

## Nutritional and Health Status of Gond and Kavar Tribal Pre-school Children of Chhattisgarh, India

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**ABSTRACT** Present cross sectional study was conducted to assess the nutritional and health status on 379 (180 Gond and 199 Kavar) tribal preschool children of Chhattisgarh, India. The studied children were compared with other tribal and caste preschool children of the same area. Nutrition and health assessment was done through diet survey, nutritional deficiency signs and also by nutritional anthropometric indices such as weight for age, height for age and weight for height. The study reveals that there were lower consumption in several macro and micro nutrients intake compared to Recommended Dietary Allowances (RDA) of India, which may be reflected through high prevalence of nutritional deficiency signs among them. According to nutritional anthropometric indices, both sexes of Gond and Kavar preschool children were suffered by different grades of malnutrition within which girls were suffered comparatively more than boys specifically among Gond tribe. Irrespective of sex, Gond preschool children were suffered more by malnutrition compared to Kavar preschool children. Whereas present Gond and Kavar children were suffered more by malnutrition compared to the Brahmin preschool children of Central India, specifically on the basis of height for age index. The amount of macro and micro nutrients consumption of both present as well as others tribal preschool children in Central India were more or less same. All the observations suggest that just like other tribal children of Central India, the studied children also have insufficient nutrition intake, which may be due to mother's illiteracy, lack of awareness and other socioeconomic and cultural factors. Therefore, future studies should be undertaken to identify the factors responsible for the high prevalence of malnutrition among them.

### INTRODUCTION

Nutrition and health were the most important contributory factors for human resource development in the country (Amirthaveni and Barikor, 2001). But still, undernourishment continued to be a major public health issue and caused of a substantial proportion of all child deaths in every years specifically in developing countries like India (Black et al., 2003). The large sections of Indian population were suffered from varying degrees of protein energy deficiency (Gopalan, 2002).

The most vulnerable group regarding health and nutritional status was preschool children living in rural as well as in urban slum areas, within which the tribal preschool children were the main victims of undernourishment (Mitra and Tiwari,

1997; Mitra, 2001; Agrahar- Murugkar, 2005; Rao et al., 2006).

The health and nutritional status of tribal preschool children in India were explored on nation wide studies (NNMB, 1978), along with region specific studies (Verma et al., 1986). In Central India, tribes like Gond, Bisonhorn Maria, Bhatra, Abujmaria and Kamar were found to have poor health and nutritional status among preschool children (Sengupta, 1980; Pal and Mitra, 1991; Mitra et al., 1993; Rao et al., 1994; Rao et al., 2005). Malnutrition was a leading problem among tribal preschool children in India (Mahapatra et al., 2000). Therefore, it is necessary to gather region and community specific data from time to time for formulating the health planning and nutritional intervention programme.

In view of high prevalence of malnutrition among tribal preschool children as well as necessity of spatial and temporal community specific data, a cross sectional survey was done among the Gond and Kavar preschool children (1-5 years) to assess their health and nutritional status. It is further felt necessary to compare the data with other regional community to measure

the magnitude and prevalence of malnutrition among preschool children.

## MATERIALS AND METHODS

**Data:** The sample of the present study was collected from four villages (Tuman, Pongosai, Putua and Banknote) of the Korba district of Chhattisgarh State, India. The population of these areas consists of about 1356 individuals of Gond and 1248 individuals of Kavar (Census of India, 2001). For the present study 90 families were considered. Within which 44 Gond and 46 Kavar families comprised of 379 preschool children (195 boys and 184 girls) aged 1 to 5 years were taken as a study population.

**Data Collection:** Diet survey was carried out by weighing method (Rao et al., 1986). Quantitative dietary assessment was done through actual weighing of raw food item. Anthropometric measurements (height and weight) were measured following IBP recommendation (Weiner and Lourie, 1981). Clinical signs of nutritional deficiency survey were conducted on each child as recommended by Jelliffe (1966) as well as World Health Organization (WHO, 1995).

