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Research Article

Puerperal sepsis: predominant organisms and their antibiotic sensitivity pattern

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ABSTRACT

Background: Puerperal sepsis is among the leading cause of preventable maternal morbidity and mortality not only in developing countries but in developed countries as well. This study was undertaken to isolate and identify aerobic bacterial agents of puerperal sepsis among the patients admitted in rural medical college of Maharashtra.

Methods: Blood samples were collected from 67 cases of Puerperal sepsis and were cultured aerobically. The organisms were identified by standard biochemical tests. Antimicrobial sensitivity testing done by Kirby Bauer disc diffusion method.

Results: Out of 67 samples, 46 (68.65%) yielded growth in blood culture. The isolated organisms were *Klebsiella aerogenes*, *Staph. aureus*, *Pseudomonas aeruginosa*, *Proteus*, *E. coli*, *Streptococcus pyogenes* and coagulase negative *Staphylococci*. Most of the organisms are resistant to commonly used antibiotics such as ampicillin, penicillin and amikacin.

Conclusions: Puerperal sepsis is the common life threatening condition in the postnatal period, particularly following vaginal delivery. Early diagnosis and appropriate treatment of puerperal sepsis can make the difference between life and death.

Keywords: Puerperal sepsis, Antibiotic sensitivity, Maternal mortality

INTRODUCTION

Puerperal pyrexia and sepsis are among the leading causes of preventable maternal morbidity and mortality not only in developing countries but in developed countries as well.¹ Maternal mortality ratio is a sensitive indicator of health status of women.² puerperal sepsis occurs in 1-8% of all deliveries. It can occur following normal vaginal deliveries and of cesarean section.³ The worldwide increase in cesarean section rates has led to increased delivery complications.⁴

Puerperal sepsis contributes to a lot of maternal morbidity, more so in rural women. How often and for

which of these complications postpartum women seek healthcare is not very well documented but need to be studied in depth as many of the complications can either be prevented or appropriately treated if detected early. The organisms which cause it include *Staph. aureus*, *Strep. pyogenes*, *Coliform* bacteria.⁵

There are very few studies particularly on bacterial etiology of puerperal sepsis. It is known that bacterial pattern with their antimicrobial susceptibility is a dynamic and changing phenomenon and surveillance of this event is needed in every healthcare setting. The study was aimed to determine causative organisms and antibiotic susceptibility of the isolates.

METHODS

The present study was undertaken for two years. Women admitted for puerperal sepsis after having delivered at home or at other hospitals or readmitted after discharge following delivery at the study hospital were included in study. A total of 67 patients were studied. Seventy five percent of the women seeking services at our hospital are rural belonging to lower and middle socioeconomic class. 10 ml of blood was collected in Brain Heart Infusion Agar-Brain Heart Infusion Broth (BHIA-BHIB). Blood culture bottles were observed daily for signs of growth like turbidity, colonies over solid slant portion and subcultured onto solid media like blood agar and MacConkeys agar and evaluated after 24 hours, 48 hours and maximum upto 7 days before declaring it as negative. All laboratory methods followed standard protocols. The preliminary identification tests like catalase, oxidase, motility and coagulase etc. were done to ascertain in the identification of the pathogen.⁶ Antimicrobial sensitivity was done on Muller Hinton agar and blood agar depending on the nature of the isolate by Kirby Bauer disc diffusion method.

RESULTS

Table 1 shows age and parity of patients. Majority of women belongs to 20-29 years of age group.

Table 1: Age and parity.

Age (years)	parity	Number of cases
< 19	1	6
20-29	1	28
	2	17
	3-4	9
30-39	2	3
	3-4	4
Total		67

Table 2: Place and type of delivery.

