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Prevalence of malnutrition and dietary intake: A comparative study on tribal children (1-3 years) of Odisha

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Abstract
Despite India's remarkable economic growth over the last decades, taking different steps to provide enough food to each and every individual through Public Distribution System, paying enough policy attention to health and nutrition issues of children, adolescents, pregnant and lactating mothers, malnutrition rates still remain high in India. The objectives of the study was to assess the food and nutrient intake of the tribal children belonged to 1-3 years age group and to analyze the impact of food intake on prevalence of different degrees of malnutrition. The results of the study revealed that out of the total surveyed children, 70% of the children were suffering from different degrees of malnutrition. Prevalence of malnutrition was more among girls in comparison to boys and was also statistically significant. Mean food intake of the children suffering from malnutrition was found to be less than RDA. Fruit, milk, sugar and Jaggery consumption was found to be nil in the diets of wasted and stunted children. C.R. value of mean food intake of children showed that there was no real difference in the intake of different food items of children suffering from two consecutive grades of malnutrition but significant difference in food intake was observed between normal children and moderately and severely malnourished children. The intake of nutrients was found to be decreased with the occurrence of severity of degrees of malnutrition. The most dis-advantageous situations for prevalence of malnutrition was found to be wrong perception about Govt. supplied food (81.7%), working mother (90%) no one to look after child (78.3%), belonging to lowest wealth quintile (75%), poor sanitation (65%) and alcoholic father (53.3%) etc. Thus it can be concluded that only providing health services and supplying food materials is not sufficient to combact malnutrition rather nutrition and health camps should be organized and the parents should be educated, inspired & mobilised to utilise the services provided to them at their door step.

Keywords: Wasted, Stunted, Wealth Quintile, Nutrient, Malnutrition

Introduction

Malnutrition among children is a global problem and India's silent emergency, Rates of Malnutrition among India's children are almost five times more than in china and twice those in sub-Sub-Saharan Africa. Nearly half of all India's children approximately 60 million are under weight (43%), about 48% are stunted, 20% are wasted, 75% are anaemic and 57% are Vitamin A deficient. The country grows sufficient food and has a functional democratic system with effective feedback mechanisms. World's largest Public Distribution system for food delivery is working to reach every citizen of the country and enough policy attention has also been paid to health and nutrition issues in recent years, still than malnutrition rates remain high in India. In Maharashtra, Orissa, Bihar, Madhya Pradesh, Uttar Pradesh and Rajasthan at least one in two children is under nourished according to the report of World Bank. Malnutrition affects children's chances of survival, increases their susceptibility to illness, reduces their ability to learn, increases their chances of dropping out early from school and makes them less productive in later life. Keeping these facts in mind, the present research is designed to assess the impact of dietary intake on prevalence of different degrees of malnutrition among tribal pre-school children (1-3 years) of Odisha. The main objectives of the study were –

- To know the socio-economic condition of the respondents.
- To assess the food & nutrient intake of the respondents.
- To analyze the impact of food intake on prevalence of different degrees of malnutrition.

Materials and Methodology

The present research was conducted at Udala ICDS project of Mayurbhanj District of Odisha during the Month of May 2015 to June 2015 One hundred and twenty tribal children belonged to 1 to 3 years of age group were selected randomly for the present study. The information on demographic profile of the respondents was collected with the help pretested questionnaire by interviewing the parents. Diet survey was done by using 24 hours recall method. The food and nutrient intake of the respondents was calculated after converting the cooked amount in terms of its raw weight and was compared with the RDA. The height & weight of the respondents was taken with the help of measuring tape and weighing machine respectively. The children were classified into different degrees of malnutrition by using Waterlow's classification.

Water lows classification

Water Low's classification defines two groups for protein energy malnutrition with retarded growth in which a drop in the height/age ratio points to chronic condition of shortness/stunting. Malnutrition with low weight for a normal height, in which the weight for a height ratio is indicative of an acute condition of rapid weight loss or wasting. In the present study weight for height and height for age was used combinedly to assess the grades of malnutrition in children. The standard of weight for height and height for age was compared with NCHS standard.

Table 1: Waterlow's Classification

W/H H/A	> m - 2 SD	< m - 2 ST
> m - 2SD	Normal	Stunted
< m - 2SD	Wasted	Wasted and Stunted

m - Mean, SD Standard deviation of standard error.

Results and Discussion

The results of the present investigation were tabulated, statistically analyzed and are discussed below.

