



Research Paper

An observational study on the relative incidence of different types of meningitis in different age and sex groups in Jharkhand

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Abstract

Introduction: Meningitis is a dreaded disease with high rates of mortality and morbidity. It may be bacterial, tuberculous or viral meningitis but the exact burden of this disease entity and of the various types is not clearly estimated in Jharkhand and this study was carried out to estimate the relative incidence of different types of meningitis in Jharkhand.

Materials and Methods: A hospital based prospective observational study was carried out on 120 patients admitted with signs and symptoms of meningitis at RIMS, Ranchi, Jharkhand.

Result: The most common type of meningitis was found to be pyogenic meningitis with 64 cases out of 120 (53.33%) followed by tuberculous (40 out of 120- 33.33%) and viral meningitis (16 out of 120-13.33%). Male incidence was 75% in pyogenic meningitis as also in tuberculous and viral meningitis and female incidence was 25% in all the three types of meningitis. Also the incidence was highest in the age group 21 to 30 years for bacterial and tuberculous meningitis whereas for viral meningitis the highest incidence was found in the age group 16-20 yrs.

Conclusion: The incidence of pyogenic meningitis has surpassed that of tuberculous meningitis probably because of increased and better health care facilities towards Tuberculosis and poor hygiene and increased exposure of males to risk factors for pyogenic meningitis (which need to be assessed for prevention and better approach towards pyogenic meningitis).

Keywords: meningitis, relative incidence in Jharkhand, sex distribution of meningitis, age distribution of meningitis.

Introduction

Meningitis is a dreaded killer of mankind and it kills quickly. Meningitis is fusion of two words – ‘meninges’ & ‘itis’ which mean inflammation of the meninges of the brain and spinal cord

including the intervening cerebrospinal fluid (CSF). Meningitis involves the pia-arachnoid matter and inflammation extends down to the fluid residing in the space which it encloses (sub-arachnoid space), and also involves the ventricles

of the brain since sub- arachnoid space is continuous around the brain, spinal cord and optic nerve; an infecting agent gaining entry to any part of it may reach immediately to all of it.

Meningitis, one of the dreaded diseases of the pre antibiotic era, is responsible even today for large number of mortality and morbidity in our country. Even in the presence of a wide range of antibiotics the main problem is that of proper diagnosis, which should be early and mortality resulting from it needed to be lowered.

Pyogenic meningitis, also referred as bacterial meningitis, is a life-threatening CNS infectious disease, with high mortality and disability rates. Three bacteria (*Haemophilus influenzae*, *Streptococcus pneumoniae*, *Neisseria meningitidis*) account for the majority of cases.^(2,3)

Aseptic meningitis is the inflammation of the meninges in patients whose cerebrospinal fluid test result is negative with routine bacterial cultures. Aseptic meningitis is caused by viruses, mycobacterium, spirochetes, fungi, medications, and malignancies⁽⁴⁾. The most common cause of aseptic meningitis is a viral infection, specifically by enteroviruses. In fact, 90 percent of all meningitis cases that are viral are caused by enteroviruses⁽⁵⁾. Other viruses that may cause aseptic meningitis are varicella zoster virus, herpes virus, and mumps virus.^[4] Other causes may include mycobacteria, fungi, spirochetes and complications from HIV. Side effects of certain drugs such as non steroidal anti-inflammatory drugs (NSAIDs), antibiotics and antiepileptic drugs can also cause aseptic meningitis.^[1]

The diagnosis of meningitis is based upon the history, clinical features (symptoms and signs) and relevant laboratory investigations, which include:

- Clinical examination
- Routine blood Examination
- Biochemical and cytological examination of cerebrospinal fluid.

Among these, the routine examination and relevant biochemical tests of the cerebrospinal

fluid have emerged as the most important investigation tools for the diagnosis and differentiation of all types of meningitis. The biochemical tests are done to get the information about the following:

- CSF glucose
- CSF protein
- CSF cytology

There has been a large no. of admissions in hospitals of Jharkhand state with clinical signs and symptoms highly suggestive of this disease. However, there is a lack of study on the relative incidence of meningitis in this part of country and this study is being carried out to estimate the relative incidence of different types of meningitis in Jharkhand and its distribution in different age and sex groups for a better understanding of its burden in this area.

Material and Method

All patients with clinical profile similar to meningitis (who were not suffering from any other neurological disease) in the age group 16-60 years were included in this hospital based prospective observational study.

120 patients of Meningitis of both sexes, within age group 16 to 60 years admitted in different wards and units of the Medicine department in Rajendra Institute of Medical Sciences, Ranchi were selected for the estimation of the relative incidence of different types of meningitis in Jharkhand. These patients were thoroughly examined clinically after taking detailed history about the disease from the patients themselves or from the attendants, in case the patients were unconscious. After complete account of history, clinical examination and CSF examination the patients were classified into three groups:

- (a) Pyogenic meningitis
- (b) Tuberculous meningitis
- (c) Viral meningitis

Other causes of aseptic meningitis like autoimmune, drug induced, fungal etc were not included in this study because of their rare incidence and difficult diagnosis.

