

## Management outcome and risk factor in children with severe acute malnutrition in <6 months of age and role of supplementary suckling technique in re-establishing breastfeeding

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### ABSTRACT

**Aim:** The aim of the study was to study management outcomes and risk factors in children with Severe Acute Malnutrition (SAM) <6 months and to assess the role of the Supplementary Suckling Technique (SST) in reestablishing breastfeeding. **Materials and Methods:** This is a prospective observational hospital-based study done in the Department of Pediatrics in a tertiary teaching institute from October 2019 to September 2020. 75 children who fulfilled the inclusion criteria were included in the study. Children were managed according to the WHO protocol. SST was used to establish breastfeeding in cases of lactation failure. **Results:** A total of 75 infant's up to 6 months of age were enrolled. Most infants presented at the age of 2–4 months (42.67%). The male-female ratio was 1.2:1. 50 (66.67%) mothers were illiterate and 65 (82.67%) belonged to the lower socioeconomic status. A history of preterm birth and low birth weight (LBW) was found in 54 (72%) and 62 (82.67%) infants, respectively. Exclusive breast feed was given to 13.33% while top feeding given to 86.6% of infants. With proper management target weight was achieved in 53 (70.66%) infants. Most infants stayed from 11 to 20 days (79.37%). Lactation was re-established in 60.46% of children who tried the supplement suckling technique. **Conclusion:** Lack of awareness regarding adequate infant feeding practices and illiteracy is an important factor for the high prevalence of malnutrition. SST is an effective way in reestablishing breastfeeding in lactational failure. Proper counseling and education of the mother by health-care professionals can help in improving exclusive breastfeeding rate.


**Key words:** Severe acute malnutrition, Breastfeeding, Supplementary suckling technique

Malnutrition is one of the leading causes of morbidity and mortality in children under the age of 5 years in developing countries. Children need extra care because they are our supreme assets, as children of today are human resources for tomorrow.

SAM remains a major health threat to children, as the mortality rates among SAM children are 9 times higher than those in well-nourished children [1]. Despite economic growth and development in India, the prevalence of severe wasting among children is increasing [2]. The third National Family Health Survey (NFHS) 3 (2005–06) indicated that 6.4% of children under 5 years were severely wasted, and it increased in 2015–16 when the NFHS 4 indicated that 7.5% of children under 5 years of age were suffering from severe wasting [3,4]. The NFHS 4 also documented the prevalence of underweight and stunting

among children in India as 35.8% and 38.4%, respectively. With the current estimated total population of India, it is expected that about 8–9 million are likely to be suffering from SAM [5]. This is more prevalent in socioeconomically deprived communities [6].

Early infancy is a period of transition from neonatal life to childhood during which there is rapid growth and neurological development. Infants <6 months are a neglected subgroup in SAM children. In addition to etiologies such as low birth weight, persistent diarrhea, and recurring sepsis or chronic underlying diseases or disability, the development of SAM in this age group commonly reflects suboptimal feeding practices precisely breastfeeding practices. Feeding severely acute malnourished young infants is labor-intensive and requires a different approach from those needed for older children. In such cases, SST can be used as a strategy to initiate relactation in mothers who have developed lactation failure. Our objective is to study the success rate of SST and to assess weight gain in infants with SAM <6 months of age.

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## MATERIALS AND METHODS

This was a prospective observational hospital-based study done in the Department of Pediatrics, tertiary teaching institute from October 2019 to September 2020. A total of 86 patients under 6 months of age with SAM were admitted during the study period. Out of these five had congenital heart disease and six had other congenital anomalies. Thus, 75 children who were admitted to the pediatric ward and fulfilled the inclusion criteria were taken for the study.

Infants of <6 months of age with SAM were included in this study. SAM in infants >49 cm length was defined as weight/length <-3SD and/or presence of bilateral pedal edema. In infants <49 cm visible severe wasting was taken as criteria of SAM according to the World Health Organization (WHO).

