International Journal of Home Science 2020; 6(3): 18-22

International Journal of Home Science

ISSN: 2395-7476
IJHS 2020; 6(3): 18-22

www.homesciencejournal.com
Received: 18-06-2020
Accepted: 25-08-2020

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Dietary and physical activity behaviour among urban adolescents

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DOI: https://doi.org/10.22271/23957476.2020.v6.i3a.1002

Abstract
Objective: To study the dietary and physical activity behavior among affluent adolescents residing in urban city.
Methods: Dietary and physical activity behavior of 155 affluent adolescents (11-14 years old) were assessed using questionnaire and 24 hour recall methods. Height and weight of the subjects were measured for BMI assessment. After suitably coding the data means, frequency charts, mean percent adequacy intakes of various food groups and nutrients as well as physical activity pattern were assessed.
Results: Skipping of meals, snacking, increased popularity of fast foods and decreased physical activity were common behavior observed among adolescents. The percent adequacy intake (n=50) of food groups was when compared to suggested intakes by ICMR 1989 was low for cereals (80%), pulses (69%), vegetables (52%) and fruits (71%), was adequate for milk and milk products (108%) and was high for sugar (168%) and visible fat/oils (163%). The percent adequacy intake of nutrient when compared to RDA ICMR 1989 was low for energy (87%), protein (78%), iron (73%), intake was adequate for calcium (110%), vitamin A (116%). According to BMI 7% adolescents were overweight, 48% underweight and 45% normal. On an average an adolescent spends 20-22 hours doing sedentary activity and only an hour is spent on moderate activity which further declines as age increases.
Conclusion: Inadequate eating behavior and inadequate physical activity among adolescent's calls for need to develop an intervention programmed for promoting healthy eating, active living and positive body image as part of their life.

Keywords: adolescents, eating behavior, physical activity

Introduction
Globalization and urbanization have brought changes in lifestyle of people. Our changing environment and the way this environment encourages and rewards individual to make lifestyle choices are of great concern. Good nutrition and physical activity are essential for long-term health of children. Adolescence is an important phase of child growth and development with total nutrient needs higher than at any other period during the life cycle. This crucial period covers almost a decade. Adolescence represents a transitional period between childhood and adulthood. It is characterized by a rapid increase in height and weight, by hormonal changes, by sexual maturation and by wide swings of emotions. The velocity of physical growth in adolescence, second only to infancy, results in an increased need for energy and nutrient especially. Thus, adequate intake of nutrients and energy is critical to health development.

In the recent decades following major economics and social reforms there is an increasing trend of morbidity and mortality in chronic degenerative diseases such as cardiovascular disease, diabetes mellitus, hypertension and cancer. Overweight and obesity which contribute to these degenerative diseases have being on rise in children of urban areas, especially the affluent population. Children belonging to High schools classes are particularly vulnerable to external factors owing to newfound independence and the influence through peer pressure and exposure to media.

Eating related concerns among adolescents are numerous and include unhealthful dieting, high intake of fast foods and other foods high in fat, sugar and salt, low intake of fruits and vegetables and dairy foods, and erratic eating behaviors such as meal skipping coupled with inadequate physical activity [1]. The relationship between adolescent diet and chronic disease

risk is predicted on the assumption that eating behaviors are learned and solidified during childhood and adolescence and are maintained into adulthood. Therefore there is a need to know the eating behavior and its determinants so as to help adolescents of today to incorporate healthy lifestyle practices in their life.

Materials and Method

In the present study, dietary behavior and its determinants were studied in 155 early adolescent children aged between 11-14 years from two public schools of Delhi catering to affluent class children. 80 students belonged to class VII and 75 students belonged to class IX. Out of total sample of 155 students, 74(48%) were girls and 81(52%) were boys.

Interview cum questionnaire method was used to identify the dietary habits and physical activity pattern. The students were required to fill the pre-validated questionnaire information on parameters like-dietary habits and exercise pattern. 24 hour dietary recall was done to calculated nutrients and food group's intake using standardized recipes in Nutritrust software of 50 subjects. The average daily intake of energy, protein, iron, calcium and vitamin A was calculated and compared to recommended guidelines [2]. Mean percent adequacy of different food groups for 11-12 to 13-14 years old adolescent boys and girls were compared with suggested intakes [3]. The measurement of height and body weight of each student was recorded by following the standard techniques and body mass index calculated. The international cutoff points for the body mass index were used. The subjects were classified as underweight or overweight by the following classification [4]-

< 5th percentile-Underweight; 5th-85th percentile-Normal
>85th percentile-Overweight; >95th percentile-Obese

The responses obtained from each questionnaire were suitably coded converted into means, frequency charts, mean percent adequacy intakes of various food groups and nutrients as well as physical activity pattern were assessed.

