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Behavioral Risk Factors of Coronary Artery Disease among Adolescents of Kerala

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Abstract

Context: According to World Health Organization (WHO) report coronary artery disease (CAD) is the largest cause of death, and by 2020, the low- and middle-income countries including India will also have ischemic heart disease as the most frequent cause of death and greatest disease burden. Various behavioral risk factors responsible for CAD include unhealthy diet, physical inactivity, tobacco use, stress. *Aim:* Estimate the prevalence of various behavioral risk factors for CAD among adolescents, Thrissur district, Kerala. *Settings and Design:* A cross-sectional descriptive design was used and study was conducted in the selected schools of Thrissur district, Kerala. *Materials and Methods:* Schools were selected using a multistage cluster sampling technique. Data was collected using a structured questionnaire. *Results & Conclusion:* It was found that 79.2% and 42.7 % don't engage in one hour daily physical activity and exercise during weekdays and weekends resp. Of all 5.1% and 95.9% of children spend more than two hours in front of the screen during weekdays and weekends resp. Out of all 64.5 % and 33.3% don't consume vegetables and fruits daily resp. The research identifies that 17.8% consume hotel, junk foods regularly at least 2-4 times in a week. 54.2 percent of adolescents were regularly (2-4 times in a week) consuming some fried foods; 7.2% were daily consumers. This study points out a very high prevalence of various behavioral risk factors among adolescents of Kerala. Hence calls for an urgent need for population based strategies implemented at local and national level to prevent escalation of CAD.

Keywords: Coronary Heart Disease; Behavioral Risk Factors; Adolescents.

Introduction

Cardiovascular disease (CVD) is a leading cause of morbidity and premature mortality globally: more people die annually from CVDs than from any other cause. An estimated 17.1 million people died from CVDs in 2004, representing 29% of all global deaths. According to the World Health Report 2002, CVD will be the largest cause of death and disability in India by 2020 [1]. By 2020, India will have the largest coronary artery disease (CAD) burden in the world and will account for one third of all deaths; many of them will be young. The addition of behavioral risk factors (physical inactivity, unhealthy diet, tobacco use) to the ethnic or genetic (hyperinsulinaemia, insulin resistance, lipoprotein A) susceptibility superimposed on the biological risk factors (hypertension, diabetes, hypercholesterolemia) can be considered as the reason for the rise of CAD in our Country. Data accumulated over the past 4 decades indicate that atherosclerotic-CAD processes begin early in childhood and are influenced over the life course by genetic and modifiable behavioral risk factors and environmental exposures.

Evidence from laboratory, clinical, and epidemiological studies the results of laboratory/ pathology studies and more recent noninvasive studies provide convincing evidence of the link

between established potentially modifiable risk factors and accelerated atherosclerotic processes in adolescence and early adulthood, support the need for primary prevention beginning early in life itself [2].

In 2000, approximately 30 per cent of India's population was aged 10 to 24 yr, that increased to 53 percent when children younger than 10 were included [3]. Various risk behaviors, such as smoking, consuming a high fat diet, poor intake of fruits and vegetables and alcohol, tobacco use, are often adopted during adolescence. At the same time, it may be easier to inculcate healthy behaviors at a young age rather than to modify behaviors at later ages or after the onset of disease. During adolescent period peer group culture is believed to play a significant role in the onset of life style risk behaviors; Strong associations between adolescents' peer group affiliations and their adoption of smoking, drinking alcohol, or both smoking and drinking alcohol have been reported. Smoking is a health risk behaviors often learned during the adolescent and school years. Along with this nutritional and lifestyle transition resulting in high fat intakes, linked to the consumption of refined foods, and foods of animal origin with an increased fat content, coupled with a low physical activity would result the risk of heart disease.

Adolescence is an impressionable age and can be motivated to make appropriate healthy modifications and in turn they can influence the society at large. There are marked variations in the epidemic of CAD its associated risk factors across India. Although there is limited knowledge this area, there have been no major studies on prevalence of CAD in Kerala. It cannot be assumed that figures from the various regions of Kerala are applicable to rest of the state.