The infants with diagnosed organic causes of malnutrition such as Gastro-Esophageal Reflux Disease (GERD), pyloric stenosis and other surgical conditions, chronic renal failure congenital heart diseases, liver disorders, asthma, mental retardation, cerebral palsy, and a suspected case of inborn error of metabolism and those with congenital malformations such as cleft lip, cleft palate, and post-operative cases were excluded from the study.

A detailed history including antenatal, natal and post-natal history, medical history of the child, developmental history, and detailed diet history including breastfeeding, whether prelacteal feeds were given or not and also the type and method of feeding was collected. Immunization status was also noted. Physical examination findings were recorded at the time of admission using standard methodology and anthropometric measurements were expressed in standard deviation from the median of the reference population. Laboratory investigations were done according to the requirement of an individual case. All children admitted with SAM were managed according to WHO guidelines. SST was tried on the infants who were not breastfed. The mothers of the infants were counseled about breastfeeding and the feeding practices. The weight of the infants was measured daily with the weighing machine. Infants were discharged if all clinical conditions or medical complications were resolved and the infant had a good appetite, was clinically well and alert with satisfactory weight gain on either exclusive breastfeeding or replacement feeding.

Final data were analyzed using univariate and multivariate analysis with the help of the latest version of SPSS (25) software.

## RESULTS

Most infants presented at the age of 2–4 months (42.67%) followed by 4–6 months (34.67%) and 0–2 months (22.67%), male female ratio being 1.2:1. Most of the infants belonged to lower socioeconomic status (72%), upper low (14.67%) then the lower middle (13.33%) whereas none belonged to upper-middle and upper class. 66.67% mothers were illiterate, 16% were primary literate, followed by middle (10.67%) which were followed by secondary pass (6.67%) [Table 1]. Exclusive breast feed was given to 13.33% followed by mixed (81.33%) whereas only 5.33% were never breastfed. Top feeding was being given

**Table 1: Risk factor associated with socio demographic parameters**

Age at presentation		
Parameters	N=75	Percentage
0–2 months	17	22.67
2–4 months	32	42.67
4–6 months	26	34.67
Gender distribution		
Parameters	N=75	Percentage
Male	41	54.67
Female	34	45.33
Socio economic status		
Parameters	N=75	Percentage
Upper and upper middle	0	-
Lower middle	10	13.33
Upper low	11	14.67
Lower	54	72.00
Educational status of mother		
Parameters	N=75	Percentage
Illiterate	50	66.67
Primary	12	16
Middle	8	10.67
Secondary	5	6.67
Higher secondary and above	0	0

to 86.6% of infant. About 77% of infants who were top-fed were receiving the dilutional feed, and only 13% received undiluted feeds. The most common top milk given was cow milk (50.76%) followed by goat milk (23%), and buffalo milk (18.46%) followed by formulae (7.6%). Top feeding was provided through the bottle (64.6%), spoon - Paladai (27%), and cotton (7.6%). Only 29.33% of infants were provided colostrum whereas 70.67% remain deprived. Only 34.67% of infants were not given pre-lacteal feeds, whereas 65.33% were given pre-lacteal feeds [Table 2]. About 82.67% of infants were low birth weight whereas only 17.33% of infants were born with normal birth weight. About 72% of infants were born preterm whereas only 28% were born at term gestation. About 58.67% of infants were of birth order 3 or more than 3. Whereas only 41.33% were of birth order <3. [Table 3] 70.67% of infant achieved the target weight. Whereas 13.33% failed to gain weight, 3 infants expired and 9 have left against the advice. Average weight gain was 5–10 gm/kg/day in 63.49% followed by 10–15 in 17.46% and <5 in 17.46% and greater than 15 were only 1.58%. Most infants stayed from 11–20 days (79.37%) followed by more than 20 days (9.52%) and 11.11% stayed for up to 10 days 60.46% mother who tried supplement suckling technique developed reestablishment lactation whereas 39.54% of mother failed to do so [Table 4].

