



Nutritional Anthropometry and Preschool Child Feeding Practices in Working Mothers of Central Orissa

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ABSTRACT The anthropometric measurements (height, weight and mid upper arm circumference) of children of working mothers in the age group of 12 to 60 months show a closeness in the values relating to urban and rural children although the males had higher values than females in all the age groups. The average Gomez percentage taking all the age groups combined were 91.59 and 86.95 in males against 95.54 and 91.99 in females in urban and rural children respectively. The mean Gomez percentage in relation to religion, caste, income, maternal education and mother's employment reveals a significant difference among Hindus and higher and middle caste children. Prevalence of malnutrition was observed among children of illiterate, lower income group and lower caste group mothers. The percentage of children under malnourished group varied from 21 to 27 as per Body-Mass index, 27 to 31 as per mid-arm circumference, 15 to 17 as per Dugdale's index and 10 to 12 as per Gomez classification. Exclusive breast-feeding beyond six months resulted in a higher percentage of malnourished children in both urban and rural area. Differences are also observed with regard to total duration of breast-feeding and age of introduction of supplementary food. The results of the present investigation is encouraging with regards to the infant feeding practices and prevalence of malnourished children in comparison to Orissan average.

INTRODUCTION

Nutrition is one of the basic requirements of any living organism to grow and sustain life. But the quality and quantity of nutrients necessary for normal growth and to keep an organism in good health during its life span vary with the age of the organism. Any major deviation in the nutrient intake either in quality or in quantity from its requirement can also affect growth and life span in a number of way particularly in the later period/growth is more influenced by nutrition (Gopalan et al., 1989).

It has now been generally accepted that nutritional anthropometry has a significant role in the direct assessment of nutritional status in preschool children. A number of anthropometric measurements have been suggested for studies on growth and nutritional status, but height, weight, mid-upper arm circumference, head circumference, chest and fat fold (skin fold) at triceps are most frequently used. In spite of high prevalence of Protein Calorie Malnutrition among children, systematic and extensive growth studies in India are not adequate to highlight either the variation in growth or its change in different parts of the country in different communities. The only information available for the general Indian children comes from the major

study made by Indian Council of Medical Research (ICMR, 1984a, b) during 1956-1965. Higher mean values for different anthropometric measurements among the children of higher socio-economic groups have been reported by Currimbhoy (1963), Swaminathan et al. (1964), Banik et al. (1972), Gupta et al. (1973), Dhamija et al. (1976), Vijayaraghavan (1976) and many others. Jain and Saxena (1977) found that the children from lower socio-economic group are lighter in weight, shorter in height, lesser in chest circumference and arm circumference but the head circumference was not differing much from those of the higher socio-economic group.

On the average the nutritional status of urban children has been found to be better than that of the rural (Chaudhury and Visweswara Rao, 1983). Gupta et al. (1973) observed that the values of rural children were similar to those of the urban poor socioeconomic group. The main cause of growth variation and retardation in India is the countrywide high prevalence of malnutrition (Visweswara Rao, 1978; ICMR, 1984b).

The state of Orissa with a total population of 6.08 million (2001), ranks ninth in the country, in terms of area. A frontier attack needs to be launched to reduce infant mortality rate. Infant mortality in Orissa during eighties was 112 deaths per 1000 live births, which was declined to 96

deaths per 1000 live births during 1984-88 and further to 81 deaths during 1994-98 (NFHS-2, 1998). According to official estimates of NFHS-2, 1998, more than 54 percent of children of under three years of age group in Orissa are under-weight and more than 45 percent are stunted. The proportion of children who are severely under-nourished is also notable i.e. 21 percent according to weight for age and 18 percent according to height for age.

In this backdrop, the present study is an humble attempt to, assess the nutritional status of the children of working mothers of central Orissa, the locality which supposed to have a higher literacy rate, employability, good minimum basic facilities, being close to the state capital, Bhubaneswar.

METHODOLOGY

The survey was conducted in central part of Orissa, which falls under the coastal belt of the state. Cuttack town and its surrounding villages were purposively selected as the universe of this study, as it is one of the oldest and advanced districts of the state. Working mothers who have their youngest child in the age group of 1 to 5 year of age (pre-school children) were selected as the respondents of the study. Data were collected from 134 urban and 158 rural working mothers selected purposively on their children's feeding practices.

