Original Research Article

Prevalence of malnutrition among under five children of urban slums of Berhampur, Odisha, India: a community a community based cross-sectional study

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ABSTRACT

Background: Under five children constitute the most vulnerable segment and their nutritional status and mortality rate is a sensitive indicator of the community's health and nutrition. Prevalence of underweight is 35.7%, wasting is 21% and stunting 38.4% in India and for Odisha, it is 34.4%, 20.4 % and 34.1% respectively. Health indices of slum children are worst among all urban groups and are even poorer than rural average. Severe PEM is often associated with infection contributing to high child mortality in underprivileged communities of slum dwellers. Objectives of present study were to find out prevalence of under nutrition and its severity among the study population and to identify socio-demographic factors associated with malnutrition.
Methods: A community based cross-sectional study was conducted from October 2015 September2016 in urban slum area of Berhampur city. Data were collected from 300 mothers of children aged 6-59 months using pre-tested semi structured questionnaires and measuring weight, height and MUAC of the children. Analysis was done using spss version- 20, Chi-square values and proportions were calculated.
Results: 69% of 300 children were having under nutrition in the form of underweight (55.3%), wasting (75%) and stunting (42%). Overlapping of different type of malnutrition was seen. Maximum number of underweight children belongs to age group 37-60 months (52.6%) followed by other two age groups. 21.3% were severely wasted and 20% were severely underweight. Factors found to be significantly associated with prevalence of malnutrition were maternal education, hygienic and feeding practices of mother.
Conclusions: Malnutrition is widely prevalent among study population more than the state and national prevalence. With increasing age cumulative increase in prevalence of malnutrition is seen perhaps due to persistence and addition of causative factors. Maternal education, faulty feeding practice and hygienic practice are contributory factor of this high prevalence of disease.

Keywords: Feeding practice, Hygienic practice, Malnutrition, Stunting, Underweight, Wasting

INTRODUCTION

Children under five years constitute the most vulnerable segment of a country. Their nutritional status and mortality rate is a sensitive indicator of community health and nutrition. Globally more than half of the under-five deaths are attributable to under nutrition.[1] At national levelNFHS-4 data revealed the national under five mortality rates (U5MR) is 50 per 1000 live births, with 34 in urban and 56 in rural area.[2] Odisha's U5MR is estimated to be 49 per 1000 live births with 25 in urban area.[3]

Nutritional status plays a vital role in deciding the health status in children. Nutritional deficiencies give rise to various morbidities, which in turn, may lead to increased mortality. Malnutrition apart from impairing growth and development of the child increases his or her susceptibility to infections like diarrhea and pneumonia. It acts in two ways to cause high mortality and morbidities in under five children

Assessing malnutrition among of under five children at global level, prevalence of stunting is 22.9% i.e. 155 million and wasting is 7.7 per cent i. e, 52 million with 17 million severely wasted. In Asia prevalence of stunting is 87 million and wasting is 36 million. So more than two thirds of all wasted children and more than half of all stunted children under five lived in Asia.[2]

Assessing national prevalence of under nutrition among under five, NFHS -4 data shows underweight is 35.7%, wasting is 21% and stunting 38.4% in India.[3] The same indicator for Odisha is 34.4%, 20.4 % and 34.1% respectively.[3]

Health indices of slum children are worst among all urban groups and are even poorer than rural average. As per Census 2011, there are 13.7 million slum households in India, which constitute more than 17% of the urban households living in the country.[4] The children living in slums are worse affected as not only deprived of the basic services but also not recognised as an important segment.

It is evident that the prevalence of under nutrition in urban slums is much higher than national average for rural and urban areas.[5]

Inappropriate feeding practices like early initiation of complementary feeds, late weaning and inadequate amount of complementary feeds in the later months are the leading causes of PEM.[6]

Severe PEM, often associated with infection, which in turn increases their proneness to infections which further decreases their already poor nutritional status thus leading to a vicious cycle of malnutrition and infection and contributes to high child mortality in underprivileged communities of slum dwellers. Under this background this study aimed to assess the prevalence of under nutrition and the factors and practices likely to influence it in the urban slum areas.

Objectives of present study were to find out prevalence of under nutrition and its severity among the study population and to identify socio-demographic factors associated with malnutrition.

METHODS

A community based cross sectional study was conducted in the urban slum area of Ankuli Berhampur, Odisha after getting clearance from institutional ethics committee. The study was conducted from October 2015 to September 2016.

Sample size was calculated taking prevalence of malnutrition as 25%.

