

Nutritional Status of Preschool Children of Raj Gond - a Tribal Population in Madhya Pradesh, India

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ABSTRACT

A cross sectional study of the nutritional status was made on 123 Raj Gond (tribal community of Central India) preschool children (62 boys and 61 girls; aged 1 to 5 years) in the Waratola village of Balaghat district of Madhya Pradesh, India. Anthropometric nutritional status was assessed by WHO criterion (SD classification) and also NCHS standard using weight for age, height for age, weight for height indices and MUAC. The prevalence of nutritional deficiency was also investigated by clinical signs. The results revealed that there was high prevalence of underweight (37.4%), stunting (46.3%), wasting (41.5%) and low MUAC (50.4%) as well as different grades of malnutrition. Boys suffered these more than the girls. Comparatively, Raj Gond preschool children were nutritionally more wasted than Gond and other non-tribal preschool children of Madhya Pradesh. When gradation of malnutrition was compared with other tribal and caste preschool children of Central India, it was observed that the present children studied suffered more by different grades of protein energy malnutrition (PEM). The poorer nutritional status was also reflected through high prevalence of sparse hair (18.7%), conjunctival xerosis (18.7%), angular stomatitis (32.5%) and other nutritional deficiency signs. All these observations suggest that preschool children need better nutrition to combat the problem of PEM. Further studies should be made to identify the factors responsible for it.

INTRODUCTION

Nutritional status is a sensitive indicator of community health and nutrition among preschool children (Sachdev, 1995), especially the prevalence of undernutrition that affects all dimensions of human development (Bhargava, 1999) and leads to growth faltering in early life (Waterlow, 1994; Sen, 1994). Therefore, the assessment

of the nutritional status of a community is one of the first steps for the formulation of any public health strategy to combat malnutrition. The principal aim of such an assessment is to determine the type, magnitude and distribution of malnutrition in different geographic areas and to identify the risk group and determine the contributory factors. Presently, about 70% (120 million out of 182 million) of the world's

stunted children aged below five years live in Asia (Allen & Gillespie, 2001). In India, infants and preschool children (15 % of the total population) are the vulnerable segments and suffer highest rates of mortality and morbidity (Gupta & Shukla, 1992), which are due to high rates of malnutrition as reported elsewhere (Scrimshaw *et al.*, 1968; Schroeder & Brown, 1994; Pelletier *et al.*, 1995; Onis, 2000). In these connections, the Integrated Child Development Services (ICDS) have launched intervention programmes to prevent severe malnutrition among preschool children in India over the last 30 years, yet high degree of poor nutritional status have been prevalent among them (Ghosh, 2004). Not only is malnutrition associated with child mortality, morbidity and retarded growth, but it can also affect mental performances that last until adulthood and in turn it may also link to decreases in strength and work endurance in adults.

In India, many recent studies have been conducted on the nutritional status of preschool children and have revealed a high rate of malnutrition (Mahapatra *et al.*, 2000; Jose & Indira, 2000; Dubey *et al.*, 2003; NNMB, 2002; Mitra *et al.*, 2004; Tiwari *et al.*, 2005; Reddy *et al.*, 2006). However, in tribal areas of India, information regarding the nutritional status of preschool children of specific tribes is very scanty, although a few studies have been done in tribal preschool children in different states (Rao & Rao, 1994; Maurya & Jaya, 1997; NNMB, 2000; Choudhary, 2001; Rao *et al.*, 2006), in Madhya Pradesh (Rao *et al.*, 1994; NFHS, 1998-99) and among the Gonds (Rao *et al.*, 2005) and Kodaku (Dolla *et al.*, 2005) tribal preschool children of Central India. They have shown that tribal populations living in different ecosystems have varying degrees of nutritional status. Because of their dependence on primitive agricultural practices, they often face uncertainty of food supply and thus tend to suffer from undernutrition. The nutritional status of the tribal community is a

sad reflection of nature's fluctuation; rain, drought, floods, temperatures variation, lack of storage facilities, primitive processing, cooking techniques and lack of health and nutritional input make malnutrition a very serious problem for the country. But there are hardly any studies on nutritional status of preschool children among the Raj Gond tribal communities in India. Therefore, the current investigation has been attempted to provide an insight into the present scenario of nutritional status of Raj Gond preschool children.

