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Original Research Article

A study of clinical profile and outcome of SAM children admitted in nutritional rehabilitation centre, Patna Medical College and Hospital, Patna, Bihar, India

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ABSTRACT

Background: Severe Acute malnutrition (SAM) with severe wasting remains a major killer of children. In Bihar 48% of children are stunted, 21 % are wasted and 7% are severely wasted. Even during the first six months of life, 31% are wasted. Under nutrition generally decreases with the increasing mother's schooling, better nutritional status of the mother. Stunting and under nutrition are higher in rural areas than in urban areas.
Methods: It is a hospital based observational study done between June 2017 to December 2017. A total of 55 SAM patients with medical complications in the age group of 6 months to 60 months admitted in Nutritional Rehabilitation center (NRC), Department of Pediatrics, Patna Medical College, Patna were included in the study. Socio-Economic profile, effectiveness of NRC in treating SAM children, and effect of timely initiation of complementary feed on nutritional status of children were assessed.
Results: A total of 55 children were admitted in the NRC of PMCH, Patna during the period of June 2017 to Dec 2017. 56.4% were males and 43.6% were females. 36% o were in the age group of 12months to 24months. 78% belonged to below poverty line. Major medical complications were anemia (53%), LRTI (33%) and acute gastroenteritis (29%). Immunisation was complete in only 45%. In only 53% babies Complimentary feeding was initiated after 6 months of age. 67% of the mothers of SAM children were illiterate. 95% children were discharged after gaining proper weight. Defaulter rate was 4% and death rate was 2%. 78% of the admitted children showed good weight gain i.e.>10 gm/kg/day, whereas in 15% children weight gain was in the range of 5-10 gm/kg/day.
Conclusions: Many factors such as literacy, income, age of marriage and sanitation facility indirectly or directly influence the nutritional status of children. NRCs provide life-saving care for children with SAM as demonstrated by the high recovery rate (95%).

Keywords: Complimentary feeds, Maternal education, Severe acute malnutrition, Socio economic status

INTRODUCTION

Severe Acute malnutrition remains a major killer of children as mortality rates in children with severe wasting- a widespread form of SAM is nine times higher than those in well-nourished children.[1] India's fourth National Family Health Survey (NFHS-4) indicates that the prevalence of severe wasting is 7.5%.[2] In Bihar 48% of children underfive years of age are stunted, or too short for their age, which indicates that they have been undernourished for some time.

Twenty-one percent (21%) are wasted, or too thin for their height, which may result from inadequate recent

food intake or a recent illness causing weight loss and 7% are severely wasted. Forty-four percent (44%) are underweight, which takes into account both chronic and acute undernutrition. Even during the first six months of life, 19% of children are stunted, 30% are underweight and 31% are wasted.[3]

Children's nutritional status in Bihar is improving since NFHS-3 by measures taken to control malnutrition. Stunting decreased from 56% to 48% in 10yrs between NFHS-3 and NFHS-4, and the percent of children who are underweight decreased from 56% to 44%. However, in the same period, wasting decreased from 27% to 21%. Despite these, child malnutrition is still a major problem in Bihar.[3]

There are only small differences in the level of under nutrition by the sex of the child, religion or the child's living conditions.

However, differences are more pronounced for other background characteristics. Under nutrition generally decreases with the increasing mother's schooling, better nutritional status of the mother. Stunting and under nutrition are higher in rural areas than in urban areas.[3]

Objectives of present study was to evaluate socio-economic profiles of SAM children, the effectiveness of NRC in treating SAM and to the timely initiation of complementary feed on nutritional status of children.

METHODS

It is an observational study in which a total of 55 patients of SAM aged 6 months to 60 months were admitted in NRC at Patna Medical College and Hospital, Patna during the period from June 2017 to December 2017 for treatment of medical complications and nutritional management using WHO protocols.

Primary screening was done in the children's OPD and admitted patients in children Hospital using the MUAC tape and observing for bilateral pitting Oedema. Children with MUAC less than 11.5cms or those who were visibly wasted were transferred to the NRC where weight, height and SD score was recorded. Children with medical complications were treated in the children's emergency. Stable children with medical complications were admitted to the NRC.