(a) Socio economic Indicators

Out of 120 respondents 60 were boys and 60 were girls. Nuclear family system (75%) was found to be prevalent in that area with 4-6 family members. Children were belonged to different tribal castes like Santal, Bhumiji, Lodha, Saura, Bhuinya etc. 45% of the parents were found to be illiterate and 30% of the were educated up to 5th class. 73.3% of the parents were working as Agricultural labourers and 47.5% parents had income less than Rs. 30,000 per annum. 58.3% families had less than 2.5 acres of land having kitchen garden in their backyard. 63.3% families keeping poultry and dairy for the purpose of milk and meat. 39% parents kept farm animals for the purpose of cow dung & manure for their land. 83.3% of the parents were using Ph. D water or water from the tube well for the purpose of drinking and cooking.

Table 2: Socio-economic Indicators

S. No	Characteristics		Frequency	Percentage
1.	Sex	- Boys	60	50
		- Girls	60	50
2	Nuclear family		90	75
3	4 - 6 family members		96	80
4	Education of Parents	- Illiterate	54	45
		- U.P. (5th Class)	36	30
		- M.E. (7th Class)	18	15
		- Metric & Above	12	10
5	Occupation of Parents	- Agriculture	88	73.3
		- Business	24	20.0
		- Any other	08	06.7
6	Income of the Parents Less than Rs. 30000 per annum		57	47.5
7	Land owned - Less than 2.5 acres		70	58.3
8	Keeping poultry & farm animals		76	63.3
9	Using water from Tube well / PhD water		106	83.3

(b) Nutritional status of children with regard to age and sex according to water low's classification

Table 3: Nutritional status of children with regard to age and sex.

S. No.	Nutritional Status/Age in Months	Normal		Wasted		Stunted		Wasted & Stunted		Total
		Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
1	13-18	13	03	05	03	04	01	02	01	32
2	19-24	04	03	05	05	01	06	01	03	28
3	25-30	03	02	07	05	04	06	02	02	31
4	31-36	03	05	04	05	01	19	01	04	29
	Total	23 (19.2)	13 (10.8)	21 (17.5)	18 (15)	10 (8.3)	19 (15.8)	06 (50)	10 (8.3)	120 (100)

N.B. Numbers in parenthesis indicate percentage of children. X^2 value - 16.7* significant at 5% level for sex of children.

It was observed that 30% respondents were normal whereas 70% respondents were suffering from different degrees of malnutrition. More percentage of boys belonged to normal & wasted (mildly malnourished) nutritional status in comparison to girls whereas more number of girls belonged to stunted (moderately malnourished) and wasted and stunted (severely malnourished) nutritional status in comparison to boys. A strong discrimination of sex was observed in this study. Statistically it was also observed that sex has significant effect on the prevalence of different degrees of malnutrition which may be due to more care and more preference for male child by the parents. Similar observations was also found out by Maurya *et al*. (1997) [13] and Chandra *et al*. (1994) [3].

(c) Food habits

Majority of the children were non-vegetarian (92%) and all children were taking 4 to 5 meals per day. Generally they took biscuit / puffed rice / chatua / in the morning followed by rice / water rice with chili / pulses / vegetables in the lunch. In the afternoon they took biscuit / rice pan cake prepared out of parboiled rice followed by dinner whatever prepared at home. Most of them (64%) did not consume food supplied by anganwadi completely food due to dislike or diseased condition or not known how to feed themselves or due to absence of their parents. During the period of survey it was observed that most of the children were taking only leftover water rice of the night with salt and chili in the morning or in the afternoon.

(d) Mean food intake of preschool children (1-3 years) with regard to different nutritional status.

A wide range of variation was observed in mean food intake of the respondents suffering from different degrees of malnutrition. It was noted that the diet of the normal children

was almost adequate in cereals, pulses, roots and tubers and non-vegetarian foods. Egg supplied by the anganwadi was taken by the children regularly. Other food stuffs such as green leafy vegetables, other vegetable etc. were deficient in their diet in comparison to RDA (ICMR).

