**INTRODUCTION:**
Severe acute malnutrition (SAM) defined by a very low weight for height (below -3z scores of the median WHO growth standards), is a devastating public health problem of epidemic proportions. Diminished immune functions render undernourished patients more susceptible to multiple infections and many severely malnourished children die from delay inappropriate treatment. This study was undertaken to study the antibiotic sensitivity pattern among organisms causing infections in patients with severe acute malnutrition so as to aid in developing a local antibiogram.

**OBJECTIVE:**
To study and compare the antibiotic sensitivity pattern of organisms involved in infections in patients with severe acute malnutrition (SAM).

**MATERIAL AND METHODS:**
In this study 72 children aged 6 months-60 months, classified as SAM children as per WHO criteria were included and their blood cultures and antibiotic sensitivity were studied and analysed.

**RESULTS AND CONCLUSION:**
Our study shows that infections in patients with severe acute malnutrition is a common occurrence with gram negative organisms being more than gram positive organisms with E.coli being the most common culprit. As per our study, we recommended that the patients suffering with SAM with associated comorbidities, with high suspicion of sepsis should be started empirically with ceftriaxone or cefotaxime. In case of non improvement, or subtle response vancomycin (if gram positive suspected) or Amikacin (if Gram negative sepsis is suspected) may be added as an additional drug, finally until the blood culture and sensitivity results for the organisms are available.
Our study included a total number of 72 cases of severe acute malnutrition with suspected sepsis who were admitted and whose blood cultures and sensitivity patterns were studied with the following results:

1) Children <1 yr constituted 50% (36/72) of cases, whereas children aged between 1-2 yr constituted 43.1% (31/72) and >2 yr 6.9% (5/72) respectively.

2) The cases as per gender are females 56.9% (41/72) and males 43.1% (31/72) respectively.

3) Of the blood culture results in our study, 41.7% (30/72) were culture positive and 58.3% (42/72) were found sterile respectively.

4) Gram negative organisms (73.34%) were more common cause of bacteraemia than gram positive ones (26.67%).

5) In positive blood culture results the organisms in decreasing order of frequency are E.Coli 33.34% (10/30), Staph. aureus 20% (6/30), Salmonella 13.24% (4/30), Klebsiella 10.0% (3/30), Proteus and Psuedomonas aerogenosa 6.67% (2/30) each, and Streptococci Pnuemoniae 3.34% (1/30) respectively.

6) Of culture positive organisms to different drugs, maximum 40% (12/30) were sensitive to ceftriaxone of which 33.34% (4/12) were E.Coli, 16.67% (2/12) were Proteus and Salmonella each and 8.34% (1/12) each of Klebsiella, H.inuenzae, Staph. aureus and Streptococcus pneumoniae. 36.67% (11/30) of cases were sensitive to cefoxaxime, of which 36.36% (4/11) were E.coli, 18.18% (2/11) were Salmonella and Proteus each, and 9.09% (1/11) were Klebsiella, H.inuenzae, and Staph aureus each. 13.34% (4/30) were sensitive to ciproxacin of which 75% (3/4) were Salmonella and 25% (1/4) were Psuedomonas aerugenosa. 10% (3/30) of each organisms were sensitive to oxifoxacin, meropenem, amikacin, and vancomycin. oxifoxacin sensitivity was in 33.34% (1/3) each of Salmonella, H.inuenzae, and Staph. aureus.
Among meropenem sensitivity isolates, 66.67% (2/3) were E.Coli and 33.34% (1/3) were Psuedomonas. Among amikacin sensitivity isolated 33.34% (1/3) were E.Coli, Klebsiella, and Psuedomonas each. Among vancomycin sensitive isolates all (3/3) organisms were Staph aureus.

Among organisms sensitive for gentamicin E.Coli and amoxycillin [Staph. aureus (1/1)] were 3.34% (1/30). 13.34% (4/30) culture positive organisms were resistant to all, of which 75% (3/4) were E.Coli and 25% (1/4) were non lactose fermenting gram negative bacteria.

**DISCUSSION:**

In our study, the maximum number of patients admitted were 50% (36/72) of the <1yr, 43.1% (31/72) between 1-2 year and 6.9% (5/72) >2 year. So the maximum number of patients who were admitted in our set up belonged to < 2 year of age which is nearly 93%. This is in accordance with study done by Mahama Saka et al in which the number of patients under two years of age was 63.2% of which 26.4% (92/348) were between 6 -11 months and 36.8% (128/348) patients were between 12-23 months of age.