For screening of SAM children WHO approved MUAC tape, weight measuring scale with 10gm. Precision andtaring facility, height/ length measurement with 0.1cm precision were used. As per length/ height and weight measurement Z score were calculated.

Babies admitted in the NRC were completely evaluated and rescreened by using standard anthropometric tools as per WHO protocols

- Weight for height <-3SD and/ or
- Mid Upper Arm Circumference <11.5cms and/ or
- Presence of bilateral pitting oedema (other causes of oedema excluded)

On every step care for hypothermia, hypoglycaemia and infections were taken.

The medical complications of the children were managed as per WHO protocols and for nutritional management F-75 feed was started on 2 hourly basis, gradually increased to 3 hrly and 4 hrly schedule as per standard protocols and then shifted to transition phase and rehabilitation phase as per Government of India guidelines.

As per guidelines micronutrients like zinc, magnesium sulphate, folic acid, vitamin a, potassium chloride and multivitamin preparation containing vitamin C, B complex, E, B12, copper and selenium were administered to the children from day 1 and iron was started after 7-10 days as per GOI protocols.

- For shifting F-75 from 2hrly to 3hrly and then 4 hourly following clinical observations were taken into considerations
- The patient should take most of the feed (at least 80%)

Patient should be stable with decrease in the amount of stool and vomit.On improvement of patient's appetite, they were shifted from the stabilisation phase to the transition phase and then to the rehabilitation phase.

Transition phase is for 3days, for the first two days the feed was changed from F75 to F100 with the volume kept the same. On day third the volume of F100 was as per guidelines. In catch up phase the patient's daily weight decides the amount of F100 which varies from 150ml/kg/day to 220ml/kg/day. After completing four days on F100, semisolid foods such as khichdi and special feed were alternated with the F100.

Discharge criteria

The patient was discharged when

- Oedema has resolved and
- All infections and other medical complications have been treated and
- Child has satisfactory weight gain >5gm/ kg/day for 3 consecutive days and
- Immunisation is updated and
- Child is eating adequate amount of food.

RESULTS

A total of 55 children were admitted in the NRC of PMCH, Patna during the period of June 2017 to Dec 2017. Out of the 55 children admitted 31 (56.4%) were

males and 24 (43.6%) were females. 29% of the children were in the age group of 6 months to 12months, 36% of the children were in the age group of 12months to 24months and 35% of the children were in the age group 24months to 60 months. The mean age presentation was 20months. 78% of the children belonged to below poverty line.

