

Physical Activity and Dietary Pattern Among Adolescents: A Cross-Sectional Analysis

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Abstract

Background: Non Communicable diseases especially cardiovascular disease, diabetes mellitus, and stroke, have emerged as a major public health problem in India. Interplay of unhealthy diet, vitamin-D deficiency, tobacco use and physical inactivity contributed to this elevated risk among Indians. Also these life-threatening yet modifiable/reversible risk factors routes quite early in life. A clear understanding of the existing risk in the population is crucial for appropriate designing and timely (before the initiation of atherosclerosis) implementation of any preventive interventions to control the rising tide of non communicable diseases. **Aim:** Assess the physical activity and dietary patterns among school going adolescents. **Methods and Materials:** The study was conducted in Thrissur district, Kerala, using a cross sectional survey approach. Data were collected using a structured self reported questionnaire. Analysis (descriptive and inferential statistics) was done using SPSS version 20. **Results and Conclusions:** The mean age of adolescents participated in the study was 12.29±0.5 years, majority were boys (68.7%), and residing in rural area (74.6%). The mean dietary behaviour score was 32.71 ±3.32; boys 32.52±3.45, girls 33.13±2.3. There were no statistically significant differences in the mean score of dietary habits ($t=0.127$, $p=0.899$), dietary consumption ($t=1.757$, $p=0.080$), and total dietary behavior score ($t=1.349$, $p=0.179$) between boys and girls at 0.05 level of significance. The mean physical activity score was 1.76±0.3; boys 1.73±0.28, girls 1.77±0.31. Out of all, none of the boys and girls reported to have adequate levels of physical activity. Among them, 69% of them were actively commuting to school. A statistically significant higher number of boys were actively commuting to school when compared to girls ($t=4.915$) at 0.05

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level. In conclusion, the findings from this study suggest that the physical activity and dietary behaviour among adolescents is largely inappropriate. So strategies need to be adopted from adolescent age itself to establish a lifestyle that promotes healthy levels of physical activity and eating behaviour.

Keywords: Non Communicable Diseases; Cardiovascular Disease; Physical Activity; Dietary Behavior; Adolescents.

Introduction

Non Communicable diseases, especially cardiovascular disease, diabetes mellitus, and stroke, have emerged as a major public health problem in India. The morbidity and mortality in most productive phase of life is posing serious challenges to Indian society and economy [1]. Also compared to Western counterparts, in South Asian population experience a higher prevalence and a decade earlier onset of cardiovascular diseases owing to unique genetic predisposition and earlier exposure to risk factors [2,3].

Interplay of unhealthy diet (added high sugar and refined grains), vitamin-D deficiency, tobacco use and physical inactivity contributed to this elevated risk among Indians, especially in urban areas [4,5]. Rapid urbanization, increasing affluence,

international and rural-urban migration, changing age structure, and aggressive marketing have contributed to the changing lifestyles of people. In the recent decades, there is a marked increase in the intake of energy-dense foods, decrease in physical activity, and high level of psychosocial stress, all of which promote the development of dysglycaemia, hypertension, and dyslipidemia [6].

Also these life-threatening yet modifiable/reversible risk factors routes quite early in life [7]. Recently, many studies have suggested that lifestyle changes in adolescents and young adults are necessary because of the increased tendency of various adverse health outcomes not otherwise typical for their age, including hypertension, dyslipidemia, and metabolic syndromes [8].

Recent studies show that adolescents tend to engage in a number of unhealthy eating behaviors, including extreme dieting, skipping meals, high intake of fast foods, low intake of fruits and vegetables, and minimal consumption of dairy products [9]. Only 54.8% consume green leafy vegetables more than once a week while 82.8% of the people consume at least one non-vegetarian dish a day [10].

It is known that children of ages 8 years, and under do not effectively comprehend the persuasive intent of marketing messages or the difference between commercial and non-commercial intents. Those as old as 11 years, also unless explicitly taught, may not be able to do so. But in the recent years the food and beverage industry has viewed children and adolescents as a major market force. As a result, children and adolescents are now the target of intense and specialized food marketing and advertising efforts. These foods related commercials targeting children or adolescents are usually high in sugar and unhealthy fat, and such are inconsistent with the dietary recommendations. In addition, foods such as biscuits, namkeens (which are rich in trans-fats and saturated fats, salt/ refined carbohydrates) are sold at rock-bottom prices and are positioned as 'entry-level' products in the food market. These foods unfortunately, are much more affordable than the healthy options making the poor vulnerable to chronic diseases. There are chances that adolescents may spend lot of time outside the home, and hence may tend to choose high fat, calorie-dense foods. As adolescents are usually open to new ideas and many preferences developed during period will persist to adulthood, due emphasis should be given in shaping their dietary habits.

