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Original Research Article

Longitudinal follow up study of clinical and anthropometric profile of severely malnourished children admitted at nutrition rehabilitation centre

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ABSTRACT

Background: Nutritional status of children is the common factor to identify the nutritional status of the entire community. Hence, this study was designed to look for clinical and anthropometric profiles of severely malnourished children during admission, discharge and follow up of the child admitted at nutrition rehabilitation centre (NRC) of our hospital.
Methods: Patients will be monitored and outcome will be seen in the form of vital and clinical parameters and detailed anthropometric assessment at admission, discharge and follow up. Total 3 follow up will be done at an interval of 15 days as per MOHFW operational guideline.
Results: Females (n=42, 56%) were slightly more as compared to males (n=33, 44%). Statistically significant results were found with respect to increase in the mean MUAC among subjects from discharge to 3rd follow-up. At discharge mean weight of the subject was 7.38 which increased to 8.99 after 3rd follow-up. When weight was compared with different time interval using ANOVA test; statistically significant result was found as p=0.002. At admission mean height of the subject was 74.73, after 3rd follow-up increased up to mean of 81.02, this shows from the discharge to 3rd follow-up as per time height of the subjects was increasing. When height was compared according to different time interval using ANOVA test; statistically significant result was found.
Conclusions: NRCs provide life-saving care for complicated severe acute malnutrition (SAM) children with high chances of recovery rate in clinical and anthropometric parameter. Follow up visits are more important for clinical and anthropometric assessment of child and counselling of parent. Large number of uncomplicated SAM child can be treated in their community with traditionally available energy dense food.

Keywords: Severe acute malnutrition, Nutrition rehabilitation centre, Mid upper arm circumference, Socioeconomic status, Prospective Cohort study, Facility based operational guideline by MOHFW

INTRODUCTION

Malnutrition is a major factor in the deaths of millions of children under five globally each year, and a child's overall health is significantly impacted by their nutritional status. In other words, poor nutrition is a leading cause of death and ill health in young children.[1] Malnutrition in children (stunting, wasting and underweight) under 5 years has reduced as per NHFS-5 (2019-2021) from 38.4% to 35.5%, 21% to 19.3% and 35.8% to 32.1% respectively as compared to NHFS-4 (2015-2016).[2,3] According to the national family health survey-3 (2005-06), 8 million under-five children in India were estimated to be suffering from SAM.[1]

Malnutrition is a significant health concern in developing nations, with children facing the greatest risk from its impact Nutritional status of children is the common factor

to identify the nutritional status of the entire community. Ensuring adequate nutrition during infancy and early childhood lays the foundation for a child to achieve their full physical, mental, and social potential, as this is a critical period for development.[4] For the developing countries including India, malnutrition and growth retardation are most common health and nutritional problems. Childhood illness and death are not only significant concerns, but surviving such illnesses can also lead to long lasting physical and mental developmental issues.[5,6] While national averages for malnutrition may appear stable, they mask significant variations between districts, with some experiencing worsening SAM due to improvements in other areas. Identifying and prioritizing districts with high SAM prevalence is crucial for targeted interventions within India's POSHAN Abhiyaan, where district-level planning and monitoring are essential. The overall prevalence of underweight, stunting and wasting in Gujarat is 39.3%, 38.5%, 26.4% according to NFHS 4 and in Surat is 41.8%, 40.3%, 18% respectively reported by Meshram et al.[12]

Malnutrition continues to be a major global health concern, particularly in developing nations, leading to significant illness and death despite widespread knowledge of its serious health consequences and the availability of interventions.[7]

Gujarat is one of the economically progressive states in India in terms of industrial growth and infrastructure development; despite the prevalence of undernutrition continues to be high in the state. There are five districts in Surat region (viz; the Dangs, Surat, Navsari, Valsad and Tapi) in Gujarat with predominantly inhabited by different tribal population ranging from 50-100%. The tribes mostly living in this region are Chaudri, Kumbhi, Dublas, etc. The government is planning to implement interventions to curb undernutrition with focus on high burden districts in the state. We are admitting SAM patient according to admission criteria for SAM in NRC for 14 days, anthropometric and clinical profile monitoring done during stay, before discharge. Relative counselled to visit healthcare facility to ensure follow up. Regular follow-ups should be made at 15 day interval till 3 visit and then monthly thereafter until weight for height reaches -1 SD or above. If a problem is detected or suspected, visit/s can be made earlier or more frequently until the problem is resolved.[7] ASHAs and AWWs are an important link in community based follow up of the child till full recovery takes place. All SAM children should be followed up by health providers in the program till He / she reaches weight-for-height of -1SD according to operational guideline by MOHFW.

