NUTRITIONAL STATUS OF PRESCHOOL TRIBAL CHILDREN IN NORTH KERALA

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ABSTRACT

BACKGROUND

Tribals are one of the most vulnerable groups in India. Under-nutrition 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 Kozhikode district in Kerala. The objectives of this study were 1. To study the prevalence of malnutrition among the preschool tribal children 2. To study the associated risk factors.

MATERIALS AND METHODS

The study was a community-based, cross- sectional. Study was carried out in randomly selected 10 panchayaths in Kozhikode. Cluster sampling method was used. Anthropometric measurements were taken. Various indices of nutritional status were expressed in standard deviation units (z scores) from the reference median.

RESULTS

More than half of the children say 57.6% (152/246) had deficits in at least one of the two anthropometric indicators. The prevalence of underweight and stunting was 47.3% and .38.6% respectively. The analysis showed significant associations between under-nutrition and educational status of mother, tribe to which the child belonged, large family size, high birth order and low preschool attendance.

CONCLUSION

The findings of the present study revealed the widespread prevalence of under-nutrition 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.

KEYWORDS

Family Size, Pre-School Children, Stunting, Under Weight, z Score.

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BACKGROUND

The tribal population are recognised as a socially and economically vulnerable group. Their life styles and habits are different from that of their rural neighbour's Health is a prerequisite for human development and wellbeing of a community. National level data show that health of indigenous people is significantly poorer than other groups.[1] In Kerala 5% of the population is tribals.[2] Kerala had over the years initiated several focused interventions for development and improvement in health and nutritional status of tribal population.[3] Though Kerala is successfully implementing all nutrition oriented programmes, the nutritional status of preschool children in the state is not that of the best performing countries. Only few studies about the nutritional status of tribal children in Kerala are available. The studies showed that the prevalence of under- nutrition was higher among the tribal children compared to general population.

The data on nutritional status of preschool tribal children in north Kerala including Kozhikode is scarce. There is an urgent need to estimate the prevalence of malnutrition among tribal children and its risk factors; hence this study on the nutritional status of preschool tribal children was conducted. The study can give an insight into the prevalence of malnutrition among tribal preschool children in Kozhikode district and can help to formulate preventive and promotive strategies to address the problem among this group.

Objectives

1. To study the prevalence of malnutrition, to study the associated risk factors.

MATERIALS AND METHODS

Study Design- Descriptive cross- sectional study.

Study Setting- The tribal population is distributed in thirty three panchayaths of Kozhikode District. Among these 33 panchayaths, 10 were included in this study. The study was

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carried out in tribal colonies of randomly selected sample of 10 panchayaths in Kozhikode district, Kerala from July 2011 to December 2011 over a period of 6 months. The investigators visited all the colonies of each panchayath and collected sociodemographic details from parents after which examination of children was done at the colony and from Anganwadies.

Study Population- All preschool children in selected panchayaths.

Inclusion Criteria- Parents of eligible children who were willing to participate in the study.

Exclusion Criteria- The children who could not be contacted at the time of survey.

Sampling- The list of panchayats with tribal population was taken from the tribal welfare office Kozhikode. Cluster sampling method was used. Each of the Grama panchayats with tribal population was taken as a cluster. There were 33 panchayats having tribals in Kozhikode district. Among these 33 clusters 10 were selected by simple random technique (lottery method). All eligible children in the 10 selected clusters included in the study.

Sample size- Sample size was calculated as

$$n = 1.96^2 \times \frac{p\,q}{d^2} \times \text{Design Effect}$$

$$= \frac{3.84 \times 48 \times 52}{7.2 \times 7.2} \times 1.24 = 229$$

Based on the National Family Health Survey-3 (NFHS-3).[4] report of 48% tribal children being stunted (p) with 15% permissible error and 95% confidence interval, q=1-p and a design effect of 1.24, the estimated sample size was 239.

Study Tools- A pretested semi structured questionnaire, electronic weighing machine and stadiometer for anthropometric measurements.