Physical activity is seen considerably low in today's children. In a study conducted among 2.3 million school children aged 10-15 years, only 11.5% of girls could finish the recommended health related physical fitness test compared to 16.58% in boys [11]. Earlier, children had more time to play, run about or work out compared to the children of this generation. Due to unsafe roads (traffic, crime) children are discouraged from walking or cycling to school. Motorized vehicles became popular and they are perceived to be quicker and safer for transport. Erosion of open spaces for exercise and lack of parental time to supervise play are all part of new lifestyles. Another important aspect to be taken note is the fact that nowadays schools put more emphasis on good test scores. This takes a toll among children as schools have less focus on physical education. Long school hours, the ordeal of getting ready for school and tuitions are another factors promoting inactivity. Without activity, even the recommended calories lead to a positive energy balance which accumulates as body fat contributing to obesity or metabolic syndrome.

Regular physical activity and exercise can positively impact traditional metabolic and vascular risk factors of coronary artery disease. It improves blood pressure, serum lipids, impaired glucose tolerance and insulin resistance, inflammatory and haemostatic factors, and endothelial function. It reduces overweight and obesity too [12]. The above evidences shows that due importance should be given to improve physical activity and dietary behaviors among adolescents so that active living is sustained throughout the life.

A clear understanding of the existing risk in the population is crucial for appropriate designing and timely (before the initiation of atherosclerosis) implementation of preventive interventions to control the rising tide of non communicable diseases including cardiovascular disease [13]. The aim of this study was thus to assess diet and physical activity patterns among rural school going adolescents residing in Thrissur district, Kerala.

Materials and Methods

Research approach

A quantitative, non experimental approach.

Research design

Cross-sectional, descriptive survey design.

Target Population

Adolescents studying in high schools of Thrissur district, Kerala.

Sample and Sampling technique

A Convenient sampling technique was used to select four high schools of Thrissur district, Kerala. A total of 252 school children were included in the study. Those who belong to the age group of 11-16 years, studying in 7th class and who were willing to participate involved in the study. Adolescents who were diagnosed as having some cardiovascular diseases, chronic illnesses, severe malnutrition, physical and mental defects or not cooperative were excluded from the study.

Setting

The study was conducted Thrissur district, Kerala, South India. Thrissur district is located approximately at the centre of the state with a population of 3121200 persons and a density of 1,026/sqkm². This district has a literacy rate higher than the national average. The study was conducted among adolescents studying in the rural schools of Thrissur district and mixed schools were selected to involve the participation of both boys and girls.

Ethical considerations

Permission was obtained from the school authorities and Directorate of Public Instructions. Assent was taken from the school children and a written informed consent was taken from parent teachers association. The study was approved by Institutional ethics committee.

Data collection tools and technique

Data were collected through a structured questionnaire. The questionnaire was developed by the researcher after an extensive literature review and pilot testing. Validity and reliability was established before administration. The first part of the questionnaire included items to obtain information on sociodemographic personal profile of adolescents. Dietary behavior was assessed under two domains; dietary habits and dietary consumption pattern of adolescents as compatible with Kerala culture and norms on diet preferences and consumption pattern. Adolescents were asked to report normal routine diet they had but not in marriages/parties [14].

Physical activity behavior was assessed by using modified version of Physical Activity Questionnaire (PAQ) for adolescents and transport related physical activity was captured by asking a question on mode of commute to school. Though it is freely available and can be modified to the context, permission was obtained to do the same. Once we have a value from 1 to 5 for each of the 6 items used in the physical activity composite score, the mean of these 6 items formed the final physical activity summary score. A score of 1 indicated low physical activity whereas a score of 5 indicated high physical activity. Based on the final score the level of physical activity was classified as adequate (scores ≥ 3) and inadequate (scores < 3) for statistical analysis and comparisons.

Validity and reliability

Validity and reliability ($r = 0.72$) was established before administration.

Data analysis

The collected data were coded, entered in the master sheet. It was decided to analyze the data by descriptive and inferential statistics on the basis of objectives and the hypotheses of the study. The data was analyzed in terms of descriptive (mean, standard deviation, percentage) and inferential statistics (independent t- test, chi-square test/fishers exact test). A p value of < 0.05 was taken as statistically significant.

