

RESEARCH ARTICLE

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Mid-day Meal Programme and Adolescent Undernutrition- an Epidemiological Study in Hyderabad, India

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Received: 18 October 2015;

Accepted: 20 November 2015

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Abstract

Background: Malnutrition is one of the most important public health challenges faced by the country. With more than 35% of its population in the productive age group being malnourished. Even though malnutrition in children and pregnant mothers are some of the most discussed topics in Indian public health, under nutrition among adolescents was not given much importance. In this article we try to look into the concept of under nutrition among adolescents and how government of India's mid-day meal programme is able to influence it.

Materials and Methods: Cross-sectional study design, sample was obtained by the means of multi-stage systemic random sampling, data was obtained from total sample size of 197 participants was obtained according to inclusion criteria, statistical techniques of correlation and Multivariate regression are used to analyze the results.

Results: around 76.1% of the total participants are malnourished; malnutrition among adolescent boys is slightly higher than that of girls. Malnutrition among low economic status is higher than the students belonging to High income status. Correlation showed that age of the participants (Mean=14.37 years, and SD=1.05 years) and "BMI of the participants" (Mean=17.35 and SD=2.70) $r=0.174$, $p\leq 0.05$, $N=197$, were significantly related with each other. Regression results yielded the influence of independent variables on BMI, for age $b=0.497$, $t(197)=2.661$, $p\leq 0.01$, for economic status $b=0.225$, $t(197)=0.582$, for gender $b=-0.525$, $t(197)=-1.303$.

Conclusion: Around three quarters of the adolescents who were availing the midday meal scheme clearly show that midday meal scheme which is the sole source of essential protein and nutrients is not able to meet the need for the adolescents clearly showing need for the policy changes to be pitched in. behavior modification towards low-cost healthy diet, subsidies, and fortification of mid-day meal might be considered.

Key words: Adolescent health, BMI, Health policy, Malnutrition, Mid-day Meal Programme.

INTRODUCTION

Undernutrition is one of the principle public health problems faced by the country, and in a situation where 29.8% of its population is below poverty line undernutrition presents itself as a significant threat to the already weakened health system in India.^[1] The third round of National family

health survey (NFHS) conducted in 2006-2007 showed that around 36% of women and 34% of men aged 15-49 years are undernourished.^[2] The situation is worse in children under 5 years of age where around 50% of children under 5 years are undernourished clearly indicating the seriousness of the problem in the country.^[3] Even though there is data pertaining to the prevalence of undernutrition among children and adults, not much data is available pertaining to the malnutrition among adolescents who account for about 21.8% of the total population, and undernutrition among



adolescents is one of the least understood areas compared to its counterparts.^[4] Even though adolescence is considered as a phase of rapid physical and mental development of an individual majority of programmes catering to them are surrounded around the reproductive and health needs, grossly ignoring the nutritional needs of the adolescence. Studies project malnutrition among adolescent girls as the prime cause for high burden of anemia among adolescent girls (around 56%) which further translates itself to High maternal mortality, and high incidence of low birth weight babies born to these anemic mothers.^[5,6] Malnutrition is considered as a risk factor increasing the risk of an individual to various communicable diseases like TB and Non-communicable diseases like CVD.^[7] Further research shows that food insecurity among adolescents is associated with lower developmental assets thereby effecting the overall development.^[8]

Keeping in view the growing burden of Malnutrition particularly among children the Government of India launched one of its land mark mid-day meal programme in 1995. With its objectives to provide children with lunch at school itself thereby improving the children's nutritional status and school attendance, mid-day meal programme was critically acclaimed and was considered as every nutritionist's dream as a most feasible way to alleviate childhood malnutrition.^[4] Though initially started as a programme at primary school level (i.e., 5th standard) it was extended to all the other levels of schooling (up to 10th standard). Taking in to consideration the Government of India Committee on schools 1961's recommendation that a school meal should provide 1/3rd of the child's daily calorie requirement and 1/2nd of the daily protein requirement, the mid-day meal programme along with the provision of essential micronutrients through diet, aims to provide about 450 calories and 12 grams of protein to children till primary school level and 700 calories and 20 grams of protein to children above primary school level.^[9] Even though the programme document is ambitious and despite of having a limited success in few areas, several other factors such as lack of funds, policy issues, issues related to quality and quantity etc., serve to be the major limitations to the programme^[10-13] there by effecting the successful achievement of its overall objective.

Recognizing the importance of proper nutrition in the adolescent age and understanding the impact of mid-day meal programme on nutritional status of the school going children, our study tries to look at the concept of adolescent under nutrition and see if midday meal programme is able to bring about the changes in the nutritional status of the adolescent boys and girls in the lingampally region of

Hyderabad metropolitan.

OBJECTIVES

- 1) To understand the and examine the nutritional status of adolescent boys and girls availing mid-day meal facility in the government schools
- 2) To quantify the changes in the nutritional status with respect to the various variables

MATERIALS AND METHODS

Study design: Since the primary objective of the study is to see the prevalence of undernutrition among adolescents at one single point of time the cross-sectional study design is chosen as an appropriate design for the study.