Data Collection- After getting informed consent from the tribal officer and District Medical Officer Kozhikode, all colonies of each panchayath were visited with the help of the tribal promoter. After getting a written informed consent from the parent/care giver of the child, data on socio-cultural and hygienic practices were collected from the households during the survey using a pre-tested, structured proforma. The nutritional intake was calculated by 24 hour recall method. The children were examined at the anganwadi, for those who are not present at the anganwadi examination was done at the houses.

Anthropometric Measurements- Height, weight and mid- arm circumference were measured to the nearest 0.1 cm, 0.1 kg, and 0.1 cm respectively using the standard method prescribed in WHO field manual.

Measurement of Height- Height was measured using a Stadiometer (Portable Height– length measuring board). Participant was asked to stand on the board facing the investigator keeping their feet together, heels against the back board and knees straight. The participant was told to look straight ahead and not look up, making the eyes at the same level as ears. The measuring plate was moved down and placed on top of head. Height was read in centimetres to the nearest 0.1 cm.

Measurement of Weight- Weight was measured using an electronic weighing machine with a precision of 0.1 kg. The scale was placed on a firm, flat surface. Participant was asked to remove foot ware, and step on to the scale putting one foot on each of the foot- prints and stand still facing forward and arms on the side and wait until told to step off. The weight was measured in kilograms to the nearest of 0.1 kg.

The body weight of each child was measured using electronic weighing machine.

The ages of the children were obtained from the Anganwadi records and from mothers.

Prevalence of malnutrition was assessed by calculating the weight/age (underweight) and height/ age (stunting) with the help of WHO Anthro-plus software. Children with Z score of -2SD or less than -2SD were taken as undernourished. Data were analyzed using with the help of Statistical Package for Social Sciences (SPSSv16) software. Association of risk factors with under nutrition was done using Chi square test. Statistical comparison was done using appropriate statistical method and level of significance was estimated with 95% confidence intervals and p value < 0.05.

Ethical Aspects- Study protocol was submitted to the Institutional Research Committee as well as Institutional Ethics Committee of Govt. Medical College, Kozhikode and clearance was obtained for conducting the study. Informed written consent was obtained from District Medical Officer Kozhikode. Written permission was obtained from District Tribal Officer. Willingness of parents was ensured before study.

Preschool Children- Children in the age group of 3 to 6 years.

Z score- A Z -score is the number of standard deviations (SD) below or above the reference median value. The Z score or standard deviation unit (SD) is defined as the difference between the value for an individual and the median value of the reference population for the same age or height divided by the standard deviation of the reference population. Z scores are used in the WHO growth chart.[5]

$$\text{Z-score} = \frac{\text{(Observed Values)-(Median Reference Values)}}{\text{Standard deviation of the reference population}}$$

Under Weight (Low Weight for Age)- Children who had weight two or more than two standard deviation below the reference median (Underweight ≤ -2SD) were identified as mildly undernourished, moderate underweight children had

two to three standard deviation below the reference median and severe underweight children below -3SD.

Stunting (Low Height for Age)- Children who had height two or more than two standard deviation below the reference median (Stunting ≤ - 2 SD), moderate stunting is the children with - 2 to -3 SD and severe stunted children had height for age less than -3SD.

Family Size- total number of members in the family.

RESULTS

Number of Clusters	Cluster by Panchayat	Pre-school Children	
		n= 264	Percentage
1	Kodenchery	62	23.5
2	Vanimel	46	17.4
3	Kottur	40	15.2
4	Puthuppadi	32	12.1
5	Koodaranji	28	10.6
6	Thiruvambadi	21	8.1
7	Koduvally	12	4.5
8	Madavoor	9	3.4
9	Kakkur	9	3.4
10	Koorachundu	5	1.8

Table 1. Preschool Children by Cluster

Socio-demographic Profile of the Study Population- A total of 264 children participated in the current study. Out of them 134 (50.6%) were males and 130 (49.4%) were females. This proportion is nearly similar to the population of tribal preschool children in Kozhikode district (52.9% males and 47.1% females- data from ICDS June 2010). Maximum numbers of children were in the age group of 4-5years (36.7%) and minimum participants were in 5-6 age groups (27.7%). In the study six different tribal groups were participated .Among the six groups, Paniyars (46.2%) constituted the major group, followed by Karimpalan (26.5%), Kurichiar (12.8%), Muthan (11.4%), Kadavar (2.3%) and Kattunaikan (0.8%).

