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Original Research Article

Prevalence and risk factors associated with severe acute malnutrition (SAM) in ICDS block of rural Hubli, Karnataka, India

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ABSTRACT

Background: Malnutrition is one of the leading causes of morbidity and mortality in children under the age of five years in developing countries. Despite economic growth of nearly 10% per annum, in India in 2006 the NFHS-3 indicated that 6.4% of children below 60 months of age were suffering from severe acute malnutrition. This study was undertaken to know the prevalence and the risk factors associated with SAM in ICDS block of rural Hubli.
Methods: This was a cross sectional observational community based study conducted in the ICDS block of rural Hubli. All children in the age group of 0- 59 months were included in the study. The study is conducted by the department and it is self-funded by the authors, no monetary benefit either from the institute or from the government or its organization.
Results: Among 1796 children who were examined in present study, the prevalence of SAM children was 5.79% (104 children). 48% were in the age group of 37 months to 59 months. Male: female ratio was 2:3. 51% of the mothers and 47.1% of fathers were illiterate. 82.7% of the parents had per capita income belonged to class 5 of the modified B.G. Prasad classification. 60% of the SAM children were seen in families who had 3 or 4 children. Maternal anemia, IUGR and PIH were seen in 53.6%, 21.6% and 18% respectively. Low birth weight (<2.5kg) and Birth asphyxia were seen in 80.6% and 11.1%.
Conclusions: The risk factors for SAM were illiteracy, low per capita income, high order births, maternal anemia, IUGR, PIH, low birth weight and Birth asphyxia. Due emphasis should be given in improving the knowledge and practices of the parents on appropriate infant and young child feeding practices.

Keywords: Feeding practices, Immunization, Low income, Malnutrition, Prevalence, Risk factors, Severe acute malnutrition

INTRODUCTION

Malnutrition is one of the leading causes of morbidity and mortality in children under the age of five years in developing countries. Severe acute malnutrition remains a major health threat of children, as the mortality rates in SAM children are nine times higher than those in well-nourished children.[1,2] Despite economic growth of nearly 10% per annum, in India the prevalence of severe wasting among children is increasing.[3] In 1999 the second National Family Health Survey (NFHS-2) indicated that 6.7% of children aged 0-35 months were severely wasted, in 2006 the NFHS-3 indicated that 6.4% of children below 60 months of age were suffering from severe acute malnutrition.[4,5]

With the current estimated total population of India has 1100 million, it is expected that about 8.1 million are likely to be suffering from SAM.[6] This is more prevalent in socioeconomically deprived communities.[7] The risk

factors for malnutrition are lack of exclusive breast feeding, late introduction of complementary feeds, feeding diluted feeds containing less amount of nutrients, repeated enteric and respiratory tract infections, ignorance, poverty, parental illiteracy and large family size and other factors.[8]

Early identification of SAM children helps in segregation for management either in community or institutional. This study was undertaken to know the prevalence of SAM children and the probable risk factors for the SAM in the ICDS block of rural Hubli.

METHODS

This was a cross section observational study conducted in the ICDS block of rural Hubli.

Inclusion criteria

- All the children in these blocks were examined, identified and those who fulfilled WHO criteria for SAM were included in the study.

All enrolled children were assessed and recorded in the predesigned proforma. Sample size was calculated based on ethical clearance from institutional ethics committee and also informed consent from the parent or guardian of the child was obtained.

Identification of children with severe acute malnutrition was done with following criteria in infants >6 months of age:[9]

- Weight for height less than -3SD and/or
- Visible severe wasting and/or
- Mid upper arm circumference (MUAC) <11.5cm and/or
- Nutritional oedema of both feet.*

In children <6 months of age SAM were identified by:[9]

Any infant more than 49cm** in length who has following features were treated as severe acute malnutrition:

- Weight for height less than -3SD and/or
- Visible severe wasting and/or
- Oedema of both feet.*

*Other causes of oedema e.g., Nephrotic syndrome excluded.

**For children with length <49cm, visible severe wasting was used as criteria to identify SAM.

Anthropometric measurements were computed using standard instruments. Weight was recorded using standard digital weighing scale, kept on firm horizontal surface to the nearest 10g. Height was recorded using infantometer and mobile stadiometer to the nearest cm.

