Bacteriological Profile of Pyogenic Meningitis in Adults

A Sonavane, VP Baradkar, M Mathur

Abstract

Acute bacterial meningitis remains a major cause of mortality and long term neurological sequelae worldwide. There is a need for periodic review of bacterial meningitis worldwide, since the pathogens responsible for infection vary with time, geography and patient's age. A retrospective analysis of 7759 clinically suspected cases of meningitis, admitted during a span of 3 years from February 2005 to February 2008 was undertaken. 4750 were males and 3509 were females. Total 43 bacteria were isolated from 7759 cases with isolation rate of 0.55%. *Pseudomonas aeruginosa* was the commonest isolate 23.25% (10/43) followed by *Klebsiella pneumoniae* 20.93% (9/43), *Acinetobacter spp.* 20.93% (9/43), *Streptococcus pneumoniae* 18.60% (8/43), while other isolates were *Neisseria meningitidis* 4.65% (2/43), *Streptococcus pyogenes* 4.65% (2/43), *Enterococcus spp*. 2.23% (1/43) and other *Streptococcus spp.* 2.23% (1/43). Antibiotic susceptibility pattern showed that out of 10 strains of *Pseudomonas aeruginosa* isolated maximum 70% (7/10) were sensitive to Piperacillin, 60% (6/10) to Chloramphenicol and Netilmicin each, 50% (5/10) to Piperacillin- Tazobactam combination, while 40% (4/10) were sensitive to ceftazidime. *Klebsiella pneumoniae* showed maximum sensitivity to Netilmicin 66% (6/9) followed by Chloramphenicol, Amikacin and Ciprofloxacin 44% (4/9 each). *Acinetobacter spp.* showed maximum sensitivity to Netilmicin 50% (5/10) followed by Ciprofloxacin 30% (3/10). Amongst Gram positive isolates *Streptococcus pneumoniae, Streptococcus pyogenes* and *Enterococcus spp.* were 100% sensitive to almost all the antibiotics tested, except *Streptococcus spp.* which was sensitive only to Amikacin and Vancomycin (Table 1). In conclusion, judicious use of antibiotics will prevent the emergence of drug resistance among Gram negative bacilli, so that morbidity and mortality can be reduced.

Introduction

Acute bacterial meningitis remains a major cause of mortality and long term neurological sequelae worldwide. Despite of availability of potent antibiotics the mortality rate due to acute bacterial meningitis remains significantly high in India and other developing countries.[1-4] There is a need for periodic review of bacterial meningitis worldwide, since the pathogens responsible for infection vary with time, geography and patient's age.[2] Increase in awareness, availability of vaccines may also reflect a change in the epidemiological pattern of these pathogens. The aetiological agents of community acquired meningitis may differ from hospital acquired meningitis. Delay in diagnosis and initiation of treatment can result in poor outcome of the disease.[5] Since clinical signs and symptoms can't be always relied upon,[4] laboratory support is imperative to achieve early diagnostics. As a result of emergence of antimicrobial resistance being reported, recommendations for therapy are changing. Laboratory surveillance of isolates is crucial to identify targets for formation of rational empirical treatment for potentially fatal bacterial meningitis.

We reviewed the microbiological records

Department of Microbiology, L.T.M.M.C. and L.T.M.G.H., Sion, Mumbai-400022.

of patients with bacterial meningitis to determine frequency of pathogens causing acute bacterial meningitis, to find out aetiological agents and their susceptibility pattern.

Material and Methods

A retrospective analysis of 7759 clinically suspected cases of meningitis, admitted during a span of 3 years from February 2005 to February 2008 was undertaken. Our Lokmanya Tilak Municipal Medical college is a tertiary care centre, which is 1500 bedded and situated in the heart of city. All the clinically suspected cases are included in this study. Cases of post-traumatic meningitis and meningitis developing after cranial surgery were excluded. CSF sample was collected aseptically in a sterile test tube and were processed immediately. The macroscopic appearance of CSF was recorded. Routine CSF counts were recorded, wet mount was prepared to find out presence or absence of pus cells, Gram's staining was done to find out pus cells and organisms, ZN staining to find out acid fast bacilli (AFB). Negative staining was done with Nigrosin to rule out Cryptococcal meningitis. All the samples were inoculated on Blood agar, Chocolate agar and MacConkey agar. Remaining portions of CSF was put in glucose broth, which acted as a back up from which subcultures were done on Blood agar, Chocolate agar and MacConkey agar. All the culture plates were incubated at 37°C in incubator for 24-48 hours in presence of 5-10% CO_2 using candle jar and 60-70% humidity. The culture plates were observed daily for presence of growth. When growth appeared, secondary smear from colony was performed to find out whether the growth is of Gram positive or Gram negative organisms.

The isolates were identified by standard techniques and their antibiotic susceptibility was done by Kirby-Bauer disc diffusion technique.

Results

Out of 7759 suspected cases of bacterial meningitis, 4750 were males and 3509 were females (Male: Female ratio 1:35). All the patients were adults. Total 43 bacteria were isolated from 7759 cases with isolation rate of 0.55%. The correlation between Gram's staining and culture was 100%.