All the tribal preschool children were from Hindu families. According to the district wise study conducted by Scheduled caste and Scheduled tribe Development department in 2010, 99.93% of tribal families in Kozhikode district were Hindus and the rest were Christians. 71.2% of the study participants were from nuclear families, Socioeconomic status was assessed by using modified Udai Pareek's scale. Majority 241;91.3% belonged to lower socio economic class followed by middle class 23;8.7% Among the parents of the study children, majority of them had studied only up-to primary level of education. 7% mothers and 6.8% fathers had no school education.

Pan chewing was the most common habit among parents. The overall prevalence of pan chewing was 65.1% among fathers and 49.1% among mothers. Pan chewing was followed by alcohol use, 43.7% fathers and 17.5% mothers were alcohol users. Brewing of alcohol in colonies was noted during the survey. This may be the reason for high alcohol intake.

Birth Details of Child- Majority of the study-children (70.8%) were born at government hospital, 25% were at home and the rest 4.2% were at private hospitals.

The mean (SD) birth weight was 2.77 kg (0.33). Minimum weight was 1.8 kg and maximum was 3.64kg. Majority 226 (85.6%) of the children had 2.5 kg or more and 38 (14.4%) children had birth weight of less than 2.5 kg, out of which two had less than 2 kg.

Calorie and Protein Intake of the Children- The mean calorie intake (SD) was 1090 (142.10) kcal (minimum 860 kcal and maximum 1420kcal). The mean protein intake (SD) was 14.42 (3.58) gm (minimum 8gm and maximum 24 gm/ day).

Prevalence of Under-nutrition- The overall prevalence of under-nutrition among the study –children (children with any of the two, either with underweight or stunted) was found to be 57.6% (152 out of 264).

Nutritional Status	Study Population n=264		Males n=134		Females n=130	
	n (%)	95% CI (%)	n (%)	95% CI (%)	n (%)	95% CI (%)
Undernourished (n=152)	152 (57.6)	55.5 -63.4	82(31.1)	25.5 -36.9	70 (26.5)	21.6 - 32.2
Normal (n=112)	112 (42.4)	36.6 -48.5	52(19.7)	15.6 - 24.9	60 (22.7)	18.1 - 28.2

Table 2. Distribution of Study- Children by Their Nutritional Status

Out of 264 children 152 (57.6%) children had under nutrition (either underweight or stunting), 112 (42.4%) children were getting adequate nutrition and there were no children with over-nutrition. 82 (31.1%) males and 70 (26.5%) females had under nutrition.

Among the 152 (57.6%) under nourished children 75 had both underweight and stunting, 50 had only underweight and 27 had only stunting. The prevalence of underweight and stunting among the study population were 125 (75+50) 47.3% and 102 (50+27) 38.6% respectively.

Study Group	Under Weight		Stunting	
	n (%)	95% CI	n (%)	95% CI
All Study subjects (n=264)	125 (47.3)	41.4 - 53.4	102 (38.6)	32.9 – 44.6
Males (n=134)	64 (24.2)	19.5 – 29.8	56 (21.2)	16.7 – 26.5
Females (n=130)	61 (23.2)	18.4 - 28.6	46 (17.4)	13.3- 22.5

Table 3. Distribution of Undernourished Children by Underweight and Stunting

Out of 264 children 125 (47.3%) had underweight and 102 (38.6%) were stunted. The rate of underweight and stunting among males were 64 (24.2%) and 56 (21.2%) respectively. In females underweight was found in 61 (23.2%) and stunting in 46 (17.4%) children. Sex distribution of underweight and stunting was almost similar.

Degree of Under Nutrition	Under Weight n=125 n (%)	95% CI	Stunting n= 102 n (%)	95% CI
Mild to Moderate	94 (75.2)	67 - 82	82 (80.4)	71.7 – 86.9
Severe	31 (24.8)	18.1 – 33.1	20 (19.6)	13.1 - 28.4

Table 4. Classification of Underweight and Stunting

Prevalence of moderate underweight (-3SD to -2SD) among the 125 underweight children was 94 (75.2%), severe underweight (< -3SD) was 31 (24.8%) and moderate and severe stunting was 80 (80.4%) and 20 (19.6%) respectively.

