups, International Journal of Behavioural Nutrition and Physical activity, 7(27).
6. Reed, K.E., Warburton, D.E.R., McKay, H.A.(2007). Determining cardiovascular disease risk in elementary school children: Developing a healthy heart score. Journal of Sports Science and Medicine, 6,142-148.
7. Cherian, A.T., Cherian, S.S. & Subbiah, S. (2012). Prevalence of obesity and overweight in urban school children in Kerala, India. Indian Pediatrics, 49, 475.