Hence, this study was designed to look for clinical and anthropometric profile of severely malnourished children during admission, discharge and follow up of the child admitted at NRC of our hospital for better understanding of the problem and outcome after rehabilitation of SAM patients.

METHODS

This is an observational prospective longitudinal study (prospective cohort study) at NRC of paediatric ward in tertiary care hospital. During the study period; 88 subjects were recruited. Out of 88 subjects; 7, 4 and 2 subjects were lost to follow-up at first, second and third follow-up respectively. Hence the final sample size for analysis was 75 subjects. Patient selected by Convenient PUPOSIVE sampling technique from NRC, located at paediatric ward of tertiary care hospital. Study was conducted during May 2023 to September 2024 after ethical permission of institutional human research ethics committee. Patient with diagnosis of SAM according to facility based operational guideline by MOHFW and meet inclusion criteria was included in the study.

Inclusion criteria

Children 6-59 months of age admitted to nutrition rehabilitation according to facility-based management guideline by MOHFW are SAM children with MUAC<11.5 cm with or without any grade up of edema. Weight for height <-3 SD with or without any grade of edema were included.

Bilateral pitting edema grade +1/+2 with any of the following complication: Anorexia, fever (39 degree Celsius) or hypothermia (<35 degree Celsius), persistent vomiting, severe dehydration based on history and clinical examination, if not alert, very weak, apathetic, unconscious, with convulsions.

Exclusion criteria

Children less than 6 months of age, mother not giving consent for participation, children with medical complications like congenital heart disease, cerebral palsy, inborn error of metabolism, tuberculous meningitis, immunodeficient child and chronic disease were excluded.

Patient who takes LAMA (leave against medical advice)/expires before 14 days and who does not come for follow up. Data entry will be carried out in MS excel. Quantitative data will be analysed and presented by percentage and ANOVA test and chi square test will be used for statistical significance. Qualitative data will be analysed and presented by proportion and chi square test will be used for statistical significance.

RESULTS

In this study females (n=42, 56%) were slightly more as compared to males (n=33, 44%). These may be due to priority of feeding male child predominantly than girl child, ignorance etc. The largest group of subjects consisted of individuals were 2-4 years old (n=43, 57.33%). The second largest group consisted of 23 (30.67%) patients having age <2 years. According to Area

of residence, out of total 75, 13 (17.33%) from urban areas and 62 (82.66%) were from rural areas.

Majority of subjects were from lower middle class (52%) followed by lower class (36%) and 12% were from middle class.

Out of 75 subject 42.67% of the subjects showed normal haemoglobin level. Mild anaemia (22.67%) was seen maximum among study subjects followed by moderate anaemia (21.33%) and severe anaemia (13.33%). Maximum subject at age, fully immunized (77.33%). Only 4% of subjects were only taken birth vaccine, partially immunized. Out of 75 subjects; increased WBC and CRP were found in 17.33% and 10.67% of the subjects respectively. Maximum subjects with normal heart rate (54.67%) and respiratory rate (81.33%). Increased heart rate and respiratory rate was seen among 45.33% and 18.67% of the subjects respectively.

Maximum subjects didn't show fever during hospital stay (62.67%), abdominal distension (96%) and skin changes (94.67%). Fever, abdominal distension and skin changes were present in 37.33%, 4% and 5.33% of the subjects respectively. Out of 75, (n=69) 92% of study subjects didn't show dehydration sign. The 8% (n=6) of subject showed sign of dehydration.

At admission, 84% of subjects had no edema, while 16% exhibited edema. By the 3rd follow-up after discharge, all subjects showed no signs of edema. A chi-square test comparing edema presence at various time intervals indicated a statistically significant result (p=0.008), suggesting that the changes in edema status over time are unlikely to be due to chance.

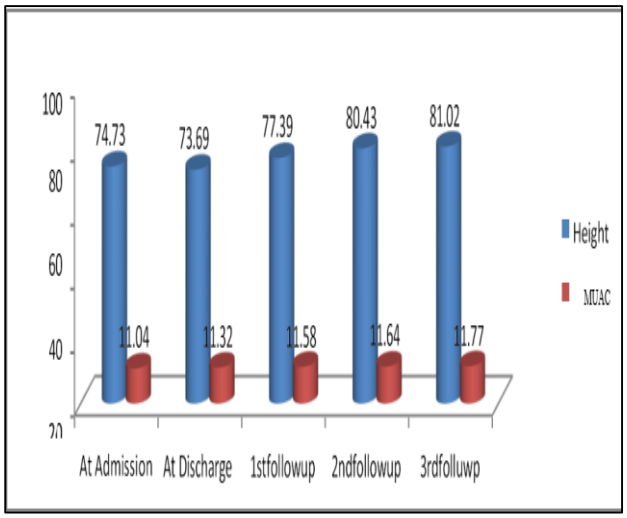

Figure 1: Descriptive analysis of anthropometric variables

As Figure 1 showed Statistically Significant results showing increase in the mean MUAC and Height among subjects from discharge to 3rd follow-up.

