DOI: https://doi.org/10.53350/pjmhs202317253

ORIGINAL ARTICLE

Impact of Nutritional Insufficiency on Nutritional Status of Adolescents in low and high Income Socio Economic Group

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ABSTRACT

Background: Adolescence is the most crucial period with uplifted energy need that demands an intense nutritive care for fulfillment of complete good wellbeing in the upcoming life course and evaluation of the nutrient inadequacy as a part of their daily routine tells about diet quality which is an essential element at every stages of a human life.
Aim: To assess the energy insufficiency of adolescents in low and high socioeconomic status as it has high significance in the growing stages because it affects both the physiological and psychological aspects of overall well-being.
Method: This was a comparative cross-sectional study. The research was conducted on 410 adolescent girls and boys with age ranging from 10 to 14 years of Lahore from public and private sector schools selected through lottery method that basically reflects low and high socioeconomic background effects with detailed energy intake analysis and association of nutritional status to the total energy consumed per day of these groups. The data was collected on the basis of a questionnaire consisting of demographics and 24-hr recall calculated by taking an average of the last 3 days' food intake.
Results: The results revealed that adolescent groups belonging to high socioeconomic class were more in the normal health status, had less energy insufficient values and better food quality than adolescents from low socio economic class.
Practical implication: The study will provide light to do in depth research should be conducted in the community in innovative ways for the better understanding of nutritional health related problems and its solutions for the children as well as adolescents as the new generation are the future of our beloved country.
Conclusion: The result shows that as socioeconomic status tends to get better, diet quality improves and encourages a healthy lifestyle as compared to those living in improvised conditions.
Keywords: Adolescence, Nutrient Inadequacy Energy Insufficient, 24-Hr Recall

INTRODUCTION

Nutrition delivers a vital role in overall health status in adolescence as it shapes the entire life of a being by instilling a solid strong base of healthy physical state and mental fitness by providing the essential nutrients like vitamins, minerals, proteins, carbohydrates and good fat to the body. The key thing to achieve an elevated health standard is to have variety in moderation from all food groups. Balanced diet and adequate intake of nutrients are the most significant features.

Appropriate energy and nutrient intake is crucial for adolescents to prosper in school as well as later life[1]. All nutrients should be consumed as per guidelines established by the United States Department of Agriculture (USDA) that delivers set Recommended Dietary Allowance (RDA) cut off values specified to age and gender that have long been recognized as vital for health, development and general well-being[2].

It is exclusively a crucial stage to build up healthy nutritious eating choices that will have a lifelong impact on the eating patterns and help them a long way to fight disease as well. Poor nutrition affects the quality of life of adolescents in their potential to take advantage of education. Stunted growth and micronutrient deficiencies or excess lead to delayed growth and increased chances of chronic disorders in life ahead[3]. Majority of diseases and conditions have been associated with nutritional deficiencies. There are evidences that nutritional deficiencies may also lead to non-communicable diseases such as overweight and obesity, coronary heart diseases, diabetes mellitus, stroke, some types of cancers, rickets, iron deficiency anemia, and osteoporosis[4].

Poor facilities in low economic groups is linked to adverse health outcomes like malnutrition, underdevelopment of body functions, poor bone health, more infections, acute and chronic diseases due to ignorant behavior to health[5]. It may also be due to limited access to health facilities, poverty, unawareness of nutrient alternatives and mental stress[6]. In Pakistan as a developing country, there has been a shift from under to over nutrition across socio economic positions. On one side, there is a high prevalence of stunting and wasting in children while on the opposite side childhood obesity is also on rise. Pakistan is in early stage of nutrition transition having changes in nutritional and lifestyle due to changes in dietary intake very much closely related to changes in socioeconomic status, demographic and environmental factors[7]. As it highly significant to address this issue and screen those groups who are in inadequacy of energy and essential nutrients in the society to save them from the related health problems later in life.