**Methodology:** The average dietary intake of food per item was calculated and was compared with the RDA (Recommended Dietary Allowances) of India using the values as per 'Nutritive Value of Indian Food' (Gopalan et al., 2002). The malnutrition was assessed through 'weight for age' (Jelliffe, 1966), 'weight for height' and 'height for age' index (Waterlow, 1972; Waterlow et al., 1977) standard. The NCHS growth standards were used as reference (Frisancho, 1990).

**Age Estimation:** Assessment of exact age is very much important for a nutritional study. It is a general experience of field workers that exact age

assessment of children in the rural area especially from the tribal communities is very difficult due to ignorance, illiteracy and lack of any written records. The ages of the children were ascertained from the Anganwadi admission register book. Ages of most of the children were also estimated and cross checked from the reference to the events remembered such as some important festivals, visiting of some eminent personalities, sibling in the family, horoscopes, storm, flood etc. The aged members of the households, along with the ward member and the clan chief also confirmed the ages 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 done.

## RESULTS

**Nutrient Intake:** Table 1 shows the mean nutrient (macro and micro) intake per consumption unit per day among Gond and Kavar tribal preschool children of Central India. The mean calories intake among Gond (1009.4 kcal) and Kavar (1012.5 kcal) preschool children was lower compared to RDA (1220.0 kcal) of India in 1-3 years age group. Whereas in 3-5 years age group, similar trend was observed among them, which signified a deficiency of calories intake compared to Recommended Dietary Allowances (RDA) of India. There was also a deficiency in fat, calcium, iron, carotene and vitamin C intake among Gond and Kavar preschool children. But deficiencies have not been noticed in respect of protein, thiamine and niacin intake. Kavar preschool children consumed higher amount of macro and

**Table 1: Mean nutrient intake per consumption unit per day among Gond and Kavar children with RDA**

Nutrient intake	1-3 years			3-5 years		
	Gond	Kavar	RDA	Gond	Kavar	RDA
Calories (kcal)	1009.4	1012.5	1220.0	987.5	1010.0	1220.0
Protein (gm)	30.4	32.2	22.0	31.2	32.4	22.0
Fat (gm)	5.6	5.6	25.0	4.2	4.2	25.0
Calcium (mg)	103.4	109.4	400.0	97.4	97.4	400.0
Iron (mg)	12.3	13.7	12.0	10.5	10.5	12.0
Carotene (ug)	201.3	215.4	1600.0	197.4	197.4	1600.0
Thiamine (mg)	0.66	0.68	0.60	0.78	0.78	0.60
Riboflavin (mg)	0.23	0.33	0.70	0.23	0.23	0.70
Niacin (mg)	10.2	10.1	8.0	8.9	8.9	8.0
Vitamin "C" (mg)	23.2	26.5	40.0	20.3	20.3	40.0

RDA= Recommended Dietary Allowances (Gopalan et al., 2002)

**Table 2: Gradations of malnutrition among Gond and Kawar children**

Gradation of malnutrition	Gond						Kawar					
	Boys		Girls		Total		Boys		Girls		Total	
	No	%	No	%	No	%	No	%	No	%	No	%
	<i>Weight for age</i>											
Normal	40	43.48	32	36.36	72	40.01	59	57.28	44	45.83	103	51.76
Grade I	27	29.35	21	23.86	48	26.67	21	20.39	25	26.04	46	23.12
Grade II	15	16.30	17	19.32	32	17.78	15	14.56	21	21.87	36	18.09
Grade III	10	10.87	18	20.46	28	15.54	8	7.77	6	6.26	14	7.03
Total	92	100.00	88	100.00	180	100.00	103	100.00	96	100.00	199	100.00
	<i>Height for age</i>											
Normal	42	45.65	38	43.18	80	44.44	59	57.28	45	46.87	104	52.26
Grade I	27	29.35	20	22.73	47	26.11	18	17.47	22	22.92	40	20.10
Grade II	12	13.04	17	19.32	29	16.11	14	13.59	19	19.79	33	16.58
Grade III	7	7.61	8	9.09	15	8.33	9	8.74	8	8.33	17	8.54
Grade IV	4	4.35	5	5.68	9	5.01	3	2.92	2	2.09	5	2.52
Total	92	100.00	88	100.00	180	100.00	103	100.00	96	100.00	199	100.00
	<i>Weight for height</i>											
Normal	45	48.91	36	40.91	81	45.01	61	59.22	42	43.75	103	51.76
Grade I	21	22.83	25	28.41	46	25.55	25	24.27	21	21.87	46	23.11
Grade II	13	14.13	12	13.64	25	13.89	12	11.65	25	26.04	37	18.59
Grade III	13	14.13	15	17.04	28	15.55	5	4.86	8	8.34	13	6.54
Total	92	100.00	88	100.00	180	100.00	103	100.00	96	100.00	199	100.00

