ORIGINAL RESEARCH ARTICLE

Determinants of Under-Nutrition Among Under Five Children in the Urban Slum of Ahmedabad, India

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ABSTRACT

Introduction: In India, 6.8% of total population are under five children and 60 million are malnourished. Around 45% of deaths among children under five years are linked to under nutrition. The study aims to assess the nutritional status of under 5 children and associate it with various factors like age, gender, Immunization, birth weight, feeding practices, Anganwadi registration etc.

Methodology: A community based cross-sectional study was conducted on 191 under five children in urban slum areas**.** Parents of under five children were interviewed with the help of a pre-designed questionnaire. Malnutrition was assessed using WHO recommended Z score category.

Observations: Total 191 under 5 children were studied. Among them, 107 were male and 84 were female. Out of the assessed children two third were normal weight for age while one third were underweight. Nutrition status was significantly associated with age, birth weight, feeding practices and immunization status of children.

Conclusions & Recommendations: One fourth of under-five children were under weight for age. Age, low birth weight, preterm delivery, faulty feeding practices and incomplete immunization were statistically significantly associated with the underweight.

Key words: Under five Children, under nutrition, Weight for age, urban slum

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Introduction

In India, 6.8% of the total population are under 5 children.[1] Important health concerns in under 5 children are low birth weight, malnutrition, infectious diseases, pattern of growth and development, diarrhoea, jaundice, accidents and poisoning.[2]

Malnutrition the term commonly used for under nutrition is a major public health problem in a developing country like India.[3] In India almost 60 million children are malnourished. Among malnourished children, stunted (height for age) are 35.5%, underweight (weight-for-age) are 32.1%, wasted (weight-for-height) 19.3%, severely wasted 7.7% and overweight are 3.4%.[4] Around 45% of deaths among children under 5 years of age are linked to under nutrition (WHO).[5] These mostly occur in low- and middle-income countries. It is also observed that the malnutrition problem in India is a concentrated phenomenon that is, a relatively small number of states, districts, and villages account for a large share of the malnutrition burden, only 5 states and 50% of villages account for about 80% of the malnutrition burden.[6] Widespread malnutrition is largely a result of dietary inadequacy and unhealthy lifestyles.[7] UNICEF reported the causes of childhood malnutrition as insufficient diet, frequent infections, poor breastfeeding practices, delayed introduction of complementary foods, inadequate protein in the diet, food taboos, growth and personal choice related to diet.[8]

Malnutrition can also develop due to neglect, abnormal mealtimes, insufficient quantities of food and insufficient parental knowledge. The developmental, economic, social, and medical impacts of the global burden of malnutrition are serious and lasting, for individuals and their families, for communities and for countries.[9] This study aimed at identifying the factors of under nutrition among the under five children.

Objectives

The objectives of this study were to assess the nutritional status of under 5 children in the urban slum and to associate nutrition status with various factors like age, gender, Immunization, birth weight, feeding practices, Anganwadi registration etc.

Methodology

This was a community based cross sectional study carried out in the urban slum areas of Jodhpur, Ahmedabad. There were 3 slum areas under Jodhpur urban health center attached to the Medical College. All the families from these areas were assessed. A total of 643 families who gave consent were included in the study. Those children whose parents/legal guardian not giving consent were excluded from the study.

There were 2572 family members in these 643 families. The under-five population was 191, that was 7.42% of the total population in this community. Information of all 191 under 5 children was taken with questionnaire, weight of 165 children could be taken as 26 children were either at anganwadi or weren't cooperative or weren't present at home.

Mothers of children were primary respondent and if mother was not available, father or another legal guardian was interviewed. They were interviewed with the help of a pre-designed questionnaire. Information about age, gender, birth history of child, breast feeding history, current feeding history, immunization status, Anganwadi centre (AWC) registration was collected.

Weight of child was taken using digital weighing scale with accuracy of 100 gm. Children more than 1 year were made to stand after removing shoes on weighing scale adjusted at zero. Children below 1 year of age were weighed first with their mother holding them, then weight of mother was taken and actual weight of child was estimated after deducting mother's weight from total weight of mother with child.

Immunization status was confirmed by Mamta card and if card wasn't available, respondents were asked about the vaccines received by their children. The immunization status of the children was assessed as per the vaccines of national immunization programme taken or not.[10] A child was considered completely immunized for age if the child received all the doses as per immunization schedule till time of visit as per his/her age. Those who had missed any dose of primary vaccines till his/her age were labelled as partially immunized[11], and those who had not received any vaccine, except OPV in pulse polio immunization, up to 12 months of age, were defined as un-immunized.[12,13]

Low birth weight was defined as birth weight <2.5 kg.[14,15] Undernutrition was assessed using WHO recommended Z score category. According to WHO criteria relating to weight for age, weight +2SD to -2SD was considered as normal weight for age, between -2SD to -3SD was considered as mild malnutrition and weight less than -3SD was considered as moderate to severe malnutrition.[16] Parents of all underweight children were counselled and referred to nearby Anganwadi centre.