Calculated by formula $4PQ/L^2$

P=prevalence of malnutrition (taking as 25%), Q= 100-P, L= Allowable error (5%)=4*25*75/5*5=300 children

Multi stage random sampling was used.

Inclusion criteria

- Those children were present at the time of household visit and not seriously ill.

Exclusion criteria

- Children <6 months and>5 yrs. of age
- Children having cerebral palsy, congenital malformation, HIV infection or any other chronic morbidity and suffering from serious illness.
- Those family not giving consent were excluded

6 urban slums were randomly selected first, and then in each slum area 50 households were randomly selected for study purpose. Mother or other care taker of under five children present at the time of household visit was interviewed for data collection. If any household has 2 under 5 children then the youngest is selected to be the study subject. If no under 5 children in a house, then the adjacent house with under 5 children was included in the study. In this manner total 300 children were included in the study.

Data was collected using a scientifically designed pretested semi structured questionnaires on socioeconomic status of the family, mother's education, birth history, feeding history and hygienic practice etc. The age, date of birth, was recorded by asking mother and confirmed by the records (MCP cards/Immunisation cards).

Operational definition

Adequate hygiene

Hand washing with soap and water at critical times-including before eating or preparing food and feeding the baby, after using the toilet and disposing excreta of the baby in the toilet was considered adequate hygienic practice. Absence of such practice or lacking any of the components is inadequate practice.

Adequate feeding

Frequency for 6-12 months, 2-3 meals per day with >8times breast feeding, for 13-60 months 3 major meals

with 2 nutritious feed irrespective of frequency of breastfeeding.

Anthropometric measurements were carried out like, weight taken in a standardised scale in kilogram with minimum clothing and length measured by infant meter in supine position for children below 2 years and height of the child was measured for those who can stand. Mid Upper Arm Circumference (MUAC) was measured with MUAC tape in a standardised way and head circumference and Chest circumference was measured with a non-stretchable measuring tape. Nutritional Status was assessed using weight for age (underweight), height for age (stunting), weight for height (wasting) and MUAC according to WHO criteria (SD Classification)

Maternal education

It is defined as the highest level of schooling attended, but not necessary completed. This variable has three categories: no education, primary, secondary education or more.

RESULTS

Total number of children studied between October 2015 to September 2016 were 300 of age group (6 months-5yrs) residing in 6 urban slums in Berhampur city. Majority of them were male (54.7%) predominantly belonging to age group of 3-5 yrs followed by age group of 1 year to 3 years (24%), and 23.4% were from 6months to 1 year which may be indicating declining birth rate.

Table 1: Distribution of study population according to nutritional status.

Nutritional status	Under nutrition (Type)						Normal nutrition
	Under weight		Wasting		Stunting		92 (31%)
	M	F	M	F	M	F	
	104	62	88	62	78	48	
	166 (55.3%)		150 (50%)		126 (42%)		

Out of total 300 children, 208 (69%) children are having under nutrition in the form of underweight (55.3%), wasting (75%) and stunting (42%). Children those are undernourished had more than one type of malnutrition overlapping (Table 1).

Table 2: Sex wise distribution of under nutrition among study population.

Under nutrition Present	Yes	No
Male	124 (59.6%)	40 (43.4%)
Female	84 (40.4%)	52 (56.5%)
Total	208	92
X^2=3.35. The p value is 0.67. The result is not significant at $p<0.05$		

Out of total 208 under nourished children, 59.6% were male and 40.4% were female, although this difference was not statistically significant (Table 2).
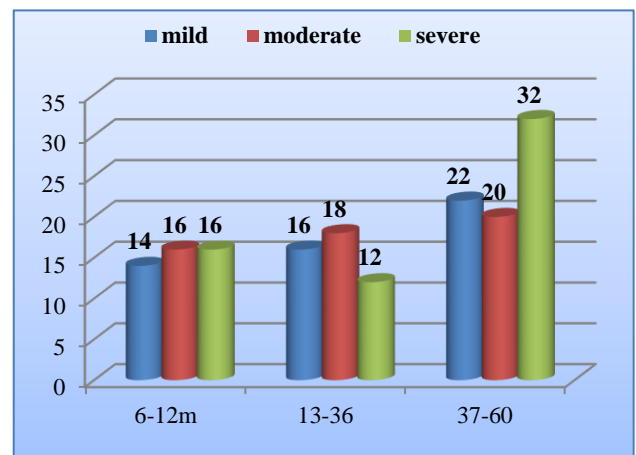

Figure 1: Distribution of under nutrition according to age.