micro nutrients than Gond preschool children specifically in 1-3 years age group.

**Nutritional Anthropometry:** The gradation of malnutrition among preschool children was classified on the basis of weight for age, height for age and weight for height nutritional anthropometric indices (Table 2). According to weight for age index, 40.01 percent Gond and 51.76 percent Kawar children were found to be normal. Whereas 26.67 percent Gond and 23.12 percent Kawar children were suffered by mild malnutrition (Grade I). The prevalence of severe malnutrition (Grade III) was higher among Gond (15.54%) compared to Kawar (7.03%) preschool children. The preschool girls children of both tribes were suffered more by different grades of malnutrition than boys except grade III malnutrition of Kawar preschool children. According to height for age index, 44.44 percent Gond and 52.26 percent Kawar children were found to be normal. The prevalence of grade I malnutrition were higher among Gond (26.11%) compared to Kawar (20.10%) preschool children, and same picture was observed in grade IV malnutrition, where 5.01 percent of Gond children were suffered than only 2.52 percent Kawar children. Here also girls were more malnourished than boys. According to weight for height index, 45.01 percent Gond and 51.76 percent Kawar children were found to be normal. Though Kawar preschool children (18.59%) were suffered more by grade II malnutrition than Gond (13.89%). On the other

hand, prevalence of severely malnourished (Grade III) preschool children were higher among Gond (15.55%) compared to Kawar (6.54%). Like weight for age and height for age indices, this index also show that girls were more malnourished than boys.

**Clinical Signs of Malnutrition:** Table 3 shows the high prevalence of nutritional deficiency signs among both the Gond and Kawar preschool children. The maximum percentages (53.33%) of Gond girls were suffered by paleness of eye, dental carries and bleeding gum. Prevalence of angular stomatitis among Gond

**Table 3: Percentage of prevalence of nutritional deficiency signs in Gond and Kawar Children**

Deficiency Signs	Gond		Kawar	
	Boys	Girls	Boys	Girls
Lack of lusture	31.58	20.01	23.53	13.33
Sparse hairs	15.79	33.33	11.76	26.67
Dispigmentation hair	15.79	13.33	5.88	20.01
Flag signs	10.53	6.67	5.88	6.67
Easy pluckability	26.31	40.01	23.53	33.33
Moon face	0.00	0.00	0.00	6.67
Paleness of eye	36.84	53.33	35.29	33.33
Angular stomatitis	42.10	33.33	41.17	40.01
Chilosis	10.53	6.67	5.58	13.33
Oedema	10.53	26.67	11.76	6.67
Atropic papillae	15.79	26.67	11.76	6.67
Mottled enamel	26.31	40.01	23.53	33.33
Dental carries	36.84	53.33	35.29	40.01
Spongy gum	10.53	20.01	11.76	13.33
Bleeding gums	42.10	53.33	41.17	33.33
Xerosis	31.58	33.33	23.53	20.01
Thyroid enlargement	5.26	13.33	0.00	0.00

boys and girls were 42.10 percent and 33.33 percent, respectively and in case of Kavar, it was 40.01 percent and 41.17 percent among boys and girls, respectively. It was also observed among 35.29 percent boys and 40.01 percent girls of Kavar preschool children. Irrespective of sex, Gond preschool children were suffered more by nutritional deficiency signs compared to Kavar preschool children.