Results

Description of study participants

The mean age of adolescents was 12.29 ± 0.5 years, majority were boys (68.7%), and residing in rural area (74.6%). Majority of the mothers (61.5%) and fathers (69.0%) of adolescents were educated up to metric. Most of the mothers were homemakers (59.9%) while majority of the fathers were engaged in private job (55.6%). It was found that most of the parents were engaged in higher and intermediate non-manual work; 46% of fathers and 44% of mothers. Out of all 49.6% of adolescents had reported family history of cardiovascular disease. Majority of the adolescents (97.2%) had no prior information regarding CAD while 0.8% each reported health personnel and school curriculum as a source of information.

Dietary behavior among adolescents**Table 1:** Gender wise comparison of dietary habits among adolescents

Variable	Category	Girls		Boys		Test value	P value
		f	%	f	%		
Skipping breakfast/meals	Inappropriate	7	8.9	6	3.5	5.149	0.076 ^{ns}
	Moderate	22	27.8	57	38.7		
	Appropriate	50	63.3	100	57.8		
Drinking soft drinks with meals or snacks	Inappropriate	6	7.6	6	3.5	5.751	0.056 ^{ns}
	Moderate	23	29.1	75	43.4		
	Appropriate	50	63.3	92	53.2		
Eating meals with pappad or pickle	Inappropriate	23	29.1	59	34.1	5.171	5.171 ^{ns}
	Moderate	46	58.2	76	43.9		
	Appropriate	10	12.7	38	22		
Add extra salt to food/ salad/curd after it is served	Inappropriate	23	29.1	33	19.1	3.164	0.206 ^{ns}
	Moderate	27	34.2	68	39.3		
	Appropriate	29	36.7	72	41.6		
Add extra butter/oil to chapathi /vegetables after it is served	Inappropriate	5	6.3	24	13.9	3.143	0.208 ^{ns}
	Moderate	29	36.7	55	31.8		
	Appropriate	45	57	94	54.3		

^{ns}Not significant at 0.05 level, Chi-square / Fishers exact test**Table 2:** Gender wise comparison of dietary consumption among adolescents

Variable	Category	Girls		Boys		Test value	P value
		f	%	f	%		
Vegetables	Inappropriate	40	50.6	75	43.4	1.175	0.556 ^{ns}
	Moderate	18	22.8	44	25.4		
	Appropriate	21	26.6	54	31.2		
Fruits	Inappropriate	30	38	77	44.5	0.948	0.623 ^{ns}
	Moderate	25	31.6	49	28.3		
	Appropriate	24	30.4	47	27.2		
Milk/milk products	Inappropriate	20	25.3	50	28.9	0.625	0.732 ^{ns}
	Moderate	16	20.3	38	22		
	Appropriate	43	54.4	85	49.1		
Bakery products	Inappropriate	34	43	81	46.8	1.519	0.468 ^{ns}
	Moderate	22	27.8	54	31.2		
	Appropriate	23	29.1	38	22		
Fish curry	Inappropriate	8	10.1	25	14.5	2.186	0.335 ^{ns}
	Moderate	35	44.3	61	35.3		
	Appropriate	36	45.6	87	50.3		
Sweets	Inappropriate	37	46.8	72	41.6	0.655	0.721 ^{ns}
	Moderate	27	34.2	67	38.7		
	Appropriate	15	19	34	19.7		

Variable	Category	Girls		Boys		Test value	P value
		f	%	f	%		
Fried foods	Inappropriate	31	39.2	53	30.6	1.843	0.398 ^{ns}
	Moderate	26	32.9	63	36.4		
	Appropriate	22	27.8	57	32.9		
Hotel	Inappropriate	1	1.3	15	8.7	12.015	0.002**
	Moderate	16	20.3	59	34.1		
	Appropriate	62	78.5	99	57.2		
Fast foods	Inappropriate	13	16.5	25	14.5	2.64	0.267 ^{ns}
	Moderate	24	30.4	71	41		
	Appropriate	42	53.2	77	44.5		
Carbonated drinks	Inappropriate	3	3.8	33	19.1	10.992	0.004**
	Moderate	20	25.3	44	25.4		
	Appropriate	56	70.9	96	55.5		

^{ns}Not significant at 0.05level, ** Significant at 0.01 level, Chi-square /Fishers exact test