Maximum number of children who are underweight belonging to age group 37-60 months (52.6%) followed by other two age groups. Severe underweight was most prevalent in the age group of 37-60 months (Figure 1).

Table 3: Distribution of wasting according to age and sex.

Age (months)	Mild		Moderate		Severe		Total
	Male	Female	Male	Female	Male	Female	
6 – 12	10	6	10	0	6	4	36
13-36	14	2	4	6	8	6	40
37-60	10	12	8	4	18	22	74
	34	20	22	10	32	32	M-88 (29.3%) F-62 (20.7%)
Total	54 (18%)		32 (10.7%)		64 (21.3%)		150 (50%)

Out of total underweight children 62.65% (104) were male and 37.34% (62) were female. Majority (36.14%) of children belong to severe category, moderate and mild underweight category being 32% each. There is no significant difference among both sexes in this (underweight) category of under nutrition. Among total underweight children, 17.3% have mild, 18% moderate and 20% have severe underweight. There is no sex wise difference between different grades of malnutrition.

Table 3 shows that out of the total 300 children, 50% of children are wasted. Among all wasted children 21.3% have severe, 10.7% moderate and 18% have mild grade of wasting. 29.3% (88) of all wasted children are male and 20.7% (62) are female. In the study population, most prevalent is mild stunting with 20.6%, 10.7% moderate and 10.7% severe stunting. Out of the total 300 under 5 children 26% of stunted children are male and 16% are female. Most prevalent form of stunting is mild stunting.

Table 4: Distribution of children according to mid upper arm circumference (MUAC).

Age(months)	MUAC (cm)				Total
	>13.5	>12.5 - 13.5	12.5 - 11.5	<11.5	
6-12	38	14	10	8	70
13-36	36	16	8	12	72
37-60	96	20	10	32	158
Total	170 (56.7%)	50 (16.7%)	28 (9.3%)	52 (17.3%)	300

X^2=5.1199, the p value is 0.5285. The result is not significant at p<0.05

In the current study 56.7% children were having MUAC more than 13.5 cm and 17.3% children were having less than 11.5 Cm and suffering from severe acute malnutrition (SAM) according to MUAC measurement (Table 4).

Associate factors and malnutrition.

Education	Malnutrition (n= 208)	Normal nutrition (n= 92)	
Educational status of mother			
Illiterate	44 (21.1%)	16 (17.4%)	
Primary	60 (28.8%)	24 (26%)	X^2= 4.0671,
Secondary	90 (43.3%)	36 (39.1%)	P value=0.2543,
College/professional	14 (6.8%)	16 (17.5%)	
Hygienic practices of mother			
Inadequate	140 (67.3%)	30 (32.6%)	X^2 =8.0268,
Adequate	68 (32.7%)	62 (67.4%)	P value=0.004609
Feeding practice of children			
Adequate frequency	124(59.6%)	50 (54.3%)	x^2= 0.3633. p-value=0.54669
Energy dense food	58 (27.9%)	72 (78.3%)	x^2=32.9611 p-value is <0.00001.
Timely introduction of complementary feeding	148 (71.2%)	80 (86.8%)	x^2 = 0.3665. p-value=0.036652.
Food supplementation	68 (32.7%)	24 (26%)	x^2= 0.6545. p-value is 0.418523.

The above table shows that among the malnourished children, most mothers had secondary education. Mother of 14 malnourished children had college or professional education. This shows malnutrition is widely prevalent among mothers of all educational groups. Table also shows significant association between malnutrition and hygienic practice adopted by mothers. Overall, 56.6% mothers had inadequate hygienic practices. Among the malnourished children, 67% mothers had inadequate hygienic practice and 33% mothers practiced good hygiene. The difference was found to be statistically significant. Showing relationship of malnutrition with feeding practices by mother, significantly less number of children are suffering from malnutrition (27.9%) who have received energy dense food. Similarly, children who have received complementary feeding in time are significantly less undernourished than those who had delay in receiving the same (87%). However, frequency of feeding and food supplementation has no significant relation with under nutrition in this study.

