

## Undernutrition & childhood morbidities among tribal preschool children

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**Background & objectives:** Undernutrition and various morbidities go hand in hand, particularly in children. Nutritional status is a sensitive indicator of community health and nutrition. The present study is an attempt to assess the nutritional status of pre-school children of Gond tribal community in Madhya Pradesh.

**Methods:** The study was a community-based, cross-sectional survey carried out in tribal pre-school children. Anthropometric measurements were taken. Various indices of nutritional status were expressed in standard deviation units (z scores) from the reference median. The children were examined for nutritional deficiencies and other morbidities. The haemoglobin concentration was measured and the children were classified into various grades of nutritional anaemias. Data on socio-cultural and hygienic practices were also collected.

**Results:** More than 60 per cent children were underweight. Micronutrient deficiency disorders such as anaemia and vitamin A deficiency were common among them. Unhygienic personal habits and adverse cultural practices relating to child rearing, breast-feeding and weaning were also prevalent among them.

**Interpretation & conclusion:** The findings of the present study revealed the widespread prevalence of undernutrition among pre-school tribal children and highlight a need for an integrated approach towards improving the child health as well as nutritional status in this area.

**Key words** Anaemia - pre-school children - tribal - undernutrition - unhygienic practices

Pre-school children constitute the most vulnerable segment of any community. Their nutritional status is a sensitive indicator of community health and nutrition<sup>1</sup>. Undernutrition among them is one of the greatest public health problems in developing countries. About 128 million (70%) of the world's 182 million stunted children aged under five years live in Asia<sup>2</sup>.

Nutritional status plays a vital role in deciding the health status particularly in children. Nutritional deficiencies give rise to various morbidities, which in turn, may lead to increased mortality. Undernutrition is a known factor closely associated with child mortality rates<sup>3,4</sup>. An analysis of six longitudinal studies by World Health Organization (WHO) revealed a strong association between severity of weight for

age deficits and mortality rates: 54 per cent deaths of under five children in developing countries were accompanied by low weight for age<sup>5</sup>. Attempts to reduce child mortality in developing countries through selective primary health care have focused primarily on the prevention and control of specific infectious diseases, with less effort being directed to improving children's underlying nutritional status<sup>6</sup>.

The subject gains more importance in tribal children, due to certain adverse realities like insufficient food intake, frequent infections, lack of access to health services, illiteracy, unhygienic personal habits, adverse cultural practices, *etc.* In this study we made an attempt towards assessing the nutritional status, nutritional deficiency signs and other morbidities among pre-school children of *Gond* tribal community of Madhya Pradesh, India.

### Material & Methods

The study was carried out in Kundam block of Jabalpur district, Madhya Pradesh (MP), during April 2000 and May 2001. It was a community based, cross-sectional survey among *Gond* tribe of the area. Majority of the villages in the block are inhabited by the *Gond* tribal population. In order to assess nutritional status of pre-school children, 27 of the 197 tribal villages were selected by the probability proportionate to size (PPS) sampling.

A house-to-house survey was conducted in study villages to examine tribal pre-school children. The sample size was estimated to be 817 at 95 per cent confidence interval (CI) with 5 per cent precision. However, considering anticipated non response in the field situation, oversampling of 25 per cent was made to achieve the estimated sample size. Thus, a total of 1022 children were covered from 27 villages. Anthropometric measurements in the form of height and weight were taken using standard techniques<sup>5</sup>. Height of children under two years of age was measured in supine position using infantometer (Seca, Germany) and older children were measured using infantometer. The body weight of each child was measured using lever balance. The ages of the children were obtained from the birth records available with the village panchayat and were cross-checked with the parents by using local events calendar to ensure accuracy of the records. The

heights and weights of each child were compared with National Center for Health Statistics (NCHS) reference data<sup>7</sup> for age and sex of children. The indices of nutritional status (weight for age, height for age and weight for height) were expressed in standard deviation units (z scores) from the reference median as recommended by the WHO<sup>8</sup>. Children with more than two standard deviations below the reference median on any of the indices were considered to be undernourished and the children who fell more than three standard deviations below the reference median were considered to be severely undernourished. All the children were examined clinically by a medical epidemiologist for clinical signs of nutritional deficiencies and other morbidities. The haemoglobin concentration was measured using Sahli's method<sup>9</sup>. Children were classified into different grades of nutritional anaemia as per the WHO criteria<sup>10</sup>.

