**Original Article**

# Nutritional Status of Rural Govt. Primary School Children in Khammam District, Andhra Pradesh, India

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## ABSTRACT

***Background:*** *Rural school children are more vulnerable victims of undernutrition and its consequences. On that ground, rural govt. primary school children were examined on the basis of height, weight and few background variables to find real picture of nutritional status.*

***Objective:*** *To assess nutritional status of govt. rural primary school children in Khammam district, Andhra Pradesh, India.*

***Materials and Methods:*** *A cross sectional study adopting a multistage random sampling technique was conducted among 600 govt. primary school children of rural communities of Khammam district, Andhra Pradesh. Anthropometric measurement like weight for age and height for age was recorded to assess nutritional status. Data were collected by interview and physical examination and were analyzed with SPSS10.0*

***Results:*** *Among 600 children, 36.0% were in Grade I malnutrition, 37.7% in Grade II malnutrition, 6.3% in Grade III and 19.0% of children were stunted and 4.0% were severely stunted. Girls (20.1%) were more stunted than boys (17.9%).*

***Conclusions:*** *The study concluded that despite adoption of several measures to curb the malnutrition, still high prevalence of undernutrition was observed in govt. rural primary school children in India and to be addressed properly immediately.*

***Keywords****: School children, Malnutrition, stunting, weight, height, gender discrimination*

## Introduction

The health of school children and youth is a fundamental value for adequate cognitive, affective and psychomotor achievement in school and to build up a healthy nation. Poor health and nutrition for school children are important contributors for inadequate school performance. Parental socioeconomic status, educational levels, geographical variation, home background variables and availability of health service facilities along with its utilization are generally major important variables for maintaining of good nutritional profile and

health in school children. Particularly rural school children are more vulnerable victims of undernutrition and its consequences like low school performance, morbidities and mortalities in low income countries than they are in developed countries. Over one fifth of our population comprises of children, aged 5-14 years i.e., the age group covering primary and secondary education. Only about 80% of these children are enrolled in schools, the rest remaining out of school. Of these enrolled, 65-85% are regularly attending school, on average in 200 days in a year. Thus the bulk of the school age children are in schools on majority of days in a year and are very easy to reach for any early nutritional intervention. [1] In recent years, there has been increased awareness that poor health and nutrition may affect children ability to learn. Many studies strongly established that nutritional status has been found to be associated with school achievement in many countries. For example, height- for-age was found to be a significant predictor of school achievement, after controlling of socio-economic status in India, Guatemala, Nepal, and Jamaica. [2] Some evidences have been found that school feeding programs improve children's cognitive and school achievement. Children reported being hungry or having poor breakfasts have been found to have poor school achievement levels. Missing breakfast also may detrimentally affect children's such functions in a laboratory situation. [2] Most of the above studies focused on one or a few nutritional or health conditions. However, rural children often suffer from multideprivation and become an easy victim of multiple ill health conditions concurrently. Particularly rural primary school children are often affected more as these children are likely may have greater energy expenditure as they often have to walk long distance to attend school, as well as help domestic works, firm works and face others unfavourable socio-cultural and environmental situations.

Clarke and colleagues (1991) found that primary school children aged 10-12 years in Kingston, Jamaica, low height-for-age, weight-for height and haemoglobin levels, poor breakfast and recent illness were significant independent predictors of school failure, in addition to socioeconomic disadvantages.[3] In developing and underdeveloped countries, unfortunately assessment of nutritional status of rural school children has been still neglected due to various reasons like lack of political and administrative commitment, inequity of health delivery system, financial scarcity and others.

In the present study, rural govt. primary school children were examined on the basis of height, weight and few background variables aimed to assess nutritional status of these children in Khammam district which lies in the Southern Telangana region in Andhra Pradesh with population of 25,78,927. Out of which schedule caste population is 426692 (16.5%) and schedule tribe population is 6,82,617 (26.5%). So, 43.0% people belong to the down trodden group.[4] Most of them are residing in rural areas and are socioeconomically backward. Hence, generally children from this group are admitted in rural school and are more vulnerable to nutritional health problems.