**Comparison:** Table 4 shows the comparative account of mean nutrient intake of the present Gond and Kavar preschool children with the three zonal (Sarguja, Bastar and Jhabua) tribal preschool children of Central India (Rao et al., 1994). It was observed that mean calorie intake among Gond and Kavar tribes were 1255.15 kcal. and 1335.31 kcal (1-5 yrs) whereas the tribal children of Sarguja zone were 801.00 kcal (1-3 yrs) and 1421.00 kcal (4-6 yrs), Bastar zonal tribal children were 823.00 kcal (1-3 yrs) and 1256.00 kcal (4-6 yrs) and Jhabua zonal tribal children were 422.00 kcal (1-3 yrs) and 633.00 kcal (4-6 yrs), which signifies a more or less same amount of calories intake among them in respect of 4-6 years of children but calorie intake of Jhabua zonal tribal children were very low. Mean protein intakes were 34.84 gm and 35.47 gm among Gond and Kavar children whereas in Sarguja zone, tribal children were consumed 22.00 gm (1-3 yrs) and 37.00 gm (4-6 yrs) and the children of Bastar zone were consumed 22.00 gm (1-3 yrs) and 28.00 gm (4-6 yrs). Overall, the intake of protein was more or less similar among all the tribal children except Jhabua, who had consumed considerably less amount of protein than other tribal children. Calcium intake was 127.05 mg and 110.95 mg among Gond and Kavar tribal children. Beside these, the tribal children of Sarguja, Bastar, and Jhabua zones were consumed calcium, 122.00 mg, 137.00 mg, and

59.00 mg (1-3 yrs) and 181.00 mg, 140.00 mg, and 82.00 mg (4-6 yrs), respectively. Iron intakes of Gond and Kavar children were 17.88 mg and 11.92 mg, whereas, three zonal tribal children were having 10.50 mg, 10.10 mg and 5.10 mg for 1-3 years and 17.10 mg, 14.60 mg and 7.80 mg for 4-6 years, respectively. This hints that Kavar children of (4-6 yrs) were taking relatively lower amount of iron. In case of thiamine intakes, Gond and Kavar children were consumed 0.83 mg, and 0.89 mg, respectively. Whereas three zonal tribal children, had consumed 0.38 mg, 0.38 mg and 0.50 mg for 1-3 years and 0.56 mg, 0.43 mg, 0.76 mg for 4-6 years children, respectively. This hinted that Gond and Kavar children were consuming higher amount of thiamine than other tribal children of Central India. In case of riboflavin, Gond and Kavar children were consuming 0.33 mg and 0.32 mg, respectively. Whereas three zonal tribal children were consuming 0.29 mg, 0.24 mg and 0.17 mg for 1-3 years and 0.48 mg, 0.29 mg and 0.24 mg for 4-6 years, respectively. This suggested that Gond and Kavar children were consumed higher amount of riboflavin than three zonal tribal children but Bastar children were found to be taken highest amount of riboflavin. Intakes of niacin among Gond and Kavar children were 10.64 mg and 9.75 mg. Whereas three zonal tribal children had taken 4.9 mg, 5.0 mg and 2.6 mg for 1-3 years and 8.0 mg, 9.4 mg and 3.8 for 4-6 years, respectively. Which also suggested that higher intake of niacin among Gond and Kavar tribal children than three zonal tribal children of Central India. Lastly, vitamin C consumption of Gond and Kavar preschool children were 25.71 mg and 22.70 mg, whereas the tribal children of central India were consuming 14.9 mg, 31.5 mg and 6.2 mg for 1-3 years and 20.2 mg, 15.4 mg and 10.4 mg for 4-6 years, respectively.

