Research Article

Common co-morbidities and prescribing pattern of antibiotics in hospitalized SAM in Central India

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Abstract

Objective: To study the co morbidities and prescribing pattern of antibiotics in hospitalized severe acute malnourishment (SAM) children. **Methods:** 202 SAM children were included by simple random sampling technique **Results:** 46.5% SAM children had diarrhea and 21.3% of children had acute respiratory tract infections (ARTI). Ceftriaxone/cefotaxime with aminoglycosides were administered to 52.9% children whereas ampicillin and gentamicin combination were given to only 18.8% children. **Conclusions:** Diarrhea and ARTI are the common co-morbidities in hospitalized SAM children. Ceftriaxone/cefotaxime and aminoglycosides are the most commonly prescribed antibiotic combination. Despite epidemiological studies, more clinical and pharmacokinetic studies are needed for commonly prescribed antibiotics.

Keywords: Antibiotics, Co-morbidities, Evidences, Severe acute malnutrition.

Introduction

Malnutrition is a global problem in developing countries, particularly in children less than 5 years of age. It is estimated that nearly 20 million children have severe acute malnutrition [1]. These malnourished children often present with co-morbidities which lead to higher morbidity and mortality among under-five children in developing countries. In the absence of appropriate treatment, case-fatality rates in hospitalized children range from 30% to 50% [1,2]. World Health Organisation (WHO) issued guidelines for the management of severe acute malnutrition (SAM) which mainly focuses on hospitalized SAM [3]. The aim of the present work was to study common co-morbidities and prescribing pattern of antibiotics in hospitalized SAM in Central India.

Methods

This descriptive study was carried out in the Department of Pediatrics, Gandhi Memorial Hospital, Rewa from August 2012 to July 2013. All children between six to sixty months of age with severe acute malnutrition (SAM) admitted in the severe malnutrition treatment unit (SMTU) were included. WHO criteria were used to define severe acute malnutrition i. e. weight-for -height (WH) below −3 standard deviations (SD or Z-scores), or MUAC (middle upper arm circumference) <115 mm, or Nutritional oedema which is defined by bilateral pitting oedema [3].

Sample size estimation: Sample size was calculated using right size (China-Uganda-Zimbabwe) statistical software assuming that n=500 i.e. total number of patient admissions at SMTU in a year. During a one year study period, expected frequency of the SAM was presumed to be at least 20% (i.e. available prevalence of 9-15%), thus considering 95% confidence level with 80% power and confidence interval of 5%, a sample of 198 patients was required. Simple random sampling technique was used to recruit the patients who were admitted to SMTU and 202 were selected.

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Intervention: Detailed history and systemic examination were done. Life-threatening problems were identified and treated, specific deficiencies were corrected. Course of the treatment was followed and recorded.

Ethical Issues: A written, informed consent from parents and clearance from Institutional Ethics Committee (Human Studies) Shyam Shah Medical College (SSMC), Rewa was obtained prior to the start of the study.

Results

Out of 202 patients 104 (51.5%) were males and 98 (48.5%) were females. Male to female ratio was nearly equal. Maximum numbers of patients i.e. 66.3%, were in age group of 6 to 12 months. Combined 6 months to 36 months constitutes about 97.5% of SAM cases studied. Diarrhea was found to be the most common co-morbid disease associated with SAM. 46.5% SAM children had diarrhea and 21.3% of children suffered acute respiratory tract infections. 7.9% children had meningitis, 6.4% had tuberculosis and only 3.9% children had malaria. (Table I).

Table I: Distribution of Co-Morbidities in the Study Population.

