



PREVALENCE OF MALNUTRITION BASED ON ANTHROPOMETRIC MEASURES AMONG SCHOOL CHILDREN IN RURAL TAMILNADU - A CROSS SECTIONAL STUDY

Community Medicine

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ABSTRACT

Introduction: Malnutrition is the leading cause of child mortality, accounting for 50% of all cases worldwide. Malnutrition in childhood and adolescence (both under nutrition and over nutrition) can cause acute and chronic co morbidities in adulthood, including diabetes mellitus, hypertension, dyslipidemia, etc. **Objectives:** To find out the prevalence of malnutrition based on anthropometric measures among school children in a rural area of kanyakumari district, Tamilnadu. **Methods:** A study among Primary and middle School students of age group between 7 to 14 years in a rural area of Kanyakumari district, Tamilnadu. A pre-designed and pre-tested questionnaire was used. Height for age (stunted) and weight for age (under weight) for each child were calculated. Average height and weight among children were compared with the standard recommended by Indian association of pediatrics(IAP). **Results:** Among the study population thinness, stunting, underweight, overweight and obesity were 12.77%, 6.66%, 14.43% and 18.88%, respectively. Types of stunting including total stunting ($p < 0.03$), Severe underweight ($p < 0.01$), Obesity ($p < 0.03$), and total of overweight & obesity ($p < 0.001$) were statistically significant with gender of the study participants. **Conclusion:** The average height and weight among the study population were found to be lesser than the standard recommended by IAP. Malnutrition among the study participants will have direct and indirect impact on their positive health and survival, as malnourished children approach adolescence and their reproductive years in a nutritionally and educationally disadvantaged position.

KEYWORDS

Malnutrition, Anthropometric, School children, Rural.

INTRODUCTION:

Children are the most important natural resource and biggest human investment for the development in every community. Approximately 20% of the population in every country constitutes school age children of age 6 to 15 years^[1]. As per World Health Organization, Malnutrition is defined as a "pathological state resulting from an absolute or relative deficiency or excess of one or more vital nutrients"^[2]. Malnutrition is the leading cause of child mortality, accounting for 50% of all cases worldwide till date. Malnutrition continues to be a primary cause of ill health and mortality among children in developing countries. Malnutrition in childhood and adolescence (both under nutrition and over nutrition) can cause acute and chronic co morbidities in adulthood, including diabetes mellitus, hypertension, dyslipidemia, etc^[3].

Children of today are the citizens of tomorrow, which means that their survival, protection, and development are a prerequisite for humanity's development in the future. The children living in rural areas of India disproportionately suffer from malnutrition compared with their urban counter parts^[4]. Nutrition during school age is critical to cover the deficits suffered during childhood. "Double burden of malnutrition" in terms of under nutrition as well as over nutrition in childhood and adolescence becomes one of the prevailing public health problems worldwide. Even though the world bank considers school health to be an essential component of its public health package, little attention has been paid to the nutrition and health of school-age children in the developing world^[5].

Since 1978, when the WHO launched the standard growth chart, malnutrition among children under 5 has been regularly monitored in all countries^[6]. It was only in 2007 that WHO introduced its standard growth chart for children and adolescents aged 5–19, based on prevalence of stunting, underweight, and thinness instead of wasting^[7].

Nutritional imbalance is measured by stunting, wasting, overweight, and underweight; they result in either under nutrition (determined by stunting, wasting, and underweight) or overweight. A low height-for-age (stunting) percentage reflects the cumulative effects of under nutrition and infections since birth. A low weight-for-age percentage (underweight) can mean wasting (i.e. low height-to-weight ratio), acute weight loss, or stunting. National Family Health Survey data shows the prevalence of under nutrition of under-five children in our country, but not of school-aged children^[8]. In this context, the present

study was conducted to find out the prevalence of malnutrition based on anthropometric measures among school children in a rural area of kanyakumari district, Tamilnadu.

METHODOLOGY:

A cross sectional study was done among Primary and middle School students of age group between 7 to 14 years in a rural area of Kanyakumari district, Tamilnadu during the month of September 2022.

