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Original Research Article

Severe acute malnutrition: seasonal variations in Southern Rajasthan, India

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ABSTRACT

Background: Malnutrition is India's one of the biggest health care challenge. India has some of the highest rates of child malnutrition. We performed a retrospective study of children admitted in Malnutrition Treatment Centre to find out any seasonal variations in the prevalence of severe acute malnutrition (SAM) in Southern Rajasthan, India.
Methods: In this hospital based retrospective study, data were analysed for all children admitted at malnutrition treatment centre of a tertiary level hospital attached to a medical college from April 2014 to March 2016 to study the seasonal variations in the prevalence of SAM.
Results: A total of 30,140 children were admitted during the last two years, out of which under five children other than new born were 4,942 in 2014-15 and 5,972 in year 2015-16. Total 1915 SAM children were admitted in our malnutrition treatment centre (MTC) in last 2 years. Among the under five children 840 (17%) children were admitted with SAM in 2014-2015 and 1075 (18%) in year 2015-2016. The number of SAM admission has increased in 2015-16 from the previous year ($p<0.05$). On an average 70±22.31 children were admitted per month in 2014-15 while average of 89.58±16.82 children were admitted in year 2015-16. There was no significant seasonal variation during both the years when analysed on the basis of months ($p>0.05$).
Conclusions: The prevalence of SAM in admitted patients was high as compared to national and state data and this has increased over the year, but there are no month wise seasonal variations in prevalence of SAM in our children representing Southern Rajasthan, India.

Keywords: Prevalence, Rajasthan, Seasonal, Severe acute malnutrition

INTRODUCTION

Malnutrition is India's silent crisis. India has some of the highest rates of child malnutrition and mortality in under-fives in the world (twice that of sub-Saharan Africa). Out of 132 million under-five children, it is expected that 9 million children, are suffering from severe acute malnutrition (SAM). This is almost 50 percent of children with SAM worldwide.[1] In India more than 5 million children die every year as a direct or indirect result of malnutrition. That translates into one child death every 10 seconds.[2] Child under nutrition remains one of the major public health problems and the leading contributor to child morbidity and mortality in the world.[3] Little has been known about the seasonal variation in the magnitude of acute child under nutrition and its determinants in low and middle income countries making difficult the choice of a better nutrition intervention. Multiple studies have been performed in different parts of the world; some of them show seasonal variation in incidence of malnutrition.

Present hospital is having a malnutrition treatment centre (MTC) since last 8 years which provides facility based

management of SAM children. This centre represents one of the 40 similar facilities established all across Rajasthan. It caters tribal and rural population of not only 6 districts of Rajasthan but also of neighbouring states representing Southern Rajasthan, India. We observed around 100% bed occupancy in our MTC throughout the year but no data are available about prevalence of SAM and its seasonality from this area. So this retrospective study was planned to find out any seasonal variations in the prevalence of SAM in our hospital so that distribution of medical and nutritional interventions can be planned effectively.

METHODS

In this hospital based retrospective study, data were analysed for all children admitted at MTC of a tertiary care hospital attached to a medical college from April 2014 to March 2016 to study the seasonal variations in the prevalence of SAM.

All the children of age less than 5 years admitted in the MTC were examined by the resident doctor who had undergone 3-days training in Facility Based Care of SAM. All the anthropometric variables were taken and recorded in spread sheets. Neonates admitted in NICU were excluded from this study.

The study includes all the children who fulfilled the inclusion criteria as per WHO reference of SAM[4]

In children less than 6 months of age

- Weight for height/length(WFH/L) <-3SD and/or
- visible severe wasting and/or
- Bipedal nutritional oedema

In children of age 6 months to 5 years

- Weight for height/length(WFH/L) <-3SD and/or
- visible severe wasting and/or
- Mid upper arm circumference (MUAC) <11.5 cm and/or
- Bipedal nutritional oedema

Total number of admissions were analysed and arranged on the basis of month of the year in which they were admitted. Percentage for every month were calculated based on annual number of admission and compared.

All the admissions were divided geographically into blocks on the basis of area(distance) they belong Badgaon, Bhinder, Girwa, Gogunda, Jhadol, Kherwara, Mavli, Sarada, Salumber, Kotra and Others which include admissions from districts of Rajasthan other than Udaipur and other neighbour states. This division of data were also evaluated for rural and urban distribution of malnutrition. Prior permission from institute ethical committee was sought before starting the study.

