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# Original Research

## Assessment of CRP level in patients with meningitis- A clinical study

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***ABSTRACT:***

**Background:** Meningitis is defined as infection predominantly involving subarachnoid space, associated with CNS inflammatory process leading to decreased or loss of consciousness, seizures, and raised intracranial pressure.The present study was conducted to assess CRP level in patients with meningitis. **Materials & Methods:**118 cases of meningitis of both genderswere included. CSF CRP levels were estimated using Beckman Coulter CRP - latex reagent kit on its full automated instrument AU 480. **Results:** Out of 118 patients, males were 68 and females were 50. The common clinical findings in patients was fever seen in 110, vomiting in 96, seizures in 84, headache in 90 and loss of consciousness in 54. Common types were types were bacterial in 56, tubercular in 30, viralin 14, cryptococcal in 5, scrub typhus in 3 and paraneoplastic in 2 cases. The mean CRP level (mg/dl) bacterial meningitis was 3.01, tubercular was 0.82, in viral was 0.30, in cryptococcal was 0.36, in scrub typhus was 0.28 and in paraneoplasticwas 0.21. **Conclusion:** Maximum level of CRP was seen in tubercular type of meningitis as compared to other forms.

**Key words:** consciousness, Tubercular, Meningitis

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## INTRODUCTION

Meningitis is defined as infection predominantly involving subarachnoid space, associated with CNS inflammatory process leading to decreased or loss of consciousness, seizures, and raised intracranial pressure. Meningitis is a significant cause of morbidity and mortality worldwide.[1] Without adequate treatment the case fatality rate can be as high as 70 per cent, and one in five survivors of meningitis may be left with permanent sequelae including hearing loss or any other neurological disability. Neurological outcome and survival depends largely on damage to central nervous system prior to effective antimicrobial therapy.[2]

Bacterial meningitis can cause death if not treated early and aggressively both in the developed and developing countries. Untreated, the mortality approaches 100%, and even with the current antibiotics and advanced pediatric intensive care, the mortality rate of disease is approximately 5% to 10%.Worldwide, the neurological aftereffects of the meningitis in the survivors following the hospital discharge approaches 20%. Risks of longterm disabling secondary results were highest in low-income countries, where the burden of bacterial meningitis is the greatest.[3]

The aetiological diagnosis of meningitis is a diagnostic dilemma. The cerebrospinal fluid (CSF) biochemical analysis and cellular response overlap in various conditions.CSF C-reactive protein (CRP) levels can prove to be a rapid and simple method for specific diagnosis of meningitis. C-reactive protein (CRP) is an acute phase reactant of "Pentraxin" group of family. Within 6 hours of an acute inflammatory stimulus, CRP is exclusively produced by hepatocytes and secreted in serum or fluids associated with involved tissues.[4] The present study was conducted to assess CRP level in patients with meningitis.

## MATERIALS & METHODS

The present study comprised of 118 cases of meningitis of both genders. All cases were above 18 years of age. Enrolment in the study was done after all agreed to participate in the study.

Data pertaining to patients such as name, age, gender etc. was recorded. Diagnosis of cases was performed based on Thwaites' diagnostic scoring and – Careggi score (BM-CASCO). Patients were subjected to routine blood and CSF investigations. CSF was sent for microbiological (cytology, Gram's stain, culture and sensitivity, TB-PCR, Z-N stain) and biochemical (protein, sugar, lactate, ADA, and CRP) analysis. CSF CRP levels were estimated using Beckman Coulter CRP - latex reagent kit on its full automated instrument AU 480. Results of the study was clubbed together for statistical analysis using chi- square test. P value less than 0.05 was considered significant.

## RESULTS

**Table I Distribution of patients**

| Total- 118 | | |
|---|---|---|
| **Gender** | **Male** | **Female** |
| Number | 68 | 50 |

Table I shows that out of 118 patients, males were 68 and females were 50.

**Table II Assessment of clinical findings**

| Clinical findings | Number | P value |
|---|---|---|
| Fever | 110 | 0.05 |
| Vomiting | 96 | |
| Seizures | 84 | |
| Headache | 90 | |
| Loss of consciousness | 54 | |

Table II shows that common clinical findings in patients was fever seen in 110, vomiting in 96, seizures in 84, headache in 90 and loss of consciousness in 54. The difference was significant (P< 0.05).

