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Study to Know the Bacterial Pathogens Causing Sepsis in Infants and Their Susceptibility to Antibiotics

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ABSTRACT

Objective: *To determine the frequency of pathogen, antibiotic susceptibility and widely used antibiotic resistance patterns in sepsis in bacterial infected infants.*

Place and duration of work: *Central Laboratory, Services Hospital, Lahore for the period of 6 months .*

Study design: *Retrospective descriptive observational study.*

Patients and methods: *During the study, all 1414 reports submitted to Civilian Hospital Karachi for culture / sensitivity to infants were analyzed for bacterial pathogens, frequency, susceptibility to antibiotics, and blood type of resistance.*

Results: *1414 babies had a positive blood culture in 604 (42.7%) . Gram-positive bacteria were more suppressed (54.1%) than Gram negative bacteria (45.9%). Male: female ratio was about 1: 0.9. Escherichia coli, and then 9 dominant organisms, Staphylococcus aureus and Pseudomonas aeruginosa, respectively, which were isolated. The overall sensitivity of the amikacin and cefotaxime was 60.87% and 36.67% respectively was used as empirical treatment. Hemorrhagic fever (56.21%), cephalosporins (55.9%), gentamycin (54.31%) and amoxicillin were very resistant (51.11%) when the microorganisms were more susceptible to vancomycin (95.54%), ciprofloxacin (94.16%).*

Conclusion: *Gram-positive organisms have been identified as the greatest threat to sepsis in infants, a model has been developed that is resistant to commonly used antibiotics and is necessary to control the spread of these resistant strains by constant monitoring of infectious disease control programs and infection resistant patterns .*

Key words: Culture and sensitivity pattern, Septicemia in infants, drug resistance.

INTRODUCTION

Sepsis is defined as a systemic inflammatory response syndrome resulting from a suspected or proven infection. According to a prediction made by the World Health Organization (WHO), 4 million newborn deaths worldwide occur every year. Approximately 98% of these deaths occur in developing countries. Neonatal sepsis is the dominant cause of morbidity and mortality, and is the reason for the frequent admission of children to hospitals in developing countries. Pakistan accounts for about 7% of newborn deaths worldwide. One third of these deaths are due to infections. Infants are at the greatest risk, 10 times more than older children. Low- and very low birth weight infants (VLBW) represent almost a quarter of the pediatric sepsis population. The bacteriological profile of neonatal septicemia is constantly changing with advances in early diagnosis and treatment. For this reason, the rational protocol for sepsis therapy should have adequate knowledge of the antibiotic susceptibility and the causative organism in the relevant area. There is little data on susceptibility and susceptibility to infantile sepsis and antibiotics in Pakistan. Therefore, we have planned health management to provide open

access to antibiotics, which is more sensitive to common bacterial diseases today. In children, sepsis is an emergency that involves the risk of life and any delay in treatment can cause death. The initial indication for sepsis is mild and not specific. For this reason, empirical antibiotic therapy should be started immediately in suspicious cases, without expecting blood culture results8 and sensitivity reports. Early treatment and adequate use of antibiotics reduces the risk of severe morbidity and mortality in sepsis to a minimum and reduces the formation of multiple resistant resistant organisms through rational use of antibiotics in intensive care units. The distribution of pathogens causing sepsis in a given hospital unit is usually considered when empirical antibiotics are selected.

METHODOLOGY

This is a descriptive observational study conducted in Central Laboratory, Services Hospital, Lahore for the period of 6 months . The blood was collected aseptically and inoculated in culture broth BD BACTEC and incubated for 5 days. Subculture was performed using blood agar and chocolate agar and Mc.Conkeys and aerobics at 37 ° C cultivated. Plates were then examined for growth of any bacteria. Various biochemical and serological tests were performed for Gram staining and identification and antibiotic susceptibility diffusion technique was confirmed with Baur Kirby Disc. Blood culture reports were developed and a copy of them was sent to the bureau. The data was analyzed by SPSS version 16.0 and frequency and percentages were calculated for each qualitative variable. Effective antibiotics were determined with P <0.05 significance by chi-square test. Intermediate resistance isolates were classified as susceptible.

