

TUBERCULOUS MENINGITIS AND BRITISH MEDICAL RESEARCH COUNCIL STAGING

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ABSTRACT

Objective: The objective of this study was to determine and compare the BMRC staging of tuberculous meningitis.

Material and Methods: Patients admitted with diagnosis of meningitis i.e., fever, headache, altered mental status with or without neurological deficits with typical CSF analysis of lymphocytic pleocytosis with increased CSF protein and low CSF glucose concentration. These patients were declared as having tuberculous meningitis when they meet any one of the following criteria: (i) positive AFB staining and/or CSF culture and/or PCR assay for mycobacterium tuberculosis; (ii) history of contact with tuberculosis patient during last 2 months; (iii) evidence of tuberculosis anywhere else in the body (iv) patients with one or more of the following radiological features on MRI brain contrast study i.e. hydrocephalus and/or basilar enhancement and/or tuberculoma formation. Patients having evidence of fungal meningitis, patient having evidence malignancy, connective tissue disease or chemotherapy were excluded. Patients were classified according to Stage I: conscious, have non-specific symptoms, no neurological deficits. Stage II: lethargy, behavior changes, signs of meningeal irritation, minor neurological deficits (involvement of cranial nerves). Stage III: stupor, coma, seizures, abnormal behaviors, severe neurological deficits.⁸

Results: A total of 115 patients were recruited in this study. Male gender dominated 65(56%) female patients were 50(44%). Average age was 34 years ranging from 10 years to 78 years. All patients were grouped according to BMRC staging. Thirty six (31%) patients presented in BMRC stage 1, stage 2 patients were dominant 54(47%) the remaining 25 (22%) were in stage 3. Headache was the predominant symptoms present in 108 (91%) patients followed by fever 101 (87%) and altered mental status 68 (59%). Neck stiffness was the leading sign found in 105 (91%) patients followed by 6th nerve palsy 68 (59%), papilledema 48 (41%), stroke in 25 (21%) and stupor 22 (19%). Basal meningitis was observed in 38 (33%) patients followed by hydrocephalus, infarction and tuberculomas measuring 26 (22%), 18 (15%), 16 (13%) respectively.

Conclusions: Tuberculous meningitis is the most serious form of tuberculosis. Patients present most commonly with BMRC Stage 2.

Key Words: Tuberculous meningitis, BMRC.

INTRODUCTION

Tuberculous meningitis (TBM) is characterized by a slowly progressing granulomatous inflammation of the basal meninges. This inflammatory reaction can lead to a number of complications.¹ Tuberculosis (TB) is a highly prevalent global human infection caused by *Mycobacterium tuberculosis*. One-third of the world's population is infected with latent TB. These individuals are not clinically affected but carry a lifetime risk of 10% for developing active disease.² There were an estimated

8.6 million incident cases of TB globally in 2012, with 1.3 million deaths.³

Tuberculous meningitis composes 5-10% of all tuberculosis cases and is a critical disease in terms of fatal outcome and permanent sequelae in spite of anti-tuberculosis treatment, requiring rapid diagnosis and treatment.⁴ Many prognostic factors for TBM have been reported, including age, the stage of the disease, level of consciousness, presence of extra-central nervous system tuberculosis, isolation of *Mycobacterium tuberculosis* from cerebrospinal fluid, pathologic biochemical findings of cerebrospinal fluid (CSF), hydrocephalus and cerebral infarction. The diagnosis of TBM is based on the detection of acid-fast bacilli (AFB) in CSF smears, and, more commonly, by the isolation of *M tuberculosis* from CSF cultures.⁵

Patients with TBM develop typical symptoms and signs of meningitis including headache, fever, and stiff neck, although meningeal signs may be absent in the early stages. The duration of symptoms before presentation ranges from several days to several months.⁶ especially in resource-limited settings, TBM cases may

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present in advanced clinical stages, with Glasgow Coma Scale scores of 10 or less.⁷

The British Medical Research Council (BMRC) staging has been significantly used to estimate the disease severity and found the estimated prognosis of tuberculous meningitis.⁸ The descriptive study was carried out at the Department of Medicine and Department of Neurosurgery, Hayatabad Medical Complex, Peshawar from 15 March 2015 to 31st March 2016 after ethical approval. After informed written consent 115 patients were included fulfilling the following inclusion criteria.

