

## Original Research Article

# Prevalence of Malnutrition among Tribal Preschool and School Children in Ranchi District of Jharkhand

Rekha Sinha\* and Karuna Kumari

Department of Home Science, Birsa Agricultural University, Ranchi, Jharkhand, India

\*Corresponding author

## ABSTRACT

### Keywords

Malnutrition,  
school children,  
preschool children,  
Body mass index,  
Haemoglobin

A study was conducted to investigate the prevalence of malnutrition among preschool (3-6) and school children (6-12 years) of Ranchi District. It was observed that mean weight, height, mid arm circumference, BMI and Triceps measurements of all children irrespective of age and sex were significantly lower than the reference values. While assessing the degree of malnutrition, 93 and 44.5 percent of preschool and school children were found to be suffered from various grades of undernutrition, respectively. The children of all age groups had significantly less haemoglobin levels than the WHO standards.

## Introduction

Jharkhand is known for its unique heritage and culture as well as natural resources. The state is largely inhabited by persons belonging to scheduled tribes and scheduled caste consisting 40% of total population. Above 80% of its population is rural and subsistence farming in their way of life. These tribals are desperately poor, backward, malnourished generally uneducated and lead a hard and miserable life. As a result of poverty, the intake of various essential constituents of food is inadequate among tribal (DGHS 1996, NFHS-3, 2005).

The occurrence of malnutrition in the poor communities of rural areas of the country and greater vulnerability of children in such areas has been well documented (Awasthi *et al.*, 2000 Boora and Kheterpaul, 2003).

Malnutrition during critical period of growth leads not only to the stunting of physical growth but also to sub-optimal intellectual development.

It contributes directly or indirectly to high morbidity and mortality.

Several studies have been conducted in our country on vulnerable group such as preschool children, pregnant and lactating mothers from various sections of farming and non-farming communities.

However, information on the nutritional status of children is still insufficient particularly with respect to tribal belt of Jharkhand. Keeping all these perspectives into consideration, the present study was

carried out to assess the nutritional status of preschool and schoolchildren.

### **Materials and Methods**

The present study was conducted purposively in Ranchi district of Jharkhand. Two tribal dominated blocks namely Kanke and Murhu were selected randomly. List of tribal dominated villages was procured and two tribal dominated villages from each block were randomly selected. Children in the age group of 3-12 years were surveyed.

A total sample of 137, 124 and 130 children belonging to the age of 3-6, 6-9 and 9-12 years, respectively were selected. A combination of anthropometry and biochemical examination was used for assessing the prevalence of under nutrition among preschool and school children.

For anthropometric measurements, data regarding height, weight, triceps, skin fold and mid arm circumference of the selected children were collected as per methods of Jellief (1965). The body mass index was calculated using the equation given by Garrow (1981).

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m}^2\text{)}}$$

The degree of malnutrition in preschool and school children was assessed according to the classification given by Gomez (1956) and WHO (NIN 2007), respectively.

The haemoglobin level of subjects was estimated by cyanmet haemoglobin method (Raghuramulu *et al.*, 1983). Values were compared with the slandered of WHO (1989).

The data were subjected to statistical analysis using standard methods.

### **Results and Discussion**

#### **Anthropometric measurements**

Anthropometric measurements of preschool children in the age group of 3-6 years are presented in table 1. Mean height, weight, mid-arm circumference (MAC) and triceps skin fold measurement (TFS) of boys were 99.23 cm, 13.78kg, 14.08 cm and 5.05 mm, whereas, that of girls were 100.73cm, 13.96 kg, 13.96 cm and 5.16mm, respectively and were significantly lower than reference values. However, all four anthropometric measurements of boys as well as girls differ significant among themselves.

The mean height, weight, MAC, BMI, and triceps measurements of boys and girls in the age group of 6-9 years were found more or less similar (Table2.). However, observed values of height, MAC, BMI, and triceps skin fold measurement in boys and girls were significantly lower than their respective reference values.