Diagnoses of different types of meningitis**(A) Pyogenic meningitis****Symptoms**

Headache, fever, vomiting, symptoms of cerebral dysfunction (manifested as confusion in some and declining level of consciousness ranging from lethargy to coma in others) and seizures/fits.

Signs:

The patients manifested many clinical signs and some were elicited on detailed clinical examination. These consisted of pyrexia, tachycardia, tachypnoea and cheyne stokes respiration, neck rigidity, positive Kering's and Brudzinski's sign, ophisthotonus, confusion, delirium and deep coma. A few patients had visual field defects, dysphasia and hemiparesis. Seizures were a prominent feature in about half the cases. A minority of patients were detected as having palsies involving IV, VI and VII nerves. Bilateral sixth nerve palsy was also detected in some of the patients. In a few patients, petechial rash was present all over the body more on the wrists and ankles, indicating meningococemia.

Cerebrospinal fluid examination:

- a) Increased pressure.
- b) Colour ranged from slightly turbid to frank purulent.
- c) Polymorphonuclear leucocytosis in the range of 200 to 5000.
- d) Raised protein content usually exceeding 100 – 150 mg/dl.
- e) Decreased glucose value ranging from low to absent, usually less than 35 – 40 mg/dl.
- f) In a few cases causative organism were demonstrated in the film after gram staining/culture.

(B) Tuberculous meningitis**Symptoms**

Patients usually presented with a history of general ill health, low-grade irregular fever, headache, generalized body ache and vomiting. A few patients had convulsions, visual field defects, drowsiness and unconsciousness.

Signs

The signs consisted of pyrexia (usually low grade), tachycardia, tachypnoea, delirium, meningism and coma. Paresis of cranial nerves was found frequently, mostly involving IV, VI and VII nerves. Ocular muscles were involved in majority of patients who had paresis of the cranial nerves.

In about 20% of patients with tuberculous meningitis, choroids tubercles were observed during ophthalmoscopy. In more than half the cases evidence of old pulmonary lesions or military pattern was found.

Cerebrospinal fluid examination

- a) Increased pressure
- b) CSF was usually clear but when allowed to stand, a fine clot (spider web) formed.
- c) Increased number of leucocytes, predominantly lymphocytes usually around 50 – 400 cells/cmm³
- d) Moderate increase in protein level.
- e) Diminished glucose content though none of the CSF samples showed absent glucose content as found in pyogenic meningitis.
- f) Ziehl Neelsen staining of centrifuge deposits demonstrated acid-fast bacilli in some cases.
- g) TB PCR of CSF sample from these patients in some cases.

(C) Viral meningitis**Clinical features**

The disease usually had started with high grade fever and headache accompanied by malaise, myalgia, anorexia, nausea, vomiting and abdominal cramps and diarrhoea in some. A mild degree of lethargy and drowsiness was present in most of the patients but more profound alterations in consciousness such as stupor or coma was usually not seen. Seizures, cranial nerve palsy and focal neurological deficits were present in 2 or 3 cases only as against majority of cases in tuberculous or pyogenic meningitis.

Cerebrospinal fluid examination

- (a) Increased pressure

- (b) Usually clear
- (c) Pleocytosis involving predominantly lymphocytes usually in the range of 50–1000/mm³
- (d) Slightly elevated protein content though normal values were encountered frequently.
- (e) Sugar content was usually normal.
- (f) Negative bacterial culture/smear examination by staining and/or TB PCR of CSF samples.

Results

The incidence of meningitis in our hospital which is the apex institute of health care in Jharkhand is high and the pattern of different types of meningitis is depicted in the tables below

Incidence of various types of meningitis

In the present study involving 120 patients, the incidence of pyogenic meningitis was highest (64 out of 120- 53.33%) followed by tuberculous (40 out of 120- 33.33%) and viral meningitis (16 out of 120-13.33%) (TableNo.-1)

Age: In pyogenic meningitis the incidence in age group 16 to 20 was 22 out of 64 or 34.37%, in the age group 21 to 30 it was 26 out of 64 or 40.62% and in the age group 31 to 60 it was 16 out of 64 or 25%. The highest incidence thus was recorded in the age group of 21–30 years.

In tuberculous meningitis the incidence in the age group 16 to 20 was 12 out of 40 or 30%, in the age group 21 to 30 it was 22 out of 40 or 55% and in the age group 31 to 60 it was 6 out of 40 or 15%. Again, the incidence was highest in the age group of 21 to 30 years.

In viral meningitis the incidence in age group 16 to 20 was 8 out of 16 or 50%, in the age group 21 to 30 it was 6 out of 16 or 37.50% and in the age group 31 to 60 it was 2 out of 16 or 12.50%. Thus, the incidence of viral meningitis was highest in the age group of 16 to 20 years.

Sex Distribution in Meningitis

In all types of meningitis the incidence was higher in male patients than their female counter parts.

Males accounted for 90 cases out of 120 (75%) and females 30 out of 120 patients (25%). Considering each type of meningitis separately, male incidence was 75% in pyogenic meningitis as also in tuberculous and viral meningitis and female incidence was 25% in all the three types of meningitis.