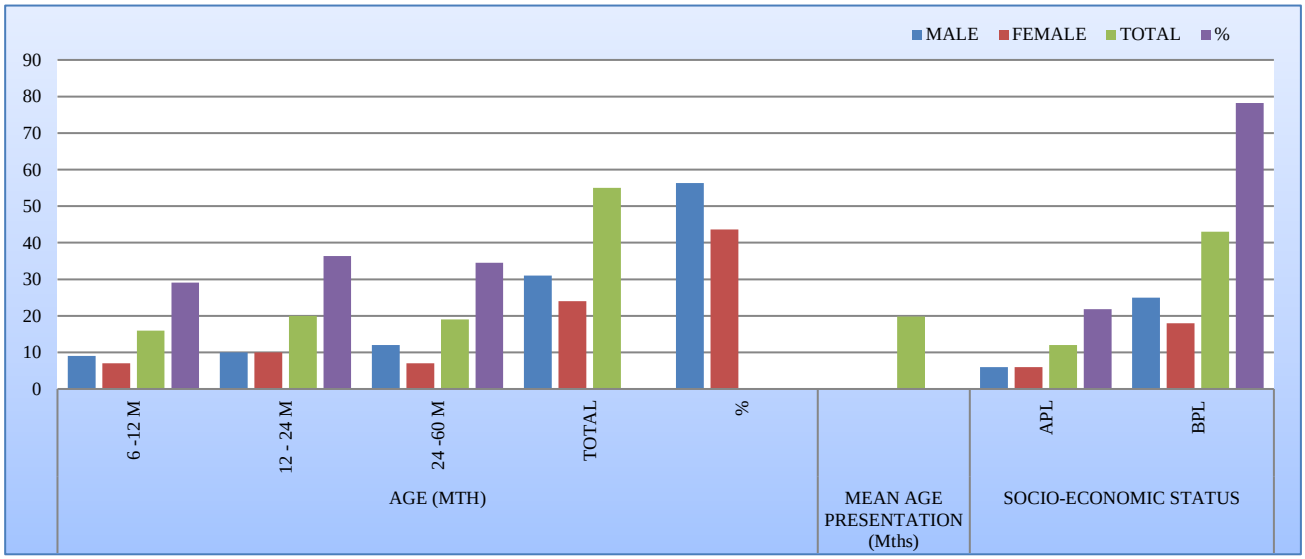

Figure 1: Age distribution of children with Sam.

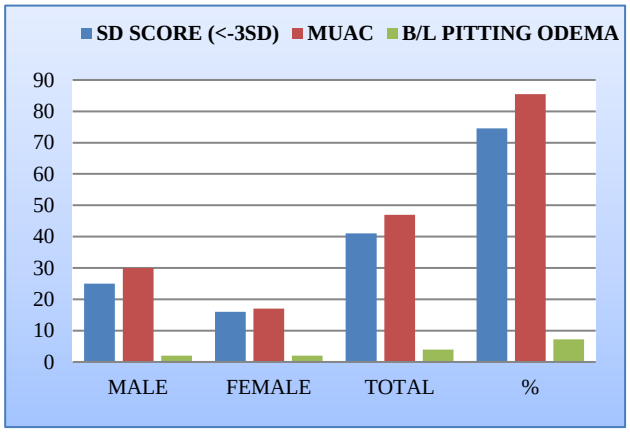

Figure 1: Admission criteria.

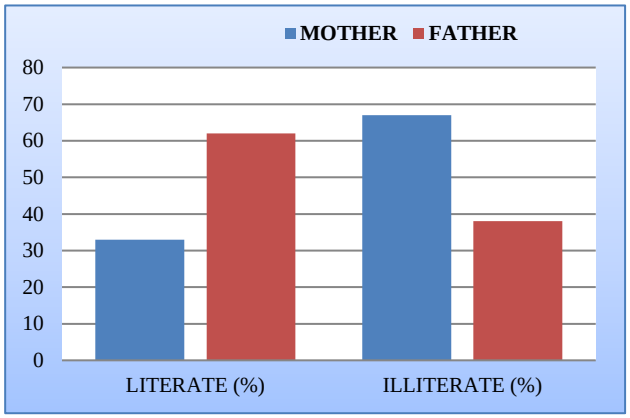

Figure 3: Socio economic profile.

MUAC [85.45%] and WHZ score [74.54%] were the most important parameters for admission (Figure 2).

67% of the mothers of admitted SAM children were illiterate while 62% of fathers were literate (Figure 3).