A pre-tested personal interview schedule was administered for the collection of information on family, its socio economic condition, feeding practices followed with regard to colostrums feeding, breast feeding, supplementary milk feeding, and on introduction of semi solids and solids in the diet of the children. The data on these feeding practices were analyzed in relation to few independent socio ecological variables and the results were compared with other published documents.

The anthropometric measurements such as height, weight, chest circumference and mid arm circumference were recorded following the standard techniques (Jelliffe, 1966). All the measurements were obtained under standard conditions with utmost care. While taking measurements minimum clothing was allowed whenever it was possible. Three nutritional indices are used to estimate the degree of malnutrition based on the weight and height

measurements (Park and Park, 1989). The standard statistical technique like measure of association (chi. square test) and student 't' test were done as per Gupta (1982). Box 1 shows the methods used in the calculation of indices.

Box 1: Nutritional indices used

- Dugdale's nutritional index (1971):** Power relationship between weight in kg, and height in cm.

$$\text{Weight} \text{ ————— } \times 10^4 : \text{Height}$$
Mal nourished ≤ 88 , Normal $88 \sim 110$, and Obesity ≥ 110
- Nutritional Index through Gomez Classification: Gomez et al. (1955)**

$$\frac{\text{Weight of the child}}{\text{Standard weight of child}} \times 100$$
The Harvard standard of weight (Jelliffe, 1966) on relation to age at child has been considered for calculation of Gomez nutritional index with following grade of malnutrition.

Grade of malnutrition	Body wt. per cent of Harvard
Normal	> 90%
Grade I (mild)	> 75- $\leq$ 90%
Grade II (moderate)	> 60 ~ $\leq$ 75%
Grade III (severe)	$\leq$ 60%
- Body mass index has been calculated as (Park & Park, 1989)**

$$\frac{\text{Weight}}{(\text{Height})^2}$$

RESULTS AND DISCUSSION

Nutritional Anthropometry

Table 1 presents the mean anthropometric measurements (grand average of both urban and rural) in different age groups of male and female children in comparison with ICMR study. Male children had a higher height, weight and mid-arm circumference than the female children in all the age groups. Bhargava et al. (1980), Bhat and Dahiya (1985), and Mishra (1994) also made similar observation.

Nutritional Anthropometry and Socio-ecological Variables

Table 2 presents the mean Gomez percentage (percentage weight of Harvard standard) in different age groups of male and female children separately. The average Gomez percentage of all the age groups was 91.59 and 86.95 in males against 95.54 and 91.99 in females in urban and rural children respectively. The test of significance ('t') shows a significant difference between males

Table 1: Mean anthropometric measurements of children (combined)

Age in (Months)	Sex	Height(cm)	ICMR1984	Weight(kg)	ICMR1984	Mid-arm(cm)	ICMR1984
>12-≤18	M	66.58	70.8	9.3	8.21	12.83	12.05
	F	70.5	69.3	9.4	7.72	12.46	12.10
>18-≤24	M	72.2	74.2	11.5	9.11	13.20	12.70
	F	78.0	73.3	10.6	8.38	13.10	12.50
>24-≤30	M	85.4	78.2	12.7	9.65	13.41	13.0
	F	84.2	77.0	12.2	8.93	3.25	12.8
>30-≤36	M	87.5	81.8	13.0	10.19	13.8	13.0
	F	86.9	80.8	12.4	9.53	13.75	13.0
>36-≤48	M	92.13	86.2	13.6	11.16	13.95	13.4
	F	93.6	84.9	13.4	10.40	13.84	13.4
48-≤60	M	101.2	93.9	14.9	12.38	14.35	14.0
	F	100.3	92.6	14.4	11.50	14.16	13.9

Table 2: Mean Gomez percentage values in relation to various variables.