Analysis: Data was entered in MS Excel. Mean ± standard deviation, χ^2 test, Fisher exact test were used to study the association between variables. '*P*' value of < 0.05 was considered as statistically significant.

Results

Total 643 families were studied. Total family members in these families were 2572, 191 (7.4%) were under 5 children, 451 (17.53%) were adolescents, 8

(0.3%) were Antenatal women and 637 (24.8%) were eligible couples. The average family size was 4.

Mean age of the under five children was 33.04+1.28 months. 23% of the children were between 37 months to 48 months, while lowest number of children were infants (16%). Out of these 191 under five children, 107 (56%) were male and 84 (44%) were female.

Out of these 191 under five, 95.8% were full term delivery and 83% were normal delivery. Looking at the birth weight, 81% children had normal birth weight. Out of the total deliveries, 61% were in government hospital, 32.5% in private hospitals and 6.3% were home deliveries. Majority of the children (94%) cried immediately after birth.

Colostrum was given to almost all children (97.9%) and 15% of the children were given pre lacteal food at time of birth. Only 33.5% of the children were immediately breast fed while 59.7% were breastfed within 6 hours. The recommended feeding as per WHO guideline (i.e., exclusive breast feeding till 6 months of age and initiation of complementary feeding after 6 months) was observed in 61.8% children, while in 25.7% children early initiation of the top feeding was observed and in 12.6% children delayed initiation of complimentary feeding was observed.

Majority of them (94.8%) had done birth registration. Out of the total, 146 (76%) children had done Anganwadi registration. 97.4% children were completely immunized as per their age and remaining (2.6%) were partially immunized, not a single child was found un-immunized.

Information of all 191 under 5 children was taken with questionnaire, weight of 165 children could be taken as 26 children were either at Anganwadi or weren't cooperative or weren't present at home.

Out of total 165 under five children, whose weight could be taken among them majority (75%) were normal weight for age while 17% were mild undernourished and 8% were having moderate to severe undernutrition. Weight for age of the children was significantly associated with age, birth weight of the children, feeding practices, immunization status of children. It was observed that infants were more prone for being underweight than children of 1 to 5 year. Children whose birth weight was less than 2.5kg were at high risk for underweight than children whose birth weight was more than 2.5kg. Children who received exclusive breast feeding up to 6 months and started complimentary feeding ideally after 6 months had less risk for malnutrition while children who had early initiation of top feed and who had delayed initiation of complementary feeding were at high risk of under nutrition. Similarly, children who were fully immunized were at low risk for under nutrition and those were partially immunized had high risk. Gender of the child, term or preterm delivery and Anganwadi registration was not significantly associated with nutritional status in this study. [Table 1]. Parents of all underweight children were counselled and referred to nearby Anganwadi centre.

Table 1: Association of Weight for age with various variables (n=165)*

Variables	Weight for age				P value
	Normal# (n=124)	Mild undernutrition# (n=28)	Moderate to severe undernutrition# (n=13)	Total (n=165)	
Gender					
Male	69(76.7)	13(14.4)	8(8.9)	90	0.58
Female	55(73.3)	15(20)	5(6.7)	75	
Age group					
<1 year	15(55.6)	6(22.2)	6(22.2)	27	0.023
1-2 years	29(78.4)	5(13.5)	3(8.1)	37	
>2 years	80(79.2)	17(16.8)	4(4)	101	
Full term/ preterm					
Full term	119(75.3)	27(17.1)	12(7.6)	158	0.81
Pre term	5(71.4)	1(14.3)	1(14.3)	7	
Birth weight					
NBW	109(81.3)	22(16.4)	3(2.3)	134	0.0001
LBW	15(48.4)	6(19.4)	10(32.2)	31	
Feeding practices					
Recommended feeding	86(81.9)	13(12.4)	6(5.7)	105	0.0013
Early top feed	22(59.5)	10(27)	5(13.5)	37	
Delayed complementary feed	16(69.6)	5(21.7)	2(8.7)	23	
Immunization					
Fully	122(76.3)	27(16.8)	11(6.9)	160	0.022
Partial	2(40)	1(20)	2(40)	5	
AW registration					
Yes	89(73)	23(18.9)	10(8.1)	122	0.5114
No	35(81.4)	5(11.6)	3(7)	43	

*This analysis was done in 165 under five children, as weight could not be taken in 26 children; NBW=normal birth weight, LBW=low birth weight; # weight +2SD to -2SD was considered as normal weight for age, between -2SD to -3SD was considered as mild malnutrition and weight less than -3SD was considered as moderate to severe malnutrition

Table 2: Logistic regression of factors with nutrition status* (n=165)

