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Original Research Article

A community based cross-sectional study on the assessment of nutritional status of children

Rajendran NK[1], Palanivel Rajan T.[2], Varun Kumar T.[3]*

[1]Department of Pediatrics, [2]Department of Community Medicine, Karpagam Faculty of Medical Sciences and Research, Coimbatore, Tamil Nadu, India
[3]Department of Community Medicine, Government Medical College and ESIC Hospital, Coimbatore, Tamil Nadu, India

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***Correspondence:**
Dr. Varun Kumar T.,
E-mail: drvarunkumar17@gmail.com

ABSTRACT

Background: Malnutrition is major public health problem in developing countries. Nutrition plays a vital role, as inadequate nutrition during childhood may lead to malnutrition, growth retardation, reduced work capacity and poor mental and social development. Therefore, the present study was conducted with the objectives of finding the prevalence of underweight, overweight and obesity and associated socio-demographic factors among the rural children in South India.
Methods: A cross sectional study was conducted from August 2015 to July 2016 in rural areas of Coimbatore district in South India. Complete enumeration of children less than 18 years of age was done in 5 villages. Data were collected from 1562 study subjects and analyzed using SPSS version 20. Binary logistic regression was done.
Results: Among 1562 study subjects, 1308 (83.7%) had their BMI below 18.5 and were found to be under-weight. Only 21 (1.3%) were found to be over-weight and 2 (0.1%) were obese. Under-weight among children was significantly associated with younger age (p-value=0.000), lower educational qualification of mother (p-value = 0.000) and lower socio-economic class (p-value=0.000).
Conclusions: The study has revealed that the prevalence of under-weight among children in rural areas is high in India. The results have also highlighted the fact that there is an urgent need to take effective steps in curbing this problem.

Keywords: Children, India, Nutritional status, Rural areas

INTRODUCTION

Malnutrition is major public health problem in developing countries. Freedom from hunger and malnutrition is a basic human right and their alleviation is fundamental prerequisite for human and national development. The nutritional status is mainly influenced by the dietary intake in quantity as well as quality. When over nutrition and the health problems related to the obesity are faced by the developed countries, developing countries like India, which are undergoing a rapid epidemiological and nutritional transition along with demographic transition, is posed by the double threat of under and over nutrition.[1]

In developing countries various forms of malnutrition affect a large segment of population and both macro and micronutrient deficiencies are of major concerns. The

school age period is nutritionally significant because this is the prime time to build up body stores of nutrients in preparation for rapid growth of adolescence. Nutrition plays a vital role, as inadequate nutrition during childhood may lead to malnutrition, growth retardation, reduced work capacity and poor mental and social development.

Under-nutrition manifesting as stunting was found to increase the risk of morbidity, impair cognitive development and reduce work productivity in later life. The consequences of under nutrition are extended not only in later life, but also into future generations. Thinness results in poor pregnancy outcomes, in particular low birth weight. Both childhood obesity and thinness are linked to underachievement in school and lower self-esteem.[2]

The assessment of growth by objective anthropometric methods (weight, length/ height and body mass index) is crucial in child care to assess the nutritional status and for the identification of growth failure. Growth is an integral part of childhood and growth monitoring is critical for the assessment of health and disease in an individual child and the community as a whole. Since growth is an indicator of a child's health and nutrition, updated population-specific reference growth standards are needed.[3]

Cross-sectional studies performed in various parts of India among school children report the prevalence of overweight to range between 2.3% and 25.1% and that of obesity to range from 0.3% to 11.3%.[4] The prevalence of under-nutrition among school children vary from 17% to 65%.[5,6] Many studies restrict themselves to either one sex or a narrow age range.[7]

Furthermore, there are only a few studies in India which were done at the community level to assess the nutritional status of children. Therefore, the present study was conducted with the objectives of finding the prevalence of underweight, overweight and obesity and associated socio-demographic factors among the rural children in South India.

METHODS

Study design

A cross sectional study was carried out over a period of one year from August 2015 to July 2016 in the field practice area of Rural Health Centre (Thekani) attached to the Department of Community Medicine, Karpagam Faculty of Medical Sciences and Research, Coimbatore.

Sample size

Sample size was calculated from the results of a pilot study conducted amongst the randomly selected children aged below 18 years to test the questionnaire in a village which was excluded from the study and the required sample size of 1400 was arrived.