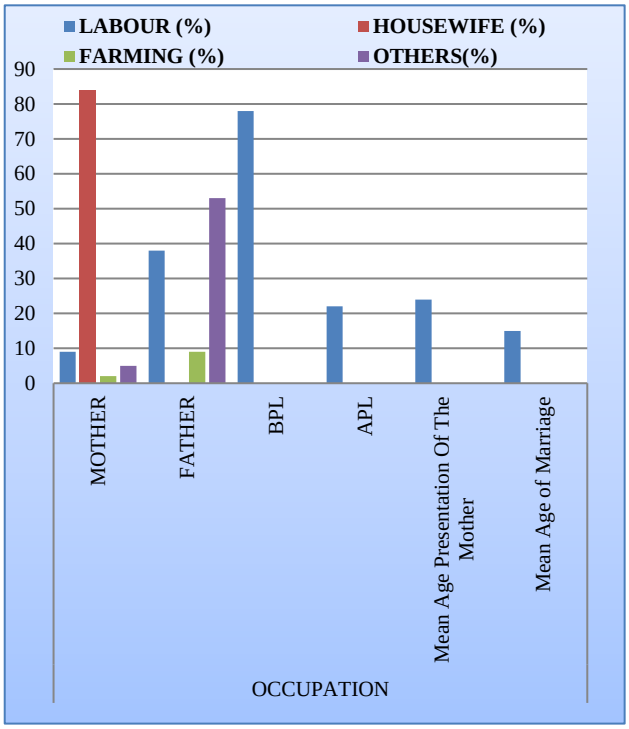

Figure 4: Occupation of parents.

Most of the mothers of the admitted children were housewives (84%). Mean age presentation of the mothers was 24 yrs and mean age of marriage was 15 yrs (Figure 4).

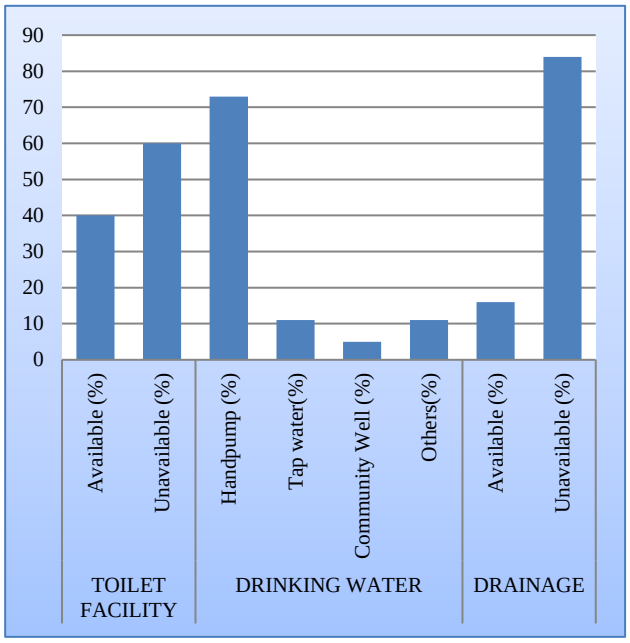

Figure 5: Sanitation facility.

Toilet facility was present only in 40% of the admitted SAM children whereas 60% of the family did open defecation. Main source of drinking water (73%) was hand pump (Figure 5).

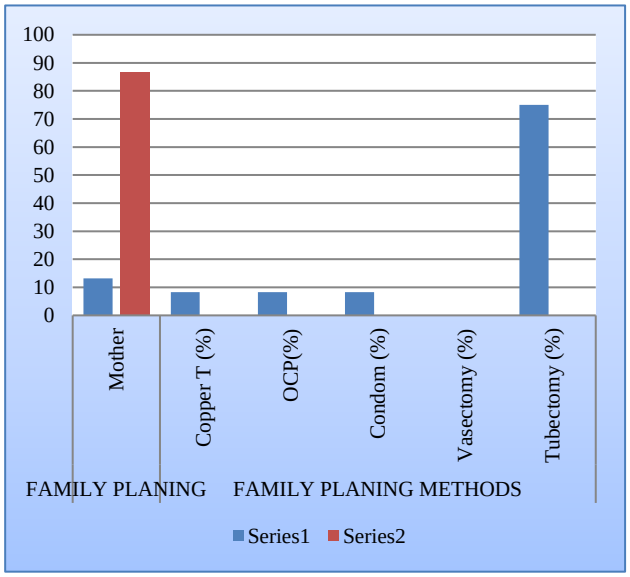

Figure 6: Family planning.

13.2% of the mothers of admitted SAM children used one or the other methods of family planning. Most of the mothers (86.8%) were not aware of the family planning methods (Figure 6).