Sample Size:

Based on a study done by Hasan et.al^[9] prevalence of malnutrition among school children in a rural population was 68%

$P = 68\%$; $Q = 1 - P = 32$; $d = 10\%$ of P

$$n = \frac{Z^2(1-\alpha)PQ}{d^2}$$

$$= \frac{3.84 \times 68 \times 32}{(10 \times 68 / 100)^2}$$

$$n = 180$$

A pre-designed questionnaire was used to interview the study participants on family characteristics like religion, type of family, education and occupation of parents; and information on individual characteristics like age and sex. Anthropometric measurements were taken and noted by trained field workers. Each child's height and weight were measured using standardized technique^[2]. Children of 7-14 years from primary and middle schools were included in the study and those Children who were seriously ill, too agitated and unwilling for anthropometric measurements were excluded from the study.

A stadiometer (measuring rod) capable of measuring to an accuracy of 0.1 cm was used to assess height of the subjects. Height for age (stunted) and weight for age (under weight) for each child were calculated. Average height and weight among children were compared with the standard recommended by Indian association of pediatrics(IAP)^[10]. Children with z scores (HAZ) under-2SD to-3SD were considered as stunting which is defined as low height-for-age. Underweight was defined as low weight-for-age.

Children with z-scores (WAZ) under-2SD to-3SD were considered as underweight. The responses were coded and the data was tabulated in Microsoft Excel 2019. Data was analyzed using IBM SPSS Statistics

Trial version 26.0. The distribution of the responses for each variable was examined using frequencies and percentages.

RESULTS:

A total of 180 school going children were included in the present study. Of these 55.4% were male children and 44.6% were female children. The age group of the study population were between 7 to 14 years with mean age of 10.2±1.5 years. Among the study population 51.5% were hindus, 43.5% were Christians and 5% were muslims.

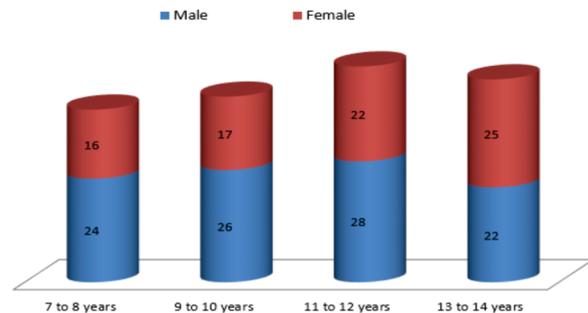


Figure I. Gender wise distribution of study participants among age group(n=180)

Among the study population, 40 (22.25%) children were in the age group of 7 to 8 years, 43(23.88%) children were in the age group of 9 to 10 years, 50(27.75%) were in the age group of 11 to 12 years, 47(26.12%) children were in the age group of 13 to 14 years. The mean height of girls were lower than that of the boys in all age groups except the 13-14 years old age group in which girls were taller than boys. The mean weight of girls was higher than the boys, in all age groups. Table I shows Height, Weight and BMI of study participants by gender and age group.

Table.I Anthropometric characteristics of the study participants by gender

Age group	Gender n(M=100, F=80)	Height in cms (Mean±SD)	Weight in kgs (Mean±SD)	BMI (Mean±SD)
7-8 years	M(n=24)	118±3.15	18.60±2.11	12.94 ± 3.64
	F(n=16)	116±4.23	19.20±3.21	13.06± 2.82
9-10 years	M(n=26)	126±3.17	22.43±3.76	14.22 ± 2.90
	F(n=17)	124±3.96	22.52±3.45	14.94 ±±2.35
11-12 years	M(n=28)	132±5.44	28.24±4.11	15.77 ± 3.10
	F(n=22)	131±5.12	28.62±3.88	16.23 ± 2.85
13-14 years	M(n=22)	140±4.21	38.26±4.37	17.63 ± 3.27
	F(n=25)	141±5.92	39.50±4.79	18.31 ± 3.45

Table II shows children with thinness, stunting, underweight, overweight and obesity were 12.77%, 6.66%, 14.43% and 18.88%, respectively. In this study, types of stunting including total stunting (p<0.03), Severe underweight (p<0.01), Obesity (p<0.03), and total of overweight & obesity (p<0.001) were statistically significant with gender of the study participants.