Statistical analysis

Retrospectively data were collected for all the children admitted in MTC during April-2014 to March-2016 and it was arranged and entered into data spread sheets and the results were calculated accordingly using standard software of Biostatics (SPSS Version 20).

RESULTS

A total of 30,140 children were admitted in our hospital during the last two years out of which 12,746 were in 2014-2015 and 17,394 in 2015-16. Among the total admission in 2014-15, under-5 children other than new born were 4,942 and 5,972 in year 2015-16. Out of these 840 (17%) children were admitted with SAM in 2014-2015 and 1075 (18%) in year 2015-2016. Out of 1915 SAM children the 1,056 (55.14%) children were of males while 859 (44.86%) were of females as shown in Table 1.

Table 1: Gender wise distribution of study group.

Year	Males	Females	Total
2014-15	453 (53.9%)	387 (46%)	840
2015-16	603 (56%)	472 (44%)	1075
Total	1056 (55.14%)	859 (44.86%)	1915

Most of the children were from age group of 6 months to 2 years which constitute around three-fourth of admissions 1469 (76.8%). Ages less than 6 months of children were also admitted with malnutrition which was 11.3% of total SAM. Age wise distribution of the study population was as shown in Table 2.

Table 2: Age wise distribution of study group.

Age	No of children
<6 months	218 (11.3%)
6 months- 1 year	894 (46.6%)
1 year-2 year	575 (30.2%)
>2 years	228 (11.9%)

Basic anthropometric variables of children included in the study were as shown in Table 3.

Table 3: Mean anthropometric variables of SAM children (n=1915).

Anthropometric variables	
Mean age, months (mean± SD)	16.2 ±11.47
Mean wt, kg (mean± SD)	5.92±1.72
Mean Ht./length, cm (mean±SD)	69.72 ±10.16
Mean MUAC, cm (mean±SD)	10.6 ± 2.36
Mean BMI	12.49±1.30

Most of the children were admitted on the basis of weight for height criteria (91.2%) while only 6.0% of children were admitted with bipedal oedema (Table 4).

Table 4: Criteria for admission to MTC.

Criteria	No of children
WFH/L <-3 SD	1747(91.2%)
MUAC <11.5cm	1340 (70%)
Bipedal edema	115 (6%)

Maximum number of admissions in both the years were in September followed by august in 2014-15 while July in 2015-16. Percentage distributions of both the years were as shown in Table 5. Mean number of children admitted in year 2014-15 were 70±22.31 and in year 2015-16 were 89.58±16.82.

Table 5: Month wise admission in MTC (n=1915).

Month	2014-15 (%)	2015-16 (%)
April	42 (5.0)	86 (8.0)
May	66 (7.9)	90 (8.4)
June	57 (6.8)	71 (6.6)
July	59 (7.0)	115 (10.7)
August	95 (11.3)	89 (8.3)
September	125 (14.9)	116 (10.8)
October	80 (9.5)	96 (8.9)
November	69 (8.2)	67 (6.2)
December	65 (7.7)	90 (8.4)
January	58 (6.9)	80 (7.4)
February	49 (5.8)	68 (6.3)
March	75 (8.9)	107 (10.0)
Total	840	1075
Mean no.	70±22.31	89.58±16.82 (p<0.05)

When month wise seasonality was analysed we found that the number of admissions to the MTC were even throughout the year except there was a slight rise during the month of Aug- Oct in 2014-15 and July-Sept in the year 2015-16 (p>0.05) as shown in Figure 1.

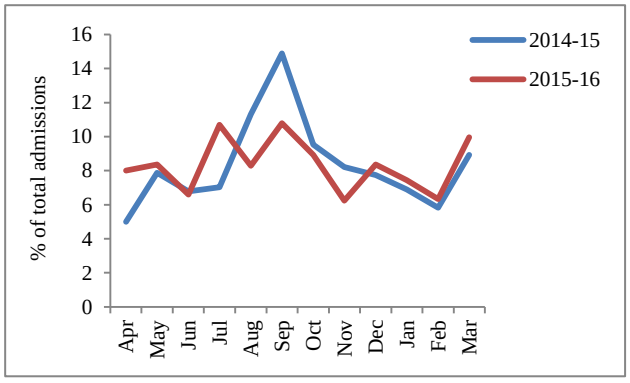

Figure 1: Month wise admission percentage to MTC.