Data on socio-cultural and hygienic practices were collected from the households during the survey using pre-tested, structured proforma. Data were analyzed using t test and  $\chi^2$  test with the help of Statistical Package for Social Sciences (SPSS) software.

### Results

A total of 1022 pre-school children (M 527, F 495) were examined. Boys were slightly taller and heavier than girls but the difference was not significant (Table I). Both the boys and girls were shorter and lighter compared to the NCHS reference data for their ages and sex.

Table II shows distribution of pre-school children according to Standard Deviation (SD) classification. High prevalence of undernutrition (below 2SD) in terms of underweight (61.6%), stunting (51.6%) and wasting (32.9%) was observed among them. The study revealed severe degree (below -3SD) of underweight, stunting and wasting in 27.8, 30.3 and 6.5 per cent children, respectively. Prevalence of undernutrition in terms of underweight, stunting and wasting was found similar in both the sexes (Table III).

Anaemia prevalence rate of 86.7 per cent was observed among the children. Moderate and severe anaemia was observed in 71.1 per cent children. Prevalence and the distribution of various grades of anaemia were found similar in boys as well as in girls (Table IV).

**Table I.** Mean anthropometric measurements of pre-school children

Age (yr)	Sex	N	Weight (kg)	Height (cm)
0-1	M	75	6.2 ± 1.75	63.6 ± 4.86
	F	69	5.8 ± 1.68	62.8 ± 5.02
1+	M	85	8.2 ± 1.64	72.3 ± 5.48
	F	82	7.9 ± 1.53	70.9 ± 4.95
2+	M	94	9.8 ± 1.81	82.0 ± 5.32
	F	88	9.5 ± 1.60	80.1 ± 5.10
3+	M	89	11.2 ± 1.72	86.2 ± 6.28
	F	86	11.0 ± 1.56	85.6 ± 5.51
4+	M	96	12.8 ± 1.98	95.4 ± 5.56
	F	89	12.4 ± 1.91	94.3 ± 6.82
5+	M	88	13.8 ± 2.01	101.2 ± 6.19
	F	81	13.6 ± 2.22	99.7 ± 6.77

Values are given as mean ± SD

Prevalence of clinical protein energy malnutrition (PEM) in the form of marasmus was found in 6 (0.6%) children, while Kwashiorkor was not recorded. Emaciation was seen in 35 (3.4%) children. Clinical signs of anaemia were present in 530 (51.9%) children. Vitamin A deficiency in the form of Bitot’s spots was recorded in 16 (1.6%) children. A total of 127 (12.4%) children were found suffering from upper respiratory tract infection. Vitamin B complex deficiency in the form of angular stomatitis and cheilosis was seen in 29 (2.8%) children.

Data on socio-cultural and hygienic practices revealed that open air defecation is the rule in these villages. Children often defecate in the open space around the houses. Most of them either do not wash their hands or use plain water for hand washing before eating and after defecation. Only 93 (9.1%) children were put on breast feeding within 2 h of birth; 380 (37.2%) children were put to breast by second day or

thereafter. Majority of the children (72.5%) did not receive prelacteal feeds. Exclusive breast feeding up to 4 months was not done in 23.4 per cent children. Supplementary feeding was, however, started by 6 months in majority of the children (84.5%). Colostrum was not given to 86.4 per cent children.

### Discussion

Undernutrition was found to be widely prevalent among pre-school children of the *Gond* tribe of Jabalpur district. More than 60 per cent children were underweight and more than 25 per cent had severe undernutrition. High prevalence of chronic undernutrition was also observed in other studies<sup>11-14</sup>. Higher prevalence of undernutrition was also observed among them as compared to the prevalence among children in general<sup>15,16</sup>. The findings of the National Family Health Survey (NFHS) also reveals the highest proportion of underweight children in Madhya Pradesh as compared to other states in India, and according to other two indicators also, higher prevalence of undernutrition was observed in the state of Madhya Pradesh<sup>17</sup>.