Results and Discussion

Eating Behavior: Data collected from 155 affluent adolescents of 11-14 year old revealed that 45% subjects (n=69) were vegetarians, 25% subjects (n=39) were eggitarians and 30% subjects non-vegetarian (n=47). The meal pattern of the subjects varied from 2 to 5 meals per day viz. breakfast, packed tiffin, lunch, tea and dinner. It was observed that 44% (n=68) of the subjects consumed 3 meals per day and 20% (n=31) reported to consume 5 meals a day including evening tea. Remaining 36% (n=56) of the subjects consumed 2 meals a day, which was undesirable.

Skipping meal was observed as a common practice among adolescents, 63% skipped meal was breakfast (only milk intake before leaving for school was not considered as breakfast), 23% lunch and 14% dinner. Children often go without breakfast owing to lack of time, hectic schedules, long bus rides, uncomfortable feeling by eating early in the morning and lack of resources therefore, leaving large margins for improvement. Reviews also show that both boys and girls with irregular breakfast intake had higher percent of energy from in-between meals that is higher energy intake from 'snack food'. This results in a lower intake of protein, calcium, fiber and zinc and in girls also of iron and vitamin C[5]. It was also observed that in early adolescents (12-13 year old) out of 28 children, who skipped their meals, 16 were boys and 12 were girls. While out of 30 adolescents (13-14 year old) the scene reversed only10 number of boys and 20 numbers of girls skipped the meals. Hence it can be said that as the children grow and progress towards the adolescent stage the girls start becoming more conscious of their body image. Weight issues and eating problems are also more prevalent in girls and women [6].

Snacking was reported by 84% adolescents. It is found that children who skip their main meals consumed more snacks. Most popular snacks among adolescents are chips, biscuits, sweets, namkeens. The most widely consumed items from the school canteen includes samosas, burger, vegetable patties, bread pakora and chips. It was also observed that most of the snacks consumed were while watching television. Most of the snack foods consumed by the adolescents were high in fat, sugar and salt. Snacks, which make-up about one-fourth of the daily intake of the food, do not compensate for meals missed because the snacks are primarily fats, carbohydrates and sugars or because the intake from snacks is not sufficient to make up for the food missed[7]. Adolescent's eating patterns reported that snacker ate on an average of 2 snacks a day and those who ate fewer meals ate more snacks [8]. Lack of knowledge on nutrient and food group intake, reading of nutrition fact information on packed food and media influence are the leading cause for today's youth to have erratic eating habit. In spite of being aware of the health consequences of eating 'junk food', adolescents reported eating these foods because of their taste and convenience [9]. Since snacking is becoming a part of adolescent food habits, it is important to provide a variety of nutritious snacks in schools and at home [10]. Passive behavior such as television viewing, working or playing on a computer, talking on phone etc. is accompanied by other adverse practices such as snacking or consuming high fat or high sugar foods [11].

Eating out has become a trend these days. Youngsters prefer to go out with their friends for meals, though families also go out together. In the present study 23% adolescent children reported that they ate meals outside home at least once a week. While 74% went out occasionally and 3% also reported that they went to eat out 2-3 times in a week. The favorite food items of adolescents while eating out were soft drinks (94%), Milk shakes (16%), Fruit juices (10%), Chips and Namkeen (30%), Burger (40%), Pizza (20%), Rasgulla/Gulabjamun (40%), Ice-creams (32%) and other Indian sweets (28%). In the study by Aggarwal *et al.* [12] in Ludhiana, about 52 per cent children ate meals outside the home, boys more frequently than girls (60% and 43% respectively) which had significant correlation with obesity. The results of this study were consistent with the studies done by Baudier *et al.* [13], Bhatia, *et al.* [14] and Lin, *et al.* [15] who reported that majority of adolescents like to eat meals outside home and prefer junk food over regular meals. Fast food center are gaining popularity among adolescents.