**Materials and methods**

A cross sectional study was conducted from 1st July 2008 to 30th June, 2009 among primary school children of rural communities of Khammam district, Andhra Pradesh among 10 Mandal praja parishad

rural primary schools which are under the management of Andhra Pradesh state government. These communities were predominantly agricultural, with the majority of students coming from home of small farmers. The communities were linked with inadequate asphalted roads and the main form of transportation was by foot, although taxis and buses could be obtained.

Sample size was determined by the following formula: Sample size (n) =4pq / $L^2$. (CI=95) [Where 'p' prevalence, q = 1-p, and L= allowable error]. Prevalence of undernutrition was considered to calculate sample size as it was the commonest health problem of primary school children which varies a wide range from 32.6 to 87.4 %.[3] Assuming an average 40% prevalence of undernutrition in school going children and allowable error 10% of prevalence , sample size was calculated. Thus, a total of 600 rural primary school children were considered.

Selection of Study Areas and Sample Frame: Khammam district consists of 46 mandals and 9 towns including 4 municipalities. Multi stage random sampling technique was adopted in this study. In 1st stage, five (10%) mandals were selected randomly and in 2nd stage, two rural primary schools were selected randomly from each randomly selected mandal. Total 10 rural govt. primary schools were selected for the study.

Eligible criteria for inclusion in the study was all school age children i.e. more than or equal to 6 years and less than 11 years of age (6-10years) studying in rural primary schools in Khammam district who were willing to participate in present study. Though above 10 years old children also studied in class V but they were excluded as because to avoid abrupt variation in growth rate during adolescent. [6]

Students who were unable to stand on platform of weighing scale and stadiometer properly due to physical or mental disability were excluded.

The study population was selected from ten randomly selected rural primary schools. The students from class I to class V were selected for the study after obtaining verbal permission of the headmaster of respective school. Total number of students was listed for each school and for each school a list of students was also prepared for each class from the attendance register taking into consideration of inclusion and exclusion criteria. The total population of students was 1486. Out of which, 600 students were selected for the study by Probability Proportional to Size sampling technique (PPS) from each school. The requisite number of students from each class from each school also was obtained by using Probability Proportional to Size sampling technique (PPS). If the randomly selected child was absent during study period, the next same sex and age group child was selected from that class to replace.

All headmasters of selected schools were convinced regarding importance of school health and its related health problems and all objectives and activities were explained clearly. In this way they were requested and motivated for their full co-operation during the survey period.

The area for conducting health examination was arranged in a room with adequate ventilation, light, furniture in the premises of school in such a way that there was maximum efficiency for each operation. If there was any lack of suitable building room, examination area was selected outside the school room and at a convenient place in school compound.

The data collection was done by interview and examination according to a pretested predesigned schedule. First part of schedule covered the general information of the school i.e. name of school, area and location, any feeding program, in school total number of students according to gender and class wise and type of management of the school, date of survey. Part II covered name of student, gender, class, religion, caste, occupation of father including anthropometrical measurements like weight and height of the children.

This schedule was pretested in randomly selected rural primary school children during the pilot study and the data of the pilot study was not included in this present study.

Calculation of age of the student was done by recording the date of birth from the admission register and deducting it from the date of examination.

Information of religion and caste of students was recorded from the admission register of the respective school.

