

Risk Ratio of Death in Infants with Severe Acute Malnutrition (SAM) and Severe Underweight (SUW) from Nandurbar, Maharashtra India

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Abstract

An analysis of anthropometric data from 2 blocks Akkalkuwa and Dhadgaon from Nandurbar district, Maharashtra, India on 2524 infants below 6 months, revealed that 148 (5.86%) had SAM and 656 (25.99%) had SUW. 10 (6.76%) out of 148 infants with SAM died and 17 (2.59%) out of 656 infants with SUW died. The risk ratio of a child with SAM dying during the period is 8.94 compared to normal infants. The risk ratio of an infant with SUW dying during the period is 3.43 compared to normal infants. This highlights that both SAM and SUW increase the risk of death, SAM more than SUW and hence the importance of taking all anthropometric measurements *i.e.*, weight for height (length) and weight for age in infants below 6 months. Recent WHO criteria (30.06.2023) for infants below 6 months 'at risk of poor growth and development' include both weight for length below -2SD or weight for age below -2 SD (WHO growth charts) or nutritional oedema or MUAC below 110 mm. Our findings appear to be in corroboration with these criteria. It has generated evidence to strengthen WHO criteria to detect infant at risk as measured by poor anthropometry based on a single measure.

Keywords: Anthropometric data, WHO, Risk ratio, Infants, SUW, SAM.

Introduction

Categorization of child malnutrition as Severe Acute Malnutrition (SAM severe wasting), Severe Underweight (SUW) based on weight for height below -3SD and weight for age below -3SD on WHO growth standards 2006 respectively is important as it predicts the risk of death. Diagnosis and management of malnutrition in children from 6 months to 5 years is widely studied and guidelines formulated. Babies suffering with SAM have 9 times the risk of death and SUW have 4 times the risk of death compared to normal children (WHO). However, data on infants below 6 months is insufficient to get adequate evidence. It was therefore decided to assess if one can find the risk of SAM or SUW infants dying compared to those who are anthropometrically normal, so that it will help in identification of these at-risk infants and then institute proper treatment [1].

Materials and Methods

A retrospective, secondary data analysis of anthropometric measurements available under 'Poshan tracker' Govt. of India and child death record available at the village level during the period of 1st April 2022 to 31st Dec 2022 was undertaken. Data was available from two tribal blocks of Akkalkuwa and

Dhadgaon of Nandurbar district Maharashtra. The district has high incidence of wasting and underweight. Under the integrated child development scheme of Govt. of Maharashtra, village health workers take measurements of children below 5 years by home visits or when the child is brought to the health facility. Data are uploaded on Poshan tracker software by frontline ICDS Anganwadi Workers (AWW) at the village level. Similarly, the frontline health workers collect data of babies who have died. This secondary data from 1st April 2022 to 31st December 2022 was analysed statistically. Since this was secondary data, ethics committee's permission was not necessary nor was registration needed. Data were collected of all babies below 6 months, growth and nutrition assessment for wasting and underweight using WHO growth charts (2006) was calculated. Emergency Nutrition Assessment (ENA) software and SPSS was used as the statistical software [2].

Results

Anthropometric data was available on 2524 infants. Table 1 shows number of SAM and SUW infants using WHO growth charts [3].

Table 1. Number of SAM and SUW infants using WHO growth charts.

Criteria of infants at risk of growth, development	Number	Percentage
SAM (WHZ \leq 3SD)	148	5.86

SUW (WAZ \leq 3SD)	656	25.99
Normal*	1720	68.15
Total	2524	100
Note: *For the purpose of this study stunting was not considered		

Table 2 shows number of infants and deaths in SAM category, SUW category and normal with risk ratio [4].

Table 2. Number of infants and deaths in SAM category, SUW category and normal with risk ratio.