Nutrient and Food Group Intake: The table No. 1 and graphical representation (Fig 1) shows mean and percent adequacy intake of food group compare to suggested intakes for 11-12 years old and 13-14 years old adolescents[3]. Intake of cereals and millets, pulses, vegetables and fruits were less than the suggested intake for both male and female adolescents. Intake of milk and milk products was just adequate where as, intake of sugar; visible fat/oils were very high. The average percent adequacy intake of food groups for cereals was 80%, pulses 69%, vegetables 52%, fruits 71%, milk and milk products 108%, sugar 168% and visible fat/oils 163%.

The table no. 2 and graphical representation (Fig 2) below shows mean and percent adequacy intake of various nutrients compare to Recommended daily allowances (RDA) for11-12 years old and 13-14 years old adolescents girls and boys [2]. The energy; protein and iron intake were less and the calcium and vitamin A content was high as compare to RDA for both girls as well as boys. The percent adequacy intake of nutrient for energy was 87%, protein 78%, iron 73%, calcium 110% and vitamin A 116%.

Anthropometry and Body Composition: Nutritional anthropometrics is the measurement of human body at various ages and levels of nutritional status. Body composition measures are estimated of amount of mass of a specific body compartment and a most sensitive to assess energy status of individuals apart from genetic determinants. The measurements of height and weight were recorded and Body Mass Index calculated. The prevalence of obesity is high in developed countries and similar trends are being observed in recent years among children from developing countries [16]. School based data on obesity in India shows a prevalence of 5.6-24% among children and adolescents [17]. The large range in the reported prevalence of overweight and obesity could be due to regional differences, non-uniformity in the criteria used to classify socio economic status and, the different age range of the children studied. In the present study, it was observed that 7% adolescents were overweight, 48% adolescents were underweight and 45% adolescents were normal. As developing societies industrialize and urbanize, and as standards of living rise, improvements in adolescents eating behavior for healthy future lifestyle is becoming of great concern in Indian society. Gupta and Ahmed [18] report 7.5% prevalence of obesity in school children. Kapil *et al.* [17] reported a 7.4% prevalence of obesity among affluent school children in Delhi. A study at Pune by Khadilkar *et al.* [19] reports 19.9% overweight and 5.75% obesity in boys aged 10-15 years. Increasing prevalence of obesity in a population, and particularly among children and adolescents is an early indicator of emerging dual health burden due to communicable and non-communicable chronic diseases like diabetes and coronary heart disease in developing societies [20]. The epidemic of obesity sits alongside the problem of undernutrition and infections in India thereby creating a greater burden of nutrition-related ill health among our children.

Physical activity: Physical activity is an important component of a healthy life style, with implications for the prevention of chronic diseases and obesity. However it is observed that physical activity declines sharply during adolescence, particularly among adolescent girls. In a cohort study with 201 high school students it was found that physical activity tends to decline as youth progress through high school [21].

It is found that on an average adolescent children sleeps for 8:20 hours. Gupta *et al.* in their study on sleep patterns of urban school-going adolescents report total sleep time as 7.8 hours per day and the sleep debt increases in higher Grades in Indian school going adolescents.

Adolescent children watches television and sit on computer for 2:50 and does homework and studies for 2:30 hours. Agarwal *et al.* [12] reports in school based cross sectional study with thousand adolescents from Ludhiana that more than half of adolescents spent 1-4hrs/day on viewing television or sitting on computer. In the present study on an average an adolescent spends 20-22 hours doing sedentary activity. Only one hour moderate activity was observed among adolescents which further decreases as the age increases. As the age progresses most of the girls preferred playing sitting games like cards, antakshari, ludo, spellers, video games than activity games like cycling and running, racing declined.

Whereas among boys though video and computer games were popular, it was found that outdoor games like cricket, football, cycling, racing were also very popular. Frequency of playing sitting games was low among boys. The perceived barriers for physical activity were lack of time, company, suitable place and academic pressure.