Variables	Gomez		t-value	Significant at (p < 0.05)
	Gomez (%) Male	Gomez (%) Female		
Area				
Urban	91.59	95.54	1.905	Y
Rural	86.95	91.99	3.55	Y
Combined	88.89	93.77	3.5	Y
Religion				
Hindu	88.42	93.25	3.56	Y
Muslim	95.18	97.93	0.79	N
Christian	85.68	93.20	1.02	N
Caste				
General	88.49	95.27	4.23	Y
OBC	86.81	92.61	2.146	Y
SC	91.80	91.15	0.229	N
ST	87.33	99.11	2.347	Y
Age-group (months)				
>12-≤18	87.17	101.87	1.842	Y
>18-≤24	98.09	98.41	0.058	N
>24-≤30	94.26	101.52	2.167	Y
>30-≤36	93.64	93.74	0.026	N
>36-≤42	88.69	94.09	2.117	Y
>42-≤48	86.95	89.13	1.303	N
>48-≤54	85.51	87.04	0.641	N
>54-≤60	83.98	88.83	2.368	Y
Family				
Nuclear	90.24	96.35	2.618	Y
Joint	88.55	93.03	3.046	Y
Per-capita Income (Rs.)				
≤500/-	90.47	93.35	1.161	N
>500-≤1000	89.38	94.06	1.469	N
>1000	87.84	94.09	4.361	Y
Education of Mother				
Illiterate	89.25	90.52	0.515	N
Elementary	102.10	95.82	0.419	N
Primary	98.02	101.29	0.622	N
Secondary	92.29	91.49	0.167	N
High School	82.01	94.51	2.385	Y
Graduate	92.42	45.30	0.520	N
P-graduate and others	87.88	94.32	3.42	Y
Occupation of Mother				
Govt. Service	86.19	95.80	4.02	Y
Business	93.05	96.25	0.921	N
Professional	90.00	94.37	2.143	Y
Labour	90.58	90.57	0.002	N

and females in both urban and rural children. The mean Gomez percentage in relation to religion, caste, family, income, maternal education and mother's employment reveals a significant difference between male and female children among Hindus, higher and middle caste children, in both nuclear and joint families. Mother's education and employment status did not contribute to the difference among male and female children. Even the difference was not consistent in different age groups of children. The average Gomez percentages of all the age groups were 89.78 and 94.32 in male and females respectively.

The student 't' test reveals no significant difference (t=1.68) in Gomez percentage between male and female children. Mishra (1994) in her study on the preschool children of western Orissa recorded 89.79 and 84.04 in males against 84.63 and 84.6 in females among urban and rural children respectively. In a detailed study on the kisan (tribe) children of Western Orissa, Mohanty (1992) found 93 per cent of male and 99.2 per cent of female children with malnutrition in respect to Gomez classification and only 3.67% normal falling both male and female children. The percentage of malnutrition was less if classified on the basis of Indian Academy of Paediatric (1972).

Table 3 presents the percentage of children (male and females combined) suffering from malnutrition (according to Gomez classification and Dougdale's index) in relation to socio-economic variables. Prevalence of malnutrition was observed among the children of illiterate, lower income group and lower caste mothers. Mishra (1994) found about 25% urban and 44.5% rural children belonging to mal-nourished class.

Prevalence of Malnutrition

A comparison of four nutritional indices

Table 3: Prevalence (percentage of children) of malnutrition in relation of socio-economic variables

Social variables		Gomez	Dugdales
<i>Maternal Education</i>			
Illiterate	U	14	18
	R	17	24
Literate	U	6	12
	R	7	10
<i>Income Group</i>			
Lower	U	12	16
	R	14	19
Middle	U	9	14
	R	12	18
Upper	U	9	15
	R	10	14
<i>Caste</i>			
High	U	7	10
	R	10	17
Middle	U	12	16
	R	12	15
Low	U	11	19
	R	14	19