MATERIALS AND METHODS

Raj Gond tribe is mainly found in the different states of Central India, specifically in Madhya Pradesh. This socio-economically backward tribe is considered to be a sub-tribe of Gond. They inhabit undulating plateaus and are predominantly dependent on plough cultivation.

The study was carried out in Waratola village of Balaghat district, Madhya Pradesh (M.P.), India, during July and August 2003. It was a community-based cross-sectional survey among Raj Gond tribal preschool children. Due to scattered and small inhabitation of the Raj Gond population in different villages of this area, only one large Raj Gond village was selected for the present study. This village consists of 191 families, of which only 107 families having children aged 1-5 years were taken as a study sample. A total of 123 preschool children including 62 boys and 61 girls were considered for the present study.

A house-to-house survey was conducted in the study village to examine tribal preschool children. Anthropometric measurements (height, weight, and mid upper arm circumference) were measured using standard techniques (Weiner & Lourie, 1981). Height of the children under two years of age was measured using infantometer. The assessment of nutrition-

al deficiency signs was based on certain physical signs (Jelliffe, 1966; NIN, 2005).

Weight for age, height for age and weight for height were calculated in standard deviation values (transformed as Z-scores) using reference median as recommended by WHO (WHO, 2006). Children who were more than two standard deviation below the reference median (<-2 SD) on the basis of weight for age, height for age and weight for height nutritional indices were considered to be underweight, stunted and wasted respectively. Children were also classified as undernourished using the value of mid upper arm circumference below 13.0 cm (WHO, 1995). We also calculated weight for age (Jelliffe, 1966), height for age (Waterlow *et al.*, 1977) and weight for height (Waterlow, 1972) to determine the nutritional gradation using NCHS reference standard (Frisancho, 1990). In the case of weight for height index, the sample size is smaller because height of the present children was below the minimum range of the reference standard (NCHS). The nutritional deficiency signs were expressed in terms of % of prevalence.

Age estimation

Assessment of exact age is very important for a nutritional study. It is the general experience of field workers that exact age assessment of children in the rural area, especially for the tribal communities, is very difficult due to ignorance,

illiteracy and lack of any written records. The ages of the present children were ascertained from the Anganwadi register book. Ages of most of the children were also estimated and cross-checked from and/or with reference to the events such as some important festivals, siblings in the family, horoscopes, storms, floods etc. The aged member, ward member and the clan chief also confirmed the age of the children. The age of the child was recorded in complete years. For analysis of the data, the age grouping was done according to the age at the last birth day (Rao *et al.*, 1961). All the children who had completed 3 years but were less than 4 years were grouped as 4 years and likewise, age group was calculated.

RESULTS

Out of 123 Raj Gond preschool children studied, there were 37.4 % underweight, 46.3 % stunted, 41.5 % wasted and 50.4 % low MUAC respectively (Table 1). The prevalence of underweight, stunting, wasting and low MUAC was found to be higher in boys than girls.

In order to determine the gradation of nutritional status (Table 2), weight for age index showed that more girls (9.84%) were normal than boys (4.84%), whereas boys had higher percentages of grade III (40.32%) and grade IV (11.29%) malnutrition than girls (27.86% of grade III and 9.84% of grade IV malnutrition). Height

Table 1. Nutritional status of Raj Gond preschool children

Preschool children	Underweight (<-2 SD weight for age)	Stunted (<-2 SD height for age)	Wasted (<-2 SD weight for height)	Low MUAC (<13.00 cm of MUAC)
Boys (n = 62)	25 (40.3)	33 (53.2)	28 (45.2)	32 (51.6)
Girls (n = 61)	21 (34.4)	24 (39.3)	23 (37.7)	30 (49.2)
Total (n = 123)	46 (37.4)	57 (46.3)	51 (41.5)	62 (50.4)

Figure in parentheses indicate percentages

Table 2. Gradation of nutritional status of Raj Gond preschool children on the basis of nutritional indices