Data pertaining to anthropometric measurement of school going boys and girls of 9-12 years old are given in the table 3. Mean height, weight, MAC, BMI, and triceps skin fold of boys were 132.51cm, 25.54 kg, 16.58cm, 14.50 and 4.24 mm; whereas, that of girls were 132.72cm, 26.31 kg, 17.18 cm, 14.50 and 5.23 mm and were significantly lower than their respective reference values. Triceps skin fold measurement was significantly higher in girls as compared to boys of same age group. Similarly higher triceps skin fold values among girls than boys of 6-9 years of age of Panipat district have been reported by Chandana and Sehgal (1996). Lower anthropometric measurement in school children have also been reported by earlier workers (Boora and Khetarpaul, 2003; Chandana and Sehgal 1996).

**Table.1** Anthropometric measurement of preschool children in the age group of 3-6 years

Anthropometric Measurement	Male children (n=69)				Female children (n=68)				
	Observed value	Reference value	Percentage of reference value	P <sup>1</sup>	Observed value	Reference value	Percentage of reference value	P <sup>1</sup>	P <sup>2</sup>
Height (cm)	99.23± 9.43	106.68 <sup>a</sup>	93.01	P< 0.01	100.73 ± 9.96	104.70 <sup>a</sup>	96.21	P< 0.01	NS
Weight (kg)	13.78 ± 2.35	17.80 <sup>a</sup>	77.41	P< 0.01	13.76 ± 2.92	16.82 <sup>a</sup>	81.81	P< 0.01	NS
Mid- arm Circumference (cm)	14.08 ± 1.02	16.04 <sup>b</sup>	87.78	P< 0.01	13.96 ± 1.02	16.04 <sup>b</sup>	87.03	P< 0.01	NS
Triceps skin Fold (mm)	5.05 ± 2.02	8.97 <sup>c</sup>	56.29	P< 0.01	5.16± 1.68	9.70 <sup>c</sup>	53.19	P< 0.01	NS

Source

a = NCHS

b = Agarwal *et al.*, (2001)

d = Vijaraghavan (1974)

Values are: Mean ± SD

NS = Non significant

P<sup>1</sup> = Level of significant for comparison of measurements with the reference value.

P<sup>2</sup> = Level of significant for compression of measurements of boys and girls.

**Table.2** Anthropometric measurement of school children in the age group of 6-9 years.

Anthropometric Measurement	Male children (n=63)				Female children (n=61)				
	Observed value	Reference value	Percentage of reference value	P <sup>1</sup>	Observed value	Reference value	Percentage of reference value	P <sup>1</sup>	P <sup>2</sup>
Height (cm)	120.84 ± 8.84	124.20 <sup>a</sup>	97	P< 0.01	116.63 ± 11.72	123.45 <sup>a</sup>	94	P< 0.01	NS
Weight (kg)	19.86 ± 3.61	24.20 <sup>a</sup>	82	P< 0.01	18.83 ± 5.27	23.50 <sup>a</sup>	80	P< 0.01	NS
Mid- arm Circumference (cm)	15.02 ± 1.35	17.02 <sup>d</sup>	88	P< 0.01	15.22 ± 1.65	17.10 <sup>d</sup>	89	P< 0.01	NS
Triceps skin Fold (mm)	4.39 ± 1.48	7.92 <sup>d</sup>	55	P< 0.01	4.54 ± 1.57	9.87 <sup>d</sup>	46	P< 0.01	NS
BMI	13.66 ± 1.48	14.45 <sup>b</sup>	92	P< 0.01	13.69 ± 1.39	14.72 <sup>b</sup>	92		

Source

a = NCHS

b = Agarwal *et al.*, (2001)

d = Vijaraghavan (1974)

Values are: Mean ± SD

NS = Non significant

P<sup>1</sup> = Level of significant for comparison of measurements with the reference value.

