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Original Article

NUTRITIONAL STATUS AND DIETARY PATTERN OF UNDERFIVE CHILDREN IN URBAN SLUM AREA

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ABSTRACT

Nutrition of pre-school children (0-5 years age group) is of paramount importance because the foundation for lifetime health, strength and intellectual vitality is laid during this period. The study was aimed to assess the nutritional status and dietary pattern of children below five years of age. It was a community based cross-sectional study in children below five years of age from Urban slum, Nagpur. A house-to-house survey was done. By systematic random sampling 434 children below five years of age were included in the study. Every child was subjected to anthropometric measurements using standard technique. Dietary survey was done in 20% subsample. 52.23 % were suffering from various grades of malnutrition. 32.18 % children were in grade I, 16.09 % in grade II, 3.46 % in grade III and 0.5 % in grade IV malnutrition. The mean calorie intake of children in the age group 2-3 years was 842.6 Kcal, 3-4 years was 956.12 Kcal and 4-5 years was 1096.24 Kcal respectively. Nutritional rehabilitation centers should be started in the community and linked with health centers to treat less severely affected undernourished children.

Key words: Malnutrition, under five children, urban slum

INTRODUCTION

The nutritional status of a community particularly of its vulnerable groups comprising of children, expectant mother and lactating mothers has been recognized as an important indicator, of national development in turn depends on social development indices. The 'Nutrition' emerges as an important prerequisite for national development.[5]

In the present context malnutrition is synonymous with protein-energy malnutrition, which signifies an imbalance between the supply of protein and energy and the body's demand for them to ensure optimal growth and function. This imbalance includes both inadequate and excessive energy intake; the former leading to malnutrition in the form of wasting, stunting and underweight, and the latter resulting in overweight and obesity.

A number of studies carried out during emergency and non-emergency situations have demonstrated the association between increased mortality and increasing severity of anthropometric deficits. Data from six longitudinal studies on the association between anthropometric status and mortality of children aged 6-59 months revealed a strong association between the severity of weight-for-age deficits and mortality rates. Indeed, out of the 11.6 million deaths among under-five children in 1995 in developing countries, it has been estimated that 6.3 million—or 54% of young child mortality—were associated with malnutrition, the majority of which is due to the potentiating effect of mild-to-moderate malnutrition as opposed to severe malnutrition.[9]

There is strong evidence that poor growth or smaller size is associated with impaired

development, and a number of studies have also demonstrated a relationship between growth status and school performance and intellectual achievement. However, this cannot be regarded as a simple causal relationship because of the complex environmental or socioeconomic factors that affect both growth and development.

The present study is carried out to find out the pattern of malnutrition in under five and dietary factors, so that actions may be taken in future to control malnutrition in community.

AIMS AND OBJECTIVES

To assess the nutritional status of under five children.

To assess the dietary pattern and its correlation of with nutritional status.

MATERIAL AND METHODS

The present community based cross-sectional study was conducted in children below five years of age from Urban health centre, Jaitala, Nagpur under the administrative control of Department of Preventive and Social Medicine, NKP Salve Institute of Medical Sciences and Research Centre, Nagpur. The total population of the area was 16042. Study was conducted from April 2005 to July 2006.

Study subjects consisted of children below five years of age. Total 1827 children were registered in 0-5 years age group. A list of household was prepared having the study subjects and 434 children's were included in the study. A pilot study was conducted in 60 children below 5 years of age of all age group to test the feasibility of the survey and test proforma.

The optimal sample size of 434 study subjects was calculated on the basis of 48% prevalence of undernourished children found in pilot survey.

$n = 4pq/L^2$

where p = positive character, q = 100-p, L= allowable error 10% of 'p'

A house-to-house survey was done. By systematic random sampling 434 children below five years of age were included in the study. Every attempt was made to cover maximum number of children by giving 3 visits to them. Total 404 children were included in the study. The information obtained from child's mother was filled in the proforma. After obtaining preliminary information at child's home, they were called at urban health centre along with their mother. Every child was subjected to anthropometric measurements. A diet survey was done in 40% subsample of children in 2-5 years age group. 0-2 year children were not included for dietary survey as most of the children were breast fed upto 2 years of age and their mothers were not able to give the quantity of breast milk fed to them.