## DISCUSSION

In this current study, most common age at presentation was 2–4 months (42.67%) and male female ratio was 1.2:1. In MM

**Table 2: Risk factor associated with sociodemographic parameters**

Breast feeding status		
Breast feeding status	N=75	Percentage
Exclusive	10	13.33
Mixed	61	81.33
Never	4	5.33
Top feeding status		
Top feeding status	N=75	Percentage
Given	65	86.6
Not given	10	13.3
Type of top milk		
Type of top milk	N=65	Percentage
Buffalo	12	18.46
Cow	33	50.76
Goat	15	23.00
Formulas	5	7.6
Dilution of top milk		
Dilution of top milk	N=55	Percentage
Diluted	50	77
Undiluted	15	13
Mode of top milk feeding		
Mode of top milk feeding	N=65	Percentage
Bottle	42	64.6
Spoon/Paladai	18	27
Cotton	5	7.6%
Colostrum intake		
Colostrum intake	N=75	Percentage
Given	22	29.33
Deprived	53	70.67
Pre lacteal feeds		
Pre lacteal feeds	N=75	Percentage
Given	49	65.33
Not given	26	34.67

**Table 3: Risk factor associated with characteristic**

Breast feeding status		
Birth weight	N=75	Percentage
Normal	13	17.33
Low	62	82.67
Gestational age		
Gestational age	N=75	Percentage
Term	21	28
Preterm	54	72
Birth order		
Birth order	N=75	Percentage
>3	44	58.67
<3	31	41.33

Islam study, there is no association found among the gender while the mean age at presentation was 5.1±1.2 weeks. This could be due to a delay in presentation to the health-care center due to a lack of resources and awareness. Maternal factors such as educational status and socioeconomic status play an important role in SAM. In the present study, the majority of the mothers of the cases with SAM were illiterate (66.67%) and belonged to lower socioeconomic status (72%). Similarly in a study conducted by Choudhary *et al.* [7] literacy rates of mothers were high among controls (70.6%) than in cases (39.1%). Furthermore, in the study of Islam *et al.* (2018) [8] mothers were less educated in the SAM group than those in the non-SAM group ( $p=0.005$ ).

**Table 4: Risk factor associated with characteristic**

Outcome		
Final outcomes	N=75	Percentage
Target	53	70.66
Failure	10	13.33
Death	3	4
Defaulter	9	12
Average weight gain		
Average weight gain	N=63	Percentage
<5 g/kg/day	11	77.46
5–10 g/kg/day	40	63.49
10–15 g/kg/day	11	17.46
>15	1	1.58
Length of stay		
Length of stay	N=63	Percentage
1–10 days	7	11.11
11–20 days	50	79.37
>20 days	6	9.52
Reestablishment of BF via SS		
Reestablishment of BF via SS	N=43	Percentage
Successful	26	60.46
Failure	17	39.54

As shown in the previous studies [9], birth weight has influence on the nutritional status of an infant. The findings of the present study are consistent with this, in which the prevalence of SAM was markedly higher in LBW infants (82.67%). Another study in Bangladesh [10] also concluded a higher prevalence of malnutrition in children with LBW than in those with normal birth weight. In a study by Mwangmome *et al.* [11], LBW was 43% and unknown birth weight was 11%. Preterm infants have their own challenges for survival and are in nutritional deficit even before birth. In the present study, 72% of the cases of SAM were preterm and only 28% were term. This is consistent with the findings of Kumar *et al.*, (2018) [12] study which described that preterm babies were more prone to be non-responder as compared to term babies.

