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Concordance of cerebrospinal fluid latex particle agglutination test with CSF and blood culture among children with acute bacterial meningitis

Muhammad Khalid, Ali Faisal Saleem

Madam, Acute Bacterial Meningitis (ABM) is potentially life threatening central nervous system infection, which is estimated to affect \approx 5, 00,000 children worldwide with 10% mortality.¹ Latex Particle Agglutination (LPA) is a rapid diagnostic test for identification of bacterial antigens in CSF in ABM. It requires only 0.5-1.0 ml CSF to carry out the test, results are available in 10-15 minutes and it could be useful in the diagnosis of partially treated meningitis. Compared to CSF culture LPA had a sensitivity of 66.66%, specificity of 87.91%, positive predictive value (PPV) of 35.29% and negative predictive value (NPV) of 96.38%.²

We conducted a retrospective data analysis of 432 paediatric patients admitted at Aga Khan University Hospital (ERC # 3791-Ped-ERC-15) of age 1 month - 16 years, discharged with diagnosis of ABM (ICD-9 codes 320 and 320.9) between January 2012 - December 2014, aimed to evaluate the reliability and accuracy of LPA test in rapid diagnosis of ABM by comparative evaluation with CSF and blood cultures. Children with post-surgical meningitis, TBM, malignancy, absent CSF report (done outside) and neonates were excluded from the study. Finally 231 children were included in study. Data was collected on demographic variables and laboratory investigations.

Our study consisted of 146 males (63.2%). Median age was 41 months and median hospital stay was 4 days (range 1-48). Positive CSF culture in 7 cases included *streptococcus species* in three cases and one case of each *corynebacterium species*, *enterococcus species*, *pseudomonas species* and *Acinetobacter species* respectively. CSF LPA was positive in only 2 (1.32%) children (Table). Both of these cases were under 1 year of age. LPA detected *H. influenza* and *streptococcus pneumoniae* in these cases whereas blood and CSF culture were negative. Only 23 (10.5%) of 219 blood cultures were positive. Thirteen (57%) of these cases were \leq 12 months of age. Gram negative micro-organisms [*Salmonella*, *Klebsiella pneumoniae*, *Burkholderia cepacia*

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Table: Clinical and laboratory features of study population (N=231).

Gender	
Male	146 (63.2%)
Female	85 (36.8%)
Age	
Mean	56.27 \pm 56.13 months
Median	41 months
Range	1 - 191 months
CSF LPA +ve	2 / 152 (1.32%)
CSF culture +ve	7 (3.03%)
Blood culture +ve	23 / 219 (10.5%)
Children with +ve blood culture and concomitant +ve CSF culture	0 / 197 (0%)
Children with +ve blood culture and concomitant +ve CSF LPA	0 / 218 (0%)

CSF: Cerebro Spinal Fluid. LPA: Latex Particle Agglutination.

and *Acinetobacter*] were identified in seven cases where as remaining cases were gram positive pathogens [*Streptococcus* and *Staphylococcus* (both *aureus* and *non-aureus*)].

In accordance to the study by Ghotaslou et al³ where CSF culture was positive in 3.97% of cases, our study had positive CSF culture in 3.03 % of the cases. LPA test in our study was positive in 1.32 % of cases whereas it was positive in 5.05% of cases from an Iranian study³ however study by Mishra et al⁴ showed positive rates of 19.3%. Sensitivity, specificity, PPV and NPV of LPA test was 0%, 98.51%, 0 % and 97.1% respectively in our study. Positive and negative predictive value (PPV, NPV) is the probability of the disease will be present or absent when screening test is positive or negative respectively.

Due to low yield and high cost LPA should not be routinely used as screening tool for diagnosis of acute bacterial meningitis. Test selection in ABM needs to be individualized on the basis of history, examination, vaccination status and prior use of antibiotics. No test can replace the utility of cultures.

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Conflict of Interest: None.

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