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Eating Behavior and Nutritional Status of Adolescents in Peri-Urban Delhi

Research Article

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Abstract

Background: The nutritional and life style transition in urban as well as rural areas of countries has resulted in rapid changes in eating behavior. The replacement of traditional home-cooked meals with ready-to-eat processed foods has contributed to malnutrition among adolescents.

Objective: The present study is with objective to investigate the eating behavior and prevalence of malnutrition among adolescents in peri-urban Delhi.

Method: This cross-sectional study was conducted with 491 children in the age group of 12 to 14 years in government peri-urban schools. The data collection was done through administering questionnaires and conducting anthropometric measurements. It was observed that adolescents have erratic eating behavior.

Results: The average percent adequacy intake of food groups for cereals was 63.5%, pulses 71%, vegetables 54%, fruits 60%, milk and milk products 69%, sugar 187% and visible fat/oils 196%. The average percent adequacy intake of nutrient for energy was 87%, protein 74%, iron 69.5%, calcium 59% and vitamin A 80%. The energy intake from fat was 35%, which is high. It was observed that as per BMI for age 5 to 19 years (z-scores) classification by WHO 17% adolescents were overweight, 42% were underweight and 41% were with normal BMI. **5. Conclusion:** Thus the study concluded that malnutrition is prevalent among the adolescents and there is need to encourage healthier lifestyle habits among students through various strategies to improve dietary pattern and nutrition status..

Keywords: Adolescents; Eating behaviour; Nutritional status; Malnutrition

Introduction

The rapid changes in the structure of the Indian diet due to globalization, proliferation of multinational fast food companies in the Indian food market have replaced traditional home cooked meals with ready-to-eat, processed foods. The replacement of traditional home-cooked meals with ready-to-eat, processed foods has contributed to an increased risk of chronic diseases. This has also bought nutritional and life style transition in urban as well as rural areas of countries resulting in high fat intakes, low intakes of fruits and vegetables, increased consumption of refined foods, erratic eating behavior coupled with low physical activity, thus placing individuals at risk of chronic diseases such as obesity, diabetes, hyper tension, cardio vascular disease, osteoporosis, etc towards development of disease in adulthood [1].

Adolescence is one of the most dynamic and complex transitions

in the life span, representing a transitional period between childhood and adulthood. During adolescence there is rapid enlargement of organs and tissues which needs to be supported by nutrients. Under nutrition in adolescents may lead to slowed growth rates and have lasting consequences on an adolescent's cognitive development. Macronutrient deficiencies may have negative impact on bone mineralization [2]. Over nutrition puts an adolescent at risk of coronary heart diseases as they grow up [3] Adolescence is a crucial period in a woman's life. Health and nutritional status during this phase is critical for the physical maturity, which in turn influences the health of the offspring. The physical developmental and social and emotional changes to occur during adolescence this bring changes in lifestyle and formation of new eating behaviors which are continued into adulthood. Thus good nutrition and dietary behavior are important to achieve full growth potential, appropriate body composition and to promote overall health and well-being

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[4]. Research on trends in food consumption and nutritional status also show that serious concerns over childhood and adolescence malnutrition.

The expansion of large cities has meant increasing and more complex interactions with surrounding rural areas, transforming them into peri-urban areas. Thus peri-urban is an area immediately adjacent to a city or urban area. They are characterized by dynamic flows of commodities, capital, natural resources, people and pollution and a range of processes leading to the intensification of urban-rural linkages [5]. In India, peri-urban areas are too often neglected. They are fraught with institutional ambiguity, unplanned growth, poor infrastructure and environmental degradation. In India, 57 per cent of the urban population lives in the expanding city peripheries, thus policy and planning must support rural-urban transformations in relation to changes in food production, access, consumption, nutritional quality and safety [6]. To improve health and nutrition, a more holistic, food security-based perspective is needed in peri-urban agriculture while protecting the environmental services on which they depend. To date, little is known about the food intakes of Indian adolescents. Neither the National Family Health Survey-3, 2007 nor the National Sample Survey Office, 2012 have examined the dietary habits of urban Indian adolescents [7,8]. This lack of evidence about the food consumption patterns of Indian adolescents is a significant barrier to the development of effective nutrition promotion and disease prevention measures. Therefore, the present study was undertaken to examine the dietary intake and nutritional status of school going adolescents in peri-urban Delhi. The area under study has observed a shift from agriculture to industrilization and is likely to result in under nutrition amongst adolescents. Mostly interventions to curb malnutrition are targeting children and mothers leaving out adolescents, whereas the adolescents may be vulnerable.