In the present study, only 13.33% of SAM cases were given exclusive breastfeeding. Sharma *et al.* (2017) [13] study also reported that only 23.2% of the severely malnourished children were given exclusive breastfeeding up to 6 months. Similarly, Kavita Choudhary *et al.* [7] study also found a strong association between exclusive breastfeeding up to 6 months with malnutrition. Furthermore, in Lalit Kumar *et al.*, (2018) [12] study, among the exclusive breastfed infants only 16.27% (7/43) were non-responders which was very low as compared to 34.72% (25/72) who were top fed which was statistically significant ( $p=0.0473$ ). Partial breastfeeding was positive in 145 (70.7%) of the study cases and no breast feeding was noted in 60 (29.3%) in the study done by Saadia *et al.* [14] study.

The percentage of exclusive breastfeeding was further low, that is, 3% in a study by Vygen *et al.*, 2013 [15]. The reason for not giving exclusive breastfeeding is mainly a lack of knowledge about its significance in the common population. A total of 29.33% cases of SAM received colostrum in our study, which is much low than compared of Diksha Sharma *et al.*, (2017) [13] study in which 59% of SAM infants received colostrum. Similarly in Lalit Kumar *et al.*, (2018) [12] study, infants who received colostrum were only 18.30% (13/68) non-responders as compared to 54.54% (19/47) in infants

who were not given colostrum and were significant ( $p=0.003$ ). Findings of these studies signify the importance of colostrum that it is very helpful in reducing infection and thus further contributing to a reduction in malnutrition. Furthermore, 65.33% cases of SAM were given pre-lacteal feeds. This was consistent with the findings of Diksha Sharma *et al.*, (2017) [13] study in which only 46.3% of the control group and 71% of the severe malnutrition group received pre-lacteal feed which was statistically significant. The effect of pre-lacteal feeds can be appreciated by the findings of Lalit Kumar *et al.*, (2018) [12] study in which out of the total infants who were given pre-lacteal feeds 47.4% were non-responders which was much higher than compared to the ones who were not given pre-lacteal feeds (18.2%). In the study done by Sharma *et al.* [16], only 21.62% (16/74) were non-responders among infants who received colostrum as compared to 38.46% (20/52) in infants who were not given colostrum ( $p=0.002$ ). Out of 126 infants, 42 (33.33%) were given pre-lacteal feed, out of which, 19/42 (45.23%) remain in SAM ( $p=0.001$ ).

The most common presenting complaint in our study was inappropriate weight gain (61.33%) followed by loose stools (17.33%) whereas in Singh *et al.* [15] study acute diarrhea (21%) was most common followed by failure to gain weight. In Martha Mwangmone *et al.* [11] study pneumonia was found in 76% and diarrhea in 29%. In the present study, out of the total SAM cases, 70.66% of infants recovered and 4% died. Similar findings were present in a study conducted in Bangladesh [8], in which out of the total SAM cases 66.2% recovered and 3.9% died.

This finding is consistent with the study of Lalit Kumar *et al.* [12] in which 68.69% were cured, 27.82% were non responders, and 0.8% expired. In a study by Vygen *et al.* [15], Recovery was 85% whereas mortality was 6%.

Relactation is a challenge which requires motivation both the mother and the staff involved in counseling. SST is a method used to induce relactation. In the present study, encouraging results were found as with SST, 60.46% of mothers successfully established relactation. Similar results were also found in some other studies like, Singh *et al.* [17] study in which SST was successful in 55.7% infants and Rampal Singh Tomar [18] study even higher percentage of mothers (85.8%) were successful in establishing relactation. With such promising results, it appears to be an effective intervention to promote breastfeeding which in turn will help in reducing malnutrition. In the current study, the maximum number of patients stayed in the hospital for 11–20 days (79.37%) followed by >20 days (9.52%). In 65% of cured patients average weight gain was 5–10 g/kg/d while it was <5g/kg/d in 17.46% and 10–15g/kg/d in 17.46% cases and in only 11.11% cases it was >15 g/kg/d.