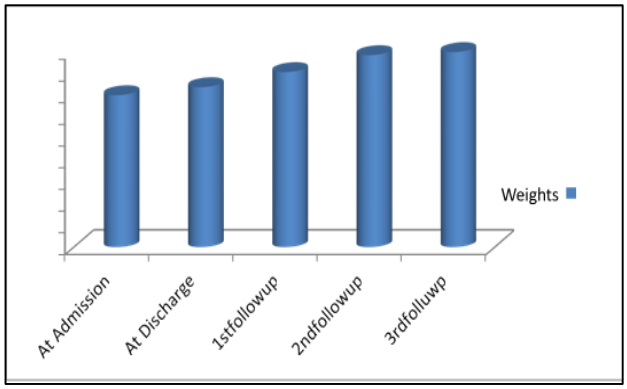

Figure 2: Descriptive analysis of weight.

Figure 2 showed When weight was compared with different time interval using AVOVA test; statistically significant result was found as p=0.002.

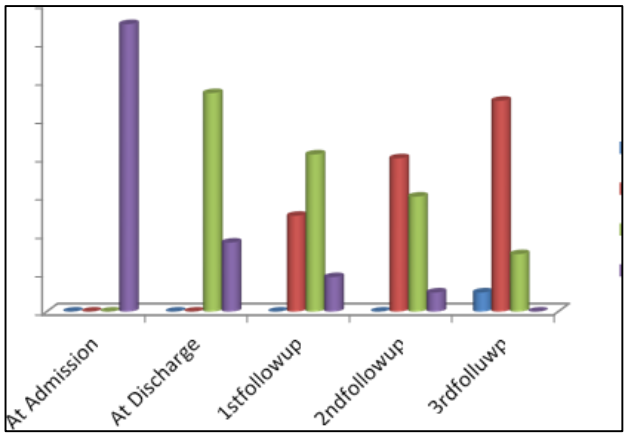

Figure 3: Z score (Blue-median, red-1 SD, green -2 SD, purple-3 SD).

Figure 3 showed Z score at different follow-ups from at admission to 3rd follow-up, When Z score compared at admission vs different time interval showed statistically significant result was found as p<0.05. Targeted weight (15% weight gain) achieved in 72% (n=54) of subjects.

DISCUSSION

Providing young children with a balanced diet is an investment in their current and future health, laying the groundwork for a healthy and successful life. Proper nutrition in early childhood can prevent stunted growth, boost cognitive development, and lessen the likelihood of developing chronic diseases later in life, according to studies.[8] Proper nutrition lays the foundation for healthy growth, optimal cognitive development, and a reduced risk of chronic diseases in adulthood.[9] At NRC special attention is given on play therapy, which improves the cognitive and motor development in SAM children.[10] The aim of the present study was to evaluate clinical and anthropometric profile of severely malnourished children admitted at NRC and follow up for the same. In this

study; females (n=42, 56%) were slightly more as compared to males (n=33, 44%). The largest group of subjects consisted of individuals were 2-4 years old (n=43, 57.33%). The second largest group consisted of 23 (30.67%) patients having age <2 years. These may be due to priority of feeding male child predominantly than girl child, ignorance etc. Najar et al in their study mentioned similar age and gender distribution.[8] In a study by Mathur et al 79.8% of children were below 24 months of age.[13] A higher number of female patients was also found by Sharma et al (60% versus 40%).[14] Shah et al and Rao et al also reported that the extent of malnutrition was significantly higher in girls (80%) respectively.[9,12]