Methodology

The present study with early adolescents was conducted in the year 2015 in a peri-urban schools situated in North West Delhi. This cross-sectional study was conducted with 491 children in the age group of 12 to 14 years in 7 Delhi government peri-urban schools. To conduct the study permission was obtained from Directorate of Education. Principals of these schools were contacted and necessary permission to collect the information was obtained. Due to the limitations of the sample size, the principal of the respective schools were asked to assign one section from either VII or VIII class for the study. Written informed consent from the teachers of the respective class and assent from children to participate in the study was taken. Data from school children was collected during regular class period of 40 minutes. Information was collected regarding the eating habits and nutrition status of early adolescents.

Dietary intake in terms of food groups, calorie, protein, vitamin A, iron, and calcium were assessed using 24 hours dietary recall for three consecutive days including one weekend day. A sub sample of 50 students was done to calculated nutrients and food group's intake using standardized recipes in Meal Planner software designed by the researcher [9]. The interactive menu planner is designed to guide daily food and meal choices based on one day's calorie allowance. The Seth U

mean percent adequacy of different food groups for 12 to 14 years old adolescent boys and girls were compared with the corresponding Recommended Dietary Allowances (RDAs) recommended by the Indian Council of Medical Research [10]

Nutritional status of the adolescents was assessed through body mass index (BMI), according to the World Health Organization (WHO) Asian criteria [11]. The measurement of height and body weight of each student was recorded by following the standard techniques and body mass index calculated. The subjects were classified as underweight or overweight by the following classification.

< 5th percentile- Underweight ; 5th - 85th percentile- Normal

>85th percentile- Overweight ; > 95th percentile- Obese

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

Results and Discussion

The study was undertaken at seven government schools in periurban Delhi from early adolescents. The sample comprised of 491 students aged between 12-14 years from seven government schools in peri-urban Delhi. The sample comprised of 101 (20.6%) 12 years, 214 (43.6%) 13 years and 176 (35.8%) 14 years old adolescents. Out of total sample of 491 students 228 (49%) were girls and 263 (51%) were boys. 192 (39.1%) students were from class VII and 299 (60.9%) students were from class VIII. Figure 1 depicts the age, gender and class wise distribution of the sample.

Eating Behaviour of Early Adolescents

Data collected from 491 peri-urban government school students of 12-14 years old revealed that 251 subjects (51%) were vegetarians, 94 subjects (19%) were vegetarians and 146 (30%) non-vegetarian (Figure 2). Most of the adolescents 85% were regularly snacking and their favorite snacks were chips, biscuits and kurkure. Almost all children liked package food. The meal pattern of the subjects varied





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from 2 to 4 meals per day viz mid-day meal, packed tiffin, lunch and dinner. It was observed that 74% (n=364) of the subjects consumed 3 meals per day and 11% (n=52) reported to consume 4 meals a day and remaining 15% (n=75) of the subjects consumed 2 meals a day, which was undesirable. Almost all children 91% carried tiffin to school and most common tiffin item was paranthas (layered, unleavened flatbread, a popular Indian cuisine made with flour, salt, fat and water) and vegetable. 47% students reported that the quality of mid-day meal (MDM) received at school was good and 22% rated the meal received as very good and 14% also rated the MDM as excellent. The students also reported that the mid-day meal provided had variety.

Dietary Pattern

Food Group Intake: Food group intake was calculated using standardized recipes in using standardized recipes in Meal Planner software designed by the researcher (Seth 2008). The interactive menu planner is designed to guide daily food and meal choices based on one day's calorie allowance. The average intake of various food groups by 50 subjects was calculated and compared to suggested intakes [10] Mean intake of different food groups by 12-14 years old adolescent boys and girls are reported in the following Table 1.

Percent adequacy of different food groups intake was also calculated. Intake of cereals, pulses, milk and milk products, vegetables, fruits was less than suggested intake whereas, intake of sugar, fat/oils were very high, almost double as compared to suggested intakes [10]. The average percent adequacy intake of food groups for cereals was 63.5%, pulses 71%, vegetables 54%, fruits 60%, milk and milk products 69%, sugar 187% and visible fat/oils 196%. The dietary pattern of peri-urban adolescents show that snacking calorie dense food was high and intake of fruits and vegetables was low coupled with erratic meal pattern. The diet of school going children was deficient in all the food groups except fat and sugar, ultimately resulted in the low intake of nutrients and micronutrients. Review of literature reports that Mid Day Meal (MDM) is an important instrument for combating class room hunger and promoting better learning. It has catered to the nutritional needs of school children in both rural and urban areas. MDM is effective in improving physical and psycho-social health for disadvantaged school children in lower income and higher income countries. It is the largest school lunch programme in the nation and has contributed to increase in the school attendance of children [12].