Regarding sex distribution our study had female predilection for admission as 56.9% (41/72) were females and 43.1% (31/72) were males. It is in accordance to national trends of our country having the under five mortality rate higher for females than males. As per SRS 2010, USMR stood at 64 for females whereas it is 55 for males.

In our study blood culture was positive in 42% (30/72) of patients, while culture of 58% (42/72) of patients remained sterile, as compared to studies conducted by Noorani et al, Babirekere-Iroso et al who observed the prevalence of bacteraemia to be 22% in their study and Noorani et al found 28.9% of their patients to be bacteraemic.

Among the organisms causing bacteraemia, gram negative organisms (73.34%) were found to be a more common cause of bacteraemia than gram positive ones (26.67%). This is in conjunction with studies conducted by Noorani et al, Babirekere-Iroso et al found predominance of gram negative organisms (77%) in causing septicemia. Bachou et al(13) too found predominance of gram negative organisms (58%) in causing bacteraemia. Others with predominance of gram negative organisms in their studies were Shmiles et al(10) with 36%, Berkowitz et al(9) with 19%, and Noorani et al(8). Whereas gram positive dominance as a cause of sepsis were found in studies of Issac et al(6). Phillip C. Hill et al(12) estimated 73% organisms as gram positive in causing sepsis.

Our study had E.Coli as the predominant organism among bacteraemic patients accounting for 33.34% of culture positive patients, followed by Staph aureus in 20% of culture positive patients, Salmonella in 13.34%, Klebsiella in 10%, Proteus and Psuedomonas in 6.67% each and lastly H.inuenzae, Streptococcus pneumoniae and non lactose fermenting gram negative bacilli 3.34% each. Comparing our results to other studies as Babirekere-Iroso et al(13) had 67% of organisms as E.Coli and Salmonella, Bachou et al(13) found 39.4% Salmonella, 26.3% Staph aureus and 13.2% Streptococcus pneumonia, whereas Issac(6) found Staph aureus, as most common organism in his study.

Of culture positive organisms to different drugs, maximum 40% (12/30) were sensitive to ceftriaxone of which 33.34% (4/12) were E.Coli, 16.67% (2/12) were Proteus and Salmonella each and 8.34% (1/12) each of Klebsiella, H.inuenzae, Staph. aureus and Streptococcus pneumoniae. 36.67% (11/30) of cases were sensitive to cefotaxime, of which 36.36% (4/11) were E.Coli, 18.18% (2/11) were Salmonella and Proteus each, and 9.09% (1/11) were Klebsiella, H.inuenzae, and Staph aureus each. 13.34% (4/30) were sensitive to ciprofloxacin of which 75% (3/4) were Salmonella and 25% (1/4) were Psuedomonas aergenousa. 10% (3/30) of each organisms were sensitive to ofloxacin, meropenem, amikacin, and vancomycin. ofloxacin sensitivity was in 33.34% (1/3) each of Salmonella, H.inuenzae, and Staph. aureus.

Among meropenem sensitivity isolates, 66.67% (2/3) were E.Coli and 33.34% (1/3) were Psuedomonas. Among amikacin sensitivity isolated 33.34% (1/3) were E.Coli, Klebsiella, and Psuedomonas each. Among vancomycin sensitive isolates all (3/3) organisms were Staph aureus.

Among organisms sensitive for gentamicin E.Coli and amoxycillin [Staph. aureus (1/1)] were 3.34% (1/30). 13.34% (4/30) culture positive organisms were resistant to all, of which 75% (3/4) were E.Coli and 25% (1/4) were non lactose fermenting gram negative bacteria.

**CONCLUSION:**

Our study shows that infections in patients with severe acute malnutrition is a common occurrence with gram negative organisms being more than gram positive organisms with E.coli being the most common culprit. As per our study, we recomended that the patients suffering with SAM with associated comorbidities, with high suspicion of sepsis should be started empirically with ceftriaxone or cefotaxime. In case of non improvement, or subtle response vancomycin (if gram positive suspected) or Amikacin (if Gram negative sepsis is suspected) may be added as an additional drug, finally until the blood culture and sensitivity results for the organisms are available.

**References**

1. World Health Organisation Department of child and adolescent Health development Management of the child with serious infection or severe malnutrition Guidelines for care at the first referral level in developing countries. WHO/FC/CAH/00.