DISCUSSION

Present study shows the prevalence of malnutrition is 69% in different forms much more than the study of Raman D et al where it was 54% among children aged between 1 and 5 years.[7] In the present study, besides 31 % of normal children all were suffering from different types of malnutrition like underweight (55.3%), wasting (75%) and stunting (42%) which overlapped .This is much more compared to national prevalence of underweight 35.7%, wasting 21% and stunting 38.4% among under five and 34.4%, 20.4 % and 34.1% in Odisha respectively.[2,3] Another study by Susmita Bharati et al revealed among infants 27.8% were underweight, 22.5% stunted and 26.7% were wasted.[8] Wasting and underweight was found to be higher than a study by Kumar D et al. where it was 10.6% , 36.4% and stunting is little less than 51.6%.[9]

Kulwa et al found that among children of 6-24 months age, 22% were underweight and 3% were wasted.[10] Also Mesharam I et al found in her study the prevalence of wasting as 20 %.[11] However, prevalence of stunting in Kulwa study was similar to our study (43%).[10] But it is much less than the study of Bhupeswari et al where moderate to severe stunting and wasting are68% and 66.8% respectively.[12] In the present study, wasting was most prevalent (18.2%) among children aged 37-48 months. The difference may be due to more number of older age group included in present study and prevalence of malnutrition being more in later phase of under-five.

In study of Tara Gopaldas et al., infants (0-1 year) had better nutritional status than the toddlers (1-3 years) similar to present study.[13] Proportions of underweight (45.5%) and stunting (81.8%) were found maximum among children aged 13-24 months.[13]

By gender differences, 28% boys while 27.6% girls were underweight. 23.5% boys and 21.5% girls are stunted while 26.5% boys and 26.9% girls are wasted. There was no significant sex wise difference statistically in prevalence of under nutrition. Analysing the wasting pattern of undernourished children in present study, total 50 % children had different grade of wasting, among all wasted children 21.3% were severely wasted which is much higher than NFHS data of Odisha (6.4%).[3] The higher prevalence of severe wasting may be due to different epidemiological factor prevalent in the study area. However, this is a matter of concern and need further detail exploration.

Analysing the prevalence of malnutrition in different age group by MUAC measurement 26% children are in yellow colour zone and 17.3% are in red zone (i.e. SAM).Such a large portion of children being SAM is much higher than the study by Dairo MD et al where the prevalence is 5.6%.[14] Natarajan, et al in his study observed that as the educational status of the mother improved there was a decrease in the percentage of children with severe grade of protein energy malnutrition.[15] Gupta R et al told maternal literacy was

identified as the most significant determinant of child's nutritional status.[16] In study conducted by Appoh LY et al on relationship between maternal education and child nutritional status (weight for age).[17] The World Health Organization reported that inappropriate feeding in children is responsible for one-third of the cases of malnutrition.[18] Feeding practices play a pivotal role in determining the nutritional status, morbidity and survival of children. The timing and type of complementary foods introduced in an infant's diet also have significant effects on the child's nutritional status.[18]

Assessing dietary intake and growth pattern of 455 children (9-36) months of age in an urban slum in Delhi by Kapur D et al. showed that the intake different component of food was grossly inadequate. Nutrient intake for energy was 56% of the current RDA, 75% children were underweight, and 19% children were excessively thin/wasted.[19] A study in West Bengal showed positive association between the intake of complementary food and the nutritional status which documented the frequency, amount, energy-density, and diversity of food remained important issues in complementary feeding.[20]

A study conducted in Vietnam shows that the main contributing factors for under-five stunting were found age of introduction of complementary feeding and method of feeding in addition to other factor.[21] In present study inadequate hygienic practice by the mother is significantly associated with malnutrition which is similar to study of Meshram II et al.[22] He also observed in another study that absence of hand washing with soap by the mother before feeding the child was significantly associated with underweight and stunting.[23]

Furthermore, it was observed in a cross-sectional analysis of 171 Demographic and Health Surveys conducted worldwide (India not included), access to improved sanitation was shown to be associated with a 27% lower risk of child stunting.[24]

This is a study involving small sample size and many known contributory variable has been excluded due to time and resource constraint which suggest further explorative study in future.

CONCLUSION

Malnutrition of all form and grade is widely prevalent among study population of this slum area even more than the state and national prevalence irrespective of sex of the children. So, it seems gender related bias in causation of malnutrition is not observed. However, with increasing age cumulative increase in prevalence of malnutrition is seen perhaps due to persistence of causative factors. Maternal education, faulty feeding practice and hygienic practice are contributory factor of this high prevalence of disease.

Recommendations

Community awareness on clean and appropriate child feeding practice, sanitary disposal of excreta to be carried out by the health personnel, ASHA, AWW and NGO working on the area. Strengthening of ICDS program. Regular deworming service to children should be strengthened. Encouraging and strengthening appropriate complementary feeding with breast feeding in child after six months of age, age specific attention should be given while feeding. Girl's education to be promoted. Applying these measures sincerely and continuously will improve the health of slum children and fight malnutrition in the community.

ACKNOWLEDGEMENTS

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