Nutrient Intake: Nutrient intake was calculated using meal

Food Group	Suggested Intake	Boys(n=26): Mean Intake ± SD (% Adequacy)	Suggested Intake	Girls 9 (n=24): Mean Intake ± SD (% Adequacy)
Cereals (g)	420	310 ± 91 (74)	300	160 ± 78 (53)
Pulses (g)	60	45 ± 13.4 (75)	60	40 ±13.2 (67)
Milk (ml)	500	380 ± 70.4 (76)	500	310 ± 74.2 (62)
Roots & Tubers (g)	200	120 ± 15.8 (60)	100	60 ± 14.6 (60)
G LV (g)	100	45 ± 14.8 (45)	100	50 ± 15.6 (50)
Other Veg (g)	100	60 ± 16.0 (60)	100	50 ± 18.2 (50)
Fruits (g)	100	50 ± 21.2 (50)	100	70 ± 22 (70)
Sugar (g)	35	75 ± 10.2 (214)	30	48 ± 12.6 (160)
Fats/ Oils (visible) (g)	25	58 ± 15.5 (232)	25	40 ± 9 (160)

planner software. The average daily intake of selected nutrients: energy, protein, carbohydrates, total fat, iron, calcium, vitamin A was calculated and compared with Recommended Dietary Allowances RDA [13]. Nutrient adequacy is the level of intake of an essential nutrient in relation to the nutrient requirement for adequate health, which is expressed as the percentage of recommended dietary allowance. Percent adequacy of different nutrient for 12-14 years old adolescent boys and girls was also calculated. Table 2 represents mean and percent adequacy intake of various nutrients by 12-14 years old adolescents boys and girls respectively.

The average percent adequacy intake of nutrient for energy was 87%, protein 74%, iron 69.5%, calcium 59% and vitamin A 80%. The average percent energy intake from fat is 35%, which is high as compared to ADA guidelines [14]. According to Gopalan, 1988 total fat intake can be limited to levels at which fat will provide no more than 20% of the total energy [15]. Malnutrition is a state of nutrition in which there is an imbalance of energy, protein, and other nutrients, it can be both over and under nutrition and has adverse physiological and clinical effects. It is a serious public-health problem that has been linked to a substantial increase in the risk of mortality and morbidity. Malnutrition is poor nutritional status due to dietary intake either above or below the recommended daily allowances.

Anthropometry Assessment

The height, weight and BMI of the sample were assessed. Body mass index is a means of expressing healthy body weight. It is computed by dividing the body weight in kilograms by the square of the height in meters. BMI= Weight in Kg / (Height in m)²

The ideal ranges of weight for a given height are provided by WHO, which is useful for categorizing persons as normal, undernourished and overweight or obese. It was observed that as per BMI for age 5 to 19 years (z-scores) classification by 2007 WHO Reference, 17% (n=84) adolescents were overweight and 42% (n=206) adolescents were underweight and 41% (n=201) adolescents were with normal BMI (Figure 3). The data reveals that malnutrition both

Nutrients	RDA	Boys (n=26): Mean Intake ± SD (% Adequacy)	RDA	Girls (n=24): Mean Intake ± SD (% Adequacy)
Energy(kcal)	2450	2080 ± 756 (85)	2060	1860 ± 777 (90)
Protein(g)	70	51.3 ± 16.5 (73)	65	48.4 ± 19.5 (75)
Calcium(mg)	600	360 ± 146 (60)	600	348 ± 141 (58)
Iron(mg)	41	24.7 ± 8.6 (60)	28	22.0 ± 9.4 (79)
Vitamin A (µg)	600	458.3 ± 281 (76)	600	503.7 ± 290 (84)



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under nutrition and over nutrition is as a priority problem in perurban adolescents and should not be overlooked. A study conducted by Seth, 2008 with urban public school adolescents also observed 7% adolescents were overweight and 48% adolescents were underweight and 45% adolescents were with normal BMI [9]. Gupta and Ahmed (1990) reported prevalence of obesity as 7.5% in school children [16]. A study conducted by Kapil et al (2002) reported that prevalence of obesity in school children from a single school of Delhi as 8% for boys and 6% for girls [17]. Khadilkar and Khadilkar (2004) from Pune reported 19.9% overweight and 5.75% obesity in boys aged 10-15 years [18]. Data thus reveals that under nourishment is prevalent in urban as well as rural families.

Conclusion

Thus it can be concluded that there is need of lifestyle programs in peri-urban school children to increase the nutrition knowledge, awareness and assist in one's behavioural change. Lifestyle programs can be multi-factorial interventions that are designed for individuals or groups according to the needs of the subjects to promote healthy lifestyle habits. The review suggests that effective nutrition intervention and education strategies based on behavior therapy are needed for promoting adoption of healthful eating and physically active lifestyle in adolescents. It is also concluded that schools can prove to be the good venues to encourage healthier lifestyle habits among students through various strategies and improve dietary pattern and nutrition status of adolescents for healthy citizens of a nation.

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