Materials & Methods

Study Design and Subjects

The present cross sectional survey was conducted at Thrissur district, Kerala. The target population was school going adolescents of Kerala in the age group 12-15 years (grade-7-9). Sampling frame consisted of all High schools (Government/Private, aided/unaided, SSLC) of Thrissur district except special schools for disabled children. Out of three educational sub districts (clusters) of Thrissur, one sub district was randomly selected. One government, private aided and private unaided school were selected randomly using 2013 DPI/DDE census list. From each sample school one cluster of subdivision (7^{th}, 8^{th}, 9^{th}) was randomly selected using class lists of the sample schools obtained from the school authorities. The study was limited to 12-15 years age, as the authorities did not grant permission to include students above 15 years. The study protocol was approved by the ethics committee of Jubilee Mission medical college and research institute, Thrissur, Kerala and permission to conduct the research in schools was obtained from Directorate of Public Instructions, Thiruvananthapuram.

Data Collection

A well designed, pre-tested and validated questionnaire was administered to students. The instrument contained 2 parts

a. Socio-demographic details including age, gender, education of mother and father, occupation of father and mother, family income, source of information, and area of living. Validation of the above details was done by cross checking the information (esp. on, educational qualification & occupation of parents, household income) with records kept in schools of about 20 % subjects.

b. Self reported behavior questionnaire on physical activity, exercise, dietary habits, screen time, tobacco use. Physical activity was measured by asking about residential distance from school/ tuition centre, mode of conveyance, routine work at home (how long and how often), outdoor games (weekdays & weekends), and participation in sports with regular practice. Information on dietary habits included a food frequency table, with 11food groups and columns indicting the number of times (home or outside) taken in the last one month, watching television during meals, snacking while watching TV, eating dinner 2 hours before sleep, preference and use of soft drinks with meals, use of extra salt and oil/ghee with foods, skipping meals, were used to assess the dietary habits. This is the normal routine diet the students had, not in marriages/parties; their response was indicated by placing a tick in the respective columns. For the purpose of analysis the following categories were made according to the dietary guidelines.

Fruit Consumption Pattern

For fruit consumption pattern individuals who consume fruits seven days a week as appropriate or adequate, 4-6 days moderate, and less than 2-3 days

in a week were considered inadequate.

Vegetable Consumption Pattern

Categories were similar to fruit consumption pattern.

Dairy Products

Categories were similar to fruit consumption pattern.

Fish consumption pattern: Consumption of fish at least 2-4 times in a week was considered appropriate, weekly once moderate and less than that was considered inadequate.

Nut consumption Pattern

Categories were similar to fish consumption pattern.

Junk Food Consumption Pattern

For junk food consumption pattern individuals, who consume monthly as appropriate, weekly as moderate, and daily as inappropriate. Total screen time was measured by asking to report time spend in watching TV/Video/DVD, computer use (Weekdays & weekends). Information on exposure to passive tobacco, experimentation with tobacco products and use of tobacco products were collected.

Prior to the final study a pilot study was carried out to know the feasibility and practicability. Following a brief presentation about the study, a written consent was sought from the school authorities to conduct the study in their school premises. Explanation about the study, questionnaire was given to participants and doubts were clarified. Anyone not interested was allowed to keep away. Children from the representative samples were called for screening using inclusion criteria according to their classes and questionnaires were administered to collect information related to health behaviors. The questions were explained briefly and demonstrated to them. Collected data were coded, categorized and analyzed (SPSS -16) using univariate and bivariate analysis.

Results & Discussion

Sociodemographic Details

The total number of adolescents participated in the survey was 96, with a mean age of 12.75±.92years; 61boys and 35 girls. More than half were residing in village (57%) and remaining (43%) were from corporation. 94.8% of adolescents had no previous information regarding coronary artery disease, while 3.1% and 2.1% received information regarding coronary artery disease from family/friends and media (visual, oral and written) and advertising resp. One quarter (25%) of the students had a family income in the range of Rs. 16020-32049, 21.9 % had in the range of 12020-16019 and 20.9% had income below Rs. 8010.

Physical Activity and Exercise Including Screen Time

Table 1 shows that the mean duration of exercise was during weekdays and weekends was 237.7±159.3 and 403.3±268.4 minutes resp. which less than the recommend duration of exercise. It was also found that 79.2% and 42.7 % don't engage in one hour daily physical activity and exercise during weekdays and weekends resp. The beneficial role of physical activity in the prevention of CVD in adults has long been recognized. Compared to active subjects, inactive subjects had a relative risk of 1.5 to 2.4 of developing CVD; these effects were independent of other risk factors [4]. There is evidence that adolescents are not enough physically active and unable to sustain their activity levels into adulthood [5].