Anthropometric measurements taken were weight, height, mid arm circumference, head circumference, chest circumference as per following technique.

Weight

Weight of under five children was measured by children weighing machine (< 2 years) and adult weighing machine (> 2 years) with minimum clothing over body and without shoes. The machine was regularly checked. Method employed for weighing was near accuracy of 100grams.

Height / Length

Height was measured by making child, after removing the shoes, to stand on a flat surface with feet parallel and with heels, buttocks, shoulders and back of head touching upright the wall. The head were held comfortably erect, with the lower border of the orbit in the same horizontal plane as the external auditory meatus. The arms were made to hang at sides in natural manner. Measurement was done with the help of fibre glass measuring tape.

For infants and children below five years of age, who could not stand, length was measured by making child laid on flat surface, head positioned firmly against the fixed hardboard, with the eyes looking vertically. The knees extended, by applying firm pressure and feet are flexed at right angles to the lower legs on the board. Length was measured between the two boards to the nearest accuracy 0.1cm.

Diet Survey

Diet survey was done in 40% subsample. Dietary intake was assessed by oral questionnaire (24 hours recall method) and weighment of raw food method. Energy and protein intake was calculated using food composition table given in the "Nutritive value of Indian food stuffs" by Gopalan.[3]

Statistical Analysis

Data was analyzed on Epi-Info Software 3.2 version. Chi square test is used to test the significance.

OBSERVATIONS AND DISCUSSION

As per table No. 1 it was observed that out of 404 children studied 206 (51.0 percent) were males and 198 (49.0 percent) were females.

Table 1: Distribution of Children according to Age and Sex (n = 404)

Age Group (Month)	Number of Children		Total (%)
	Male (%)	Female (%)	
0-3	22 (5.4)	13 (3.2)	35 (8.6)
4-6	09 (2.2)	19 (4.7)	28 (6.9)
7-9	19 (4.7)	16 (4.0)	35 (8.6)
10-12	16 (4.0)	16 (4.0)	32 (8.0)
13-18	23 (5.7)	19 (4.7)	42 (10.4)
19-24	24 (5.9)	23 (5.7)	47 (11.6)
25-30	20 (5.0)	19 (4.7)	39 (9.7)
31-36	17 (4.2)	14 (3.5)	31 (7.7)
37-42	13 (3.2)	12 (3.0)	25 (6.2)
43-48	12 (3.0)	22 (5.4)	34 (8.4)
49-54	15 (3.7)	11 (2.7)	26 (6.4)
55-60	16 (4.0)	14 (3.5)	30 (7.5)
Total	206 (51.0)	198 (49.0)	404 (100)

Majority of children belong to 0-12 months age group (32.1 %), followed by 13-24 months (22.0 %), 25-36 months (17.4 %), 37-48 months (14.6 %) and 49-60 months (13.9 %).

Table 2: Distribution of Children according to Per-capita Monthly Income (n = 404)

Per-capita Monthly Income (Rs)	**Number of Children**	Percentage (%)
≥ 3000	4	1.0
1500-2999	10	2.5
900-1499	37	9.1
450-899	240	59.4
<450	113	28.0
Total	404	100

Classification according to Prasad's Socio-economic Scale

As per table No. 2 it was found that majority of children' family were having per-capita monthly income less than Rupees 900 i.e. 59.4 percent had per-capita monthly income between Rupees 450-899 and 28.0 percent had less than Rupees 450.

Table 3: Distribution of children according to child feeding practices (n = 404)

	Children	Percentage
Prelacteals fed	68	16.83
Colostrum not fed	37	9.16
Breast feeding	404	100
Weaning at 4-6 months	253	71.87*

* Weaning was yet to start in 52 children

As per table No. 3 it was observed that 68 (16.83 percent) children were given prelacteals. Maximum numbers of children were given Jaggery water (67.65 percent) followed by 23.53 percent given honey and 8.82 were given ghutti as first fed.

Out of 404 children, 37 children's mother did not fed colostrums to their children. The main reason for not giving colostrum was advised by grandmother of the baby. Breast feeding was given to 100 percent children. In general mothers fed breast milk to their children upto 1 to 2 years of age. Only 3 children's mother breast-fed till the age of 3 years.