Patients admitted with diagnosis of meningitis i.e., fever, headache, altered mental status with or without neurological deficits with typical CSF analysis of lymphocytic pleocytosis with increased CSF protein and low CSF glucose concentration. These patients were declared as having tuberculous meningitis when they meet any one of the following criteria: (i) positive AFB staining and/or CSF culture and/or PCR assay for mycobacterium tuberculosis; (ii) history of contact with tuberculosis patient during last 2 months; (iii) evidence of tuberculosis anywhere else in the body (iv) patients with one or more of the following radiological features on MRI brain contrast study i.e. hydrocephalus and/or basilar enhancement and/or tuberculoma formation. Patients having evidence of fungal meningitis, patient having evidence malignancy, connective tissue disease or chemotherapy were excluded.

Patients were classified according to Stage I: conscious, have non-specific symptoms, no neurological deficits. Stage II: lethargy, behavior changes, signs of meningeal irritation, minor neurological deficits (involvement of cranial nerves). Stage III: stupor, coma, seizures, abnormal behaviors, severe neurological deficits⁹ and various variables were recorded in restructured proforma. Statistical Package of Social Sciences (SPSS) version 11.0 was used for descriptive statistics such as age, gender, duration of illness, frequency and percentages of various complications.

RESULTS

A total of 115 patients were recruited in this study. Male gender dominated 65(56%) female patients were 50(44%). Average age was 34 years ranging from 10 years to 78 years. All patients were grouped according to BMRC staging. Thirty six (31%) patients presented in BMRC Stage 1, Stage 2 patients were dominant 54(47%) the remaining 25 (22%) were in Stage 3. (Table 1)

Headache was the predominant symptoms present in 108 (91%) patients followed by fever 101(87%) and altered mental status 68 (59%). Neck stiffness was the leading sign found in 105(91%) patients followed by 6th nerve palsy 68 (59%), papilledema 48(41%), stroke in 25(21%) and stupor 22(19%). Basal meningitis was observed in 38 (33%) patients followed by hydroceph-

alus, infarction and tuberculomas measuring 26(22%), 18(15%),16 (13%) respectively. (Table 2)

Table 1: BMRC staging of patients

BMRC Stage	Amin et al	Ersoz et al ¹⁷	Alarcón et al ¹⁸
Stage 1	36 (31%)	27 (45%)	66 (43%)
Stage 2	54 (47%)	29 (48%)	53 (34%)
Stage 3	25 (22%)	4(7%)	33 (23%)

Table 2: frequencies of TBM complications

	Amin et al	Ersoz et al ¹⁷
Neck stiffness	105(91%)	53 (88%)
Cranial nerve palsy	68(59%)	11(18%)
Meningeal enhancement	38(33%)	19(37%)
Stroke	25(21%)	12(20%)
Stupor	22(19%)	31(51%)
Tuberculomas	16(13%)	12(23%)
Hydrocephalus	26(22%)	10(16%)

DISCUSSION

Tuberculous meningitis is the most fatal type of tuberculosis and occurs due to reactivation of meningeal or subcortical focus.⁹ Tuberculous meningitis, the most devastating form of tuberculosis, happens to be associated with significant mortality and morbidity. It is the main cause of death resulting from tuberculosis.¹⁰ Mortality for untreated TBM is 100%.¹¹ Tuberculous meningitis can be seen at all ages, but is more common in children age 0-5 years, and in adults between the ages of 25 and 45 years¹²⁻¹³ as compared to our study revealing average age 34 years.

Majority of patients in this study were found to have Stage-II disease at the time of presentation followed by this pattern of presentation is not too different from recent studies from Pakistan¹⁴ which found Stage-II pattern at the time of presentation in 50-55% of cases. However, Rim Abdelmalek et al also found similar pattern of presentation in 23 out of 29 patients with tuberculous meningitis in Tunisia.¹⁵ (Table 2)

Neck stiffness was the most commonly symptom observed in 91% similar to findings of Sher K et al.¹⁶ Headache was the leading symptoms as observed by Ersoz et al.¹⁷ (Table 2) Cranial MRI revealed meningeal enhancement in 33%, tuberculomas in 16%, and hydrocephalus in 22% as compared to Ersoz et al¹⁷ who noticed leptomenigeal contrast enhancement in 37% patients and tuberculoma in 23% patients and hydrocephalus and 7%.

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