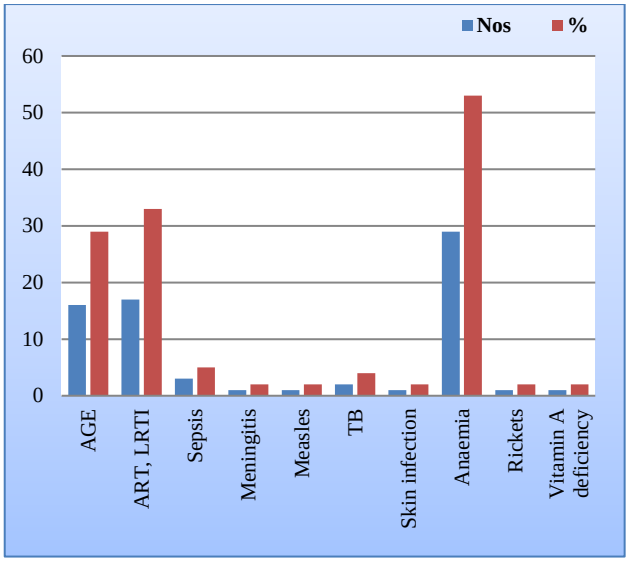

Figure 7: Medical complications.

Of the total admitted SAM patients 53% of the children were anaemic, 33% of the children had LRTI. Acute gastro enteritis was present in 29% of the SAM children while Sepsis was present in 5% of children. Tuberculosis was present in 4% of the children while Meningitis, measles, skin infections, rickets and vitamin A deficiency were present in 2% of the admitted children (Figure 7).

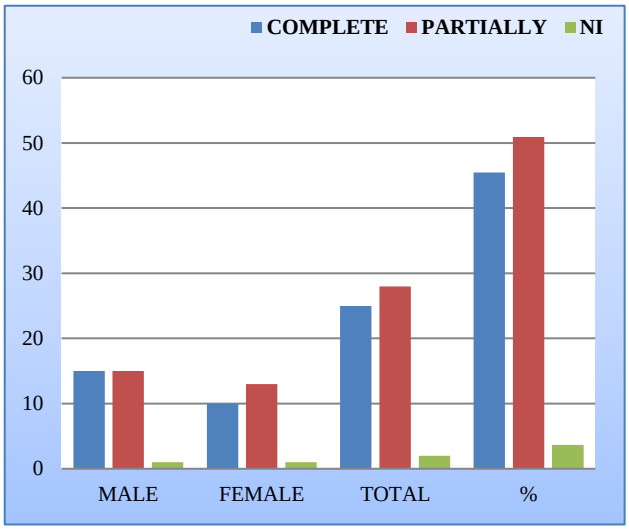

Figure 8: Immunisation status of admitted SAM children.

Immunisation was complete in only 45% of the children as per age, 4% of the children were not immunised while more than 50% children were partially immunized (Figure 8).

Complimentary feeding was initiated in about 53% of babies while in about 47% not initiated after 6 months of age (Figure 9).

In the study authors found that 62% of the children successfully gained >15% of the admission weight whereas 33% of the children were discharged from the NRC when they gained >5g/kg/day for consecutive 3 days.