Table 1: Mean Daily Food Group Intake by Adolescents (n=50) 11-14 year old

Food groups	Sex	11-12 Years Male: n=13; Female: n=12		13-14 Years Male: n=13; Female: n=12	
		Suggested Intake [3]	Mean ± SD (% Adequacy)	Suggested Intake [3]	Mean ± SD (% Adequacy)
Cereals & millets (g)	Male Female	330 270	280 ± 80 (85) 220 ± 70 (81.5)	420 300	310 ± 91 (74) 240 ± 78 (80)
Pulses (g)	Male Female	60 60	42 ± 12.6 (70) 38 ±14.2 (63)	60 60	45 ± 13.4 (75) 40 ±13.2 (67)
Milk (ml)	Male Female	500 500	580 ± 78.7 (116) 525 ± 70.5 (105)	500 500	550 ± 70.4 (110) 505 ± 74.2 (101)
Roots & tubers (g)	Male Female	100 100	70 ± 16.3 (70) 55 ± 13.5 (55)	200 100	80 ± 15.8 (40) 60 ± 14.6 (60)
Green leafy Vegetables (g)	Male Female	100 100	40 ± 12.2 (40) 46 ± 13.8 (46)	100 100	45 ± 14.8 (45) 50 ± 15.6 (50)
Other Vegetables (g)	Male Female	100 100	50 ± 14.2 (50) 55 ± 18.6 (55)	100 100	60 ± 16.0 (60) 50 ± 18.2 (50)
Fruits (g)	Male Female	100 100	80 ± 20.5 (80) 75 ± 25 (75)	100 100	60 ± 21.2 (60) 70 ± 22 (70)
Sugar (g)	Male Female	35 30	55 ± 9.3 (157) 50 ± 12.5 (167)	35 30	65 ± 10.2 (186) 48 ± 12.6 (160)
Fats/Oils (visible) (g)	Male Female	25 25	39 ± 15 (156) 34 ± 10 (136)	25 25	48 ± 15.5 (192) 42 ± 9 (168)

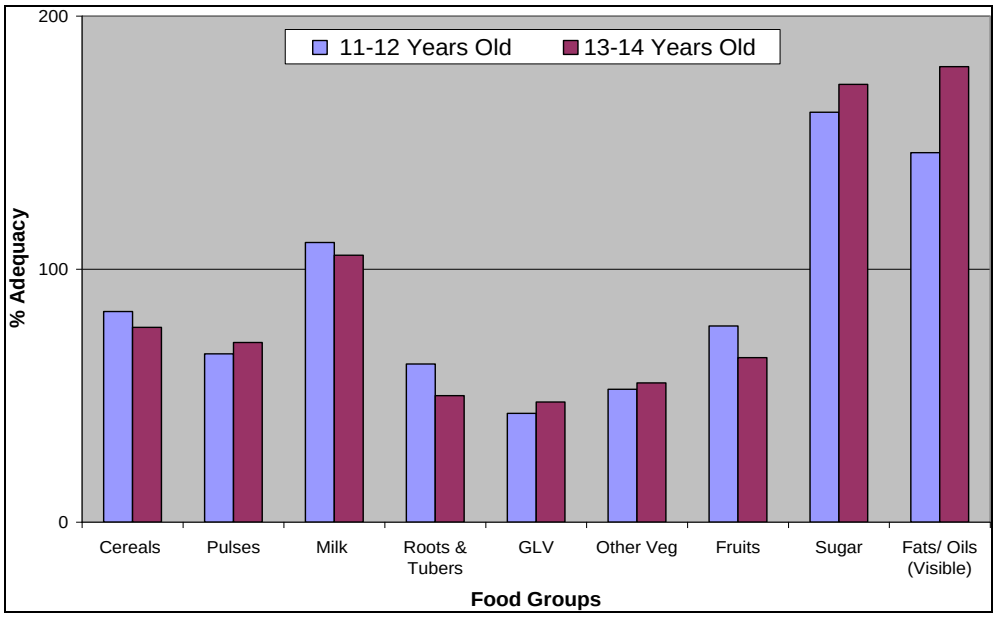

Fig 1: Adequacy of Food Group Intake by Adolescents (11-14 years) [3]

Table 2: Nutrient Intake by Adolescents (n=50) 11-14 year old

Nutrients	Sex	11-12 Years Male: n=13; Female: n=12		13-14 Years Male : n=13; Female: n=12	
		RDA[2]*	Mean ± SD (% Adequacy)	RDA[2]*	Mean ± SD (% Adequacy)
Energy (Kcal)	Male	2190	1960±782 (89.5)	2450	2080±756 (85)
	Female	1970	1650±698 (84)	2060	1860±777 (90)
Protein (g)	Male	54	45.3±17.5 (84)	70	51.3±16.5 (73)
	Female	57	46.2±16.7 (81)	65	48.4±19.5 (74.5)
Calcium (mg)	Male	600	664±236 (111)	600	678±246 (113)
	Female	600	640±216 (107)	600	660±241 (110)
Iron (mg)	Male	34	20.4±9.2 (60)	41	24.7±8.6 (60.2)
	Female	19	17.2±8.3 (90.5)	28	22.0±9.4 (79)
Vitamin A (µg)	Male	600	692±381 (115)	600	678.3±481 (113)
	Female	600	718±293 (120)	600	703.7±493 (117)