Study Group	Mean (SD) Weight in kg	Mean(SD) Height in cm
Total study subjects n=264	13.38 (2.29)	98.02 (7.60)
Males (134)	13.55 (2.32)	98.29 (7.67)
Females (130)	13.21 (2.26)	97.74 (7.55)

Table 5. Anthropometric Indices

Mean Weight (SD) and mean (SD) Height were found to be similar in both sexes.

Sociodemographic Factors	Underweight		P value	Stunting		P value
	Yes No. (%)	No No. (%)		Yes No. (%)	No No. (%)	
Tribal Group						
Paniyar (122)	87 (71.3)	35 (28.7)	0.000	62 (50.8)	60 (49.2)	0.002
Muthan (30)	19 (63.3)	11 (36.7)		12 (40)	18 (60)	
Karimpalan (70)	11 (15.7)	59 (84.3)		15 (21.4)	55 (78.6)	
Kurichiar (34)	4 (11.8)	30 (88.2)		9 (26.5)	25 (73.5)	
Others (8)	4 (50)	4 (50)		4 (50)	4 (50)	
Family ize						
≤4 (102)	31 (30.1)	71(69.9)	0.000	31 (30.1)	71 (69.9)	0.038
>4 (162)	94(58)	68 (42)		71 (43.8)	91 (56.2)	
Birth Order						
≤ 2 (180)	74 (41.1)	106 (58.9)	0.002	66 (36.7)	114 (63.3)	0.204
>2 (84)	51 (60.7)	33 (39.3)		36 (42.9)	48 (57.1)	
Mother's Education						
No school education (23)	15 (65.2)	8 (34.8)	0.000	14 (60.9)	9 (39.1)	0.000
LP & UP(135)	88 (65.2)	47 (34.8)		63 (46.7)	72 (53.3)	
High school & above(105)	21 (20)	84 (80)		25 (23.8)	80 (76.2)	
Preschool Attendance						
Not attending (36)	32 (88.9)	4 (11.1)	0.000	25 (69.4)	11 (30.6)	0.000
Attending Preschool (228)	93(40.8)	135 (59.2)		77 (33.8)	151 (66.2)	

Table 6. Risk Factors of Under Nutrition (Underweight and Stunting)

Under weight and stunting were found to be higher (71.3%) in Paniyar children followed by Muthan and others (Kadavar and Kattunaikkan groups). This difference was found to be statistically significant.

The prevalence of underweight and stunting were higher (58% and 43.8%) in children whose family size was more than 4. The study showed that the prevalence of underweight was higher among children whose had birth order was more than 2 (60.7%) than the children of second or first birth order (41.1%). The association was found to be statistically significant. Stunting was also found to be higher among the children of more than second birth order (42.9%) than the children of second or first birth order, but it was not statistically significant. The rates of underweight and stunting were showed a decreasing trend in prevalence with higher level of mother's education. This association was found to be statistically significant.

DISCUSSION

There was no association between the age and sex of the child with undernutrition in this study.

Tribal Group- Under weight and stunting were found to be higher (71.3%) in Paniyar children. Thi finding was comparable with study- findings made earlier by other researchers. It was noticed that Paniyar group was less educated and socioeconomically backward and this may be the reason for this difference. In Philip, et al' study conducted in 2010 (to assess under-nutrition among tribal preschool children in Kerala) showed that the prevalence of underweight among Paniyar tribal group is higher than the other groups[5] The SC/ST Development department study (2010) showed that the children among the Paniyar are the most vulnerable group in Kozhikode district

Family Size- The prevalence of underweight and stunting were higher (58% and 43.8%) in children whose family size was more than 4. According to the study conducted at Army School, Pune by Maj R Mukherjee et al (2007), family size was significantly associated with the nutritional status of the school children in general population.[6] The present study also showed a risk association between the family size and under- nutrition. When the family size increases the availability of food to each individual may decreases.