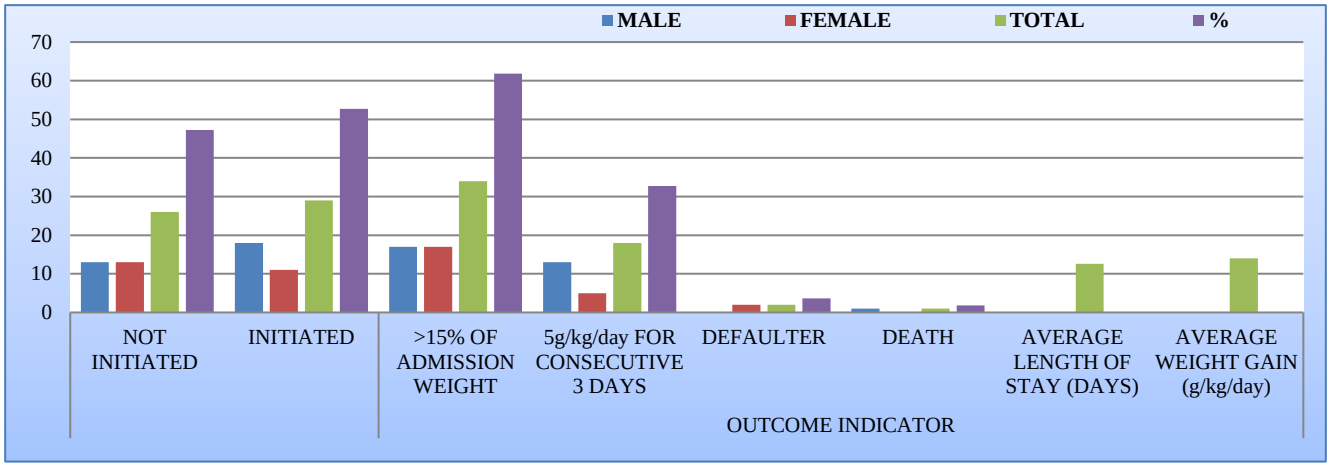

Figure 9: Complimentary feeding.

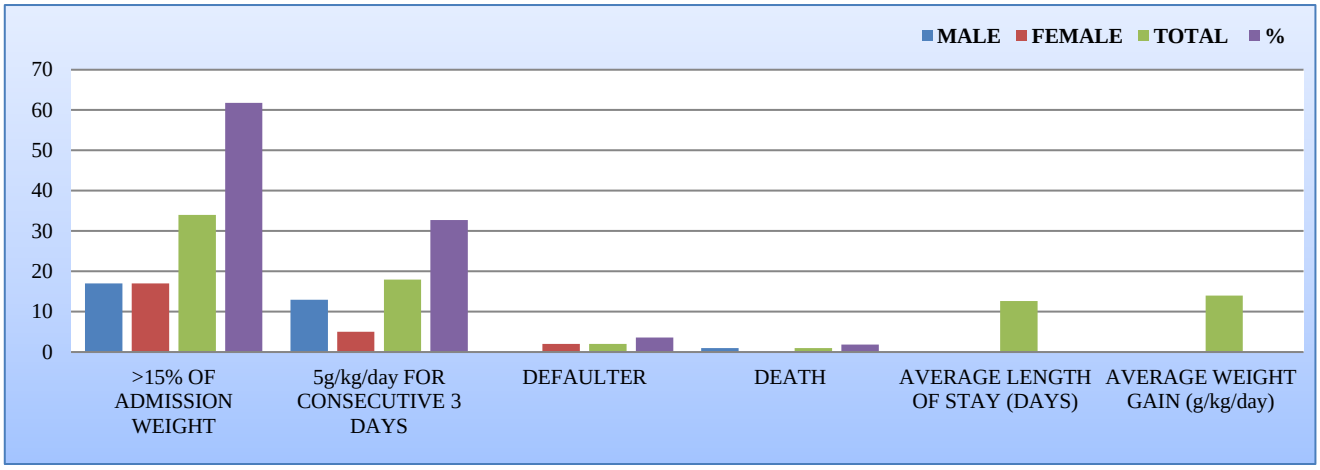

Figure 10: Outcome indicator.

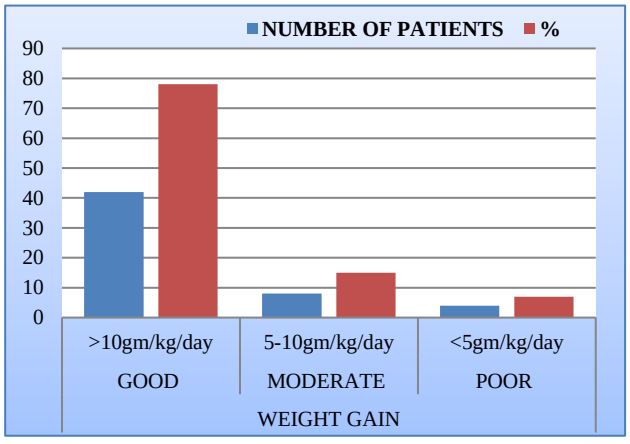

Figure 11: Weight gain pattern among admitted children.