Place	Type of delivery	Number of cases
Study hospital	Normal delivery	17
	Institutional V D	6
	Caesarean section	2
Other hospitals	Normal delivery	13
	Institutional V D	5
	Caesarean section	3
Home	Normal delivery	21
Total		67

V D- vaginal delivery

Table 3 shows various isolates. Sixty seven patients from Obstetric department were evaluated over a period of two years. Of them, 46 showed bacterial growth. Rests of the samples were sterile. Gram negative organisms were isolated in 31 cases (67.39 %) while Gram positive organisms in 15 cases (32.60 %). *Klebsiella* was the most frequent isolate 13 (28.26%) followed By *Staph. aureus* 10 (21.73%).

Table 3: Isolates in blood culture.

Organisms isolated	Number	Percentage
<i>Kleb. aerogenesa</i>	13	28.26%
<i>Staph. aureus</i>	10	21.73%
<i>Pseudo. aeruginosa</i>	9	19.56%
<i>Proteus</i>	5	10.86%
<i>E. coli</i>	4	8.69%
<i>Strept. pyogenes</i>	3	6.52%
<i>Staph. albus</i>	2	4.34%
Total	46	68.65%

Table 4 shows antimicrobial sensitivity pattern of isolates. Most of the organisms are resistant to ampicillin, penicillin and amikacin.

Table 4: Antimicrobial susceptibility pattern of isolates.

Isolates Antibiotics	<i>Klebsiella aerogenes</i> (n = 13)	<i>Staph. aureus</i> (n=10)	<i>Pseudo. aeruginosa</i> (n = 9)	<i>Proteus species</i> (n = 5)	<i>E. coli</i> (n=4)	<i>Strep. pyogenes</i> (n=3)	<i>Staph. albus</i> (n=2)	Total (n=46)
Ampicillin	4 (30.76)	1 (10)	5 (55.55)	1 (20)	0 (0)	1 (33.33)	1 (50)	13 (28.26)
Gentamicin	11 (84.61)	8 (80)	6 (66.66)	3 (60)	2 (50)	2 (66.66)	1 (50)	33 (71.73)
Cotrimoxazole	2 (15.38)	2 (20)	1 (11.11)	1(20)	1 (25)	1 (33.33)	0 (0)	8 (17.39)
Ciprofloxacin	12 (92.30)	7 (70)	8 (88.88)	5 (100)	3 (75)	3 (100)	2 (100)	38 (82.60)
Cephalexin	4 (30.76)	10 (100)	5 (55.55)	2 (40)	1 (25)	3 (100)	2 (100)	23 (50)
Norfloxacin	9 (69.23)	7 (70)	4 (44.44)	1 (20)	2 (50)	0 (0)	0 (0)	23 (50)
Amikacin	8 (61.53)	7 (70)	5 (55.55)	4 (80)	2 (50)	2 (66.66)	1 (50)	29 (63.04)
Penicillin	1 (7.69)	2 (20)	2 (11.11)	0 (0)	1 (25)	2 (66.66)	1 (50)	9 (19.56)
Erythromycin	2 (15.38)	1 (20)	1 (11.11)	0 (0)	0 (0)	2 (66.66)	2 (100)	8 (17.39)
Polymyxin B	-	-	7 (77.77)	1 (20)				8 (17.39)
Carbenicillin	-	-	6 (66.66)	1 (20)				7

Figures in the bracket represent percentage.

DISCUSSION

Post partum morbidity continues to be major health issues which need to be looked into critically not only for curative but preventive and promotive health. It is being believed that in developing countries 65% of all women have some form of antenatal care and 53% intranatal care, only 30% receive postpartum care. A big proportion of Indian women still deliver at home with or without any prenatal and intranatal care. They are malnourished, anemic and remain prone to postpartum complications.

Out of all the women admitted in present study, six (8.95%) were teenagers, 54 (80.59 %) between 20 and 29 years of age and seven (10.44%) between 30 and 39 years. Majority of the women came from lower socioeconomic class. Majority of them were uniparous (50.74 %), 29.85 % belonged to parity two, 19.40 % to parity 3 or 4 (Table 1).