P<sup>2</sup> = Level of significant for compression of measurements of boys and girls.

**Table.3** Anthropometric measurement of school children in the age group of 9-12 years.

Anthropometric Measurement	Male children (n=64)				Female children (n=66)				P <sup>2</sup>
	Observed value	Reference value	Percentage of reference value	P <sup>1</sup>	Observed value	Reference value	Percentage of reference value	P <sup>1</sup>	
Height (cm)	132.51 ±	140.60 <sup>a</sup>	94	P< 0.01	132.72 ± 10.94	141.67 <sup>a</sup>	93	P< 0.01	NS
Weight (kg)	6.73	33.97 <sup>a</sup>	75	P< 0.01	26.31 ± 5.48	34.84 <sup>a</sup>	85	P< 0.01	NS
Mid- arm Circumference (cm)	25.54 ± 5.55	18.59 <sup>d</sup>	89	P< 0.01	17.18 ± 1.75	18.99 <sup>d</sup>	90	P< 0.01	NS
Triceps skin Fold (mm)	16.58 ± 1.57	8.55 <sup>d</sup>	50	P< 0.01	5.23 ± 2.09	10.36 <sup>d</sup>	51	P< 0.01	NS
BMI	4.24 ± 1.45	15.67 <sup>b</sup>	92	P< 0.01	14.50 ± 1.45	16.47 <sup>b</sup>	88		

Source

a = NCHS; b = Agarwal *et al.*, (2001); d = Vijaraghavan (1974)

Values are: Mean ± SD; NS = Non significant

P<sup>1</sup> = Level of significant for comparison of measurements with the reference value.

P<sup>2</sup> = Level of significant for compression of measurements of boys and girls.

**Table.4** Percentage distribution of preschool children (3-6years) according to different grade of malnutrition

Grade	Boys (n = 69)	Girls (n = 68)
Normal	5 (7)	5(7)
Mild	26(38)	15(22)
Moderate	34(49)	37(54)
Severe	4(6)	11(17)

**Table.5** Percentage distribution of school children (6-12years) according to different grade of malnutrition

Grade	Boys (n = 69)	Girls (n = 68)
Normal	57(5.5)	10(8)
Mild	63(50)	60(47)
Moderate	50(39)	44(35)
Severe	7(5.5)	13(17)

**Table.6** Haemoglobin level of selected tribal children

Sl. No.	Respondent	Haemoglobin level(g/100ml)		
		Age (year)	Observed	Standard
1	Preschool children	3-6	10.26 ± 1.45	11
2	School children	6-9	11.34 ± 1.13	12
3	School children	9-12	11.80 ± 1.07	12

Values are mean ± SD

P<sup>1</sup> - level of significant of Z test for comparison of Hb level of respondent with standard Hb value (WHO 1989)

To assess the degree of malnutrition, children were classified according to deficit in weight for age and data are presented in table. 4 and 5 for preschool children and school going children, respectively. Among male preschool children, 49 percent had grade II malnutrition, 38 percent had grade I malnutrition and 6 percent had grade III malnutrition. With reference to female children, only 7 percent had normal weight where as 54 percent had grade II malnutrition followed by grade I (22%) and grade III malnutrition (17%). Percentage distribution of male school children according to BMI (Table 5) shows that about 29 and 5.5 percent had moderate and severe grade malnutrition, whereas that of female, 35 and 17 percent were found to have moderate and severe grade respectively. On sex wise analysis, it may be concluded that girls were more prone to severe form of malnutrition as compared to their male counterparts. The results of present investigation are in accordance with Awasthi *et al.*, (2000), who also reported that maximum children studied were in first and second grade under nutrition.