Table 1 Incidence of different types of meningitis

Type	No. of Cases	Percentage
Pyogenic	64	53.33
Tuberculous	40	33.33
Viral	16	13.33
Total	120	100

Table 1 shows that the incidence of pyogenic meningitis was highest [64 out of 120 (53.33%)] followed by tuberculous meningitis [40 out of 120 (33.33 %)] and viral meningitis [16 out of 120 (13.33%)].

Table 2 shows a higher number of male patients in each age group in all the three types of meningitis.

Table – 2 Age & sex distribution of meningitis

Type of Meningitis	Age groups (in year)							
	16 - 20		21 - 30		31 - 60		Total	
	M	F	M	F	M	F	M	F
Pyogenic	16	6	20	6	12	4	48	16
Tuberculous	8	4	18	4	4	2	30	10
Viral	6	2	4	2	2	0	12	4

Total number of males = 90 (75%)

Total number of females = 30 (25%)

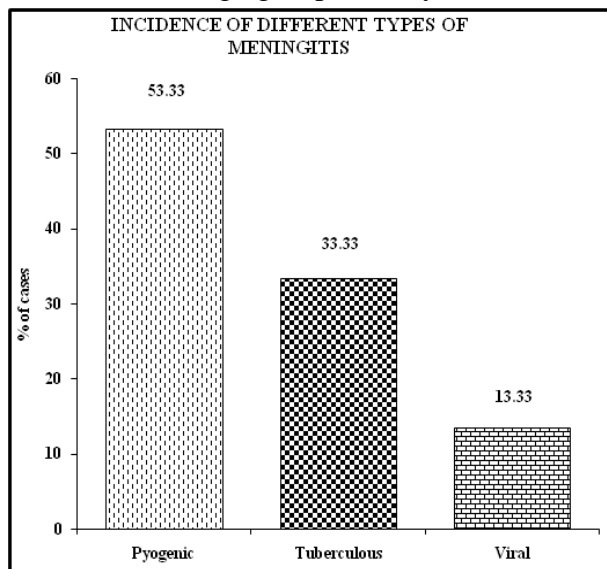
Discussion

The high incidence of pyogenic meningitis indicates low standard of living poor hygiene and lower socio-economic strata of the people in this part of Jharkhand. A sizeable population admitted in this hospital is from villages and tribes.

However, the low incidence of tuberculous meningitis in this study is slightly in contrast to the earlier reports but more closer to recent reports.⁽⁶⁾ This might reflect increasing public awareness, better hygiene, improved standard of living and earlier approach to health centre. It also indicates faster investigation procedures, easily available health care facilities, a volley of effective and new drugs in the market with an eye on patient compliance, continued research in the

field of tuberculosis and earlier diagnosis and treatment of patients.

Also the incidence was higher in males in all types of meningitis and highest in the age group 21 to 30 years for bacterial and tuberculous meningitis whereas for viral meningitis the highest incidence was found in the age group 16-20 yrs.



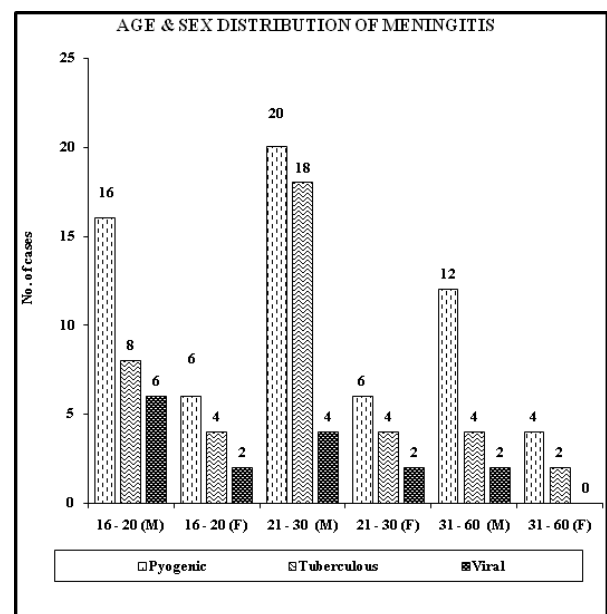
Conclusion

From the present study it can be concluded that the burden of pyogenic meningitis is highest in Jharkhand out of all the three types of meningitis. The high incidence is probably due to poor hygiene in this population group. There has been a declining trend of tuberculous meningitis in the state according to the present study as compared to previous studies which may be attributed to increasing awareness and better health care to the patients.

This study also shows higher incidence in males for all types of meningitis and also highest incidence in the age group 21-30 years in case of bacterial and tuberculous meningitis while highest in the age group 16-20 years for viral meningitis suggesting the increased risk in males of that age group probably due to increased exposure to infectious agents either due to work conditions or poor self hygiene.

Better hygiene and early diagnosis can help reducing the burden of meningitis and related mortality in Jharkhand respectively and more

studies with larger sample size are needed in this field for a better healthcare of the people of this area of Jharkhand.



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