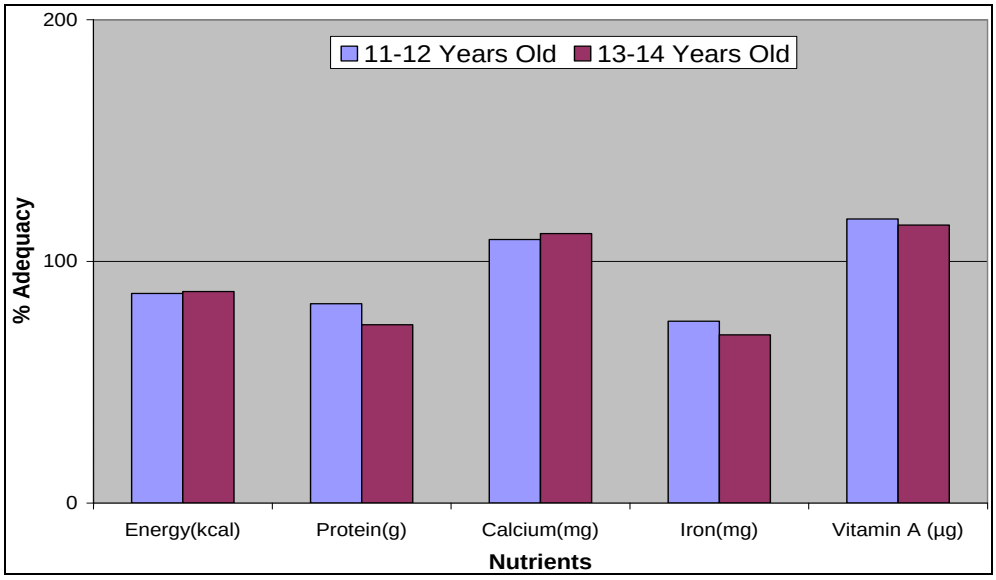

Fig 2: Adequacy of Nutrient Intake by Adolescents (11-14 years) [2]

Conclusion

The change in diet, a decrease in physical activity and too much time spent in front of television or computer have been blamed for the growing number of overweight children in India and world over. Increasing energy intakes with decrease in energy expenditure due to decreased physical activity or increased sedentary behaviors result in significant changes in body weight.

Our modern eating environment has had an effect on the way children eat. The changing environment by making fast food outlets conveniently available has promoted consumption of energy dense foods high in fat and sugar. The traditional micronutrient rich foods are being replaced by energy dense processed micronutrient poor foods (snacks) like burgers, pizza, chowmein and cold drinks and fruit drinks in greatly increased portions. TV watching, video games and internet

gazing, now important activities of children at home, leaves hardly any time to get involved in leisure time physical activity. Due to intense academic competition to perform better at school, children are hardly seen at the playground.

Thus dietary and lifestyle changes typical of nutrition transition have increased under nutrition and over nutrition among adolescents. The period of adolescence provides a window of opportunity for effective intervention to encourage sound nutrition by imparting knowledge, inculcating preventive behavior and increasing youth value expectancy towards a healthy lifestyle could aid in prevention of diabetes, heart disease, obesity, cancer, hypertension and other health disorders. Weight related concern is seen very high among adolescents, but they have poor knowledge about relationship between their body height and weight for age. The dietary pattern show that skipping or improper breakfast practices, snacking calorie dense food and low intake of fruits and vegetables together with erratic meal timing. Findings from present study can inform the development of effective programs to improve eating behavior and physical activity among adolescents. The large amount of time spent on watching television suggest that the potential exists to address time constraints for physical activity through a reduction in sedentary activity. In summary, finding from the present study suggest that inadequate eating behavior and inadequate physical activity among adolescents calls for need to develop an intervention program for promoting healthy eating, active living and positive body image as part of their life.

Acknowledgement

The authors thank University Grants Commission, New Delhi for providing financial support to the study.

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