Risk ratio calculation for infants-SAM and SUW (0-6 months age group)						
Category	Total number	Death numbers	Death (%)	Death per 1000 live birth	Risk ratio (SAM/Normal)	Remarks
SAM infants WHZ (\leq 3SD)	148	10	6.76	60.76	8.94	Risk of death of SAM infants is 9 times more than normal
SUW infants WAZ (\leq 3SD)	656	17	2.59	25.9	3.43	Risk of death of SUW infants is 3 times more than normal
Normal infants	1720	13	0.76	7.6	1	

Discussion

Malnutrition in children between 6 months to 59 months and its management has been studied world over specially in developing countries. WHO has published guidelines in 2013 which have been widely used. Community management of SAM without complications gave success to the program as also in India. However, malnutrition in infants below 6 months, strategies for its detection and management have been poorly studied and evolved. WHO guidelines have now been issued in 2023 [5].

NFHS 5 data 2019-20 for Maharashtra revealed that 10.9% children under 5 years are severely wasted and 36.1% are under weight. Severe wasting in Nandurbar is 13.5% and underweight 57.5%. No separate data on infants below 6 months, prevalence of wasting, undernutrition and association with mortality is available. There is also no clarity on which anthropometric measurements should be undertaken to detect infants at risk of growth and development. WHO released guidelines on detection and management of malnutrition for infants below 6 months in June 2023 [6].

In the present study of secondary data analysis from Nandurbar district has shown interesting results. Out of 2524 infants in the community 148 had SAM (5.8%) and 656 had SUW (25.99%). Mortality of SAM was 6.76%, SUW 2.59% and mortality in normal infants was 0.76%.

Risk ratio of SAM vs. normal was 8.94 thereby meaning that a SAM infant had nearly 9 times more the risk of death compared to normal while risk ratio of SUW was 3.43 meaning that an SUW infant has nearly 3 times the risk of death compared to normal [7].

Study by Kumar et al. on secondary data of 1813 hospitalized Indian children aged 1 to 6 months, from Kalawati Saran Hospital New Delhi; showed that prevalence of SUW was

39.9% with mortality of 11.1% and SAM to be 26% with mortality of 9.9% while that in normal was 5.9%. Weight for age was more sensitive predictor of mortality (74.8%). However, it is not a community based data.

Shivani Randev in a commentary quoted studies by Kumar, others from Kenya and stated the need to change to Wt. for age as malnutrition diagnostic criteria for infants under 6 months. The ease of taking wt. in comparison to taking length of very small infants was also a consideration by Randev [8].

With release of WHO guidelines it has become clear that both wt for age and wt for ht. are important anthropometric measurements to be advocated. It has stated that infants at risk of poor growth and development should include any of the following criteria [9]:

Infants with poor growth based on sequential measures.

- No wt. gain or wt. loss from one measurement to the next or
- Downward crossing of wt. for age centile lines or
- Insufficient wt. gain (velocity or gms/per specific time period)

Infants with poor anthropometry based on single measure.

- Wt. for age z-score (WAZ) \leq 2SD or
- Wt. for length z-score (WLZ) \leq 2SD or
- Nutritional oedema or
- Mid Upper Arm Circumference (MUAC) < 110 mm for infants between 6 weeks to 6 months

Infants with known risk factors for poor growth and development like neurodevelopmental concerns, maternal physical or mental issues, feeding concerns etc.

Infants at risk due to poor birth outcomes like preterm or LBW or SGA.

The present study testifies the importance of anthropometric measurements wt. and length in first 6 months of life.

Conclusion

In conclusion, the findings from this study underscore the critical association between anthropometric measures and infant mortality risk in Nandurbar district. Both Severe Acute Malnutrition (SAM) and Small Underweight (SUW) were found to significantly increase the risk of death in infants, with SAM posing a substantially higher risk. The observed mortality rates among infants with SAM and SUW strongly align with recent WHO criteria for identifying infants at risk of poor growth and development, reinforcing the importance of comprehensive anthropometric assessments (weight-for-height, weight-for-age, MUAC) in the early detection and management of malnutrition. This study provides valuable evidence supporting the use of these indicators for identifying infants who may benefit from targeted nutritional interventions to reduce mortality and improve health outcomes.

Conflict of Interest

We declare no conflict of interest.

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