**Anthropometric Measurement**

**Weight:**

The children were weighed on an electronic bathroom scale which was standardized daily. It reads to maximum 100 kg with increments of 100 gm. This weighing apparatus was placed properly on a smooth surface in the examination room. Indicator was brought and approximated with zero prior to measurement of each child. Every student was weighed after removing shoes, socks and with light clothes maintaining proper privacy. The weight of the children was recorded to the nearest 100 gm. [7]

**Height:**

Height in centimeter was recorded by anthropometric height measuring rod. The measuring rod was placed on a smooth flat floor in the examination room. All children were instructed during measurement of height to remove the foot wear and stand on flat surface of foot stand with feet parallel and with heels, buttocks, and back of head touching the upright measuring rod. The head was held comfortably erect, with the lower border of the orbit of the eye in the same horizontal plane head as the external canal of the ear (Frankfurt plane). The arms were hanging loosely at the sides. The head piece of the measuring device was gently lowered, crushing the hair and making contact with the top of the head. The presence of unusual thick hair was pressed firmly to minimize the error. Height was recorded to the nearest 0.1 cm. [7]

**Malnutrition:**

The expected weight for age of children was calculated using the ICMR growth monitoring charts [6] and graded as per Indian Academy of Pediatrics (IAP) where a weight of more than 80 percent of expected for age as normal and undernutrition are grade I (70-80%), Grade II (61-70%), Grade III (51-60%) and Grade IV (≤50%) of expected weight for that age. [8]

Stunting was assessed on the basis of expected height for age according to ICMR growth standards and graded as per Indian Academy of pediatrics, where height for age ≥90% is normal, 85-89% was considered as stunting and <85% was considered as severe stunting. [9]

Permission for the study was obtained from the Ethics Committee of Mamata Medical College, Khammam, District Education Officer and the principals of the respective schools. First aid box containing sphygmomanometer, thermometer, stethoscope, clinical hammer, battery operated 3 cells torch, dressing materials, medicines like

paracitamol, antidiarrhoeal drugs, ondansetron syrups etc. were carried with during survey period to provide immediate care. Parents or guardians of all children who have nutritional and others visible health problems were informed individually and educated on selection of right kind of local foods and in the planning of nutritionally adequate diets with in the limits of their purchasing power and were requested to seek advices of physicians or to attend primary heath centre for further attention.

Data was entered in Microsoft Excel and analyzed with SPSS10.0 (Statistical Package for Social Sciences). Chi-square test was used to analyze the relationship between qualitative variables. Adjacent categories were clubbed, whenever required, for a valid chi-square test. A p value of <0.05 was taken as significant.

**Results**

Out of examined 600 students, boys were 302 (50.3%) and girls were 298 (49.7%). Representation of children according to their sex in each class was almost equal. Among the examined children, majority of the students (97.7%) were Hindu. While 2.3% were Muslim and 0.7% was Christian. Of these students, 28.3% belonged to the SC category, 37.0% were from ST category and 31.0% from OBC category. Only others were 3.7 %.

As per ICMR standards and IAP classification, it was found that out of 600 children , 36.0% were in Grade I malnutrition, 37.7% in Grade II malnutrition,6.3% in Grade III and none of the them were in Grade IV malnutrition. Only 20.0% children had a normal nutrition. In this study it has been found that malnutrition was significantly associated with age (p<0.001). (Table 1)

Out of 298 girls, 42.3% girls had Grade I malnutrition followed by 30.25 % Grade II malnutrition and 6.7% girl had Grade III malnutrition. While out of 302 boys, 29.8% had Grade I malnutrition followed by 45% had grade II and 6.0% boys had Grade III. This difference of malnutrition between girls and boys was statistically significant (p=0.001). (Table 2)

According to the ICMR standards and IAP classification, it was found that about 19.0% of children were stunted and 4.0% were severely stunted. Severe stunting was more in 6 years age group (14.5%) and next in ten years age group (3.3%). Stunting and severe stunting were observed in young age groups and it is statistically significant (p<0.001). (Table 3)

Among boys, stunting and severe stunting were 17.9% and 2% respectively. While among girls, stunting and severe stunting were 20.1% and 6% respectively. Girls (20.1%) were more stunted than boys (17.9%). The prevalence of stunting and severely stunting was higher among girls as compared to boys. This difference of stunting and severe stunting between boys and girls was statistically significant (p=0.026). (Table 4)