Table 1: Screen time and exercise behaviour among adolescents

Variable	Mean ±SD
Screen time (Hours)	
Weekend	8.62±3.4
Weekdays	6.1±3.4
Total	14.7±5.4
Exercise (Minutes)	
Weekend	167.8 ±172.3
Weekdays	237.7±159.3
Total	403.3±268.4

As shown in table 2, although 54.2%of children stay within 5 km radius of school, 67.7% were using motor vehicles for transportation. Only 43.8% were involved in any sports, while 68.8% participate in school physical education sometimes and 14.6% only often resp. These findings were supported by

Ramachandran TY [6].

This is supported by the previous studies done by Ramachandran TY [6] and Nayak et al [7].Sudhain 2007 Active lifestyles imply not only increasing physical activity levels, but also decreasing sedentary behavior. Body weight, in between meals snacking, parental TV watching habits and having a TV in the bedroom are positively associated with youth's TV/ video viewing habits [8].(Gorely, Marshall & Biddle, 2004). More than half of television viewers in India today are children below 15 years (Sudha, 2007) [9]. The short-term effects of tobacco addiction among youths include damages to the respiratory system, nicotine dependence and are associated with its consumption until adulthood. Generally, pulmonary function deteriorates more rapidly in smokers of all ages, compared to non-smokers, and it increases the risk of CVD directly through harmful changes in blood pressure, total serum cholesterol and HDL cholesterol levels [10].

Table 2: Physical activity behaviour among adolescents

Variables	Frequency	Percentage
Distance from School		
0 to 5 kms	52	54.2
5 to 10 kms	35	36.5
More than 10 kms	9	9.4
Mode of conveyance to school		
Physical mode (Not using vehicles)	30	31.2
Using motor vehicles	66	67.7
Participation in school Sports		
Member of sports team	42	43.8
Not a member	54	56.2
Participation in school physical education		
Always	16	16.7
Sometimes	66	68.8
Often	14	14.6
Very often	0	0
Never	0	0

Food Consumption Pattern

The study finds out that only 64.5 per cent of the respondents take vegetables on a daily basis,6.2% takes once in a week and 6.3%only 1-3 times in a month. Only 33.3% consume fruits daily. 19.8%consume 2-4 times in a week, while 4.2% consume only once in a week and 14.6% don't have consume fruits at all in a month. Regular Fish consumption was seen in 63.4% of adolescents while 12.5% consume never and 12.5% only 1-3 times in a week30.2% of adolescents don't have the habit of consuming nuts, while 34.4% consume 1-3 times in a month. Only 25% consume at least 2-4 times in a week. Only 55.2% consume dairy products daily while 11.5%consume never. There is a tendency of junk food consumption among students. The research identifies that 17.8 percent consume hotel foods/junk food regularly at least 2-4 times in a week, of which 4.2% consume the same every day.er cent of the students consume soft drinks regularly (2-4 times in a week) and 3.1% consume soft drinks daily. Another important finding is related to the consumption of baked or bakery items. 88.6 per cent of the respondents consume any one of the confectionary items regularly. 54.2 percent of adolescents were regularly (2-4 times in a week) consuming some fried foods. Out of this 7.2% were daily consumers. 33.2% were regularly including butter or ghee in their foods. 72.9% were consuming foods rich in salt and oil like Pappad, Pickles on a regular basis.

Previous studies have shown that snacking while watching TV was associated with higher overall caloric intake, and calories from fat in women (Gore, Foster, DiLillo, Kirk & Smith West, 2003).[11] Eating at fast-food restaurants was associated with excessive weight (French, Story & Jeffery, 2001) [12] and eating quick-service foods twice a week or more was associated with increase in BMI scores in female adolescents; in addition, this behaviour continued from childhood through adolescence (Williams, Holmbeck, & Greenley, 2002) [13]. Also, increased consumption of soft drinks is concomitant with decreased consumption of milk in children and adolescents. Conversely, fruits and vegetable consumption is 50% below recommended levels [12].

From table 5 it is evidenced that 48.7% of adolescents are exposed to tobacco smoke at home and 15.6%of them are unaware of passive smoking and had been offered by some tobacco products by

others. 10.3% of them had experimented with tobacco before the age of 13 years. These findings were supported by the studies done by Mathur et al [14] and Sinha DN [15].