Defaulter rate was 4% and death rate was 2%. Average length of stay in the NRC was 13 days whereas average weight gain was found to be 14g/kg/day (Figure 10).

78% of the admitted children showed good weight gain i.e.>10 gm/kg/day, whereas a poor weight gain was found in 7% of the admitted children. In 15% children weight gain was in the range of 5-10 gm/kg/day (Figure 11).

DISCUSSION

Severe acute malnutrition is preventable and treatable cause of childhood morbidity and mortality [4]. At NRC not only the medical and nutritional aspect of the SAM children is taken care but a special attention is given on play therapy, which improves the cognitive and motor development in SAM children.

36% of children admitted were in the age group of 12-24 months while 35% were in 24-60 months age group. 29% of children were in the age group of 6-12 months. In a study by Mathur A et al.79.8% of children were below 24 months of age.[5] In present study 78% of the families were below poverty line. Income is one of the most significant variables in the child's health. To a large extent, it determines the amount of different inputs e.g., food, clothing, residence, sanitation, medical care etc.[6]

Children of economically disadvantaged (BPL) families are prone to multifactorial risks.

In this study about 75% of patients had both MUAC <11.5 cm and WHZ SD score <-3 SD. In a study from Uttar Pradesh, India 70.7% of children had both WHZ below <-3SD and MUAC <11.5 cm, while in another study by Mathur A et al. 56% children diagnosed as SAM had both WHZ score below <-3SD and MUAC <11.5 cm.[5,7,8] In another study by DhanalakshmiKetal.100% of children admitted in NRC had WHZ score <-3SD.[9]

67% mothers of SAM children were illiterate while 62% of fathers were literate. Maternal illiteracy played more important role in malnutrition of children. Maternal education has direct effect on nutrition of whole family particularly children. Several studies from Bangladesh, Pakistan and our country observed a correlation between low parental education and increased risk of wasting in children.[10-15] Islam and others in their study concluded that poverty is a very important risk factor for wasting as are unsafe drinking water sources and lack of latrines. Similar observations were made by Meshramand others.[14] Several studies in Bangladesh, India, and Pakistan demonstrate a correlation between low parental education and increased risk of wasting in children.[10-14]

A study in Burkina Faso finds incomplete vaccinations and maternal literacy status to be risk factors for wasting relapse.[16]

In present study the mean age of marriage was 15 years with very low literacy rate (33%) among the mothers of admitted SAM children. Low literacy of parents can result in poor understanding of their children's health-related problems and has been found to be associated with malnutrition of children under the age of five years.[17] Maternal education has been associated with better nutritional condition during pregnancy and after birth. This has been shown to be an indirect predictor of child's health throughout life.

Pregnancy at an early age, when the nutritional status of the mother is inadequate, can lead to children developing into SAM.[18] 84% of mothers were house wife and the mean age of presentation of the mother was 24 years. Mean age of marriage of 15 years appears to be contributory factor in SAM children. Baily W observed that the infants of adolescent mothers were admitted to hospitals with malnutrition at an earlier age than infants of older mothers.[19,15]

Sanitation facility in present study was assessed through the presence of toilet facility, source of drinking water and availability of proper drainage facility. Toilet facility was present in 40% of the family whereas 60% of the family defecated in open. Major source of drinking water was hand pump (73%) whereas 3% of the family used the community well for drinking water. Majority of the family had kaccha drainage (84%).The sanitation-nutrition nexus refers to the multiple connections between sanitation practices and nutritional outcomes. There are three identified direct pathways through which poor sanitation (and associated open defecation) may adversely affect nutritional outcomes in children: diarrhoeal diseases, environmental enteropathy and nematode infections. Improvement in sanitation were associated with higher weight for height score.[20]

86.8% of families have either no idea or very little idea about the importance and availability of family planning services and the main method of family planning was tubectomy. Lack of education, sanitary facility, good source of drinking water and proper use of available health facilities remain important risk factors in SAM children.