Sampling technique

There are 6 villages in the rural field practice area. The pilot study was conducted in one of the village and the study was conducted in the rest 5 villages. Complete enumeration of all children aged below years was done.

Data collection

Pre-designed pre-tested questionnaire was used and the survey was carried out by the investigator and his team which received one day training for administering the questionnaire and carrying out the anthropometric (Weight and height) measurements as per the standard protocol recommended by the World Health Organization (WHO). House to house visit was made in the morning and in the evening time and if children could not be contacted even after 3 visits, they were excluded from the study. Finally, data were collected from 1562 study subjects.

Data analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 20. Chi-square test was applied in bivariate analysis with categorical variables. Binary logistic regression analysis with backward elimination was used to determine the independence of associations observed in bivariate analysis by controlling for potential confounding factors. Goodness of fit of the model was tested by Hosmer and Lemeshow test.

Ethical issues

The study was conducted after getting approval from Institutional Ethical Committee (IEC). Informed written consent was taken from the parent/guardian of each study subject before administering the questionnaire. Those who were found to be malnourished were referred to the Rural Health Centre (Thekani). Rest of them were given health education and counseling about childhood malnutrition.

RESULTS

Of the 1562 study subjects, majority (42.4%) were between 5 to 10 years of age, 463 (29.6%) were below 5 years of age, 427 (27.3%) were between 11 to 15 years of age and only 10 (0.7%) were between 16 to 18 years of age. Most of the study subjects were males, 889 (56.9%) and 673 (43.1%) were females. Regarding the educational statuses of mother of the children, only 11.4% of them had their education above high school level. Socio-economic class classification was done according to BG Prasad classification, updated for the year 2014.[8] Among 1562 study subjects, 631 (40.3%) were belonging to lower socio-economic class (Table 1).

Table 1: Distribution of study subjects according to socio-demographic profile (n=1562).

Socio-demographic factors		Number	Percentage
Age in completed years	<5	463	29.6
	5 - 10	662	42.4
	11 - 15	427	27.3
	16 - 18	10	0.7
Sex	Male	889	56.9
	Female	673	43.1
Educational status of Mother	Illiterate	202	12.9
	Primary school	488	31.2
	Middle school	354	22.7
	High school	340	21.8
	Graduate	152	9.7
	Post graduate	26	1.7
Socio economic class (BG Prasad Scale, 2014)	Upper	40	2.6
	Upper middle	215	13.8
	Middle	261	16.7
	Lower middle	415	26.6
	Lower	631	40.3

The mean (SD) body mass index (BMI) of 1562 study subjects was found to be 16.54 (2.52). The mean (SD) BMI values in males and females were found to be 16.52 (2.59) and 16.56 (2.42) respectively (Figure 1). Among 1562 study subjects, 1308 (83.7%) had their BMI below 18.5 and were found to be underweight. Only 21 (1.3%) were found to be overweight and 2 (0.1%) were obese (Table 2). The prevalence of underweight among males and females were found to be 752 (84.5%) and 556 (82.6%) respectively.

The prevalence of under-weight was found to be more in children under 5 years of age when compared to other age groups and the association was found to be significant (p-value = 0.000). On the other hand, the prevalence of under-weight decreased significantly in children if their mother had received education above high school level (p-value = 0.000). BG Prasad's socio-economic classes were divided into two categories. Upper, Upper middle and Middle were taken as Upper socio-economic class. Lower middle and Lower were taken as Lower socio-economic class. Chi-square test was applied and then it was found that the prevalence of under-weight children was more in lower socio-economic class when compared with upper socio-economic class (p-value = 0.000). Gender does not have any significant association with childhood under-weight (Table 3).

After multivariate analysis, it was found that under-weight was significantly associated with below 5 years of age (OR = 2.15; 95% CI 1.91 to 2.43), lower educational status of mother (OR = 1.96; 95% CI 1.68 to 2.21) and lower socio-economic class (OR = 2.04; 95% CI 1.82 to 2.31) (Table 4).