Type of Disease	Age Groups			Total
	Age < 12 months	12 – 24 months	>24 months	
Acute gastroenteritis	52	31	11	94
Acute respiratory tract infection	30	10	3	43
Malaria	4	2	2	8
Tuberculosis	6	7		13
Meningitis	8	7	1	16

All admitted children received one or other antibiotics (Table II). 18 children received oral antibiotics (cotrimoxazole or amoxycillin), of them 14 received only oral antibiotics and 4 were switched to higher parenteral antibiotics. Aminoglycosides were the most commonly used antibiotic in combinations with others. Combination of aminoglycosides and ceftriaxone/cefotaxime was given to 52.9% and that of ampicillin and aminoglycosides to 18.8% children. Vancomycin as well as meropenem were used in 11.9% children each, although they were used after using above mentioned antibiotic combinations, according to culture and sensitivity reports. Only 2.4% children received systemic antifungal.

Table II: Distribution of Antibiotics in the Study Population.

Antibiotics	Age Groups			Total
	Age< 12 months	12- 24 months	> 24 months	
Oral (Cotrimoxazole or Amoxycillin)	10	7	1	18
Ceftriaxome / Cefotaxim + Aminoglycosides	61	35	11	107
Ampicillin + Aminoglycosides	22	10	6	38
Piperacillin & Tazobactum	14	5	4	23
Meropenem	15	8	1	24
Vancomycin	12	8	4	24
Linezolide	-	-	1	1
Fluconazole	2	2	1	5

Discussion

Diarrhea and acute respiratory infection were the two most common co-morbid diseases associated with SAM. Previous studies have also reported that malnourished children suffer in greater proportion from bacterial gastrointestinal and respiratory infections [4].

In a Colombian study, 68.4% of malnourished children were suffering from diarrhea at the time of admission [5]. Two African studies also showed high incidence of diarrhea in SAM children of 49% and 67% [6,7]. Though previous reports have described malnutrition as

an important risk factor for pneumonia than for diarrhea [8].diarrhea was the major co-morbid condition found in our study. Hossain et all [9]. reported bronchopneumonia in 33%, diarrhoea in 11% and pulmonary tuberculosis in 9% children.

With the implementation of WHO guidelines, low mortality rates were achieved in children with severe acute malnutrition in hospitals [10,11]. Current WHO guidelines recommend giving routine antibiotics for all children with severe acute malnutrition (SAM), even if they have uncomplicated disease with no clinically obvious infections [3]. WHO recommendation is on the basis of several epidemiological studies which have documented a high prevalence of pneumonia, bacteraemia and infections in children with malnutrition [4,7]. If clinical complications were present, then parenteral antibiotics were recommended [12]. For all admitted cases with any complications other than shock, meningitis or dysentery ampicillin and gentamicin are recommended. For septic shock, meningitis, dysentery and in case of no improvement ceftriaxone/cefotaxime with or without aminoglycosides is recommended [12].

We initiated management of all hospitalozed SAM children as per WHO protocol and later changed/upgraded antibiotics as per culture and sensitivity reports. In our study ampicillin and gentamicin combination were given to only 18.8% children where as ceftriaxone/cefotaxime with aminoglycosides were administer to 52.9% children. No or limited studies have been published on the efficacy, safety or pharmacokinetics of these drugs in children with SAM. Lazzerini et al quoted only one study on use of ampicillin and gentamicin that has been studied in controlled trials [13]. In spite of lack of pharmacological evidences these broad spectrum antibiotics are being increasingly used in hospitalized complicated SAM as recommended by WHO.

Conclusion

Diarrhea and acute respiratory infection are the two most common co-morbid diseases in SAM. The use of broad-spectrum antibiotics for children with SAM is supported by epidemiological data demonstrating a high prevalence of infections in these children, but clinical studies are lacking. Aminoglycosides are the most commonly used antibiotic in combinations with others. Most commonly used antibiotic combination in admitted SAM is ceftriaxone/cefotaxime and aminoglycosides followed by ampicillin and gentamicin combination in hospitalized complicated SAM. Although there are several epidemiological studies, control trials studies with regards to safety or pharmacokinetics of commonly prescribed antibiotics are needed as there is increase in use of higher antibiotics in SAM.

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Permission of IRB: Yes

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