Sample size: According to NFHS-3, Prevalence of SAM is 6.4% with allowable error (α) 20% and considering 95% confidence interval, n=1463 with formula using:

$n=4pq/\alpha^2$
$n=4\times6.4\times93.6/ (1.28)^2$
$n=1462.5$

The sample required for study is 1463.

Statistical analysis

Statistical analysis was carried out using Statistical Package for Social Science (SPSS ver 20.0) package 2017.

RESULTS

During present study period total children enrolled were 1796 and 104 had SAM and the Prevalence of SAM was 5.79%.

Table 1: Age distribution of SAM (age in months) n=104.

Age in months	n	Percent
0-6	0	0
7-12	7	6.8
13-36	47	45.2
37-59	50	48
Total	104	100.0

χ^2=33.250, p=0.0001, HS.

In present study all the children were between 6 and 59 months of age, mean age of presentation was 35±17.28 months, among them fifty children (48%) were in the age group of 37 to 59 months and 47 children (45%) were between 13-36 months.

Table 2: Sex distribution (n=104).

Sex	n	Percent
Female	44	42.3
Male	60	57.7
Total	104	100.0

χ^2=2.462, p=0.117, NS ratio 2:3.

About 58% of SAM children were male children and it wasn't statistically significant. In present study male to female ratio was 3:2, males 60 (58%), females 44 (42%).

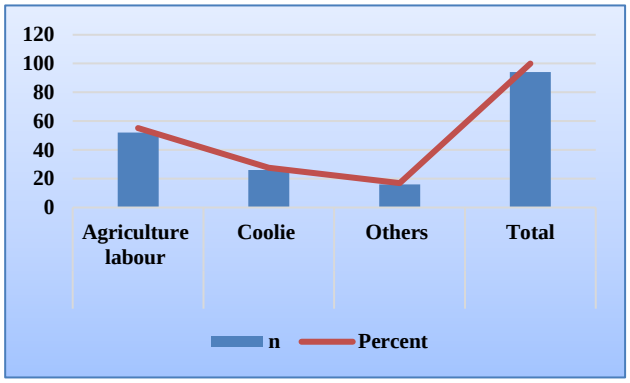
About 47% to 51% of the parents were illiterate and 43% to 46% were below S.S.L.C. In present study 49 (52.1%) of the SAM children fathers were illiterate and 53 (53%) mothers were illiterate. Maternal illiteracy was more in present study.

Table 3: Parents education (n=104).

	Father	Percent	Mother	Percent
Illiterate	49	47.1	53	51
SSLC and below	45	43.3	48	46.2
PUC and above	10	9.6	03	2.9
Total	104	100	104	100

*Illiterate means a person who can merely read but cannot write.

In present study 52 (55%) of the fathers were agricultural laborer 26 (27.56%) coolie's and 16 (17%) had other occupation.



χ^2=40.923, p=0.0001, HS.

Figure 1: Father occupation.

In present study 59 (59%) were housewives, 29 (29%) were agricultural laborer and 12 (12%) were coolies. Working women is a risk factor as they can't feed their children properly. Even though in present study, more women were housewives, still SAM was present because of lack of education.

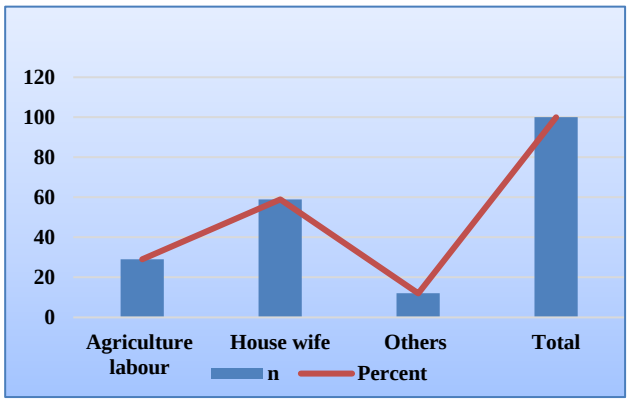
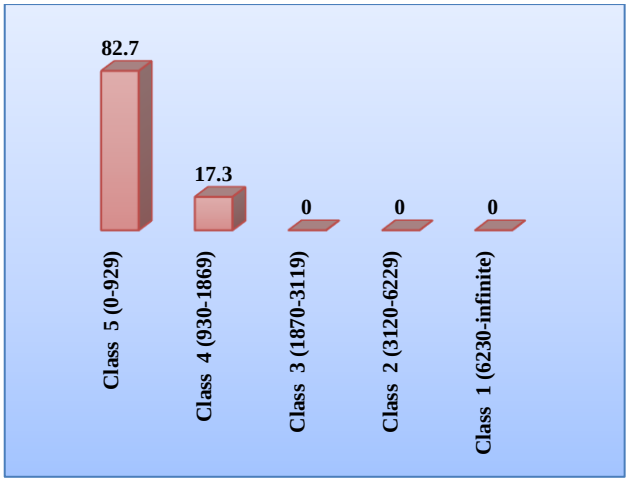