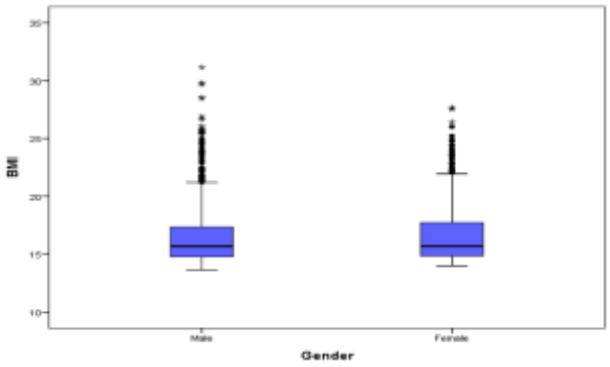

Figure 1: Box and Whisker plot showing distribution of BMI in study subjects (n=1562).

Table 2: Distribution of study subjects according to body mass index (BMI) (n=1562).

BMI	Number	Percentage
Under-weight (<18.5)	1308	83.7
Normal (18.5–24.9)	231	14.8
Over-weight (25–29.9)	21	1.3
Obese (>30)	2	0.1

Table 3: Distribution of study subjects according to under-weight (n= 1308).

Socio-demographic factors		Number (%)	p-value
Age in completed years	<5	450 (97.2)	0.00
	5 - 10	573 (86.6)	
	11 - 15	282 (66.0)	
	16 - 18	3 (30.0)	
Sex	Male	752 (84.6)	0.72
	Female	556 (82.6)	
Educational status of Mother	Till High school	1220 (88.1)	0.00
	Graduate and above	88 (49.4)	
Socio economic class (BG Prasad Scale, 2014)	Lower Class	992 (94.8)	0.00
	Upper Class	316 (61.2)	

Table 4: Association of different socio-economic variables with childhood under-weight: multivariate analysis.

Socio-demographic factors		p-value	OR (95% CI)
Age in completed years	<5	0.00	2.15 (1.91 – 2.43)
	5 - 10		
Sex	Male	0.56	1.15 (0.88 – 1.51)
	Female		
Educational status of Mother	Till High school	0.00	1.96 (1.68 – 2.21)
	Graduate and above		
Socio economic class (BG Prasad Scale, 2014)	Lower Class	0.00	2.04 (1.82 – 2.31)
	Upper Class		

DISCUSSION

The prevalence of under-weight, over-weight and obesity in the present study were found to be 83.7%, 1.7% and 0.1% respectively. The prevalence of under-weight was higher in the present study when compared with similar studies done in other parts of India which had reported the prevalence of under-weight among children to range from 17% to 65%.[5,6] The prevalence of thinness found in this study is much lower than that found by the National Nutritional Monitoring Bureau (NNMB) survey performed in 2004-06 in rural areas across nine states (57% in 10-13 years and 30% in 14-17 years) [6] Most of these studies were carried out in small sample of school going children in urban areas. But, the results of our study were obtained from community based survey in a rural area.

In our study, we have found that the likelihood of under-weight among children was higher in younger age groups. Children below 5 years of age are more prone to under-weight because of many factors which includes common childhood diseases like acute respiratory infections (ARI) and diarrhea. Child rearing practices like faulty and inadequate breast feeding and complimentary feeding, low vaccination coverage, bad hygiene and environmental sanitation also contribute to under-weight in under-5 children. In-spite of various government run programmes like Integrated Management of Childhood Illness (IMNCI) and Infant and Young Child feeding Practices (IYCF), the prevalence of under-weight among under-5 children continues to remain high.

Another important finding in our study was that the problem of under-weight in children reduced significantly if the mothers of the children had received education above high school. Similarly, the prevalence of under-weight children was significantly lower in upper socio-economic class. Various authors have argued that the growth of children of higher socioeconomic status is similar throughout the world, irrespective of ethnic back-ground.[9] Environmental rather than genetic differences are believed to be the principal determinants of disparities in physical growth.[10] Awareness about child health and increased access to health care are important factors for the improved nutritional status of children belonging to affluent families.

Our study is not without limitations. It was a cross-sectional study and so provides no information on longitudinal growth. The interpretations are restricted to rural children only. Also, detailed analysis of the various socio-demographic determinants of childhood nutritional status was limited by the study being a cross-sectional one. Further studies can be done that cover large group of rural children to have an in-depth knowledge of various factors influencing their nutritional status.

CONCLUSION

The study has revealed that the prevalence of under-weight among children in rural areas is high in India despite the existence of various Health and Family Welfare programmes in the country. The prevalence of under-weight among children is found to be higher among lower socio-economic class. The results have highlighted the fact that there is an urgent need to take effective steps, in curbing this problem.

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