In their study, Menon and others have observed the impact of infants and young child feeding as well as water, sanitation and hygiene on wasting and the improvement in these parameters has been observed with better nutrional outcome and they concluded that integrated interventions targeted to these risk factors would have a greater impact than single interventions.[13]

Poverty is another risk factor for wasting, as are unsafe drinking water sources and lack of latrines.[10,14] Economically disadvantaged families are less likely to have access to improved sources of drinking water, such as water from pipes or tubewells, and are less likely to have access to latrines. One study finds these to be risk factors independent of the wealth index.[10] Another study, which does not assess WASH indicators, finds that the family wealth index to be significantly associated with wasting.[14] Both studies also find larger family sizes to be associated with an increased risk of wasting, as does a study in Pakistan.[10,11,14]

Anemia (53%), Respiratory tract infection (33%) and acute gastroenteritis (29%) where the chief medical complications of SAM children. Severe anemia was present in 22.4% of admitted SAM children. Mathur A et al. in their study found 88% of children anaemic and 20.1% of children were severely anemic.[5]

Severe anemia has been reported 24% in study from Rewa, Madhya Pradesh while a study from Lady Harding Medical College, New Delhi severe anemia has been reported to be 67.3%. In their study Mathur A et al.

observed Diarrhoea and Respiratory infections in 85.3% of cases. In the study from Rewa, MP 54% of SAM children had Diarrhoea and 27.9% of children suffered with respiratory infections. In another study from Africa, Diarrhoea observed in 49% and Respiratory infections in 67 % of SAM children.[5, 21]

Dhanalakshmi K et al in their study found acute gastroenteritis in 35.75% of cases and respiratory tract infection in 28.49% of SAM children.[9]

Immunisation status of SAM children as per nation immunisation schedule was initiated in more than 97% children, of which 45.45% children were completely immunized as per their age while 50.9% of children were partially immunized. Dhanlakshmi K et al in their study found up to date Immunization coverage in 89% of cases.[9]

An appropriate diet is critical in the growth and development of children especially in the first two years of life. The World health organisation recommends exclusive breast feeding for the first six months with continued breast feeds until the age of 2 years. Infants and young children are at an increased risk of malnutrition especially from 6 months of age, when the breast milk alone is no longer sufficient to meet all their nutritional requirements and complimentary feeding must be started.[22] In present study complimentary feeding was not initiated in 48% of the children at the time of admission in the NRC.

Children in whom complimentary feeding was started after 6 months, they were more vulnerable for wasting. Similar observation was made by Pravana NK et al[15]

The proportion of children who defaulted was 4%.[23] Recovery rate was 62% (15% of the admission weight) and 33% (>5g/kg/day for consecutive 3 days). Recovery rate in present study was found to be higher when compared with similar studies conducted in Uttar Pradesh and Gujrat.[7,8,21] Average weight gain in present study was 14gm/kg/day; indicating a good weight gain. The proportion of children discharged was above the acceptable range (>75%). The average length of stay was 13 days reported in present study which was in the acceptable range of the national standard (1-4 weeks}. Mathur A et al in their study found average weight gain of 8.5gm/kg/day.[5] Similar observation was made from NRC UP and Hyderabad.[7,8,21] Dhanlakshmi K et al. Observed weight gain of more than 5gm/kg/day in 62.2% of children and target weight gain in 12.35% of children.[9]

The programme achieved survival outcome that compare favourably with national standards of care (<5% child deaths).[23] This is important as the primary objective of the NRCs is to reduce fatality rates among children with SAM.

In present study 3.4% cases defaulted while a single baby (1.8%) died. Dhanlakshmi K et al found 12.93% as defaulters and death was observed in 6.97% of cases.[9] In present study recovery rate was 94.5%. Dhanlakshmi K et al observed recovery rate in 81% of cases.[9]

CONCLUSION

From present study authors can conclude that many factors such as literacy, income, age of marriage and sanitation facility indirectly or directly influence the nutritional status of children. NRCs provide life-saving care for children with SAM as demonstrated by the high recovery rate (95%).

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