**Table III Type of meningitis**

| Type | Number | P value |
|---|---|---|
| Bacterial | 56 | 0.05 |
| Tubercular | 30 | |
| Viral | 14 | |
| Cryptococcal | 5 | |
| Scrub typhus | 3 | |
| Paraneoplastic | 2 | |

Table III, graph I shows that types were types were bacterial in 56, tubercular in 30, viral in 14, cryptococcal in 5, scrub typhus in 3 and paraneoplastic in 2 cases. The difference was significant (P< 0.05).

**Graph IType of meningitis**

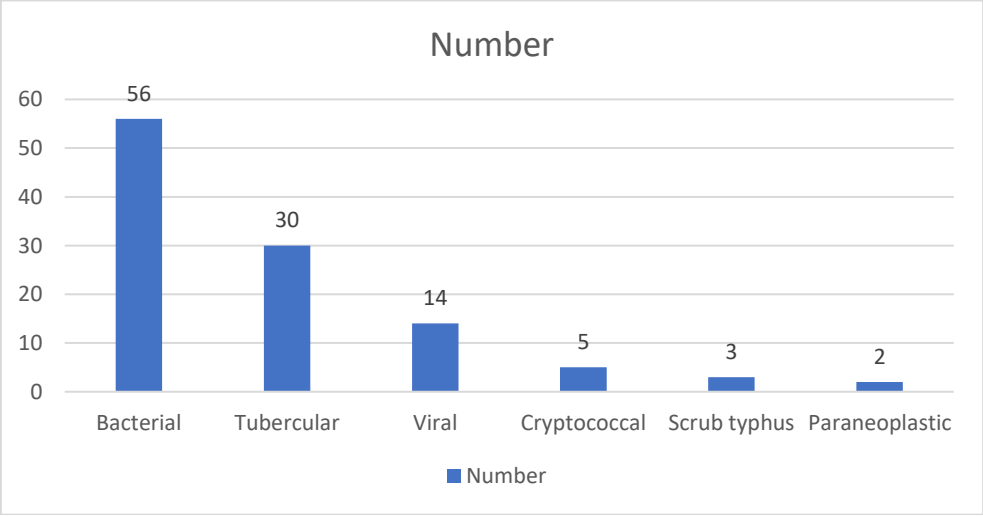
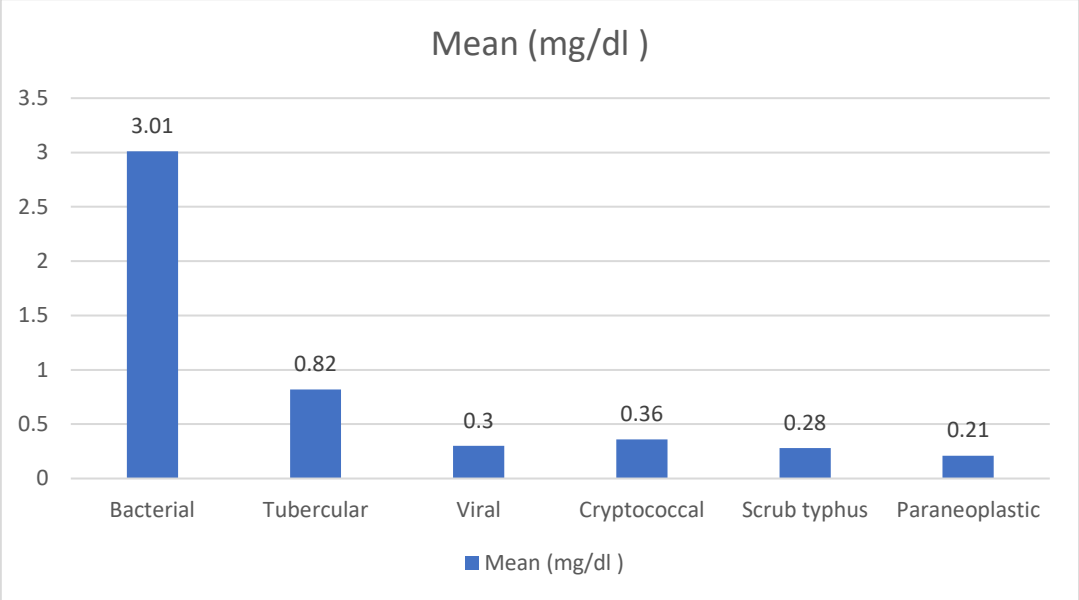


**Table IV CRP level in meningitis cases**

| Type | Mean (mg/dl) | P value |
|---|---|---|
| Bacterial | 3.01 | 0.05 |
| Tubercular | 0.82 | |
| Viral | 0.30 | |
| Cryptococcal | 0.36 | |
| Scrub typhus | 0.28 | |
| Paraneoplastic | 0.21 | |

Table IV, graph II shows that mean CRP level (mg/dl) bacterial meningitis was 3.01, tubercular was 0.82, in viral was 0.30, in cryptococcal was 0.36, in scrub typhus was 0.28 and paraneoplastic was 0.21. The difference was significant (P< 0.05).

