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INCIDENCE OF BACTERIAL MENINGITIS WITH SPECIAL REFERENCE TO LATEX AGGLUTINATION TEST

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ABSTRACT

One hundred and fifty patients with a clinical diagnosis of pyogenic meningitis were studied. Incidence of the disease was more common in low socioeconomic group. The present study was carried out to determine the prevalence of pyogenic meningitis in our hospital and to find out the sensitivity of gram stain, CRP and latex agglutination tests for diagnosis of pyogenic meningitis from CSF sample. Out of 150 samples studied 50 were diagnosed as pyogenic meningitis Haemophilus influenzae was the commonest organism 12 (24%) followed by the staphylococcus aureus 8 (16%) , streptococcus pneumoniae 6 (12%) acinetobacter species 5 (10%) coagulase negative staphylococcus 2(4%) Ecoli 3(6%) klebsiella species 3(6%), Pseudomonas species 2(4%), Group B streptococci 1(2%), Enterococci 1(2%). The sensitivity of Gram stain and latex agglutination test was 98% and 92% respectively. Sensitivity of CRP was 70%. As few cases in our study were treated earlier the culture positivity was 72%. Hence Gram stain and latex agglutination test were found to be most reliable tests for diagnosis of pyogenic meningitis.

KEY WORDS: Pyogenic meningitis, Latex agglutination CRP

INTRODUCTION

Bacterial meningitis is one of the most common infections disease emergencies involving the central narrows system. Despite the large number of pathogens that have been reported to cause acute meningitis, certain microorganisms are isolated with higher frequency. Bacterial meningitis continues to be an important cause of morbidity and mortality throughout the world despite the arailability of effective antimicrobial therapy.[1]

The present study was carried out to know the incidence of bacterial meningitis in our hospital, also to study antibiogram of isolates, usefulness of CRP in the diagnosis of acute pyogenic meningitis in comparison with culture and also to know the sensitivity of latex agglutination test compared to gram stain and culture.

MATERIALS AND METHODS

One hundred and fifty clinically suspected cases of acute bacterial meningitis admitted in Kesar SAL Medical College and Hospital, Ahmedabad, Gujarat from the year November 2010 to September 2011.

The C.S.F. sample collected under aseptic precautions in a sterile container was subjected to centrifugation at 1500 rpm for 10 minutes. After centrifugation the supernatant was transferred to another test tube and used for serological tests like latex agglutination for bacterial antigens and CRP. The sediment was used for gram stain, Ziehl Neelsen staining and culture. For culture CSF sample was inoculated on sheep blood agar, chocolate agar and Maconkeys agar. Also subcultures from BHI broth were done after 8 hrs and 24 hrs, on above mentioned media. The inoculated plates were incubated at 37'c with 5% CO_2 using candle jar. The culture plates were observed for any growth next day. The isolated organisms were identified by standard biochemical reactions.[2] Antibiotic sensitivity test was done by the Kirby-Bauers disc diffusion method.[3]

CRP test :

The supernatant from the centrifuged CSF sample was used for C- reactive protein test. One drop of CSF was mixed with one drop of reagent (span diagnostics) on a slide and looked for agglutination within two minutes and the results were recorded.[4,5]

Latex agglutination test:

Detection of polysaccharide surface antigen by latex agglutination test was found to be highly sensitive and specific. The test is easy to perform, requires no special instrumentation, is technically simple and provides results in short span of 10 minutes. The detection kit used in our

study is manufactured by Becten & Dickenson USA. It detects the presence of meningococus, streptococcus pneumoniae, H. influenzae type B, Group B streptococcus and Ecoli in CSF.[6]

RESULTS:

Out of 150 clinically suspected cases of meningitis studied 50 (33.33%) were proven by laboratory investigations as pyogenic.

Out of 50 cases of pyogenic meningitis males were affected more than females with ratio 2:1. The incidence of pyogenic meningitis was more in patients below 12 years of age.

Out of 50 cases of pyogenic meningitis, H.influenzae was the commonest organism 12(24%), followed by Staphylococcus aureus 8 (16%), Streptococcus pneumoniae 6(12%), Acinetobacter 5(10%), Coagulase Negative staphylococcus 2(4%), E coli 3(6%), Klebsiella 2(4%), pseudomonas species 2(4%), Enterococci 1(2%), and Group B streptococci 1(2%).

Among 50 cases studied 35(70%) were positive for both gram stain and culture. One case (2%) was negative for gram stain but culture positive for coagulase negative staphylococci 12 (24%) cases were positive by gram stain but negative for culture. Among these 12 negative culture cases, 4 cases were positive by latex agglutination for H.influenzae, Ecoli, Group B streptococci and streptococcus pneumoniae. 2(4%) cases were negative for both gram stain and culture but latex agglutination was positive in these two samples for H.influenzae and Ecoli (Table 1). The fourteen culture negative cases include 6 cases which were detected by latex agglutination.