Table 3: Pattern of food consumption among aadolescents

Items	Frequency (percentage)								
	Monthly			Weekly			Daily		
	0	1-3	1	2-4	5-6	1	2-3	4-5	6+
Hotel food, Fast foods (noodles, burger, pizza etc)	17(17.7%)	5(57.3%)	10(10.4%)	9(9.4%)	4(4.2%)	4(4.2%)	0	0	0
Fried foods (fish/meat/vegetable)	73(7.3%)	22(22.9%)	7.3(7)	35(36.5%)	11(11.5%)	6(6.2%)	1(1%)	0	0
Fish curry	12(12.5%)	12(12.5%)	11(11.5%)	36(37.5%)	10(10.4%)	3(3.1%)	10(10.4%)	1(1%)	1(1%)
Vegetables	0	6(6.3%)	6(6.2%)	12(12.5%)	10(10.4%)	12(12.5%)	30(31.2%)	20(20.8%)	0
Fruits	14(14.6%)	20(20.8%)	4(4.2%)	19(19.8%)	6(6.2%)	12(12.5%)	14(14.6%)	5(5.2%)	1(1%)
Nuts	29(30.2%)	33(34.4%)	10(10.4%)	10(10.4%)	5(5.2%)	7(7.3%)	2(2.1%)	0	0
Fruit Juice/ Carbonated drinks (cola, sprite etc.)	23(24)	46(47.9%)	4(4.2%)	17(17.7%)	2(2.1%)	3(3.1%)	1(1%)	0	0
Pappad, Pickles	3(3.1%)	14(14.6%)	9(9.4%)	25(26)	9(9.4%)	17(17.7%)	10(10.4%)	9(9.4%)	0
Butter , Ghee	26(27.1%)	24(25%)	14(14.6%)	17(17.7%)	8(8.3%)	6(6.2%)	1(1%)	0	0
Biscuits/bread/cakes/ Mixture/chips	3(3.1%)	3(3.1%)	5(5.2%)	24(25)	10(10.4%)	19(19.8%)	18(18.8%)	14(14.6%)	0
Milk/yogurt (1 cup=250ml, a household tea cup)	11(11.5%)	3(3.1%)	9(9.4%)	16(16.7%)	4(4.2%)	27(28.1%)	19(19.8%)	7(7.3%)	0

Table 4: Dietary habits among adolescents

Variables	Frequency	Percentag
Habit of watching TV during breakfast		
Yes	74	77.1
No	22	22.9
Habit of watching TV during lunch		
Yes	79	82.3
No	17	17.7
Habit of watching TV during dinner		
Yes	81	84.4
No	15	15.6
Preference of drinks		
Water	34	35.4
Carbonated drinks	10	10.4
Fruit juices	52	54.2
Family eats dinner together		
Yes	75	78.1
No	21	21.9
Snacking while watching TV		
Yes	58	60.4
No	38	39.6
Eating dinner at least 2 hours before sleep		
Yes	35	36.5
No	61	63.5
Extra salt to food/ salad/curd after it is served		
Most of the times	17	17.7
Sometimes <25%	51	53.1
Never	28	29.2
Apply ghee/oil on chapatti /foods		
Most of the times	14	14.6
Sometimes <25%	39	40.6
Never	43	44.8
Parents offer food/sweets as reward		
Most of the times	20	20.8
Sometimes <25%	56	58.4
Never	20	20.8

Drink soft drinks with meals or snacks		
Most of the times	10	10.4
Sometimes <25%	57	59.4
Never	29	30.2
Do you skip breakfast/lunch/dinner		
Most of the times	8	8.3
Sometimes <25%	57	59.4
Never	31	32.3

Table 5: Exposure and use of tobacco among adolescents

Variables	Frequency	Percentage
Exposure to passive tobacco at home		
Never	49	51
1 or 2 days	28	29
3 or 4 days	9	9.4
5 or 6 days	1	1
All 7 days	9	9.3
Heard of passive smoking		
Yes	79	82.3
No	15	15.6
Offered tobacco by others		
Yes	15	15.6
No	81	84.4
Age of experimentation with tobacco products		
I have never tried tobacco	86	89.6
7 years or younger	3	3.1
8 or 9 years old	3	3.1
10 or 11 years old	1	1
12 or 13 years old	3	3.1
Use of tobacco products during last 6 months		
Yes	5	5.2
No	91	94.8

Conclusion

The study reveals the high prevalence of major factors leading to coronary artery disease among adolescents. The major conclusion from this study is that of low physical activity, sedentary lifestyle, poor dietary habits with consumption of junk food and tobacco use are prevalent among adolescents in the study area. Unless effective preventive strategies are implemented at the local, and national level, we can expect that trend of increasing coronary artery disease in adults observed in recent decades will accelerate even further and suggests concerted efforts targeted at improving lifestyles of children and adolescents.

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