Table 4: Mean Food Intake of Preschool Children of different nutritional status (1 to 3 years)

Intake of food items (g/ml/day) ± S.E		Grades of children				Recommended allowances ICMR (1990)
		Normal (36)	Wasted (39)	Stunted (29)	Wasted and stunted (16)	
Cereals	Actual intake	179.3±4.6	154.3±4.58	142.6±4.1	131.70±6.46	175
	% of deficiency / excess	0.4(+)	11.8(-)	18.5	24.73	
Pulses	Actual intake	19.5±1.3	8.4(+)±1.64	7.69±1,42	6.55±1.91	20
	% of deficiency	25	57,65	61.55	67.25	
Green leafy vegetables	Actual intake	27.36±3.15	14.74±2.6	11.21±2.9	11.87±4.07	40
	% of deficiency	31.6	63.15	71.97	70.3	
Other vegetables	Actual intake	12.78±1.40	7.69±1.32	6.9±2.38	4.37±3.18	20
	% of deficiency	36.1	61.55	65.5	78.2	
Roots and tubers	Actual intake	10.38±1.4	8.97±1.69	8.62±1.99	6.25±2.48	10
	% of deficiency / excess	3.8 (+)	10.3 (-)	13.3 (-)	37.5 (-)	
Fruits	Actual intake	26.39±8.7	20.77±0.76	11.38±1.06	-	50
	% of deficiency	47.2	58.5	77.24	-	
Milk	Actual intake	116.4±4.7	85.13±3.06	-	-	300
	% of deficiency	61.2	71.6	-	-	
Sugar and Jaggery	Actual intake	23.19±2.1	11.79±0.8	-	-	30
	% of deficiency	22.7	60.7	-	-	
Fats and Oils	Actual intake	9.69±0.44	8.82±0.71	7.10±0.3	8.19±0.28	15
	% of deficiency	35.4	41.2	52.66	45.4	
Non-veg	Actual intake	30.12±2.01	28.08±1.28	20.9±1.7	18.12±2.53	30
	% of deficiency	0.4 (+)	6.4 (-)	30.3 (-)	39.6 (-)	

However amount of consumption of all food items was found to be decreased with the prevalence of degrees of severity of malnutrition. Their diet was predominantly consist of cereals followed by pulses, roots and tubers and egg i.e. supplied by anganwadi. The mean percentage deficiency of different food stuffs consumed by wasted children in comparison to RDA was 11.8%, 57.6%, 63.15%, 61.5%, 10.3%, 58.5%, 71.6%, 41.2% and 6.4% for cereals, pulses, green leafy vegetables, other vegetables, roots and tubers, fruits, milk, fats & oil and non-vegetarian foods respectively. Similarly cereal, consumption was found to be deficient by 18.5% and 24.73% whereas pulses consumption was found to be deficient by 61.5% & 67.25% in case of stunted (moderately malnourished) and wasted and stunted (severely malnourished) children respectively. Fruit, milk, sugar & jaggery consumption was found to be nil in case of wasted & stunted children. It was observed the mean food intake of the children suffering from different degrees of malnutrition was less than the RDA (ICMR). Similar findings were also observed by Kanwar *et al*. (1994). Lenka *et al*., (2013) [12].

C.R. Value for mean food intake of Children (1-3 years) of different nutritional status

C.R. Value was calculated between two different grades of malnutrition for intake of a particular food item to analyze the existence of any difference in the intake of individual food items and occurrence of different grades of malnutrition. Highly significant difference was found to exist between normal and wasted & stunted (severely malnourished) children except roots and tubers. Similarly statistically significant difference was found between normal and stunted group (moderately malnourished) children except in the intake of pulses. No significant difference was found in the intake of food item between two consecutive grades of malnutrition except green leafy vegetables & roots and tubers for normal and wasted children, fats and oils for wasted & stunted children and pulses for wasted (mildly malnourished) and wasted and stunted (severely malnourished) children.

Thus the results of the study revealed that there was no real difference in the intake of different food items of children suffering from two consecutive grades of malnutrition. Only significant difference was found in the intake of almost all food items between normal & stunted children and normal & wasted & stunted children.

Table 5: C.R. Value for mean food intake of tribal children of different nutritional status (1 to 3 years)

Sl. No.	Grade of Children	Cereals	Pulses	Green leafy Vegetable	Other Vegetables	Roots and Tubers	Fats and Oils	Non-veg
1	Normal & Wasted Stunted	2.89**	2.60**	3.03**	2.27*	1.66	2.79**	2.47**
2	Normal & Stunted	3.18**	0.69	3.72**	1.94*	2.97**	4.90**	3.08**
3	Normal & Wasted	1.89	0.46	3.08**	2.32	3.45**	1.02	0.84
4	Wasted & Stunted	1.59	0.57	0.92	0.27	0.23	2.28*	0.06
5	Wasted and Wasted Stunted	1.39	2.39*	0.59	0.26	0.86	0.92	0.04
6	Stunted & Wasted Stunted	0.02	1.59	0.11	0.58	0.84	2.63**	0.08

* & ** indicate significance value at P = 0.05 and 0.01 respectively

Lenka *et al*., (2013) [12] found significant difference in the intake of different food items between normal and moderately malnourished children and normal and severely malnourished children.