Out of 25 cases for latex agglutination test done, 17 (68%) cases were positive for both culture and latex agglutination, 6 (24%) cases were positive for latex agglutination but not by culture, 2(8%) cases were negative by latex agglutination but positive by culture. No cases were negative for both latex agglutination and culture (Table1)

Out of 25 cases for which latex agglutination test was done depending on Gram Stain morphology 20 (80%) cases were positive for both latex agglutination and Gram Stain. Three cases were positive for latex agglutination and negative by Gram stain. Two cases were negative by latex agglutination but positive by gram stain. No cases were negative for both latex agglutination and gram stain. (Table-2)

Table – 1 Comparison of Gram stain & Latex agglutination test VS culture.

Test	Culture		*Total*
	Positive	Negative	
Gram Stain			
Positive	35(70%)	12(24%)	47(94%)
Negative	1(2%)	2(4%)	3(6%)
Total	36(72%)	14(28%)	50
LAT			
Positive	17(68%)	6(24%)	23(92%)
Negative	2(8%)	-	2(8%)
Total	19(76%)	6(24%)	25

Out of 50 cases studied 33 (66%) were positive for both C-reactive protein and gram stain. 2 (4%) cases positive for CRP were negative by gram stain. One case (2%) was negative for both CRP and Gram Stain. (Table-2)

Table – 2 Comparison of LAT and CRP VS Gram Stain

Test	Gram Stain		Total
	Positive	Negative	
LAT			
Positive	20(80%)	3(12%)	23(92%)
Negative	2(8%)	-	2(8%)
Total	22(86%)	3(12%)	25
CRP			
Positive	33(66%)	2(4%)	35(70%)
Negative	14(28%)	1(2%)	15(30%)
Total	47(94%)	3(6%)	50

Out of 50 cases studied 20 (40%) cases were treated and 30 (60%) were not treated before

CSF was drawn. Among 20 treated cases 6(12%) were culture positive and 14 (28%) were negative by culture.

All the 30 untreated cases were positive by culture (Table 3). Table 4 gives the age wise distribution of bacteria.

Table – 3 Comparison of Results treated and Untreated cases.

Test	Culture		Total
	Positive	Negative	
Treated	6(12%)	14(28%)	20(40%)
Untreated	30(60%)	-	30(60%)
Total	36(72%)	14(28%)	50

Table – 4 Age wise distribution

Age	Bacteria	No of isolates
1 Month-1 Years	H. influenzae	7
	Streptococcus pneumoniae	2
	Staphylococcus aureus	2
	Group B Streptococci	1
1– 6 Years	H. influenzae	3
	Streptococcus pneumoniae	1
	Enterococci	1
	Staphylococcus aureus	3
	Coag neg staphylococcus	1
	Acinetobacter	2
	Klebsiella pneumoniae	1
	Ecoli	2
6– 12 years	Streptococcus pneumoniae	2
	Acinetobacter	3
	H. influenzae	2
	Staphylococcus aureus	2
	Coag neg staphylococcus	1
	Pseudomonas species	1
	E coli	1
Adults	Pseudomonas	1
	Streptococcus pneumoniae	1
	Staphylococcus aureus	1
	Klebsiella	1

DISCUSSION

Among 150 cases studied 50 cases were identified as pyogenic meningitis of which 14(28%) were between 1yr to 6yrs followed by 12(24%) cases between 6 yrs to 12 yrs, followed by 12(24%) between the age 1 month to 1yr and 4(8%) cases of adult age group. The present study indicates that the incidence of acute pyogenic meningitis is more in children than in adults with male patients outnumbering females 2:1. This observation correlates with the observation of Suvarna etal[7] and Bhatt etal[8].

The recovery of organisms was more in gram stain than in culture media which correlates the findings of Rao BN etal (86%)[9] and Punjara thinam R etal (85%)[10]. In our study culture positivity was 72% and is more than that of Johny Vincent etal (43%)[11]. Our culture positive correlates with that of Gaitonde etal (68%)[12] . and Rao BN etal (66%)[9].

CRP is considered asensitive indicator of inflammation. Nanda etal have found that the sensitivity of CRP for slide agglutination test is adequate for diagnosis of bacterial and viral meningitis.[4,13,14] in our study the sensitivity of CRP was 70 %.

In our study the sensitivity of latex agglutination is 92% and it correlates with Rao etal 89% [15] and Mirdha B. 90% etal [16].

Most of our cases 20 (40%) were treated before admission hence culture positivity was only 36(72%) out of 50.

All the H.influenzae isolates were sensitive to ciprofioxacin 66.6% , Penicillin 80% & 55% to cephalexin, gentamicin and cotrimoxazole.

The antibiotic sensitivity of streptococcus pneumoniae to penicillin was 70% and for gentamicin and ciprofloxacin was 84% and 64% respectively. All the isolates were 90% sensitive to cotrimoxazole and ampicillin. Pseudomonas was 65% sensitive to pipercillin and ticarcillin (70%). Ecoli, klebsiella were 75% sensitive to the amikacin, gentamicin, cephalexin,.

CONCLUSION

Gram stain was better indicator than culture latex agglutination is found to be highly sensitive and specific test for detection of antigen in CSF.

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