Table.II Prevalence of malnutrition forms among study participants based on BMI, height and weight by gender

Malnutrition forms	Total (n=180)	Male (n=100)	Female (n=80)	p Value
Severe thinness	< -3SD 8 (4.44%)	5 (5%)	3 (3.75%)	1.36
Moderate thinness	< -2SD to -3SD 15 (8.33%)	9 (9%)	6 (7.5%)	0.54
Total of thinness	< -2SD 23 (12.77%)	14 (14%)	9 (11.25%)	0.82
Severe stunting	< -3SD 3 (1.66%)	2 (2%)	1 (1.25%)	0.02*
Moderate stunting	< -2SD to -3SD 9 (5%)	5 (5%)	4 (5%)	0.001*
Total of stunting	< -2SD 12(6.66%)	7 (7%)	5 (6.25%)	0.03*
Severe underweight	< -3SD 5 (2.77%)	3 (3%)	2 (2.50%)	0.01*

Moderate underweight	< -2SD to -3SD	21 (11.66%)	11 (11%)	10 (12.50%)	2.71
Total of underweight	< -2SD	26 (14.43%)	14 (14%)	12(15%)	1.65
Overweight	> +1SD to +2SD	18(10%)	7(7%)	11 (13.75)	1.02
Obesity	> +2SD	16 (8.88%)	7(7%)	9 (11.25%)	0.03*
Total of overweight and obesity	> +1SD	34 (18.88%)	14 (14%)	20(25%)	0.001*

*p<0.05- statistically significant

DISCUSSION:

Most of the studies on malnutrition are done among children under five years. In the present study, an attempt was made to find the prevalence of malnutrition using anthropometric measures among Primary and middle School students of age group between 7 to 14 years in a rural area of Tamilnadu and the study shows that 14.43% of study participants suffered from underweight which is higher than stunting (6.66%) and thinness (12.77%). Meanwhile, 10% and 8.88% of children were overweight and obese respectively. In this study, the overall prevalence of stunting was 6.66% which is lower than the studies done in West Bengal^[11] 17.2% and Uttar Pradesh^[12] 18.5%. The overall prevalence of thinness in this study was 12.77% which is also lower than the studies done in West Bengal^[11] 23.1% and Assam^[13] 23.6% , but higher than the study done in Vietnam^[14] 11.19%. In this study the overall prevalence of overweight and obesity was found to be 18.88% which is much lower compared to the study done in Vietnam^[13] 30.1%. The overall prevalence of underweight among study population was 14.43% which is lower compared to the study from West Bengal^[11] 16.9% but higher than the study from Vietnam^[14] 10.79%. These differences may be due to cultural habits, feeding habits, socio-economic status, environmental factors, and public service utilization of the community in the study area.

In this study, the average height and weight among the study population were found to be lesser than the standard recommended by IAP. The consequences of under nutrition (weight and height for age) include impaired intellectual performance and school performance, as well as reduced adult body size, and later, reduced work capacity. Thinness in school aged children can result in delayed maturation, reduced bone density, deficiency in muscular strength and diminished work capacity later in life. These Malnourished children will also have lower resistance to infection, so they are more likely to get common childhood ailments like diarrheal diseases and respiratory infections as well as locking them into a vicious cycle of recurring sickness, faltering growth and diminished learning ability.

Although it is beyond the scope of this report to determine what causes stunting, thinness, and being underweight, Lack of adequate nutrition and parasitic infections like intestinal helminthes may hinder this process, thus worsening the nutritional situation. In the present investigation, school-going children are at a high risk of nutritional stress.

CONCLUSION:

The present study has successfully documented the prevalence of malnutrition in terms of stunting, thinness, underweight and obesity among school going children in a rural area of Kanyakumari district, Tamilnadu. There was a significant difference in the prevalence of overweight and obesity for sex among the study participants with respect to the different nutritional indicators. Malnutrition among the school children will have direct and indirect impact on their positive health and survival, as malnourished children approach adolescence and their reproductive years in a nutritionally and educationally disadvantaged position. Since the nutritional status of the subjects of the present study is not satisfactory, there is scope for much improvement in the factors associated with their nutritional status.

Recommendation:

The results of the present study will be useful for policy makers to make changes in the developmental and nutritional health care programmes. Nutritional intervention is also necessary to ameliorate the nutritional status among the studied rural school going children. Nutritional deprivation among the school children can further constrain the physical and cognitive development, possibly limiting their educational achievement and attenuating the impact of

educational interventions for social development. Efforts to reduce under nutrition, morbidity and mortality depends on reducing poverty and raising people's living standards by improving the housing conditions and by increasing access to clean drinking water and adequate sanitation. Such interventions have positive impacts on health and also fulfilling people's basic human rights.

Limitation:

Since malnutrition is the consequence of both food deprivation and disease, which are in turn the consequence of poverty, anthropometric indices can serve only as proxies for evaluating the prevalence of malnutrition among children.

Declarations:

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Conflict of interest: None

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