Figure 2: Mother occupation (n=100).

Most of the parents belong to poor socio-economic status. In present study according to B.G. Prasad's classification 86(82.7%) were Class 5, 18 (17.3%) were Class 4 and 0% were in Class 3, Class 2 and Class 1.



p=0.0001, HS.

Figure 3: Per capita income (n=104).

Poor family income has been proved to be significant contributors to SAM in the present study, because it deprives to provide quality foods to the family.

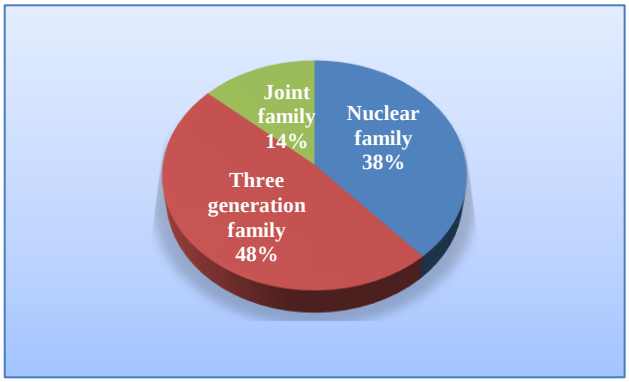


Figure 4: Family size (n=104).

In present study 64 (61.5%) had large family size, 40 (38.5%) had nuclear family. The effect of a large family size with overcrowding has been implicated as a risk factor.

Table 4: Child spacing (n=104).

	n	Percent
<2 years	66	83.5
≥2 years	13	16.5
Total	79	100.0

χ^2=29.570, p=0.0001, HS.

Authors noticed that child spacing was <2 years in 66 (83.5%) and 13 (16.5%) had >2 years in present study. If the average interval between births is >3 years, the prevalence of undernourished children would be reduced. This has been reinforced in present study which showed that if the child spacing ≤2 years there was a significant association with under-nutrition.

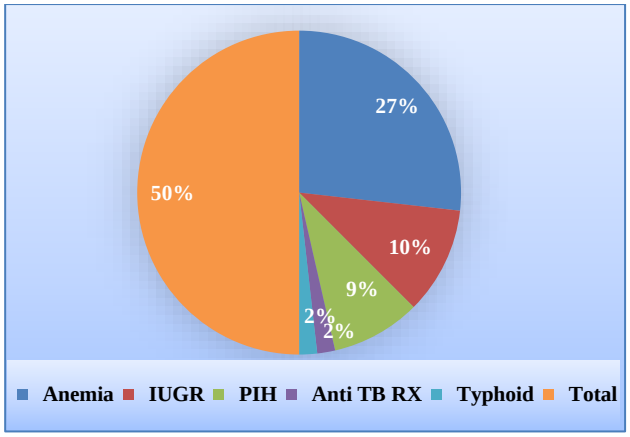
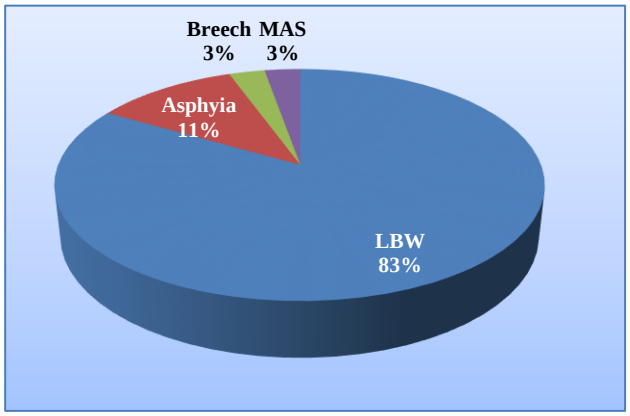


Figure 5: Maternal risk factors.