**Table 4: Comparisons of mean nutrient intake with other tribes of central India**

Nutrient intake	Sarguja		Bastar		Jhabua		Gond	Kavar
	(Rao et al., 1994)						Present study	
	(1-3 yr)	(4-6 yr)	(1-3 yr)	(4-6 yr)	(1-3 yr)	(4-6 yr)	(1-5 yr)	
Calories (kcal)	801.00	1421.00	823.00	1256.00	422.00	633.00	1255.15	1335.31
Protein (gm)	22.00	37.00	22.00	28.00	16.00	22.00	34.84	35.47
Fat (gm)	-	-	-	-	-	-	6.24	5.62
Calcium (mg)	122.0	181.00	137.00	140.00	59.00	82.00	127.05	110.95
Iron (mg)	10.50	17.10	10.10	14.60	5.10	7.80	17.88	11.92
Carotene (ug)	-	-	-	-	-	-	222.58	213.25
Thiamine (mg)	0.38	0.56	0.38	0.43	0.50	0.76	0.83	0.89
Riboflavin (mg)	0.29	0.48	0.24	0.29	0.17	0.24	0.33	0.32
Niacin (mg)	4.90	8.00	5.00	9.40	2.60	3.80	10.64	9.75
Vitamin "C" (mg)	14.90	20.20	31.50	15.40	6.20	10.40	25.71	22.70

Gond and Kavar children were consumed much higher quantity compared to other three zonal tribal children but Bastar tribal children consumed highest amount in 1-3 years of age.

Table 5 represents the comparative account of nutritional status on the basis of nutritional anthropometric indices among Gond and Kavar children with the Kamar children of Chhittisgarh (Kumar et al., 1993), the Brahmin community of the Central India (Mitra and Tiwari, 1997), and with the Abujmaria tribal community of Chhittisgarh (Mitra, 2001). According to weight for age index, the Gond and Kavar children showed relatively higher (40.01% and 51.76 %) percentage of normal children compared to Brahmin (29.10%), Kamar (1.02%) and Abujmaria children (14.11%) of the same region as well as relatively lower percent of Grade I, Grade II and Grade III malnutrition than Brahmin and Abujmaria tribal children. But there was a relatively lower percentage (44.44% and 52.26%) of normal children than Brahmin children (85.13 %) in respect of height for age index. The weight for height index of malnutrition provides 45.01 percent Gond and 51.76 percent Kavar children were normal in comparison with 38.01 percent

Brahmin children. Grade I and Grade II malnutrition of weight for height shows that Brahmin children (42.97% and 19.02%) had relatively higher prevalence of malnutrition compared to Gond children (25.55% and 13.89%) and Kavar children (23.11 % and 18.59 %). The Kamar preschool children showed relatively higher (67.86 percent) occurrence of Grade III malnutrition compared to Gond (15.55 %) and Kavar children (6.54 %).

### DISCUSSION

Several studies have been done in different parts of India on health and nutritional status of preschool children (NNMB, 1978; FNB, 1981; Mahapatra et al., 2000; Ghosh, 2001; Urade et al., 2004; Kaur et al., 2005), protein energy deficiency (Sengupta, 1980; Gopalan, 1997), as well as nutritional status among different tribal children of Madhya Pradesh and Chhattisgarh states in India (Rao et al., 1994; Kumar et al., 1993; Mitra and Tiwari, 1997; Mitra, 2001).

Along with those studies, it was observed from the present study that the intake of nutrients was very much lower among Gond and Kavar preschool children along with other tribal children