RESULTS

1414 blood samples of suspected sepsis and 6 months (six) children were included during the study period. There was a positive blood culture in 604 (42.7%) of these. Of these, 322 (53.3%) were male and 282 (46.7%) female. Male: female ratio was about 1: 0.9. positive blood cultures reported 604 reports and 54.1% when compared to gram negative (45.9%) Gram positive bacteria. A total of 9 organisms were isolated; where Pseudomonas aeruginosa (18.2%) and Escherichia coli (9.1%) (Fig. 1) and Staphylococcus aureus (49%) were suppressed. Antibiotic susceptibility patterns of bacterial isolates were also analyzed. we found amikacin and cefotaxime (60.87% and 36.67%, respectively) which can be used as empirical treatment for the total sensitivity of the organisms or in the child care. the resistance is mainly sensitive to cephalosporins (cefaclor 81.55%, cefradine 78.85%, cefixime 75.69%, organisms, vancomycin 95.54%, sparfloxacin 94.16%, linezolid 93.56% and cefuroxime 75.47% , 56.21%, kanamycin, gentamycin 54.31 and 51.11%, amoxycillin. (Graph 2)

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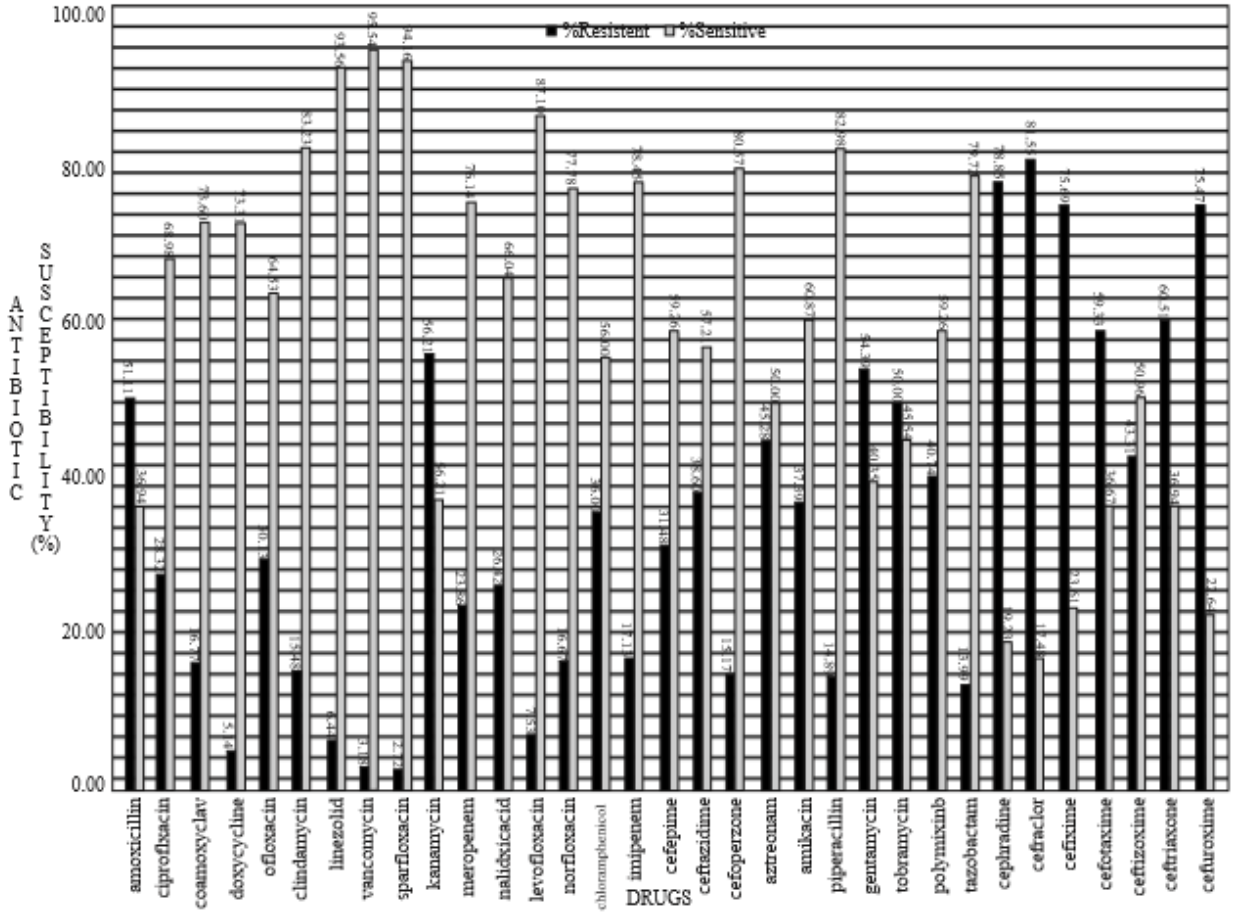
Graph 2: Combined Susceptibility Pattern of Antibiotics in All Bacterial Pathogens