Variables	AOR	95% CI
Age group		
<1 year	1.59	0.34-2.65
1-2 years	1.52	0.18-2.17
>2 years	1	
Gender		
Male	1.21	0.53-2.76
Female	1	
Full term/preterm		
Full term	1	
Pre term	1.22	0.22-6.54
Birth weight		
NBW	1	
LBW	2.42	1.58-814
Feeding Practice		
Recommended feeding	1	
Early top feed	0.67	1.58-11.75
Delayed complementary feed	1.45	0.54-8.17
Immunization		
Fully	1	
Partial	4.81	0.77-29.8
AW registration		
Done	1	
Not done	1.15	0.21-6.42

*Outcome was nutrition status that was converted into binary-normal or under nourished (mild and moderate to severe under-nourished were clubbed), AOR= adjusted odd ratio, CI=confidence interval

As per table 2, there was 4.8 times higher risk of under nutrition among partially immunized children than fully immunized. Children with low birth weight had 2.4 times higher risk of under nutrition as compared to children with normal birth weight. Under nutrition was 1.5 times more common in infants and children between 1 to 2 years of age as compared to children elder than 2 years. Children who received delayed complementary feeding were at 1.4 times higher risk of under nutrition than children who received recommended feeding. Children delivered preterm, male child and who didn't register at Anganwadi had 1.22, 1.21- and 1.15-times higher risk respectively as compared to children delivered full term, female and children registered at Anganwadi.

DISCUSSION

Total 191 under five children from 2575 population were studied. The under-five population was 7.4% of the total population. This is similar to a study carried out by Sujata Murarkar *et al* in Maharashtra in 2020.[2]

Nutritional status assessment was done in 165 children and out of them 75% were normal weight for age and 25% were underweight. Out of this 25% underweight children, 17% were mild and 8% were moderate to severe underweight. This was comparable with the data of NFHS-5-India, which was 27%.[17] Similarly, Sumon Chandra Debnath *et al* also found 70.8% of the children's weight was within normal limit for their age followed by 16.1% underweight, 9.3% moderate underweight and 3.8% of children severely underweight.[18]

This study did not find significant association of gender with nutritional status. Out of total (41) malnourished children, male and female proportion was almost similar, 51% and 49%. respectively. But in another study by Dhrubajyoti J Debnath *et al*. the difference in malnutrition in male and female children was statistically significant.[3] In a study carried out by Choudhury KK, it was observed that out of the severely malnourished children, 54.2% were female, and 45.8% were male.[19] This may be due to equal treatment given to both male and female children now a days.

In this study, prevalence of undernutrition was more among pre term deliveries than full term deliveries but the difference wasn't statistically significant (p-0.81). Similarly, in study Gupta *et al*. found that preterm deliveries showed more prevalence of under nutrition but the difference was not statistically significant with nutrition status (p-0.24).[20] This may be because of improvement in child's weight and health due to good feeding practices.

Birth weight has always been an important determinant of under nutrition in under five age group. In this study, the proportion of underweight in the children who had history of low birth weight was 51.6% while it was 18.7% in the children with normal birth weight. The difference was statistically significant. This could be because children of low birth weight are prone to low immunity and infection and hence are more at risk of developing undernutrition. Dhrubajyoti J Debnath *et al*. observed 69.2% undernourishment in the children who had history of low birth weight as compared to 25% out of total children without history of low birth weight.[3]

WHO recommended Exclusive breastfeeding till 6 months and initiation of complementary feeding after 6 months. This was observed in 61.8% of children and remaining (38.2%) had faulty feeding practices. Dhrubajyoti J Debnath *et al*. found only 40.4% children had received recommended feeding and 59.6% children had faulty feeding practices.[3] In a study carried out by Sujata Murarkar *et al* in Maharashtra this proportion of faulty feeding practices was 54% and recommended exclusive breast feeding was 46%, which was lower than this study.[2]

Many times, mothers are not aware of the benefit of exclusive breast feeding their child for first 6 months of life and the importance of initiation of complementary feeding after 6 months of age. This makes the child more vulnerable to fall in the pit of malnutrition.

In this study, only 18.1% children were malnourished among children who received recommended feeding, while out of those with faulty feeding practices, 36.7% were malnourished, indicated importance of proper feeding among children to prevent under nutrition.

Dhrubajyoti J Debnath *et al*. found that malnutrition was seen in 64.7% out of the children who were not completely immunized for age as compared to 53.3% out of the children who were completely immunized for age but the difference was not statistically significant.[3] In this study, malnutrition was present in 23.7% of completely immunized children while 60% of partially immunized children were malnourished. This difference was statistically significant. This reflects the direct effect of immunization on poor immunity and infection and indirect on malnutrition.

Limitation

Recall bias can be there because questionnaire includes past history and birth history of the child. However, it was tried to reduce recall bias as much as possible during the interview.

Conclusion

One fourth of the under-five children suffered under nutrition. Age less than 1-year, low birth weight, preterm delivery, exclusive breastfeeding less than 6 months, delayed introduction of complementary feeding and partial immunization were significantly associated with the under nutrition.

Recommendations

Promoting exclusive breast feeding, correct feeding practices and full immunization to address the problem of under nutrition among under five children.

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