**Table 1: Age wise distribution of children according their nutritional status based on weight for age (ICMR standards)**

| Age( years) | Nutritional status | | | | | Total |
|---|---|---|---|---|---|---|
| | Normal (n) (%) | Grade-I (n) (%) | Grade II (n) (%) | Grade-III (n) (%) | Grade-IV (n) (%) | |
| 6+ | 10 (9.1) | 54 (49.1) | 38 (34.5) | 8 (7.3) | 0 (0.0) | 110 (100.0) |
| 7+ | 22 (18.6) | 42 (35.6) | 46 (39.0) | 8 (6.8) | 8 (0.0) | 118 (100.0) |
| 8+ | 18 (15.0) | 40 (33.3) | 60 (50.0) | 2 (1.7) | 0 (0.0) | 120 (100.0) |
| 9+ | 44 (33.8) | 38 (29.2) | 40 (30.8) | 8 (6.2) | 0 (0.0) | 130 (100.0) |
| 10+ | 26 (21.3) | 42 (34.4) | 42 (34.4) | 12 (9.8) | 0 (0.0) | 122 (100.0) |
| Total | 120 (20.0) | 216 (36.0) | 226 (37.7) | 38 (6.3) | 0 (0.0) | 600 (100.0) |

**$\chi^2$= 46.125, df=12 (p<0.001), (Significant)**

**Table 2: Sex wise distribution of children according to their nutritional status based on weight for age (ICMR standards)**

| Sex | Nutritional status | | | | | Total |
|---|---|---|---|---|---|---|
| | Normal (n) (%) | Grade-I (n) (%) | Grade II (n) (%) | Grade-III (n) (%) | Grade-IV (n) (%) | |
| Male | 58 (19.) | 90 (29.8) | 136 (45.0) | 18 (6.0) | 0 (0.0) | 302 (100.0) |
| Female | 62 (20.8) | 126 (42.3) | 90 (30.2) | 20 (6.7) | 0 (0.0) | 298 (100.0) |
| Total | 120 (20.0) | 216 (36.0) | 226 (37.7) | 38 (6.3) | 0 (0.0) | 600 (100.0) |

**$\chi^2$ =15.575, df=3 (p=0.001), (Significant)**

**Table 3: Age wise distribution of children according to their nutritional status based on height for age (ICMR standards)**

| Age (years) | Nutritional status | | | Total |
|---|---|---|---|---|
| | Normal (n) (%) | Stunting (n) (%) | Severe stunting (n) (%) | |
| 6+ | 60 (54.5) | 34 (30.9) | 16 (14.5) | 110 (100.0) |
| 7+ | 96 (81.4) | 22 (18.6) | 0 (0.0) | 118 (100.0) |
| 8+ | 90 (75.0) | 28 (23.3) | 2 (1.7) | 120 (100.0) |
| 9+ | 110 (84.6) | 18 (13.8) | 2 (1.5) | 130 (100.0) |
| 10+ | 106 (86.9) | 12 (9.8) | 4 (3.3) | 122 (100.0) |
| Total | 462 (77.0) | 114 (19.0) | 24 (4.0) | 600 (100.0) |

**$\chi^2$ =43.841, df =8 (p<0.001)**

**Table 4: Sex wise distribution of children according their nutritional status based on height for age (ICMR standards)**

| Sex | Nutritional status | | | Total |
|---|---|---|---|---|
| | Normal (n) (%) | Stunting (n) (%) | Severe stunting (n) (%) | |
| Male | 242 (80.1) | 54 (17.9) | 6 (2.0) | 302 (100.0) |
| Female | 220 (73.8) | 60 (20.1) | 18 (6.0) | 298 (100.0) |
| Total | 462 (77.0) | 114 (19.0) | 24 (4.0) | 600 (100.0) |