Of the 67 women, 21(31.34%) has delivered at home, 21(31.34%) at other hospitals or private maternity homes and 25 (37.31%) at the study hospital (Table 2).

It is important to understand the bacteriology of puerperal sepsis. Enhanced detection of blood stream infections needs to be a national priority. Blood culture is the essential investigation for the management of sepsis. In the present study, out of 67 cases studied, bacteremia was present in 46 (68.65%) cases. The ratio of Gram positive to Gram negative organism was (2.06: 1).

Present study shows predominance of Gram negative bacilli (67.39%) with 32.60% isolates being Gram positive cocci. Similar findings reported by another study which showed isolation of Gram negative organism as 60% and Gram positive cocci as 40% from cases of puerperal sepsis.⁷ Distribution of bacteria as the cause of puerperal sepsis observed in the present study was in contrast to the other studies. They showed predominance of Gram positive cocci (78%) with 8% isolates being Gram negative bacteria.⁸

Klebsiella and *Staph. aureus* were the major isolates in the present study. Other studies from India reported *E.coli* as the predominant pathogens followed by *Staph. aureus* and *Klebsiella*.^{9,10} Whereas Venugopal and Bhaskaran and Omu and Ajabor reported *E. coli* as the predominant pathogen in puerperal sepsis.^{11,12} Other organisms isolated in our study were *Pseudomonas aeruginosa*, *Proteus*, *E. coli*, *Streptococcus pyogenes* and coagulase negative *Staphylococci* in the descending order of their frequency. Other study found *E. coli* as the predominant bacteria (50%) followed by *Staphylococcus species* (30%) and *Streptococcus species* (20%).¹³ Distribution of *E. coli*, *Staphylococcus species* and *Streptococcus species* in another study done in USA was reported to be 36%, 28% and 21% respectively.¹⁴

Another study observed that in cases of puerperal sepsis the most common bacteria were *Staph. epidermidis*, *E. coli*, *Enterococci* and *streptococci*.¹⁵ The frequency of puerperal infection due to Group A beta hemolytic *Streptococci* has decreased greatly in the 21st century and now rarely caused maternal death. In the 18th and 19th centuries puerperal infection was a serious life threatening condition.¹⁶

In the present study, antimicrobial susceptibility of different bacterial isolates was seen. *Kleb. aerogenes* shows sensitivity to ciprofloxacin (92.30%) and gentamicin (84.61%), *Pseudo. aeruginosa* shows sensitivity to ciprofloxacin (88.88%). Majority of the isolates of *Proteus* were sensitive to ciprofloxacin (100%) and Amikacin (80%). *E. coli* shows sensitivity to ciprofloxacin (75%). *Staph aureus* shows sensitivity to cephalixin (100%), gentamicin (80%) and ciprofloxacin (70%). *Strep. Pyogenes* was 100% sensitive to cephalixin and ciprofloxacin.

Others reported that majority of different Gram positive cocci shows sensitivity to cephalosporin.¹⁷ Another study from Nepal also observed that 100% strains of Gram positive cocci were sensitive to cephalixin.¹⁸ Finding of the two studies mentioned above were well consistent with results of the present study. In a study by Modi et al *E. coli* and other Gram negative bacteria showed 100% sensitivity to gentamicin which was not similar to our study.¹⁹ Sensitivity to ciprofloxacin among different bacteria as found in the present study was similar to Marten et al.²⁰

CONCLUSIONS

Blood culture is still the 'Gold Standard' for the diagnosis of puerperal sepsis and should be done in all cases of suspected septicemia. In view of the changing spectrum of the causative agents of puerperal sepsis and their antibiotic sensitivity patterns from time to time and from one hospital to another, a positive blood culture and the antibiotic susceptibility testing of the isolates are the best guide in choosing the appropriate antimicrobial therapy in treating puerperal sepsis.

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