Block wise admissions to MTC were assessed and it was found that 21.9% and 4.7% admissions were from Girwa and Badgaon respectively which represent urban areas of Udaipur and accounts for one fourth of total admissions. Other block wise admissions were as shown in Table 6. Seventy percent of the admissions were from Udaipur district and rest of the 30% admissions were from other nearby districts.

Table 6: Block wise distribution of admission to MTC.

Block (distance in km) *	Admissions (%)
Girwa (11)	420 (21.9)
Sarada (60)	193 (10.3)
Jhadol (44)	157 (8.2)
Gogunda (40)	140 (7.3)
Mavli (40)	132 (6.9)
Bhinder (65)	114 (5.9)
Badgaon (8)	90 (4.7)
Salumber (71)	65 (3.4)
Kherwara (83)	32 (1.7)
Kotra (112)	17 (0.8)
Others	555 (28.9)
Total no of admission	1915

* Average distance from hospital

DISCUSSION

In this hospital based retrospective study it was found that the prevalence of SAM in Southern Rajasthan was very high as compared to national (6.2%) and state (7.3%) prevalence and it has increased significantly over the previous year (p<0.05). Seasonality on month wise basis was even throughout the year (p>0.05) except there was a slight rise in the month of September which used to be post rainy season when most of the children were bought to the hospital with fever and other ailments which were common in that part of the year. This high prevalence of SAM in our area is mainly because majority population is of tribals who are having poverty, high illiteracy and poor access to health facilities.

Nationwide Rapid Survey on Children (RSoC), conducted by the Ministry of Women and Child Development and UNICEF in 2013-14 showed a marked improvement in the status of the child malnutrition over the third National Family Health Survey (NFHS-3) that was conducted in 2005-06. Despite some impressive gains in the anthropometric indicators of malnutrition, the absolute levels remain high, and of concern.[5] Other studies conducted at various parts of the world shows variable results.

In a similar study conducted in a tribal area of Odisha shows that the prevalence of under nutrition was significantly (P <0.01) higher during monsoon as compared with winter season.[6] Similarly, in another study, 16.5% of sedentary children aged less than 5 years were found to be acutely malnourished in rainy season while 10.6% of them have the problem in the dry season. Seasons, child age, mother's nutritional status, ethnicity, and place of residence were also identified as important predictors of seasonal acute child malnutrition.[7] In another study conducted by Gudina Agata et al in rural

Ethopia, seasonal variations have been observed in the magnitude of acute child under–nutrition, with a relative rise of the condition in the dry season. The prevalence of acute child under nutrition was 7.4% in wet and 11. 2% in dry seasons. Although season was not significantly associated with child under - nutrition, household poverty and poor access to health facilities were found to be more important predictors of wasting.[8]

Present hospital being one of the largest health facility in southern Rajasthan caters to the population of multiple districts in that area, Udaipur being the largest one. A quarter of admission to MTC were from the urban areas of Udaipur city, which shows that the problem of malnutrition is not only limited to the rural areas but even the urban areas are also plagued by it and the cause for malnutrition is not only food scarcity but other social factors like feeding practices, illiteracy, lack of knowledge and ignorance of people towards the child care plays an important role.

The Sustainable Development Goal (SDG) 2.2 calls for ending all forms of malnutrition by 2030. Looking to this much high prevalence of SAM in hospitalised children only not in the community, it seems very difficult road ahead, if not impossible! The limitation of our study is that it was retrospective, it would have been better if it has been prospective so that there was no bias in recording details by different observers throughout the year.

CONCLUSION

To conclude that there is a very high prevalence but there are no month wise seasonal variations in number of children admitted with SAM throughout the year in Southern Rajasthan, India.

Recommendation

So based on this study we recommend that nutritional and medical interventions for the management of SAM should be distributed evenly throughout the year instead of focussing on a particular part of the year. Infant and young child feeding (IYCF) activities should be strengthened to reduce the prevalence of SAM.

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