Majority of mother were illiterate (54.67%) followed by secondary education (30.69%) and only 2.67% were graduate. Majority of subjects were from lower middle class (52%) followed by lower class (36 %) and 12% were from upper middle class in this study. Maternal illiteracy played more important role in SAM. 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. 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. Islam and others in their study concluded that poverty is a very important risk factor for wasting as there are unsafe drinking water sources and lack of latrines. Similar observations were made by Meshram and others.[12] Several studies in Bangladesh, India, and Pakistan demonstrate a correlation between low parental education and increased risk of wasting in children. Najar et al in their study stated that SAM is common in families with low socio-economic scale and illiterate mothers which is similar to the present study.[8] According to Tiwari et al 67% mothers of SAM children were illiterate while 62% of fathers were literate.[10] The 78% of the families were below poverty line. Income is one of the most important variables in the child's health. To a large extent, it determines the number of different inputs e.g., food, clothing, residence, sanitation, medical care etc. Children of economically disadvantaged (BPL) families are prone to multifactorial risks. A study in Burkina Faso finds maternal literacy status to be risk factor for wasting relapse. Taneja et al study analyzed 93 children for anthropometric indicators.[11] A statistically significant difference was obtained between the weight of children at admission and discharge and follow up (t=14.552, p<0.001). Bhanat et al also reported significant mean weight gain at 3rd follow up visit (p<0.05).[16] Patel et al in their study revealed a statistically significant difference between the mean weight at discharge and the mean weight at admission in the age group.[17] In the present study; 100% of children admitted in NRC had WHZ score <-3SD. In another study by Dhanalakshmi et al 100% of children admitted in NRC had WHZ score <-3SD.[19] In a study from Uttar Pradesh, 70.7% of children had both WHZ below <-3SD and MUAC <11.5 cm, while in another study by Mathur et al.[13] In the present study; statistically significant results were found i.e. increase in the mean MUAC among subjects from admission to discharge to 3rd follow-up. The difference between mean MUAC at discharge and at admission was found to be statistically significant for the entire study group (t=9.548, p<0.001), for boys (t=6.876, p<0.001) and girls (t=6.723, p<0.001) in study group of in Taneja et al.[11] Weight of severe malnourished children has huge impact in reducing the mortality among them. In this study; at discharge mean weight of the subject was 7.38 which increased to 8.99 after 3rd follow-up. When weight was compared with different time interval using AVOVA test; statistically significant result was found as p=0.002. Majority of the subjects showed good weight gain (84%), followed by Moderate weight gain (12%). Only 4% of subjects showed poor weight poor. As per guidelines given by the NRHM, department of health and family welfare, govt. of Gujarat, a child suffering from SAM should be considered cured when the child has achieved 15% weight gain of the admission weight during discharge from NRC.[20] Targeted weight (15% weight gain) was achieved among 72% of the subjects in this study. Similarly, Bhanat et al in their study reported that approximately 2/3rd of children out of 159 study subjects has gained more than 15% weight on 3rd follow-up.[16] A similar finding was also found in the study conducted by Rawat and Marskole.[20]

In the present study; mean (SD) z-score of the entire study group was -3SD on admission and on 3rd follow-up, respectively, which shows z-score was shifted to above -3 on follow-up visits (good outcome) and it was found to be statistically significant (p<0.05). In a study by Bhanat et al too, mean (SD) z-score of the entire study group was -3.7 (0.7) and -2.1 (1) on admission and on 3rd follow-up, respectively, which shows z- score was shifted to above -3 on follow-up visits (good outcome) and it was found to be statistically significant (p<0.05).[16] A similar result was found in the study conducted by Gupta and Sharma, which indicates improvement in nutrition status of malnourished children.[14] Govt of India is currently strengthening integrated child development (ICDS) scheme, working on national guidelines on community-based management of SAM in India (CMAM) and allowing controlled use of ready-to- use therapeutic food (RUTF) in various states so that in years to come, more SAM children can be taken care well at home.

As we conducted study in tertiary care center, our institute receive complicated SAM children so we are lacking data of rate of improving anthropometric parameters in uncomplicated SAM children.

Implication of further research

Large scale follows up community-based study can be done to generate regional data which will help to move financial and social health resources accordingly.

Limitations

This study is we were unable to do long term community based follow up till weight for height reaches -1SD as per operational guideline of SAM by MOHFW. Also, most of the them were came from rural area and migrating population.

CONCLUSION

In the majority of the SAM children, mean (±SD) weight, MUAC, and z-score of different age group were almost improved on discharge and 3rd follow-up visit compared to the parameters measured at the time of NRC admission. Nearly 76% of severely malnourished children showed improvement in weight for height after treatment that was given during NRC admission and follow up.24% still remain SAM which improved in anthropometric and clinical profile during subsequent follow up visit. Around 14.7% of admitted children dropped out on follow-up visits. Hence, we conclude that NRCs provide life-saving care for complicated SAM children with high chances of recovery rate in clinical and anthropometric parameter. SAM is preventable and treatable cause of childhood morbidity and mortality. Follow up Visits are more important for clinical and anthropometric Assessment of child and counselling of parent. Large number of uncomplicated SAM child can be treated in their community with traditionally available energy dense food. As SAM is multidimensional and multifactorial problem it requires combine effort of facility-based management followed by continuous community-based management with parental involvement. Many factors such as literacy along with socioeconomic status indirectly or directly influence the nutritional status of children.

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