**$\chi^2$ =7.337, df =2 (p=0.026), (Significant))**

## Discussion

Improved child health is considered as universal humanitarian goal. Nutritional health status of school children has a great role for development of better future generations. In India, 80% of children are enrolled in schools. Of those enrolled 65-85% are regularly attending schools an average 200 days in a year [1].Thus the bulk of the school children are very easy to reach

for early intervention of their nutritional health problems and to impart appropriate health education to improve the health. In this study, it was found that as per ICMR standards, 80% children were undernourished (Table-1). Prevalence of undernutrition based on weight for age, varies from 32.6 to 87.7% in different parts of India. A study carried out among school children in Nepal showed that 66.7% boys and 45.4% girls were undernourished by weight for age respectively.[5] Bose et al reported that overall prevalence of undernutrition was 53.4% among rural primary school children in West Bengal in2004. [13]

Probably this study also revealed that many government rural primary school children were nutritionally deprived. In this study prevalence of under nutrition as per weight for age was higher as compared to other studies. This is probably because majority of rural children were from lower socio-economic (i.e. 96.3% students were from SC, ST and OBC categories) conditions, vulnerable to childhood infections and other socio-cultural factors which influence the nutrition of rural children in addition to different methodologies/criteria used in studies. Furthermore, enhancement of awareness as a result of increase literacy rate in rural people regarding better education with jobs and others facilities influences migration of comparative better socioeconomic down trodden rural people to urban areas.

In this study, undernutrition gradually decreased from 6-9years of age. But undernutrition increased again at 10 years of age. Similar findings were observed in the study on rural primary school children in South India and West Bengal by Ananthakrishnan et al and Bose et al respectively.[4, 13] Another study conducted by Joshi et al, at Allahabad, Uttar Pradesh showed the same trend.[14] Probably students of 6-9 years age group get more attention regarding health and nutrition besides nutritional program in primary school which can meet the demand of growth and development at this stage. But there is an abrupt increased demand of food, in quality and quantity due to rapid growth at the beginning of adolescence which is not met properly. This is also supported by the report of I.C.M.R. that children grow satisfactorily up to the age of 9 years after which they lagged behind. [9,12]

In that this study, prevalence of stunting and severe stunting were19.0% and 4.0% respectively as per I.C.M.R. standards (Table- 4). Review of studies revealed that prevalence of undernutrition based on height for age varied in different parts of India in different studies. Bose et al and Pandey et al were observed that prevalence of stunting in school children was 29.7% and 52.2% respectively.[5, 13] But in those studies, prevalence stunting was at higher level as compared to this study. This variation was probably because of geographic, socio-economic and cultural differences in addition to different methodologies/criteria used in the studies. Laxmaiah et al also conducted one studies in this district among rural primary school children in almost same background and showed higher prevalence of stunting.[15]

Studies carried out by National Nutrition Monitoring Bureau (NNMB) in different states revealed that, even though there has been marked decrease in prevalence of severe undernutrition over a period of three decades, the prevalence of overall undernutrition continues to be still high.[15] Similarly, higher prevalence of undernutrition is also observed in this study.

In this study overall prevalence of undernutrition according to weight for age and height for age was higher among girls as compared to boys. Probably this is because of gender discrimination in the society which is generally more in rural areas and the fact that growth spurt occurs earlier in girls, increasing the demand for food, which may not be properly met at this stage.[14, 15]

On observation of result, it has been revealed that Mid-day Meal program, school health services and other measures have been adopted over recent years in health education technique to improve the health and nutritional status of primary school children in rural areas of India. But improvement has not been at an expected level till date probably due to lackadaisical implementation of toothless policies and programs for upliftment of relevant background factors. This observation has some similarity with WHO's observation in "Overview of current situation primary school physical environment and health." [15,16,17],

It is concluded that alarming and challenging situation of high prevalence of undernutrition was observed in rural primary school children of Khammam district in Andhra Pradesh. School health programs including Mid Day Meal program, health education activities in school children and community along with measures for improvement in socio-economic condition should be intensified to address the undernutrition in rural areas.

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