### **Haemoglobin**

The haemoglobin values of selected children were ranging from  $10.26 \pm 1.45$  to  $11.80 \pm 1.07$ g/100 ml (Table 6). When compared with standard values, haemoglobin level of children all three groups were falling below the normal value. The lower level of haemoglobin of children may be due to lower intake of iron rich foods. The results of present investigation are in accordance with earlier workers (Goyal, 1994, Boora and Khetarpaul, 2003).

The study was undertaken to assess the prevalence of malnutrition among tribal children of Ranchi district of Jharkhand. The study was comprised of 137, 124 and 130

children belonging to the age group of 3-6, 6-9 and 9-12 years, respectively. The anthropometric measurements revealed that the mean weight, height, mid arm circumference, BMI and triceps measurements of the children of both sex in all age groups were lower than their respective reference values. On sex wise analysis, there was non-significant difference in all four anthropometric measurements of children belonging to these age groups except significantly higher triceps skin fold measurement was observed in girls of 9-12 years old. While, assessing the degree of malnutrition with respect to weight for age among preschool female and male school; children, only 75.5 and 8 percent were found normal and remaining suffered from some or other grade of under nutrition. The children of all age groups had significantly lower haemoglobin level than the standard values. Inclusion of more food stuffs especially green leafy vegetables, seasonal fruits and pulses in the daily diet is recommended for improving nutritional status. Nutrition counselling and education to mothers should be made an important component of health services which would help to decrease the level of ignorance and faulty cooking or dietary practices.

### **Acknowledgment**

The study was a part of an adhoc ICAR scheme and financial help rendered by ICAR is duly acknowledged.

### **References**

- Agarwal, K.N, Saxena, A. Bansal, A.K and Agarwal D.K. (2001) physical growth assessment in Adolescence, *Indian Pediar* :38: 1217-35.
- Awasthi, C.P., Kumar, S., Tewari. P.P. and Singh, A.B. (2000). Nutritional status of preschool and school children in the

- rural areas of Sultanpur district. *J. Dairying foods and H.Sc.* 2000 19 (I): 16-21.
- Boora, P. and Khetarpaul, N. (2003) Assessment of nutritional status of school going children of panchkula and Hisar district. *J. Dairying foods and H.Sc.*, 22(I):50-54.
- Chandana, S. and Sehgal, S (1998) Presence of nutritional deficiency diseases among School children (9-12 years) of Panipat city. *J. Dairying foods and H.Sc* 17 (I): 67-70.
- Director General of health services. A report on the survey of the micronutrient malnutrition situation in Gumla district of Bihar. Ministry of health and family welfare, Government of India, New- Delhi, 1996.
- Garrow, J.S. Treat obesity seriously. A clinical manual, Edinburg Churchill, living stone, 1981.
- Goyal, J. Hawk's physiological chemistry. Tata McGrew. Hill pub. Co. Ltd. Bombay. 1994.
- Mercedes.de.onis *et al.*, Development of a WHO growth reference for school aged children and adolescents Bulletin of WHO, 2007 vol, 85, PP 660-667.
- National center for health statistics. Anthropometric reference data prevalence of overweight. U.S 1976-80, vital and health statistics, series II. No. 238, DHMS, Pub. No. (PHS). 1987, 87-1688.
- National family health survey-3, India Jharkhand Indian Institute of population Sciences, Mumbai, 2005.
- NIN (2011). Dietary guidelines for Indians – A manual. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, pp 92-103.
- Oser, B.L Hawk's physiological chemistry. Tata Mc Grow. Hill publication Co. Ltd. Bombay. 1954.
- Raghuranulu, N; Madhavan, N.K and Kalyansundaran, S. (1983) Manual of Laboratory techniques, Hyderabad. Indian Council of Medical Research, 24-29.
- Vijayaraghvan, K; Singh D and Swaminathan, M.C. (1991) Arm circumference and fat fold at triceps in well-nourished Indian school children. *Indian j. Res* 1971 62; 994-1001.
- WHO. Preventing and controlling iron deficiency anaemia through primary Health Care. Geneva, 1989, 26.