According to the sensitivity and sensitivity of the isolates, this sparfloxacin was discovered and vancomycin is the most sensitive to most bacteria when amoxicillin and kanamycin are the most resistant bacteria isolates. (Table I).

Table I: Sensitivity Pattern of Bacterial Isolates

NO.	Bacteria	Most Sensitive Antibiotic	Total Used	Sensitivity	Most Resistant Antibiotic	Total used	Resistance
1.	Staphylococcus Aureus	1.sparfloxacin	116	97.41%	1.kanamycin	270	57.78%
		2.vancomycin	292	97.26%	2.amoxicillin	294	52.04%
		3.linezolid	293	93.52%	3.ciprofloxacin	264	39.05%
		4.clindamycin	288	85.42%	4.ofloxacin	291	38.14%
		5.coamoxyclav	290	83.45%	5.cefepime	66	34.85%
2.	Pseudomonas Aeruginosa	1.sparfloxacin	47	93.62%	1.Gentamycin	110	54.55%
		2.ceftazidime	106	77.36%	2.tobramycin	108	49.07%
		3.ciprofloxacin	93	90.32%	3.aztreonam	103	44.66%
		4.Pipera/tazobactam	58	89.66%	4.polymixinb	106	41.51%
		5.amikacin	110	64.55%	5.imipenem	108	18.52%
3.	Escherichia coli	1.sparfloxacin	26	96.15%	1.cefixime	53	77.36%
		2.levofloxacin	51	90.20%	2.cefaclor	53	71.70%
		3.cefoperzone	35	77.14%	3.cephradine	52	67.31%
		4.ofloxacin	53	75.47%	4.cefuroxime	51	62.75%
		5.Pipera/tazobactam	27	74.07%	5.ceftriaxone	51	52.94%
4.	Klebsiella pneumoniae	1.levofloxacin	48	91.67%	1.cefaclor	48	91.67%
		2.ofloxacin	49	85.71%	2.cefixime	48	93.75%
		3.ciprofloxacin	45	82.22%	3.cefuroxime	49	98.14%
		4.cefoperzone	13	76.92%	4.ceftriaxone	48	87.54%
		5.ceftizoxime	46	50%	5.cefotaxime	45	80%
5.	Salmonella typhi	1.ofloxacin	7	100%	1. amoxicillin	9	66.67%
		2.sparfloxacin	5	100%	2.ceftizoxime	8	50%
		3. imipenem	9	88.9%	3.ceftizoxime	2	50%
		4. levofloxacin	9	88.9%	4.chloramphenicol	9	44.4%
		5. norfloxacin	9	88.9%	5.cefixime	9	44.4%