Sample: The sample size was calculated by obtaining the list of the total number of students studying 8-10th class in the government schools in the geographical region of lingampally, Hyderabad. The sampling was done by multi-stage systematic random sampling. The total list of government schools in the geographical region was obtained which consisted of about 13 schools out of which randomly a school was picked and every 3rd school was chosen. From each school the list of students between 8-10th standard is obtained and a student was selected randomly and every 3rd student was chosen. The number of students chosen per school is proportionate with the total number of students in the school. In whole a total number of 197 students 113 boys and 84 girls were included in the sample randomly.

Inclusion criteria: Students from class 8-10 both male and female without any serious health complications (such as TB etc.) and who didn't have a recent episode of any fever/infection and those who avail the facility of midday meal program for the last 3 years are included in the study.

Exclusion criteria: all those who do not comply with the inclusion criteria are excluded. Majority of the students of the sample are from the similar socioeconomic back ground which rules out the confounding caused by socioeconomic factors.

Anthropometric measurements of height and weight are taken and Body mass index is used criteria to measure nutritional status. Even though middle upper arm circumference (MUAC) is considered as one of the measurement to assess nutritional status considering it's limitation of continuous change in MUAC because of rapid growth during adolescence, and due to the requirement of special training and supervision to measure MUAC, body mass index (BMI) is chosen over MUAC as a measure

quantify nutritional status.^[14] WHO's BMI criteria of BMI < 18.50=Underweight, BMI 18.51-24.99=Normal, BMI ≥ 25.00=over weight, BMI ≥ 30.0=obese were used to categorize the participants according to their BMI.

Data Collection: Each and every participant was given a questionnaire to fill the basic details and the anthropometric measurements of Height and Weight are measured by using Standard instruments by the work group.

Data analysis: The data analysis was done using Statistical Package for Social sciences (SPSS) version 21 software. Frequency tables and basic statistics are done. Correlational analysis and Multivariate Regression analysis was done to understand the possible association between the variables. The variables of Economic Status, Age and Gender are considered as independent variables and the calculated BMI of the individual participant is considered as dependent variable. Since the participants were unable to give any proper idea of their family's monthly income or house hold expenditure we used the type of house living (either kaccha or pucca) as a proxy indicator for economic status of the family. Kaccha refers to Houses which are hut and tent like temporary and are made of materials like straw, plastic curtains etc. Pucca refers to houses which are permanent dwellings built by Wood, Bricks, steel and Cement. Where ever used in the article the words kaccha and pucca refer to the above mentioned meaning. Dummy variables for categorical variables are made where necessary during the data analysis.

Ethical Approval: The Ethical approval for the study was obtained from the Institutional Review board (IRB) of School of Medical Sciences, University of Hyderabad. The permission for nutritional assessment was obtained from the principals of respective schools. The participants were explained about the study in the language which they were able to understand (Telugu) Informed consent was obtained from them prior to data collection.

RESULTS

The Total size of the sample is 197 participants comprising 84 (42.6%) are males and 113 (57.4%) are females. The age of the participants in the sample is in between 12-17 years with the mean age for girls being 14.16 years with the standard deviation of 1.01 years, the mean age of boys is 14.41 years with standard deviation of 2.08 years, overall the mean age of the participants is 14.37 with a standard deviation of 1.05. The Participant's BMI is calculated. The BMI values range between 12.50-29.95, the mean BMI for girls is 17.45 with standard deviation of 2.84. The mean BMI

for boys is 17.22 with 2.41 as the standard deviation, overall the mean BMI of the participants in the study is 17.35 with standard deviation of 2.70. considering the various BMI groups around 150 (76.1%) individuals fall in the category of Undernourished (BMI ≤ 18.5), 45 (22.8%) of the participants fall under the category of Normal (BMI 18.5-24.99), whereas 2 (1%) participants fall under the category of overweight (BMI ≥ 25.0). 92 (46.7%) of the participant's live in kaccha houses which represent lower economic status whereas 105 (53.3%) of the participants live in pucca houses which represent a slightly higher economic status.

Correlation: The Correlation analysis was done in between the continuous variables Age of the participant and the BMI of the participant which yielded the results which were statistically significant ($p \leq 0.05$) the positive correlation was observed between the variables "age of the participants" (Mean=14.37 years, and SD=1.05 years) and "BMI of the participants" (Mean=17.35 and SD=2.70) $r=0.174, p \leq 0.05, N=197$.

Regression: The variable age of the participants significantly predicted the change in BMI of the individuals. $b = 0.497, t(197) = 2.661, p \leq 0.01$. The variables Type of House (Proxy for economic status) and Gender though not significant predicted the change in BMI of the individuals. For type of house $b=0.225, t(197)=0.582$. For Gender of the respondents $b=-0.525, t(197)=-1.303$. A female of 12 years living in kaccha house is expected to have a predicted BMI of 15.756 with an addition of 0.225 for those living in Pucca houses. A male of 12 years living in a kaccha house has a Predicted BMI of 16.281 with an addition of 0.225 for those living in pucca house.