The strength of our study was that we considered all sociodemographic parameters, maternal literacy and feeding characteristics of a baby in this paper. This is a modest attempt to study the effectiveness of SST in SAM < 6 months, which has a paucity of data, especially in the Bundelkhand region. We were limited by our sample size and were not able to maintain follow-up records to assess the appropriate continuation of breastfeeding. Furthermore, we did not compare weight gain in infants with or without SST.

## CONCLUSION

Maternal awareness and birth and feeding characteristics such as colostrum intake, prelacteal feeds, breastfeeding status, and intake of top feeds play an important role in SAM in less than 6 months infants. Hence focus should be laid on proper counseling and education of mothers by health care professionals. Exclusive breastfeeding can be achieved through proper counseling and SST can be used as an effective tool in establishing relactation.

## REFERENCES

1. Black RE, Allen LH, Bhutta ZA, Caulfield LE, De Onis M, Ezzati M, *et al.* Maternal and child undernutrition: Global and regional exposures and health consequences. *Lancet* 2008;371:243-60.
2. Chatterjee P. Child malnutrition rises in India despite economic boom. *Lancet* 2007;369:1417-8.
3. National Family Health Survey (NFHS-3). 2005-06: India O IIPS-Vol. I. Mumbai: International Institute for Population; 2007.
4. India National Family Health Survey. NFHS-4 2015-16 ICF IIPS. Mumbai: IIPS and ICF; 2017.
5. UNICEF. Tracking Progress on Child and Maternal Nutrition: A Survival and Development Priority. New York, United States: UNICEF; 2009.
6. Bhandari N, Bahl R, Taneja S, De Onis M, Bhan MK. Growth performance of affluent Indian children is similar to that in developed countries. *Bull World Health Organ* 2002;80:189-95.
7. Choudhary K, Shekhawat K, Kawatra A. A cross sectional study to assess nutritional status of adolescent girls at a government senior secondary girls' school at Bikaner, Rajasthan Indian J Community Health 2014;26:318-21.
8. Arafat Y, Islam MM, Connell N, Mothabbir G, McGrath M, Berkley JA, *et al.* Perceptions of acute malnutrition and Its management in infants under 6 months of age: A qualitative study in rural Bangladesh. *Clin Med Insights Pediatr* 2018;12:1-10.
9. World Health Organization. Updates on the Management of SAM in Infants and Children (Guideline). Geneva: World Health Organization; 2017.
10. Singh DK, Rai R, Dubey S. SST for relactation in infants with SAM. *Indian Pediatr* 2014;51:671.
11. Mwangome MK, Berkley JA. The reliability of weight-for-length/height Z scores in children. *Matern Child Nutr* 2014;10:474-80.
12. Kumar L, Das G, Gaur A. Prognostic factors affecting outcome of hospitalised infants 1-6 months with severe acute malnutrition in North India. *Int J Contemp Pediatr* 2018;5:1315-21.
13. Sharma D, Sareen D, Bamnawat S. A study of correlation of different grades of malnutrition with feeding practices during 1<sup>st</sup> 6 months of life. *Int J Contemp Pediatr* 2017;4:460.
14. Khan S, Hasan G, Ali I, Arshad R, Ali I, Abbas A. Management of infants less than six months with SAM (severe acute malnutrition). *Prof Med J* 2020;27:1113-8.
15. Vygen SB, Roberfroid D, Captier V, Kolsteren P. Treatment of SAM in infants <6 months in Niger. *J Pediatr* 2013;162:515-21.
16. Sharma AK, Das G. Infant and maternal risk factors of severe acute malnutrition under 6 months of age. *Ind J Child Health* 2020;7:454-8.
17. Singh DK, Rai R, Dubey S. Supplementary suckling technique for relactation in infants with severe acute malnutrition. *Ind Pediatr* 2014;51:671.
18. Tomar RS. Initiation of relactation: An army hospital based study of 381 cases. *Int J Contemp Pediatr* 2016;3:635-8.

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