**Table 5: Nutritional status of Gond and Kavar children with different communities in Central India**

Gradation of malnutrition		Kamar (Kumar et al., 1993)	Brahmin (Mitra and Tiwari, 1997)	Abujmaria (Mitra, 2001)	Gond (Present study)	Kavar (Present study)
<i>Weight for age</i>						
Normal	N	2	34	23	72	103
	%	1.02	29.10	14.11	40.01	51.76
Grade I	N	3	56	77	48	46
	%	1.53	46.28	47.24	26.67	23.12
Grade II	N	3	24	45	32	36
	%	1.53	19.85	27.61	17.78	18.09
Grade III	N	23	-	15	28	14
	%	11.73	-	9.20	15.54	7.03
<i>Height for age</i>						
Normal	N	-	103	-	80	104
	%	-	85.13	-	44.44	52.26
Grade I	N	-	18	-	47	40
	%	-	14.87	-	26.11	20.10
Grade II	N	-	-	-	29	33
	%	-	-	-	16.11	16.58
Grade III	N	-	-	-	15	17
	%	-	-	-	8.33	8.54
<i>Weight for height</i>						
Normal	N	17	46	-	81	103
	%	8.67	38.01	-	45.01	51.76
Grade I	N	11	52	-	46	46
	%	5.61	42.97	-	25.55	23.11
Grade II	N	35	23	-	25	37
	%	17.86	19.02	-	13.89	18.59
Grade III	N	133	-	-	28	13
	%	67.86	-	-	15.55	6.54

(Rao et al., 1994) from Central India compared to Recommended Dietary Allowances (RDA), specially consumption of calories and fat. Intake of micronutrients especially calcium and iron consumption were also very low among them. Apart from Central India, intake of calories (2211 kcal), protein (76 gm), fat (26 gm), calcium (407 mg) and other macro and micro nutrients per consumption unit per day of the Saharia primitive tribal preschool children of Rajasthan were higher than present children (Rao et al., 2006). It was revealed through the reflection of various indices of nutritional anthropometry such as weight for age, height for age and weight for height that high percentages of Gond and Kavar children were suffering from third or fourth degree of malnutrition. The high prevalence of malnutrition was also observed among Gond tribal preschool children of Madhya Pradesh (Rao et al., 2005). Comparatively, the Gond children were more malnourished than the Kavar children on the basis of weight for age index. The height for age and weight for height indices also showed the same trend, which may be due to their low standard of living and low intake of essential nutrient resulting in form of various deficiencies in clinical signs in both the tribes. On the other hand, in both tribes girls were more suffered by malnutrition compared to boys. Which may be due to the influence of gender bias regarding insufficient breastfeeding practices as well as early childhood diseases among girls than boys. However, they were far better than Brahmin (Mitra and Tiwari, 1997), Abujmaria (Mitra, 2001) and Kamar (Kumar et al., 1993) community of the same area in respect of weight for age and weight for height. But in height for age the number of normal children in Brahmin community were double than the present preschool children. Whereas present preschool children were more suffered by malnutrition compared to another Brahmin preschool children of Chhattisgarh state on the basis of weight for age and weight for height indices. The results were same in case of Teli (caste) children but reversed among lower caste Rawat preschool of the same area, where 23.65 percent of Rawat preschool children were suffered by grade III malnutrition on the basis of weight for height index (Mitra et al., 2004). The insufficient intake of macro and micro nutrients as well as high prevalence of malnutrition among Gond and Kavar preschool children may also be reflected through high prevalence of nutritional

deficiency signs among them. The prevalence of angular stomatitis (0.6%) and dental caries (3.0%) among Kodaku preschool children of Central India were much lower than present children (Dolla et al., 2005). Whereas the prevalence depigmentation of hair, easy pluckability of hair and xerosis were less than 15 percent among Pahariya tribal preschool children of Rajmahal hills of Bihar (Choudhary, 2001), which was also much lower in prevalence compared to present preschool children. Therefore, the present study indicates that tribal deprivation is still going on in the same order but in caste group of that area was previously better (height for age) but at present situation, their condition were worst than tribal community in respect of specific region due to some unknown reasons.

Therefore, the reason for the poor health and nutritional status of the study populations may be due to low purchasing power, illiteracy, ignorance, anti-nutritional factors of the plant origin food due to lack of appropriate nutrition knowledge. Thus it is necessary to make them aware and educates the population to adopt the easy methods to improve their dietary quantity. Future studies will necessary for extract the determinants of chronic malnourishment of Gond and Kavar preschool children.

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