Mean Nutrient Intake of the respondents with regard to different Nutritional status

The mean nutrient intake of the respondents showed that protein, calorie and Vitamin - C intake of the normal children was more than the RDA whereas their diet was deficient in protective nutrients such as calcium, iron, thiamin, riboflavin and vitamin -A.

The mean protein intake of all children was more than RDA except the wasted and stunted group which may be due to inclusion of egg and sattu in their diet. Calorie intake of the respondents was found to be deficient by 19.67%, 35.99%, 43.49% in comparison to RDA for wasted, stunted, wasted and stunted children. However it was also observed that the intake of nutrients was decreased with the occurrence of severity of malnutrition. Similar findings were also observed by Devi *et al*., (1990), Lenka *et al*., (2013) [12].

Table 6: Mean Nutrient Intake of Tribal Children of different nutritional status (1 to 3 years)

Grades of children Nutrient intake per day		Normal (36)	Wasted (39)	Stunted (29)	Wasted and stunted (16)	Recommended allowances ICMR (2010)
Protein (g)	Actual intake	24.27	19.8	17.1	14.28	16.7
	% of deficiency/excess	45.3 (+)	19.8 (+)	2.34 (+)	14.5 (-)	
Energy (Kcal)	Actual intake	1078	851.48	678.5	598.99	1060
	% of deficiency/excess	1.7 (+)	19.67 (-)	35.99 (-)	43.49 (-)	
Calcium (mg)	Actual intake	303.22	177.45	175	161.49	600
	% of deficiency/excess	49.46 (-)	70.4 (-)	70.75 (-)	73.08 (-)	
Iron (mg)	Actual intake	8.52	5.36	4.65	4.43	9
	% of deficiency/excess	5.33 (-)	40.44 (-)	48.33 (-)	50.78 (-)	
Thiamine (mg)	Actual intake	0.55	0.50	0.48	0.48	0.5
	% of deficiency/excess	10.0 (+)	Nil	4 (-)	4 (-)	
Riboflavin (mg)	Actual intake	0.31	0.19	0.25	0.14	0.6
	% of deficiency/excess	48.33 (-)	68.3 (-)	58.3 (-)	76.67 (-)	
Ascorbic and (mg)	Actual intake	46.75	31.21	16.25	13.67	40
	% of deficiency/excess	16.87 (+)	21.97 (-)	59.82 (-)	65.82 (-)	

Disadvantageous situations for low consumption of food stuffs: An attempt has been made to study the dis-advantageous situations under which the children were compel/forced to take insufficient food which ultimately lead them to suffer from malnutrition.

Table 7: Disadvantages situations

S. No.	Characteristics		Frequency	%
1	Too young mother (Less than 18 years)		58	48.7
2	1st born baby		32	26.7
3	No proper knowledge about child rearing		52	43.3
4	Illiterate mother		54	45
5	Belonging to lowest wealth quintile		90	75
6	Working mother		108	90
7	No one to look after their child		94	78.33
8	Non-availability of food		42	35
9	Dislike of foods by child (Pulses, vegetable etc.)		56	46.67
10	Wrong perception about food supplied by Anganwadi		98	81.67
11	Diseased condition of the child	i) Diarrhoea	18	15
		ii) Fever	29	24.17
		iii) Cold & Cough	48	40
		iv) Anaemia	34	28.3
12	Poor sanitation		78	65
13	Diseased Condition of mother		18	15
14	Alcoholic father		64	53.3

Working mother (90%), no other member in family to take care of child (78.3%), wrong perception about supplied food (81.67%), low wealth quintile (75%), poor sanitation (65%) illness of child (15-40%) were found to be major causes prevalent in that area for low food consumption. Even though Government is supplying foods & medicines through Anganwadi's, it could not be utilized properly due to wrong perception of mothers about the food stuff and the medical services. Till now, most of the mother's thought that their child will fall ill, if he would be weighed and measured. The sattu provided for the children belonged to the age group of 1-3 years was not fed to them, rather it was eaten by the elder children or elderly members of the family by saying that it will create stomach cramp in small kids.

Conclusion

Thus it was felt that there is an immense need to educate the mothers regarding the benefits of the supplied food and to utilize medical services available in their local area to enhance the nutritional status of their children. Government should also

take necessary steps to establish creches to take care of the children's of working tribal mothers. Nutrition education must be planned and implemented on a much more extensive and decentralized basis to improve and change the attitude of the parents regarding breastfeeding practices, weaning, supplementary food and child rearing practices.

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