Birth Order- The study showed that the prevalence of underweight was significantly higher among children who had birth order of more than 2 .The association was statistically significant. Stunting was also found to be higher in the children of more than second birth order but it was not statistically significant. This may explained by the fact that as the birth order increases the caring given by parents to their children may also decreases.

A study by Jyothilakshmi et.al at Mysore showed that underweight and stunting were increased when the order of birth is more than 3 and it showed statistical significance.[7] The current study finding affirmed their findings.

Mother's Education- From the current study, it was seen that the rates of underweight and stunting were showed a decreasing trend in prevalence with increase in mother's education. This was statistically significant. The child rearing may be better in educated mothers than illiterate.

In the study by Aparna Pandey et al. (2007) showed that the proportion of both underweight and stunting was more among children of illiterate mothers (52.2% and 55.8%) while compared with children of mothers having above primary education (41% and 42.9%).[8]

The present study also showed a prevalence of higher under nutrition among the children of illiterate mothers and the prevalence decreased with increase in the educational status. Educated mothers may more aware to give better care to their children.

Preschool Attendance- Among 264, 166 were Anganwadi going children. 16 were studying in Ekadyapaka Vidyalayam (under Tribal department), 18 in Multi Grade Learning Centre (Education department), 15 in Kinder Garden (Tribal dept.), and 13 in Government Welfare Lower primary School. 36 were not attending any preschools.

According to NFHS-3 (2005-2006) report, in Kerala 31% of children (general population) aged 36-71 months received early childhood care/preschool services.

The prevalence of underweight and stunting were more (88.9% & 69.4%) among the children who were not attending preschools, from where they were getting supplementary nutrition. The findings of the present study emphasized that utilization of supplementary nutrition was a protective factor against under nutrition. The study by DK. Mukhopadhyay. et al (2009) among tribal children in West Bengal showed that availability of supplementary nutrition was a protective factor against under nutrition (AOR=3.25, 1.46-7.27).[9] The present study also pointed out that the supplementary nutrition from preschools is a protective factor for the children, because they may get food at least from there.

CONCLUSION

The study has shown that underweight and stunting is prevalent among preschool tribal children in Kozhikode district. Paniyar (46.2%) was the main tribal group included in this study. The mean family size (SD) of the study group was 5.29 (1.77). Majority of the children (91.3%) belonged to lower socioeconomic status. Pan chewing was the most common addictive habit among parents followed by alcohol use. 43.7% fathers and 17.5% of mothers were using alcohol. The mean calorie and protein intake was low among the children.

Under weight and stunting were found to be higher in Paniyar children followed by Muthan and others. The prevalence of underweight was similar among male and female children. Risk factors like large family size, birth order more than two, poor mother's education, and non-availability of supplementary nutrition due to the absence of preschool attendance were associated with higher prevalence of underweight. The association between the birth order and stunting was not significant, all other factors were showed significant association with stunting also.

Recommendations- The increasing prevalence of under nutrition among preschool tribal children needs to be addressed. Paniyar groups contributes major part of the under nutrition so more attention has to be given to this groups.

Providing facilities like tribal clinics to address proper rearing of children by mothers' education or learning, public awareness programs, counselling and monitoring should be initiated under Rural Health Training center. Proper guidance and education or learning create chances for their mingling with the general public which in turn shall give them opportunities for widening their outlook .Supplementary nutrition program under Anganwadi need to be strengthened for preschool children. Out of total workers of 42 preschools visited, only four were from the tribal community. It is better to give proper training for the eligible women in their own community and appoint them as preschool workers. This can influence and motivate the children and their parents to attend the preschools. Alcohol use of parents is one of the most crucial problems faced by the tribal children. In some colonies brewing of alcohol was also noticed during the study. This may increase the parents' alcohol consumption. Alcohol use among parents' particularly in mothers adversely affects the mental quality as well as intellectual potentiality of children Frequent visits by the health workers, tribal promoters and other local volunteers can do a lot to decrease the alcohol consumption. They can arrange special programmes and campaigns which help to convey the adverse effects of alcohol use.

Limitations- A few tribes were living in independent families. Their nutritional status may not be included in this study, this may influence the results.

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