Anemia was most common in pregnant patients and others were PIH and IUGR. Maternal risk factors like anemia was seen in 15 (14%), IUGR in 6 (6%) and PIH in 5 (5%).



p=0.0001, HS.

Figure 6: Neonatal events (n=36).

Among 36 babies, low birth weight and birth asphyxia were seen in 30 (83.4%) and 4 (11.1%) respectively in present study. One newborn was <1.5kg (VLBW).

Table 5: Initiation of appropriate complementary feeds (n=104).

	n	Percent
6 months and below	43	41.3
7-12 months	15	14.4
13-18 months	37	35.6
Above 18 months	9	8.7
Total	104	100.0

Authors found appropriate initiation of complementary feeds was seen in only 15 (14.4%) children between 7-12 months. 37 (35.6%) of the children were started between 13-18 months and 43 (41.3%) in <6 months of age in present study. Complimentary feeding was started either too late or too early in these children.

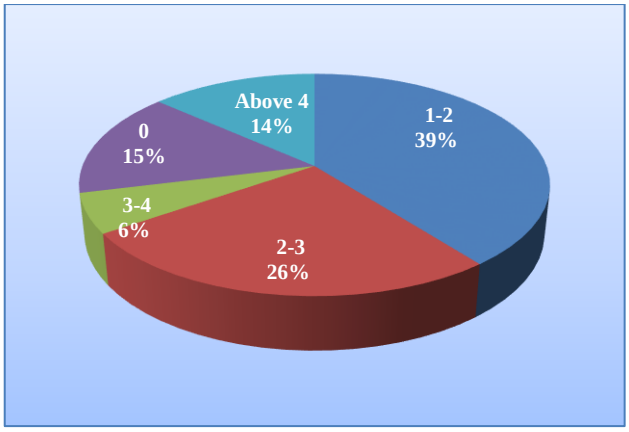


Figure 7: Number of complementary feeds/day.

In present study 39% of children had just 1 to 2 complimentary feeds which was insufficient, 26% had 2-3 feeds per day, just 14% had above four feeds.

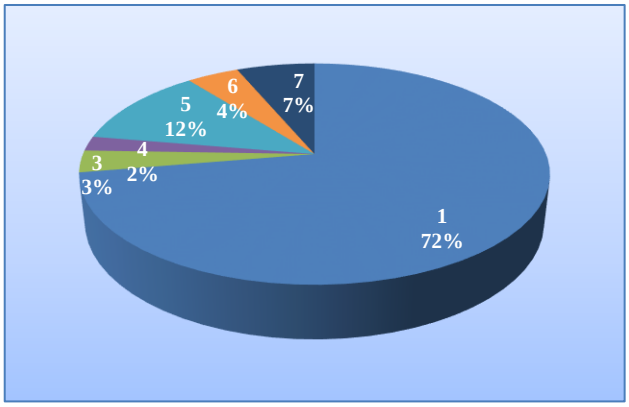


Figure 8: Clinical symptoms (n=94).

Most of the children around 72% had complained loss of appetite, 12% had diarrhea, 7% had vomiting. Fever and cough were seen in 2-3%.

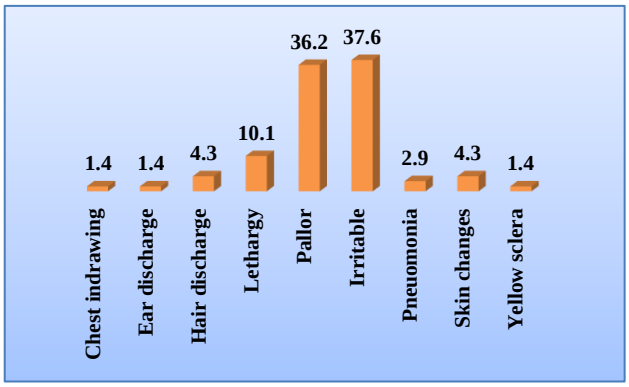


Figure 9: Clinical signs (n=69).