Received on 24-08-2022
Accepted on 17-01-2023

METHODS

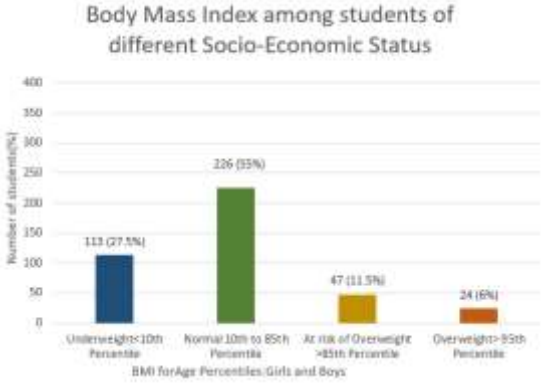
This was an observational study design. In this cross-sectional study, the data collection was done through questionnaires comprising demographic variables and dietary data. Study population was selected as low and high SES on the basis of school fee structure. Sampling was done by probability technique i.e. random sampling namely lottery method. The school names were written on chits in the bowl and then picked up for selection. A software named Nutri Survey was used to evaluate the energy intake analysis of individual children and its comparison to the standard set as Recommended Dietary Allowance (RDA) for the specific age group was done.Dietary intake was calculated by 24 hr. Recall by taking an average of 3 days' dietary consumption. Then total calories were then calculated by the overall diet consumed per day by each student and it also reflected the quality of diet consumed by these students. It also helped to show the type of food consumed and the eating pattern of each child. Then association was tested between Body Mass Index (BMI) and energy insufficiency. The results were statistically analyzed using Chi square test in SPSS version 21.

Inclusion Criteria: All students of age 10 to 14 male and female were taken for the data collection. The students of the government and private secondary schools were selected as samples.
Exclusion Criteria: Child having any pathologic condition or taking any medications.

RESULTS

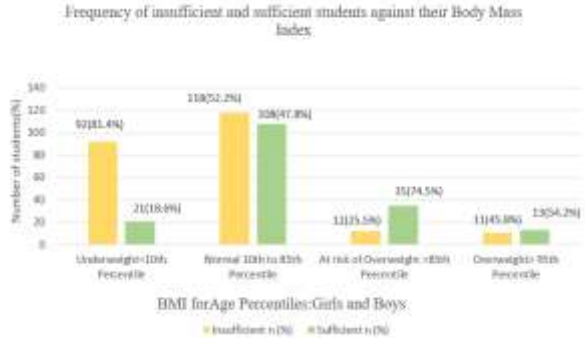
The results of the study are presented in the form of a graph and table below.

Fig1. frequency distribution of BMI for Age Percentiles of all students



The above figure shows it is evident from the data that among 410 students of the collective data majority of the students fall in the normal category of BMI i.e. 10th to 85th percentile charts value followed by underweight i.e. <10th Percentile and then the higher BMI values of at risk of overweight i.e. >85th Percentile and obesity i.e. > 95th Percentile respectively.

Fig.2 Frequency distribution of comparison of Energy Insufficient and Sufficient group of all students in detail to BMI for Age Percentiles



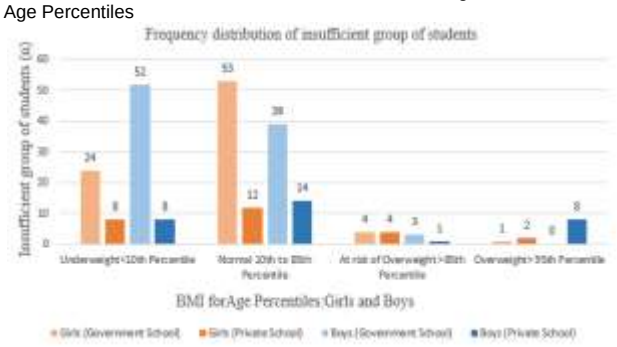
The above graph shows that yellow bars (insufficient energy intake group) showed more students in the underweight and normal class of Body Mass Index. It is evident from the above data that students who in <10th percentile have more insufficient level as compared to the students who in >85th percentile having more sufficient energy intake as required in the Recommended Dietary Allowance. From all the data, we 233(56.8%) students as insufficient and 177(43.2%) students as sufficient. Further, Chi square test has been done to see the association of BMI to energy insufficiency in all students from both low and high socioeconomic background.