(Body-mass index, mid upper-arm circumference, Dugdale's index and Gomez classification (Table 4) shows a higher percentage of children belonging to undernourished class as per mid-arm circumference (27 and 31 in urban and rural respectively) and lowest in respect of Gomez classification. However, the difference between urban and rural children was not significant except in case of mid-upper-arm circumference (Table 5). A study in the western part of Orissa reveals that a higher percentage of rural children belonged to under-nourished /malnourished class followed by those in urban and industrial area. A study by National Nutrition Monitoring Bureau (NNMB) noted that under nutrition is widely prevalent among preschool age children belonging to low-income group. Among eight states covered, Orissa was the second highest with severely malnourished children (8.6%). Survey by NIN in the past two decades indicates that the energy

intake of rural low income group children is grossly inadequate. About 85% of the children in India below 5 years suffer from varying degrees of malnutrition. A National Family Health Survey conducted by International Institute for Population Science (NFHS, 1993, 1994) in Orissa shows 23-25% of children who were severely malnourished and wasting was also quite evident affecting more than one in every five children. The findings also revealed a consistently higher percentage of children under under-nutrition in rural than in urban area and the differentials in

Table 4: A comparative picture of prevalence of malnutrition (percent) by different indices

Indices	Urban	Rural
Body-mass Index	21	27
Mid-Arm Circumference	27	31
Dugdale's Index	15	17
Gomez Classification	10	12

Table 5: Percentage distribution of malnourished children on the basis different indices

Indices	Urban	Rural
<i>Body-mass Index</i>		
> 0.0015 (normal)	79	73
≥ 0.0013 - ≤ 0.0015 (Moderate)	17	21
< 0.0013 (severe)	4	6
	χ^2 0.5892	Not Significant
<i>Mid-upper-arm Circumference</i>		
<i>Body-mass Index</i>		
> 13.5 cm (normal)	73	69
≥ 12.5- ≤ 13.5 cm (moderate)	19	22
< 12.5 cm (severe)	8	9
	χ^2 3.683	p < 0.05
<i>Dugdale's Index</i>		
Malnourished (< 88)	105	17
Normal (≥ 88-≤110)	78	78
Obesity (> 110)	7	5
	χ^2 0.4583	Not Significant

Table 6: Percentage distribution of malnutrition in relation to feeding practices (urban and rural combined)

Feeding practices	Age/duration (months)	Urban		Rural	
		DI < 88	GZ = 90%	DI < 88	GZ = 90%
Exclusive Breast Feeding					
	≤6	12	8	3	9
	>6	20	4	19	13
Total Breast-feeding					
	≤12	12	6	14	7
	>12	20	16	18	15
Introduction of Supplementary Food					
	≤6	10	5	14	9
	>6	22	17	18	13

(Gomez Classification (G) and Dugdale's Index 'D')

under-nutrition by mother's educational level were very large. The percentage of children of illiterate mothers who were undernourished was 2-3 times higher than the percentage among children of mothers who completed high school (NFHS 1993). Incidentally the present study covered the working mothers consisting of only 26-32 % illiterate and 33-38 % lower income group and the prevalence of malnutrition was limited to only 8-12% of the children against all Orissa average of 23-25%. Thus, the socio-economic status of the family and mother's schooling may be the important influential factors for children's nutritional status than caste, religion or places of delivery.

Feeding Practices and Malnutrition

Table 6 presents the percentage distribution of malnourished children (classified according to Dugdale's Index < 88 and Gomez classification < 90) in relation to three major feeding practices. The data reveal that exclusive breast-feeding beyond six months of age results in a higher percentage of malnourished children both in urban and rural area. Similar differences have been observed with regard to total duration of breast feeding and age of introduction of supplementary food.

CONCLUSION

Orissa has a large proportion of population living below the poverty line. Undernourishment among the population particularly among the children is extensive. Although the results of the present investigation are encouraging with regard to the estimation of malnourishment in comparison to the Orissan average, this does not reflect the picture of the whole state. The area under the study is lying in close proximity to the political power center i.e. state capital and the survey was conducted only on the children of working mothers who are expected to be educated, supplement the family income and thereby contribute significantly to the child's nutrition and health. Perhaps from among the many factors contributing to the well being of the child, economic status of the families and education of mothers are few most prominent.

The growing concern for the future of the children at local, state, national and international level is an encouraging trend. Public policies in support of children are taking shapes across different social service sectors. The national

policy on children, the perspective plans for the women and the new education policy are significant steps towards the improvement of the situation of children in India. However its success depends upon the strong sense of commitment by the state governments to translate the goals setout by the national governments to ensure safe and healthy childhood by providing immunization, amenities (School and water supply), supplementary feeding, primary health care and other developmental schemes in the underdeveloped areas.

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