Among 104 children 69 had clinical signs on examination as mentioned. Among the clinical signs, pallor was seen in 36.2% and irritability was seen in 37.6% of the children, lethargy was seen in 10% of children, chest

indrawing, ear discharge, hair and skin colour changes, pneumonia and icterus were also seen.

Broken homes* (n=104)

*A family in which the parents have separated/divorced /one of the parents expired. Broken homes were seen in 13.5% of SAM children.

Immunization (n=104)

About 96% of the SAM children had complete immunization for corresponding age. p=0.0001.

Antenatal events in SAM mothers

Among the mothers of SAM children, about 54% of the mothers had anemia, next common was IUGR and PIH. (These antenatal events were taken from the SAM record as entered by the respective medical officer).

Exclusive breast feeding (n=104)

In present study 58.7% of babies had exclusive breast feeding.

DISCUSSION

Severe acute malnutrition is both a medical and social disorder. It is the social problem in most of the times which leads to medical problems. Lack of exclusive breast feeding, late introduction of complementary feeds, age of father and mother, literacy status, occupation of the parents, risk factors during pregnancy, lack of adequate birth spacing, poor maternal nutrition during lactation, high birth rate, low birth weight, pre lacteal feeds, early and late introduction of complimentary feeds, ignorance, less hygiene conditions, poverty etc., are the risk factors for development of SAM.[9]

In present study the prevalence of SAM children was 5.79%, whereas national average according to NFHS-3 is 6.4%. In present study all the children were between 6 and 59 months of age, mean age of presentation was 35±17.28 months, among them fifty children (48%) were in the age group of 37 to 59 months and 47 children (45%) were between 13-36 months whereas in Mishra K et al showed mean age 19.1±15.4 months.[9]

In present study male to female ratio was 3:2, males 60 (58%), females 44 (42%). Similar findings were noticed by Mishra K et al, whereas study done by Basit A et al showed 55% females and 70% females respectively.[10,11] Several studies has shown that female children are prone to SAM due to negligence but in present study male children were more than females probable reason is the health seeking behavior of parents wherein there will be male preference as against female children. Ninety-four (90%) children had clinical symptoms, among which 68 (72.3%) had loss of appetite and 11 (11.7%) had diarrhea. About 69 (66.3%) had clinical signs among which 26 (37.6%) had irritability, 25 (36.2%) pallor and 7 (10%) lethargy. Similar findings were noted by Vella V et al.[12] The reason for more no. of loss of appetite in our children probably due to frequent illness especially diarrhea which undermines children's growth. During diarrhea appetite is decreased along with decreased absorption of nutrients from intestine. This is added to an increased metabolic rate due to fever and all these couple to produce weight loss.

Risk factors

Authors in present study assessed following risk factors for development of SAM. Mother's age, parental education, parental occupation, per-capita income, family size, siblings, child spacing, broken homes, immunization, maternal risk factors, neonatal factors, exclusive breast feeding, initiation of complementary feeds and number of feeds.

Forty-nine (49%) SAM children mothers were between the ages of 21y to 25y and 34 (34%) were between 26y to 30y similar study by Prost MA et al showed mothers in the age group of 25.6±3y, whereas in the study by Haider J 34% were <25y and 66% were >25y.[13,14] The risk of developing SAM will be more if mother age is <20yrs which was not seen in present study.

Parental education status is also one of the main contributory risk factors for SAM. On studying the parental education status, it was found that maternal, rather than paternal illiteracy was an independent risk factor for SAM which is consistent with earlier reports.[16] On the contrary, the level of father's education has also been found to be associated with the nutritional status of the child in some studies. In present study 49 (52.1%) of the SAM children fathers were illiterate which was similar to study by Rayhan et al showed 42.6%.[15]

Authors found 53 (53%) mothers were illiterate similar percentage was noticed in studies by Prost MA et al 48.5% whereas in Haider J et al it was 68%.[13,14] Since, maternal illiteracy was more in present study, could be one of the reasons for SAM. Maternal literacy has a positive impact in socio-demographic status as it decreases SAM in children. Positive association were found between mother's education and under-nutrition of their children in some studies.[16] However a study by Elizabeth KE, described cases of edematous SAM in which the mothers of these children were educated, some even being graduates.