As the p <.001, it shows that there is statistically significant association between BMI (Body Mass Index) and energy insufficiency. Here, an in-depth scrutiny has been done to see which socio economic group lies in the insufficient energy intake group.

Table 1: Association of Body Mass Index of all students to Energy Insufficiency and Sufficiency

Body Mass Index	Insufficient n (%)	Sufficient n (%)	Total n (%)	χ^2 value	P-value
Underweight<10th Percentile	92 (81.4)	21 (18.6)	113(100)	49.76	<.001
Normal 10th to 85th Percentile	118 (52.2)	108(47.8)	226(100)		
At risk of Overweight >85th Percentile	12 (25.5)	35 (74.5)	47 (100)		
Overweight> 95th Percentile	11 (45.8)	13 (54.2)	24 (100)		
Total	233 (56.8)	177(43.2)	410(100)		

Fig. 3: Frequency distribution of comparison of Energy Insufficient group of students in detail with their Socioeconomic Status background to BMI for Age Percentiles



The above figure shows that among 233 (56.8%) students as insufficient students of the collective data 410 students. It is evident from the above data that government school girls and boys are more in ranges of insufficiency than the private school girls and boys.

Table 2: Association of BMI among students and their schools of different Socio Economic Status

BMI	Girls (Gov. School)	Girls (Private School)	Boys (Gov. School)	Boys (Private School)	Total	χ^2 value	P-value
Underweight< 10th Percentile	26(23.0)	12(10.6)	53(46.9)	22(19.5)	113(100)	51.9	<.001
Normal 10th to 85th Percentile	65(28.8)	63(27.9)	45(19.9)	53(23.5)	226(100)		
At risk of Overweight >85th Percentile	9 (19.1)	15(31.9)	9(19.1)	9(19.1)	47(100)		
Overweight> 95th Percentile	1(4.2)	10(41.7)	10(41.7)	11(45.8)	24(100)		
Total	101(24.6)	100(24.4)	109(26.6)	100(24.4)	410(100)		

The table 4.10 illustrates that there is statistically significant association between BMI (Body Mass Index) and SES (Socio Economic Status). ($\chi 2$= 51.9, p<.001). It is evident from the data that boy students from government schools were underweight than boy students from private schools having sufficient caloric intake according to their Recommended Dietary Allowance. Similarly, underweight girl students belonging from low SES or government schools were more in range than those belonging from high SES or private schools.

DISCUSSION

Adolescence shapes the entire life of a being by instilling a solid strong base of physical fitness that leads to a healthy mind and psychological health. It is exclusively a crucial stage to build up healthy nutritious eating choices that will have a lifelong impact on the eating patterns and help them a long way to fight disease as well. Efforts done in the starting challenges of physical demands also aids to expand the life expectancy. It also provides positive consequences in improving the nutritional health status of the current and future generation[8]. The research study is the way to find out reasons behind the subject under observation and then to find solutions to the prevailing problems. Likewise, the study conducted on the dietary assessment of adolescents aged 10 - 14 years and the relationship of their nutritional status to their respective socioeconomic background and nutritional insufficiency has been carried out in this present study. After which productive strategies and plans will be prescribed to eradicate any root cause of the problem in discussion.

In a National Nutrition Survey, 2011 it was examined that what makes Pakistan's population deprived of the essential nutrients is that not enough food is being reached to groups which in easy terms is known as food insecurity. The households which don't have an adequate amount of food supply tend to suffer from severe hunger10%, moderate hunger 20% and even with no hunger as 28%. Overall the households that were not food insecure were 42%. It can be said that food insecurity is in direct relation to nutrient insufficiency[9]. The comparison between nutrient sufficiency and insufficiency among 410 sample students. It says that among 410 population sizes 233 are insufficient (56.8%) and 177(43.2%) are sufficient in the energy requirements on a daily basis. It further reflects statistically significant association of body mass index and nutrient sufficiency among students based on their mean energy consumption as per their RDA (Recommended Dietary Allowance). As it clearly shows that majority 92 (81.4%) from the insufficient students were in range of <10th Percentile i.e. underweight as compared to the students who in >85th percentile i.e. at risk of overweight having sufficient energy intake as required in the Recommended Dietary Allowance.