Contrary to popular belief, we found that colostrum was not given to majority of the children and exclusive breast-feeding up to 4 months was not done in about one fourth of the children. More than one third of the children were put to breast by second day of birth or thereafter. Giving prelacteal feed was lower in tribal children than in other urban studies<sup>18,19</sup>.

Undernutrition is a well known contributory factor to high mortality in children due to infectious diseases. High infant mortality and under five mortality rates among scheduled tribes of Madhya Pradesh have been observed<sup>17</sup>. Though the causes of high rate of childhood mortality were not studied, high prevalence of respiratory tract infections and

**Table II.** Distribution of pre-school children according to SD classification

	Pre-school children				
	<-3SD	-3SD to <-2SD	-2SD to <-1SD	-1SD to <median	≥median
Weight/age	283 (27.7)	347 (33.9)	240 (23.5)	93 (9.1)	59 (5.8)
Height/age	308 (30.1)	220 (21.5)	200 (19.6)	155 (15.2)	139 (13.6)
Weight/height	66 (6.5)	270 (26.4)	419 (41.0)	198 (19.4)	69 (6.7)

Figures in parentheses indicate percentages

**Table III.** Nutritional status of pre-school children

Children	Underweight (%)	Stunting (%)	Wasting (%)
Boys (n=527)	332 (62.9)	287 (54.4)	159 (30.1)
Girls (n=495)	298 (60.3)	241 (48.8)	177 (35.8)
Total (n=1022)	630 (61.6)	528 (51.6)	336 (32.9)

t(a), (b) and (C):  $P > 0.05$

**Table IV.** Prevalence of anaemia among pre-school children

Anaemia status	Boys (n=509)	Girls (n=476)	Total (n=985)
Mild	86 (16.9)	68 (14.3)	154 (15.6)
Moderate	313 (61.5)	315 (66.2)	628 (63.8)
Severe	39 (7.7)	33 (6.9)	72 (7.3)
Total	438 (86.1)	416 (87.4)	854 (86.7)

Figures in parentheses indicate percentages

$\chi^2=2.04$  at 2df  $P > 0.08$

micronutrient deficiency disorders such as anaemia and vitamin A deficiency might be playing an important role. A study among preschool children of this tribe also revealed high prevalence of intestinal parasitic infections (48%) among them<sup>20</sup>. Poor environmental sanitation and unhygienic personal habits appear to predispose them to the risk of infections. In addition to the infections, adverse cultural practices relating to child rearing, breast-feeding and weaning were some other contributory factors for malnutrition and must be playing an important role in this community.

The present study revealed the widespread prevalence of undernutrition among pre-school children of this tribal community. Analysis of pooled data obtained from several studies has shown that children with mild to moderate degrees of malnutrition have a relative risk of 2.2 for death under five years of age and children with severe malnutrition have a relative risk of 6.8<sup>21</sup>. Also, the population attributable risk for death due to potentiating effect of malnutrition on infectious diseases varies with the percentage of children, with weight for age less than 80 per cent of the reference point, following a quadratic relation<sup>3</sup> and 21 per cent of all deaths occurring among under-fives is attributable to malnutrition<sup>20</sup>.

Though undernutrition *per se* cannot be the direct cause of high rate of childhood mortality it appears to be a major contributory factor for high infant and child mortality rates. The problem of undernutrition amongst pre-school tribal children needs to be addressed through comprehensive preventive, promotive and curative measures. The community needs to be educated about environmental sanitation and personal hygienic practices, and also proper child rearing, breast-feeding and weaning practices. Appropriate nutritional programmes should be designed to meet the requirements. A comprehensive child survival programme with supplementary feeding, growth and development monitoring and early, prompt treatment during illness needs to be devised and implemented ensuring community participation.

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