In present study 52 (55%) of the fathers were Agricultural laborers, 26 (27.56%) coolies and 16 (17%) had other occupation, similar to others study who had 40.4% occupation as agriculture and Prost MA where 39.3% were farmers whereas in Basit A et al 67.9% were professional/skilled, 32.1% were laborer/unemployed.[13,11] In present study agriculture as occupation was more this

could be the reason for low income in this part of the state. Occupation of the father directly correlates to socioeconomic status which in turn points to nutrition status of the children. This is because unemployment and low income deprives the children of the means to provide quality foods to their family. Even though in present study authors had more no. of housewives still SAM was present because of lack of education.

In present study according to B.G. Prasad's classification 86 (82.7%) were Class 5, 18 (17.3%) were Class 4 and 0% were in Class 3, Class 2 and Class 1, whereas in, Mishra K et al 72.4% and Basit A et al 32.1% belonged to low class group. In present study poor family income was predominant.[10,11]

In present study 64 (61.5%) had large family size, 40 (38.5%) had nuclear family. Large family size was seen in Odunaya SI et al 81%, Jamro et al 66.6%, Basit et al 51.8% and Amsalu S et al 40.2%.[9,11,17,18] A large family size is associated with an increased risk of SAM. In the present study large family size could be the reason unable to provide good nutritional food to the family.

Authors noticed child spacing was <2yrs in 66 (83.5%) and 13 (16.5%) had >2yrs in present study, in a similar study by Basit et al 44.1% had child spacing ≤2y. Odunaya et al showed that if the average interval between births is >3years, the prevalence of undernourished children would be reduced.[11,17] This has been reinforced in present study which showed that if the child spacing ≤2yrs there was a significant association with under-nutrition similar to other studies.[11]

Complete immunization was 100 (96.2%) in present study similar to Kikafunda JK et al who had 93.1% complete immunization.[16] High coverage of immunization was noticed in present study. Immunization is an essential intervention to prevent childhood infections and consequent under-nutrition. Since present study was conducted in Anganwadi's where routine immunization will be taken care by the respective anganwadi worker in contrast to other studies.[8,10,12]

Low birth weight and birth asphyxia were seen in 30 (83.4%) and 4 (11.1%) respectively in present study. Children of well-nourished mothers had a lower risk of being under-weight compared to children of acutely malnourished mothers. The reason may be that malnourished mother cannot provide sufficient breastmilk because of their nutritional deficiency. Acute malnutrition of mother could be an impediment for her child's growth.[14]

Exclusive breast feeding was seen in (61) 58.7% in present study, similar to Mishra K which was 55.2% and Amsalu S 52%, whereas in the Jamro B study it was 25.9% though both studies were conducted in the medical college hospital set up, lack of education and lack of support to promote breastfeeding might be the reason.[9,10,18] In the present study, SAM was noticed in 61 out of 104 SAM children though EBF given, the reason might be inadequate breast feeds. However, some authors have reported no statistically significant difference in wasting and stunting between those who were exclusively breast fed and those who were not, though the latter group of infants were more likely to be underweight.

Authors found appropriate initiation of complementary feeds was seen in only 15 (14.4%) children between 7-12 months.37 (35.6%) of the children were started between 13-18 months and 43 (41.3%) in <6 months of age in present study. In Mishra K et al it was 43.42% after 9 months whereas in Amsalu et a1 21.6% had after 12 months and found that late initiation of complementary feeds beyond 12 months was an independent risk factor for SAM.[10,18]

Number of complementary feeds in present study was 1-3 feeds/day in 68 (66%) children similar to Mishra et al and Kikafunda JK whereas in Owor et al study 51% of children had feeds 3-4 times per day.[10,16,19] In present study 1-3 feeds/day could be the reason for malnourishment. Children whose feeding frequency was low were at a higher risk of stunting and underweight.[20]

CONCLUSION

In present study prevalence of SAM children in Hubli rural ICDS block was 5.79%. The risk factors for development of SAM in present study were mother's literacy status, father's occupation, higher number of siblings, inadequate child spacing, maternal risk factors (anemia, IUGR, PIH), neonatal events (LBW, birth asphyxia.,). Too early or too late initiation of complementary feeds and less number of feeds per day are other risk factors for SAM.

Recommendations

Authors suggest due emphasis should be given in improving the knowledge and practices of the parents on appropriate infant and young child feeding practices.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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