Maximum number of women started weaning at 4-6 months of age (62.62 percent), followed by 7-9 months of age (20.54 percent), 10-12 months of age (3.22 percent), in 0.74 percent children weaning started after 12 months and in 12.87 percent children weaning was not started.

In general weaning was started with rice and dal water in majority of cases, few children were given daliya, khichadi and fruit juice as weaning food.

As per table No. 4 it was observed that according to Indian Academy of Pediatrics (1972) classification out of 404 children studied, 47.77 percent were normal and 52.23percent were suffering from various grades of undernutrition. 32.18 percent children were in grade I, 16.09 percent in grade II, 3.46 percent in grade III and 0.5 percent in grade IV undernutrition[8].

Table 4: Distribution of children according to various grades of nutritional status Age and Sex wise (I.A.P. Classification) (n = 404).

Age Group In months	Normal		Grades of Under Nutrition I		II		III		IV		Total no. of Children (%)
	M	F	M	F	M	F	M	F	M	F	
0-3	19	12	1	1	1	-	1	-	-	-	35 (8.7)
4-6	8	15	1	3	-	1	-	-	-	-	28 (6.9)
7-9	13	11	5	3	1	2	-	-	-	-	35 (8.7)
10-12	4	4	9	7	3	3	-	2	-	-	32 (7.9)
13-18	8	7	9	2	4	8	2	2	-	-	42 (10.4)
19-24	11	7	11	8	1	7	1	1	-	-	47 (11.6)
25-30	9	9	9	7	2	2	-	-	-	1	39 (9.7)
31-36	6	4	5	5	6	4	-	-	-	1	31 (7.7)
37-42	9	6	4	5	-	1	-	-	-	-	25 (6.2)
43-48	5	5	4	10	2	6	1	1	-	-	34 (8.4)
49-54	5	3	6	7	2	1	2	-	-	-	26 (6.4)
55-60	5	8	6	2	4	4	1	-	-	-	30 (7.4)
Total	102	91	70	60	26	39	8	6	-	2	404
Total	193(47.77)		130(32.18)		65(16.09)		14(3.46)		02(0.5)		404 (100)

Age group wise prevalence of undernutrition was highest in 13-24 months age group (13.86 percent), followed by 0-12 months (10.9 percent), 25-36 months (10.4 percent), 49-60 months (8.66 percent) and 37-48 months (8.41 percent). In age group of 0-12 months and 25-36 months prevalence was almost equal i.e. 10.9% and 10.4% respectively. On comparing prevalence of undernutrition in 0-6 months age group with 7-60 months age group it was observed that former group had a better nutritional status as compared to later group. The difference was statistically significant ($\chi 2$ =43.07, df=1, $p<0.0001$). Probably indicating faulty weaning practices and dietary habits.

Table 5: Mean daily intake of foodstuffs among 2-5 years children

Food Stuff	2-3 yrs (gm/day)	RDA (gm/day)	% Deficit	3-5 yrs (gm/day)	RDA (gm/day)	% Deficit
Cereals	123.8	175	29.26	158.8	270	41.19
Pulses & Legumes	24.2	35	30.86	28.9	35	17.43
Leafy Vegetable	5	40	87.5	7.4	50	85.2
Other Vegetable	5	20	75	8	30	73.33
Milk and Milk product	90	300	70	80	250	68
Oil & fat	10	15	33.33	22	25	12
Sugar and jaggery	20	30	33.33	32	40	20

Sex wise prevalence of undernutrition was slightly higher in females (26.49 percent) as compared to males (25.74 percent), however no significant difference was observed. Grade IV undernutrition was found only in female (0.5 percent) children.

In India, as per NNMB the prevalence of grade I, II, III and IV undernutrition was 36.6, 19.7, 4.4 and 0.7 percent respectively among 6-60 months children from rural area. In Maharashtra, as per NNMB the prevalence of grade I, II, III and IV undernutrition was 39.0, 21.2, 4.8 and 0.6 percent respectively among 6-60 months children from rural area.[7]

Undernutrition is a very complex entity. Purchasing power, socio-economic factors, cultural factors, urban rural settings and many similar factors plays role in its etiology, hence observations of various authors vary.