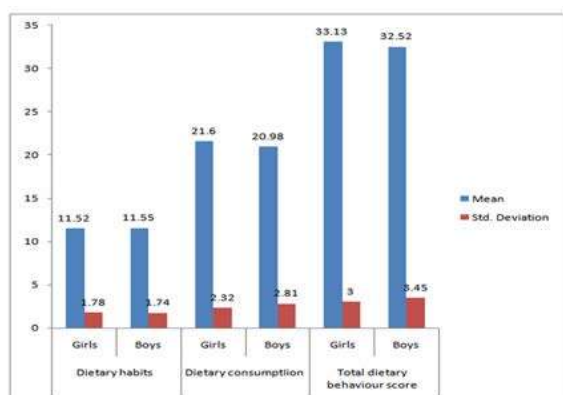


Fig. 1: Mean and standard deviation of dietary behavior score

The mean total dietary behavior score was found to be 32.71±3.32; boys 32.52±3.45, girls 33.13±2.3. There were no statistically significant differences in the mean score of dietary habits (t=0.127, p=0.899),

dietary consumption(t=1.757, p=0.080), and total dietary behavior score (t=1.349, p=0.179) between boys and girls at 0.05 level of significance. But inappropriate consumption of carbonated drinks and hotel foods was found to be higher among boys when compared to girl (Table 2) at 0.01 level.

Physical activity/exercise behavior among adolescents

The mean physical activity score was 1.76 ±0.3; boys 1.73±0.28, girls 1.77±0.31. Out of all, none of the boys and girls reported to have adequate levels of physical activity. Among them, 69% of them were actively commuting to school. A statistically significant higher number of boys were actively commuting to school when compared to girls (t=4.915) at 0.05 level. The details of physical activity behavior can be obtained from Table 3.

Table 3: Gender wise comparison of physical activity behaviour among adolescents

Variable	Category	Girls		Boys		Test value	P value
		f	%	f	%		
Physical activity level during physical education classes	Adequate	16	20.3	37	21.4	0.42	0.838
	Inadequate	63	79.7	136	78.6		
Physical activity level during lunch	Adequate	10	12.7	31	17.9	1.102	0.294
	Inadequate	69	87.3	142	82.1		
Physical activity level during weekdays (evening)	Adequate	9	11.4	20	11.6	0.002	0.969
	Inadequate	70	88.6	153	88.4		
Physical activity level during weekends	Adequate	22	27.8	30	17.3	3.656	0.056
	Inadequate	57	72.2	143	82.7		
Physical activity level during last 7 days	Adequate	13	16.5	22	12.7	0.634	0.426
	Inadequate	66	83.5	151	87.3		

Discussion

The unhealthy dietary behavior revealed in the present study findings have been supported by studies conducted by Rao KM et al. [15], Srivasthava A et al. [16], and Kotecha PV et al. [17] In a large prospective population study, there was a clear revelation of increasing CAD risk with consumption of meat [18]. Rastogi T et al. revealed an inverse association between CAD risk and consumption of vegetables specifically green leafy vegetables and use of mustard oil compared to sunflower or other oils among Indians [19]. A high intake of saturated fat, trans fatty acids, and hydrogenated vegetable oils may contribute to elevated serum cholesterol and CAD mortality [20,21]. Kuriyan R et al. found a relationship between increased consumption of bakery items, nonvegetarian foods, eating while watching television, snacking between meals, family meals, skipping breakfast, and waist circumference among South Indian children [22]. Chambers JC et al. had also found that low intakes of vitamin B-6 and folate as a contributory element for high CAD in India [23]. Meta-analyses by He FJ et al have found a 4% lower risk of CAD with each daily serving of fruits or vegetables [24] and Dauchet L et al recommended five or more daily servings of fruits and vegetables for optimal nutrition [25].

It is commonly believed that South Asians are mostly vegetarians and consume large quantity of fruits and vegetables. But the INTERHEART data revealed a low daily fruit and vegetable intake among South Asian population compared to the rest of the world. The meal pattern was often high in grains, ghee, fried foods, and processed foods. Many of these are high in carbohydrates, transfatty acids, and saturated fat. In addition, the habit of overcooking vegetables reduced the content of protective micronutrients compared with raw or properly cooked vegetables [26]. There are frequent consumption of meals at fast-food outlets [27] and oversized portions at home and at restaurants [28]. These foods are often high in calorie, fat, and low in fibre [29]. An increased tendency towards consumption of sweetened beverages is also commonly seen [30]. Evidences suggest that physical activity in Indian adolescents has diminished in the last few decades. According to Roy S et al. [31], Kaur SS et al. [32], Bachani D et al. [33], Ramya KR [14] and Jagdish et al. [34] the current generation of adolescents are spending less time being physically active.

Conclusion

In conclusion, the findings from this study suggest that the dietary and physical activity behaviour among adolescents is largely inappropriate. These observations give a cause for concern in relation to their current and future risk of non communicable diseases including cardiovascular diseases, and diabetes. So Strategies need to be adopted to improve young youths' nutritional status, such as improving their dietary knowledge, improving their dietary intake, promoting healthy eating habits and establishing a healthy lifestyle via an increase of physical activity.

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