DISCUSSION

The current study was conducted to look into the concept of adolescent under nutrition and to quantify the levels of under nutrition among the adolescents availing the facilities of Mid-day meal programme at government school. The total sample size of 197 participants was obtained by the means of Multistage systematic random sampling method, the total number of boys sampled were 84 where as it was 113 for girls. The primary reason for more number of girls in the sample could be because of the presence of a school especially for girls in the selected sampling unit. Moreover, since the growth of both boys and girls is rapid in the adolescence age it can be seen that the effect of gender on BMI change in this age group is minimal and insignificant which was evident from the result. Literature Shows that the Age of the individual has significant effect on BMI,^[15,16] with increase in Age there is a unit increase in the BMI

Table 1: Table showing the Distribution of various BMI groups in accordance with Gender

BMI Groups	Gender of the participants		Total
	Male	Female	
Undernourished	65	85	150
Normal	19	26	45
Overweight	0	2	2
Total	84	113	197

of an Individual, which was evident from the significant results in the study. The poverty and economic status of the individual is well known to have a determinable effect on BMI of the individual.^[17,18] Since the students were unable to recall their family income and Household expenditure the type of House was used as an indicator for economic status. But since it is a government school and majority of them come from low socio-economic status type of house was not able to elucidate any significant relationship with change in BMI. This is better explained from the tables 1 and 2 showing Levels of BMI (representing nutrition status) in accordance with Gender and the Type of House. Altogether around 150 (76.14%) of the total respondents are undernourished with differences in terms of gender and economic status. It can be seen that around 77.38% of males are undernourished and 22.62% of them are in the range of Normal BMI whereas, around 75.2% of females are undernourished and 23% of them are in the range of normal BMI (Table 1) though not much high it is clear that during adolescence malnutrition among males is slightly higher than that of females. A greater degree of understanding can be obtained by looking at Table 2 which shows the variables BMI and Type of house which was used as proxy for economic status. It can be seen that around 79.3% of the students who were living in kuccha houses are malnourished whereas around 73.33% of students living in pucca houses are undernourished. This 6% gap clearly indicates that even though malnourishment is high among the population living in low economic status (as evidenced by the type of school they are studying-Government school), its impact is still severe on those who are poorest among the poor (those living in kuccha houses and studying in government schools compared to their counterparts). This study clearly shows that even though the students were being provided with mid-day meals at school the meals provided to them are of minimal impact as evidenced by high degree of malnutrition among adolescents. Since Adolescence is a phase of rapid growth and development government should give special consideration in order to look into their nutritional needs. Literature shows that apart from investing more on mid-day meal scheme government should look in to other ideas such as fortification of mid-day meals^[5] in order to

Table 2: Table showing the Distribution of various BMI groups in accordance with Type of House

BMI Groups	Type of House		Total
	Kuccha	Pucca	
Undernourished	73	77	150
Normal	18	27	45
Overweight	1	1	2
Total	92	105	197

prevent micro-nutrient deficiencies. For Adolescent girls Government of India has launched a national programme called as Rajiv Gandhi Scheme For Empowerment of Adolescent Girls (RGSEAG) also called as “Sabla”^[19] programme to provide supplementary nutrition through anganwadi centers. Despite this being a good approach to tackle the problem of adolescent under nutrition it can be contradicted on the basis of its one-sided view of looking at adolescent under nutrition as under nutrition just among girls. This study shows that both girls and boys of low socio-economic groups are equally vulnerable to under nutrition thereby calling up for the need of cost-effective, holistic, and sustainable programmes to tackle this problem in a large scale.

CONCLUSION

The midday meal program was entitled towards providing nutritious diet to the school children with aim of at least covering 1/3rd of child's daily calorie requirements and half of daily protein requirement targeting at reducing hunger, malnutrition and improving school attendance. Though the programme was able to improve attendance in the school and though it showed some promise in reducing hunger and malnutrition it can be said that it is not sufficient. Even after 20 years of implementation of the programme still there are questions being raised about the continuation of the programme its quality and its effectiveness. Nevertheless though Mid-day meal programme was successful at primary school level our research shows that it had a limited success in terms of adolescents. Considering adolescence as an age of rapid development and the potential which mid-day meal possess, we urge for the effective implementation of mid-day meal programme with additions focusing towards improving nutritional status of adolescents. Also it should be noted that the midday meal program itself cannot reduce the prevalence of malnutrition and other approaches like overall policy changes towards nutrition, educating and bringing about behavioral change by encouraging low-cost high nutritious diet, providing subsidies on nutritious diet and approaches like fortification etc., might be considered.

ACKNOWLEDGEMENT

We would like to acknowledge the Principals of the schools for giving permission for the study. We would also like to acknowledge Ms.M. Varalakshmi Assistant Professor, School of medical Sciences, University Of Hyderabad. For her guidance and support for the study.

Conflict of Interest: None Declared

Funding: NIL

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Cite this article as: Kodali P, Kopparty S, Vallabhuni R, Kalapala GR. Mid-day meal Programme and Adolescent Undernutrition- an Epidemiological study in Hyderabad, India. J Pharm Prac Community Med. 2016;2(1):16-20.