Nutritional grades	Boys		Girls		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Weight for age (Jelliffe, 1966)						
Normal	3	4.84	6	9.84	9	7.32
Grade I malnutrition	7	11.29	7	11.48	14	11.38
Grade II malnutrition	20	32.26	25	40.98	45	36.59
Grade III malnutrition	25	40.32	17	27.86	42	34.15
Grade IV malnutrition	7	11.29	6	9.84	13	10.56
Total	62	100.00	61	100.00	123	100.00
Height for age (Waterlow <i>et al.</i> , 1977)						
Normal	36	58.06	39	63.93	75	60.98
Grade I malnutrition	22	35.48	22	36.07	44	35.77
Grade II malnutrition	3	4.84	-	-	3	2.44
Grade III malnutrition	1	1.62	-	-	1	0.81
Grade IV malnutrition	-	-	-	-	-	-
Total	62	100.00	61	100.00	123	100.00
Weight for height (Waterlow, 1972)						
Normal	12	30.77	13	30.95	25	30.86
Grade I malnutrition	11	28.21	12	28.57	23	28.40
Grade II malnutrition	11	28.21	14	33.34	25	30.86
Grade III malnutrition	5	12.81	3	7.14	8	9.88
Total	39	100.00	42	100.00	81	100.00

for age and weight for height also showed similar results.

In Table 3, the prevalence of underweight, stunting and wasting is compared with the National Family Health Survey of Madhya Pradesh (NFHS II, 1998-99) and preschool children of Gond tribal community in Madhya Pradesh (Rao *et al.*, 2005). Though the overall prevalence of underweight (37.4%) and stunting (46.3%) among Raj Gond preschool children was lower than preschool children of M.P. (underweight 55.1% and stunting 51.0%) and also Gond tribe (underweight 61.6% and stunting 51.6%), the prevalence of wasting among Raj Gond was higher

(41.5%) compared to Gond tribe (32.9%), while it was much higher compared to the National Family Health Survey of Madhya Pradesh (19.8%). Beside these, the trend of high prevalence of underweight and stunting among boys was also reported in the Gond tribe of M.P. Children of M.P. reported reverse results, where girls had more undernutrition compared to boys.

In Table 4, the gradation of nutritional status among Raj Gond preschool children is compared with Kamar (Kumar *et al.*, 1993) and Abujmaria (Mitra, 2001) tribe and also Brahmin (higher caste), Teli & Rawat (lower caste) (Mitra *et al.*, 2004) preschool children of Central India. In weight

Table 3. Comparison of nutritional status of Raj Gond preschool children with other Central Indian population

Nutritional status	Madhya Pradesh (NFHS II, 1998-99)			Gonds in Madhya Pradesh (Rao et al., 2005)			Raj Gonds Madhya Pradesh (Present study)		
	Boys (%)	Girls (%)	Total (%)	Boys (%)	Girls (%)	Total (%)	Boys (%)	Girls (%)	Total (%)
Underweight	52.8	57.6	55.1	62.9	60.3	61.6	40.3	34.4	37.4
Stunted	49.2	52.9	51.0	54.4	48.8	51.6	53.2	39.3	46.3
Wasted	19.8	19.9	19.8	30.1	35.8	32.9	45.2	37.7	41.5

Table 4. Comparison of nutritional status of Raj Gond preschool children with different communities of Central India

Nutritional grades	Central Indian populations					
	Kamar (Kumar et al., 1993)	Abujmaria (Mitra, 2001)	Brahmin	Rawat	Teli	Raj Gonds (Present study)
Weight for age (Jelliffe, 1966)						
Normal	10.30	14.11	28.10	1.09	4.12	7.32
Grade I	1.53	47.24	46.28	40.86	4.02	11.38
Grade II	1.53	27.61	19.85	48.38	50.51	36.59
Grade III	11.73	9.20	5.78	9.67	5.85	34.15
Grade IV	—	—	—	—	—	10.56
Height for age (Waterlow et al., 1977)						
Normal	—	—	85.13	39.78	44.33	60.98
Grade I	—	—	14.87	52.68	47.42	35.77
Grade II	—	—	—	7.54	8.25	2.44
Grade III	—	—	—	—	—	0.81
Grade IV	—	—	—	—	—	—
Weight for height (Waterlow, 1972)						
Normal	8.67	—	38.01	8.60	12.37	30.86
Grade I	5.61	—	42.97	46.23	51.54	28.40
Grade II	17.86	—	19.02	21.52	30.94	30.86
Grade III	67.86	—	—	23.65	5.15	9.88