A nationwide population based study conducted with a total of 1432 participants aged 13-18 years old showed that people belonging to low socioeconomic status had high energy density diet consumption than people of high socioeconomic background[10]. In this study it was revealed that students from high economic background have high energy consumption than students from low economic background having low energy consumption per day as per their Recommended Dietary Allowance. High economic school students had a variation in the dietary pattern, the students were eating healthy foods as well as junk food[11].

CONCLUSION

There are many aspects that influence an individuals' dietary intake pattern, ingested nutrient quantity and nutrient quality depending on the social disparities. The results revealed that adolescent groups belonging to high socioeconomic class were more in the normal health status category than adolescents from low socioeconomic class. It was evident that the former group had less energy insufficient values than the later one which clearly shows the better access to wholesome food choices.

Recommendations: Government authorities must incorporate health programs at schools and society level to help children from less privileged backgrounds to fulfill their energy demands of the day. It should enable them to choose nutrient dense food wisely out of the available resources and manifest a healthy lifestyle. Health sector high officials must focus on government policies and programs addressing nutrition related issues of adolescents by appointing qualified health practitioners like nutritionists and dietitians in schools for provision of education regarding the nutritional needs of adolescents to the students and their parents.

Conflict of Interest: There is no conflict of interest.

REFERENCES

1. Hinnig PD, Monteiro JS, De Assis MA, Levy RB, Peres MA, Perazi FM, Porporatti AL, Canto GD. Dietary patterns of children and adolescents from high, medium and low human development countries and associated socioeconomic factors: a systematic review. Nutrients. 2018 Mar 30;10(4):436.
2. de Ridder D, Kroese F, Evers C, Adriaanse M, Gillebaart M. Healthy diet: Health impact, prevalence, correlates, and interventions. Psychology & health. 2017 Aug 3;32(8):907-41.
3. Shehzad MA, Khurram H, Iqbal Z, Parveen M, Shabbir MN. Nutritional status and growth centiles using anthropometric measures of school-aged children and adolescents from Multan district. Archives de Pédiatrie. 2022 Feb 1;29(2):133-9.
4. Khalid A, Qadir F, Chan SW, Schwannauer M. Adolescents' mental health and well-being in developing countries: a cross-sectional survey from Pakistan. Journal of Mental Health. 2019 Jul 4;28(4):389-96.
5. Mozaffarian D, Angell SY, Lang T, Rivera JA. Role of government policy in nutrition—barriers to and opportunities for healthier eating. Bmj. 2018 Jun 13;361.
6. Lee JY, Ban D, Kim H, Kim SY, Kim JM, Shin IS, Kim SW. Sociodemographic and clinical factors associated with breakfast skipping among high school students. Nutrition & Dietetics. 2021 Sep;78(4):442-8.
7. Iqbal A, ulHaq MZ, Naveed Q, Razaq M, Parveen R, Sattar M, Abid MA. Physical Fitness, Food Intake And Physical Activities Of School Children Of Bahawalpur City. Ilkogretim Online. 2020;19(4):7015-24.
8. Appelhans BM, French SA, Tangney CC, Powell LM, Wang Y. To what extent do food purchases reflect shoppers' diet quality and nutrient intake?. International Journal of Behavioral Nutrition and Physical Activity. 2017 Dec;14(1):1-0.
9. Sharaf MF, Mansour EI, Rashad AS. Child nutritional status in Egypt: a comprehensive analysis of socioeconomic determinants using a quantile regression approach. Journal of biosocial science. 2019 Jan;51(1):1-7.
10. Harding KL, Aguayo VM, Namirembe G, Webb P. Determinants of anemia among women and children in Nepal and Pakistan: An analysis of recent national survey data. Maternal & child nutrition. 2018 Nov;14:e12478.
11. Turner C, Aggarwal A, Walls H, Herforth A, Drewnowski A, Coates J, Kalamatianou S, Kadiyala S. Concepts and critical perspectives for food environment research: a global framework with implications for action in low-and middle-income countries. Global food security. 2018 Sep 1;18:93-101.