**Graph IICRP level in meningitis cases**




## DISCUSSION

In India approximately 52 000 children die each year from meningitis; this accounts for 2% of all deaths in children.Quick diagnosis and effective management is the key to success. Risks of long- term disabling secondary results were highest in low-income countries, where the burden of bacterial meningitis is the greatest. Most of these reported results could have been averted by vaccination with Hib, pneumococcal, and meningococcal vaccines.[5] The clinical and laboratory picture of meningitis is further complicated by the widespread availability of antibiotics, reducing the utility of standard microbiological methods in confirming bacterial meningitis and in formulating appropriate treatment difficult.CSF CRP levels in meningitis are raised due to passive diffusion across inflamed meninges. Normally CRP is present only in trace amount in plasma (< 0.5 mg/dl) and is negligible in CSF. In acute infection, serum CRP concentration can rise up to 3,000 mg/dl within 24 to 48 hours.[6]The present study was conducted to assess CRP level in patients with meningitis.

In present study, out of 118 patients, males were 68 and females were 50. The common clinical findings in patients was fever seen in 110, vomiting in 96, seizures in 84, headache in 90 and loss of consciousness in 54. Thakur et al[7] conducted a study on 110 patients of meningitis. Routine blood and CSF investigations were sent along with CSF CRP and lactate levels. Mean CSF CRP levels were significantly higher in bacterial meningitis (3.08 ± 1.95 mg/dl) as compared to other types of meningitis (p = 0.005). CSF CRP levels were significantly higher in patients with Thwaites' score > 4 (p = 0.03) and in patients with BM-CASCO score ≥ 3 (p = 0.00001). CSF CRP levels can help in differentiating bacterial meningitis from other types of meningitis.

We found that types were types were bacterial in 56, tubercular in 30, viral in 14, cryptococcal in 5, scrub typhus in 3 and paraneoplastic in 2 cases.Ansari et al[8]assessed the cases of aseptic and bacterial meningitis in children. 48 Children aged >30 days to <24 months of cases of meningitis were included in this study. It was found that simple seizure was seen 13 in aseptic cases and in 10 in bacterial meningitis, complex seizure in 12 and 13 cases in aseptic and bacterial meningitis respectively., altered consciousness in 12 and 13 in aseptic and bacterial

meningitis respectively, fever in 22 and 17, stiff neck in 11 and 7, bulging fontanelle in 6 and 3, shock in 8 and 5 and rash in 15 and 12 cases respectively.

We found that mean CRP level (mg/dl) bacterial meningitis was 3.01, tubercular was 0.82, in viral was 0.30, in cryptococcal was 0.36, in scrub typhus was 0.28 and paraneoplasticwas 0.21.Prashanth et al[9] reported that mean CRP level in CSF of patients was 31.44 mg/dl, 0.86 mg/dl and 1.01 mg/dl in bacterial, tubercular and viral meningitis respectively. Aharwaret al[10]reported CSF CRP levels above 10 mg/dl in 26 (86.6%) cases of bacterial meningitis. Majority of cases (91.6%) of tubercular meningitis had a CSF CRP range of < 5 mg/dl and one case in range of 10 - 15 mg/dl.Fitzwater et al[11]found that a total of 2564 children with suspected meningitis were enrolled over 45 months; 156 cases of aseptic and 51 cases of bacterial meningitis were identified. Stiff neck and bulging fontanelle were more common in bacterial meningitis (P < .05), but were present in<15% of patients.

The World Health Organization and American Academy of Pediatrics classifications for high suspicion of bacterial meningitis were met in 84% and 88% of cases of bacterial meningitis, respectively, but were also present in 54% and 74% cases of aseptic meningitis. Culture and gram stain were positive in 7 (14%) and 4 (8%) cases of bacterial meningitis.[12]

## CONCLUSION

Authors found that maximum level of CRP was seen in tubercular type of meningitis as compared to other forms.

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