DISCUSSION

Sepsis is a leading cause of morbidity and mortality and is the cause of frequent hospitalization in children. Life is a dangerous emergency and any delay in treatment can cause death. In our study, positive blood cultures were 42.7%. This suggests that sepsis in infants continues to be the leading cause of hospital morbidity. Similar studies were conducted in SIMS in 2002 and 2008, indicating that these rates were 12% positive cultures with 55.2% and 11.9% respectively and these rates do not change much in the same hospital within 10 years. Different researches in Pakistan showed different results such as 40% in Islamabat, 13% in Lahore and 62.8% in Peshawar. In our study, all cultures gave a single pathogen. This is similar to other work done in Karachi and Lahore. Gram-positive COCs are the most common (54.1%), contradictory to previous studies in Pakistan and neighboring countries. However, in one study, Gram-positive organisms were the leading cause of neonatal sepsis in Karachi. A similar predominance of Gram-positive organisms has been reported at different centers in Nigeria. The prevalence of male gender in our study is similar to some previous studies. Staphylococcus aureus was the most common causative agent of septisemine in our study (49%). The lack of information about safety protocols during

medical procedures in society as a whole, as well as being a deeply normal flora, may be the reason for such high prevalence. The other two partners were Pseudomonas auregnosa (18.2%) and Escherichia coli (9.1%). Escherichia coli and Staphylococcus aureus were isolated in 2005 (24%), followed by Staphylococcus aureus (22%), followed by SIMS in 2008, with the most common frequency changes in different organisms in 2005, Klebsiella pneumoniae. Studies outside Karachi have shown that the incidence of enterobacter in Escherichia coli and Islamabad in Lahore and Multan is high. Among neighboring countries, Enterobacter India and Iran, Pseudomonas and Klebsiella were more common in Bangladesh. For this reason, different geographical regions have a different prevalence. As reported in most studies in Pakistan, group B streptococci (GBS) was not isolated from any culture in our study. Nevertheless, a previous study in Karachi and Peshawar reported an incidence of sepsis with isolated single GBS. On the contrary, Western countries reported GBS as a frequent isolate. This difference may be due to the presence of low virulence, low prevalence of a prevalence of lower socioeconomic GBS colonization that results in the death of most babies in the beginning of sepsis, early disease (EOS), or pregnancy because of the undeclared house. In cephalosporins, there is significant resistance from 15% (cefoperone) to 81.55% (cefaclor). Resistance was reported at similar levels in different studies. Cefotaxime (an empirical therapy agent in SIMS) showed significant resistance to gram negative rods (59.33%). This pattern of resistance is supported by A. Mahmood et al., Batoola et al., Because increased resistance to this disease suggests that prudent use of cefotaxime should be encouraged. Choose antimicrobial therapy as cephalosporin resistant strains have limited treatment options. Aminoglycosides showed moderate resistance to the majority of gram-negative rods ranging from 37% (amikacin) to 56% (kanamycin). On the contrary, in a SIMS study, significant resistance to aminoglycosides has been reported, the same study has been found in other studies. However, when we studied aminoglycosides, amikacin showed good sensitivity and this pattern is consistent with that found in Islamabad by Karachi. Sems et al., Mahmood et al. Amikacin and cefotaxime are now used as empirical therapy in newborns of our hospital, with 60.87% and 36.67% sensitivity respectively. SIMS Lab (Staphylococcus aureus) test for amikacin cefotaxime susceptibility and gram-positive smell However, observation in this study may be uncertain because it is recommended that the laboratory controls these drugs because they are an important treatment against Staphylococcus and pseudomonas and that the most common organisms present in our structure it lacks the sensitivity model.

CONCLUSION

In our study, we concluded that Staphylococcus aureus is an important cause of sepsis in infants. In addition, the frequency of bacterial pathogens and susceptibility to antibiotics varies geographically and over time. In addition, the antibiotic susceptibility profile of different organisms shows significant resistance to conventional antibiotics. Therefore, the search for routine bacterial surveillance and resistance patterns is crucial for the formulation of antibiotic policy guidelines, and such a study should be done periodically at each hospital.

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