As per Table No. 5 it was observed that the diet of the children were predominantly cereal and pulses based like wheat, rice and pulses. The diet was deficient in green leafy vegetables, other vegetables, milk and milk products. The children were given mainly two meals, lunch

and dinner. All the foodstuffs were less than the recommended dietary allowances by ICMR.[6]

The major dietary sources of energy were observed to be mainly cereals, sugar, and oil.

The children were consuming toast and biscuit with morning tea. Some people used cow's milk for making tea and children were given tea, many children were consuming tea without milk.

As per table No. 6 it was observed that the mean protein intake of children in the age group 2-3 years was 20.92 gm, 3-4 years was 23.12 gm and 4-5 years was 24.98 gm. Pulses and cereals were the main sources of protein. Protein deficit was 16-18 percent less than the recommended daily allowance by Indian Council of Medical Research 1990.[6]

Table 6: Mean Protein & Calorie Intake of Children in the age group of 2 – 5 Years.

Age Group in Years (n)	Proteins (gms)			Calories (Kcal)		
	Mean intake of study Population	RDA	% Deficit	Mean intake of study Population	RDA	% Deficit
2-3 (28)	20.92	25	16.32	842.6	1400	39.81
3-4 (25)	23.12	28	17.41	956.12	1560	38.71
4-5 (27)	24.98	30	16.73	1096.24	1690	35.13

The mean calorie intake of children in the age group 2-3 years was 842.6 Kcal, 3-4 years was 956.12 Kcal and 4-5 years was 1096.24 Kcal respectively. Cereals were the main sources of calories. The mean intake of calories was less (35-40 percent) than the recommended daily allowance by Indian Council of Medical Research 1990.

Almost all children had protein and calorie deficit as compared to RDA recommended by ICMR. The percent of deficit for calories was more than the protein deficit, thus indicating the widespread prevalence of malnutrition among these children is largely conditioned by low calorie intake and protein gap. This may be because of low purchasing power of parents.

Agrawal K et al (2001)[2] mentioned that the mean value of intake of calorie in the age group of 2-3, 3-4 and 4-5 was 1017.2 kcal, 1126.6 kcal and 1100.3 kcal respectively and protein was 25.9g, 28.7g and 28.2g respectively.

Table 7: Association of Per Capita Monthly Income and Nutritional Status (n = 404)

Per Capita Monthly Income (In INR)	Nutritional Status		Total (%)
	Normal (%)	Malnourished (%)	
≥ 3000	2 (50.00)	2 (50.00)	04 (100)
1500-2999	4 (40.00)	6 (60.00)	10 (100)
900-1499	24 (64.86)	13 (35.14)	37 (100)
450-899	108 (45.00)	132 (55.00)	240 (100)
<450	55 (48.67)	58 (51.33)	113 (100)
Total	193 (47.77)	211 (52.23)	404 (100)

($\chi 2$ =5.24, df=3, p-0.15).

Goyle A et al (2004)[4] stated that the mean intake of energy, protein of the age group 2-3 years and 3-4 years was 777 ± 158.95 kcal, 22.7 ± 5.9 gm and 787 ± 170.7 kcal, 23.7 ± 7.7 gm respectively. The mean intake of energy was below the recommended daily allowances not for the protein for both age group.

As per table No. 7 it was observed that prevalence of undernutrition was higher in children from low income group (Rs 450-899 and <450) as compared to higher income group (1500-2999 and >3000), however the association was not found significant ($\chi 2$ =5.24, df=3, p>0.1).

Dhakal MM et al (2005)[2] mentioned that the burden of malnourishment still haunts the poor with 82.75% children from low income group i.e. IV & V by Prasad Scale.

In the present study the association between per capita monthly income and nutritional status was not found significant as the number of children from high per capita income were few as compared to the children from low per capita income.

RECOMMENDATIONS

Based on study findings following recommendations are suggested.

1. The families from community should be encouraged for home-based activities for alternative source of income, which will help in improving their purchasing power.
2. As low birth weight of child had significant effect on malnutrition, more emphasis should be given on nutritional education during pregnancy including knowledge about breast feeding practices especially exclusive breast feeding for 4-6 months, proper and adequate weaning, breast feeding for 2-3 years.
3. Nutritional rehabilitation centers should be started in the community and person from the community is identified and linked with health centers to treat less severely affected undernourished children.

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