Table 5. Prevalence of nutritional deficiency signs

Nutritional deficiency signs	Boys (n= 62)		Girls (n= 61)		Total (n= 123)	
	n	%	n	%	n	%
Protein energy malnutrition						
Sparse hairs	10	16.1	13	21.3	23	18.7
Dispigmentation of hair	5	8.1	10	16.4	15	12.2
Easy pluckability of hair	1	1.6	5	8.2	6	4.9
Oedema	9	14.5	3	4.9	12	9.8
Vitamin A deficiency						
Conjunctival xerosis	11	17.7	12	19.7	23	18.7
Vitamin B-complex deficiency						
Angular stomatitis	22	35.5	18	29.5	40	32.5
Chellosis	16	25.8	9	14.8	25	20.3
Other conditions						
Dental carries	13	21.0	8	13.1	21	17.1
Spongy gum	1	1.6	1	1.6	2	1.6
Bleeding gum	0	0.0	3	4.9	3	2.4

for age index, the largest percentage of normal preschool children was found in the Brahmin (28.10%) community whereas Raj Gond preschool children had very high prevalence of grade III and IV malnutrition compared to other caste and tribal community. Height for age index had reported more or less same results but in weight for height index, maximum percentage of severe malnutrition (grade III) was in Kamar tribe (67.86%) followed by Rawat (23.65%), Raj Gond (9.88%) and Teli (5.15%) preschool children. Here also the maximum percentage of normal children was found among Brahmin community (38.01%) followed by 30.86 % of Raj Gond children.

Table 5 represents prevalence of nutritional deficiency signs in Raj Gond preschool children. The overall prevalence of sparse hair was found to be 18.7 %, dispigmentation of hair (12.2%), oedema (9.8%) and easy pluckability of hair (4.9%) respectively. Vitamin A deficiency (conjunctival xerosis) was reported at 18.7 %,

while night blindness and bitot's spot were not present. Vitamin B complex deficiency, mainly angular stomatitis and chellosis, had higher prevalence (32.5% of angular stomatitis and 20.3% of chellosis) compared to other nutritional deficiency signs and boys were affected more than girls. 17.1 % of children suffered from dental carries but very few from spongy and bleeding gums.

DISCUSSION

Based on the results of the study, it appears that undernutrition in the form of underweight, stunting, wasting along with different grades of malnutrition and nutritional deficiency signs was found to be widely prevalent among preschool children of the Raj Gond tribe of Waratola village in Balaghat district, Madhya Pradesh, India. Similarly, high prevalence of undernutrition was also reported in Maria Gond (Rao & Rao, 1994) and Gond (Rao *et al.*,

2005) tribal preschool children of Madhya Pradesh. High prevalence of chronic and acute undernutrition was also observed in other tribal and caste preschool children in India (Iqbal *et al.*, 1999; NNMB, 2000; Mahapatra *et al.*, 2000; Ghosh *et al.*, 2001; Mitra *et al.*, 2004; Rao *et al.*, 2006). The National Family Health Survey (NFHS II, 1998-99) also found the highest prevalence of underweight (64.54%), stunting (59.9%) and wasting (24.7%) among preschool children of scheduled tribal community in Madhya Pradesh, which were also much higher compared to Raj Gond preschool children except wasting. The wasting of the present children was higher compared to tribal (NNMB, 2000) and rural (NNMB, 2002) preschool children of M.P., which may be the result of failure to get adequate nutrition immediately before the survey, seasonal variation of food supply or recent episodes of illness (NFHS, 1998-99). However, the high prevalence of wasting (35.0%) was also reported among Kodaku tribal preschool children of Madhya Pradesh (Dolla *et al.*, 2005).

Generally, it was observed that boys suffer less undernutrition compared to girls (NFHS, 1998-99). But present boys suffered more than girls, which may be due to the influence of early childhood diseases among boys. The reflection of such diseases may lead to high prevalence of oedema, vitamin B complex deficiency and dental carries among Raj Gond boys. When the gradation of nutritional status was compared with other tribal and caste communities of Central India, Brahmin preschool children were found to be more nutritionally well off than other tribal, specifically Raj Gond, and other caste groups, which may be due to the influence of socio-economic and other micro-environmental factors (Ghosh *et al.*, 2001). Finally, reflections of poor nutritional status were also observed through high prevalence of protein energy malnutrition, vitamin A and B complex, and other nutritional deficiencies among Raj Gond preschool children.

CONCLUSION

In rural areas and especially in tribal areas, chronic energy deficiency is a more important problem than overweight, which may reflect high prevalence of undernutrition among Raj Gond preschool children. There may be several socio-cultural and environmental factors associated with this phenomenon. In future, studies should be done on preschool children aimed at identifying the factors responsible for this problem, which may in turn help to adopt and implement the proper intervention strategies.

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