Pseudomonas aeruginosa was the commonest isolate 23.25% (10/43) followed by *Klebsiella pneumoniae* 20.93% (9/43), *Acinetobacter spp.* 20.93% (9/43), *Streptococcus pneumoniae* 18.60% (8/43), while other isolates were *Neisseria meningitidis* 4.65% (2/43), *Streptococcus pyogenes* 4.65% (2/43), *Enterococcus spp.* 2.23% (1/43) and other *Streptococcus spp.* 2.23% (1/43). A predominance of polymorphonuclear cells was seen in all the samples which grew bacteria, the protein counts were raised and sugar counts were decreased.

Antibiotic susceptibility pattern showed that out of 10 strains of *Pseudomonas aeruginosa* isolated maximum 70% (7/10) were sensitive to Piperacillin, 60% (6/10) to Chloramphenicol and Netilmicin each, 50% (5/10) to Piperacillin- Tazobactam combination, while 40% (4/10) were sensitive to ceftazidime. *Klebsiella pneumoniae* showed maximum sensitivity to Netilmicin 66% (6/9) followed by Chloramphenicol, Amikacin and Ciprofloxacin 44% (4/9 each). *Acinetobacter spp.* showed maximum sensitivity to Netilmicin 50% (5/10) followed by Ciprofloxacin 30% (3/10). Amongst Gram positive isolates *Streptococcus pneumoniae, Streptococcus pyogenes* and *Enterococcus spp.* were 100% sensitive to almost all the antibiotics tested, except *Streptococcus spp.* which was sensitive only to Amikacin and

Table 1 : Shows the antibiotic susceptibility pattern of the isolates to various antibiotic discs used

	PT	Pc	Zn	Nt	Ch	Ca	Ak	CF	Cf	Cu	CP	Ag	I
Pseudomonas aeruginosa (10)	5	7	2	6	6	4	—	—	—	—	—	—	—
Kl. Pneumoniae (9)	NA	NA	NA	6	4	NA	4	1	4		1	1	2
Acinetobacter spp. (10)	NA	NA	NA	5	2	NA	1	2	3	1	1		2
E.coli (5)	NA	NA	NA	—	3	NA	3	1	1	2	1	1	3
Enterobacter spp. (5)	NA	NA	NA	—	4	NA	3	2	3	1	1	1	3
N.meningitidis (2)	NA	NA	NA	—	1	NA	2	2	1	2	1	1	—
	CF	PG	Cu	Ag	Cf	Va	Ak						
Str.pneumoniae (8)	8	8	8	8	8	8	8						
Str.pyogenes (2)	2	2	2	2	2	—	—						
Str.spp (1)	—	—	—	—	—	1	1						
Enterococcus spp. (1)	1	1	1	1	1	1	1						

PT- Piperacillin-Tazobactam, Pc- Piperacillin, Zn- Ofloxacin, Ch- Chloramphenicol, Ca- Ceftazidime, Ak- Amikacin, CF- Cefotaxime, Cf- Ciprofloxacin, Cu- Cefuroxime, CP- Cefoperazone, Ag- Augmentin, I- Imipenem, PG-Penicillin, Va- Vancomycin, NT- Netilmicin, NA- Not applicable.

Vancomycin (Table 1).

Discussion

Acute bacterial meningitis is a medical emergency, which warrants early diagnosis and aggressive therapy. Most of therapy for bacterial meningitis has to be initiated before the aetiology is known. The choice of initial antibiotics therapy is based on the most common pathogens prevalent in geographical area, age group and antibiotic susceptibility pattern.

The isolation rate was very low 0.55% (39/7759). Several studies report low CSF culture positivity ranging from 6-50%.[1-4] The low isolation rate may be due to partially treated cases, delay in transport as reported earlier.

Though common pathogens isolated were *Pseudomonas aeruginosa*, *Acinetobacter spp*, *Klebsiella pneumoniae*, *Streptococcus pneumoniae*, *Escherichia coli* and *Enterobacter spp.*, their relative frequency vary in different geographical area. As compared to western studies, the relative incidence of meningitis caused by *Haemophillus influenzae*, *Neisseria meningitidis* and *Listeria spp.* is less in South East Asia. On the contrary Gram negative bacilli such as *K. pneumoniae, Pseudomonas aeruginosa, Acinetobacter spp.* are increasingly being recognized as important pathogens.[2] These Gram negative isolates are also reported as pathogens of bacterial meningitis in a recent study conducted at NIMHANS Bangalore in 2006.[7] Among Gram positive bacteria isolated in the present study commonest was *Streptococcus pneumoniae* 18.60% (8/39) followed by *Streptococcus pyogenes* (2), *Enterococcus spp.* (1) and other *Streptococcus spp.* (1). *Streptococcus pneumoniae* was also reported as predominant isolate in the study from NIMHANS and other Indian studies.[1,4,8] *Neisseria meningitidis* was isolated in only 2 cases in the present study.

Only 4 (1%) cases of Meningococcal meningitis were detected in a study carried out over last ten years, all in adult patients.[4] Our finding is comparable with Indian report.[4] In our study *N.meningitidis* was isolated in 2 cases only showing low isolation rate (4.65%). All the patients responded to treatment.

In conclusion, in recent years Gram negative bacilli are emerging as important pathogens causing acute bacterial meningitis in adults. Judicious use of antibiotics will prevent the emergence of drug resistance among Gram negative bacilli, so that morbidity and mortality can be reduced.

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