

ORIGINAL ARTICLE

Frequency of Hydrocephalus in Pediatric Tuberculus Meningitis Patients

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ABSTRACT

Objective: Objectivity of study is to determine the frequency of hydrocephalus in pediatric tuberculus meningitis patients.

Materials and Methods: This prospective observational study was done in pediatrics department Lady Reading Hospital Peshawer from 1st January 2013 to 31st June 2015 with 2½ years duration. All patients of tuberculus meningitis who survived with both gender and age ranging from 1 to 10 years were included. Pediatric patients admitted with other diseases, age greater than 10 years and those who expired due to tuberculus meningitis were excluded. Patient's demographic features, vaccination status, clinical features of tuberculus meningitis and Frequency of hydrocephalus post meningitis were documented according to the proforma. Follow up duration was 6 months, SPSS version 18.9 used for data analysis, Results represented in the form of tables.

Results: 38 patients fulfilled inclusion criteria. Females 22 (57.90%) were common than males 16 (42.10%). Patients age was in the range of 1 to 10 years with the mean age 5 years \pm 5 SD. Fever 35 (92.10%), headache 37 (97.36%), vomiting 31 (81.57%) and failure to thrive 32 (84.21%) were dominant in clinical presentation. 29 (76.31%) patients vaccination status was satisfied. 14 (36.84%) patients developed hydrocephalus in 6 months follow-up.

Conclusion: Hydrocephalus is common in post tuberculus meningitic patients. It mostly affect non vaccinated patients.

Key Words: Hydrocephalus, Tuberculus meningitis, Pediatric.

Abbreviations: TBM: Tuberculous Meningitis. ETV:

INTRODUCTION

Tuberculosis is a disease which is nowadays more prevalent in developing countries and is almost eradicated from developed countries. Every year approximately 9 million new cases are diagnosed in the world while about 2 millions deaths occur from every year. Recently it has been estimated that about 1/3rd of the world population harbor latent tuberculosis while they have 10% risk to develop tuberculosis.¹⁻³ Those patients who have both HIV infection and latent tuberculosis they have 10%/year risk of reactivation. Although the site of involvement is lungs but about 20% cases of tuberculosis are detected in other sites of the body other than lungs.^{3,4} In all these extra pulmonary

tuberculosis cases the most severe form is considered to be tuberculus meningitis. Although exact data is not available about the incidence of tuberculus meningitis but in developed countries it occurs with amount of 1/100,000 population⁵.

Like pulmonary tuberculosis Mycobacterium tuberculosis is the main organism which is responsible for tuberculus meningitis. Risk factors for tuberculosis and tuberculus meningitis are missing of vaccination during childhood, migration during wars, floods and natural disasters from country to other, immunocompromised and immunosuppressed states. It mostly occurs in children's below 13 years. It presents with both non specific and specific symptoms like in

specific features fever, headache, vomiting, failure to thrive, feeding difficulties, meningism, neurological deficit and hydrocephalus.^{6,7} Hydrocephalus in pediatric population is more common than adult population. It literature its incidence in pediatric population with tuberculus meningitis has been documented in the range of 65 to 95%.^{8,9} It can occur in the form of both communicating and non communicating types but the communicating type is more common than the non communicating type in pediatric population.¹⁰

TBM diagnosis is a complicated process because it can both specific and non specific symptoms. So its diagnosis needs correlation clinical features, positive findings on neurological examinations, laboratory tests and radiological investigations.^{11,12} Serological tests in the form of Mantoux test detects 30 to 50% cases of tuberculosis while chest X Rays up to 50% cases of lung tuberculosis can be diagnosed.^{12,13} Ct brain and MRI are although used for diagnosis but they have also their limitations like they are normal in early stages of TBM along with availability problems at peripheries. Lumber puncture is a valuable test in order to diagnose cases of TBM. In TBM routine examination of CSF shows elevated proteins and lymphocytes cell lineage while glucose are decreased. The gold standard for diagnosis is a positive culture for Mycobacterium Tuberculosis.¹³ Other newer modalities like Gene Xpert are highly sensitive for sputum while its sensitivity decreases in CSF.¹⁴

Management of TBM includes treatment of TBM by anti tuberculus medications, symptomatic treatment and if any complications occur then it should be treated. In complications hydrocephalus should be treated soon whenever it is diagnosed. It can be managed by both medications and surgically. Medical treatment might be the first option for communicating hydrocephalus. Medical treatment includes diuretics, steroid and mannitol.¹⁵ Indications of surgery include failed medical treatment in communicating hydrocephalus, none communicating hydrocephalus, Very sick patients due to raised intra cranial pressure. Surgery can be done on different ways depending upon the conditions of the patients and status of ventricular system. Ventriculoperitoneal shunt and endoscopic third ventriculostomy are two ways by which patients of hydrocephalus due to TBM can be treated. Surgery have also their own complications like shunt infection, hard ware problems, Malfunction of the shunt, ETV failure, damage to the surrounding structures around the tract of ETV.^{16,17}

MATERIAL AND METHODS

After taking consent from ethical research committee of post graduate medical institution of Peshawer this cross sectional study was conducted at pediatric department of Lady reading hospital Peshawer. All admitted patients of tuberculus meningitis with either gender or age ranging from 1 to 10 years were included in the study while patients admitted in pediatric department with other diseases, age greater than 10 years and patients who expired due to TBM were excluded from the study. All included patients were evaluated by history and physical examination for signs of meningism and any other complication of meningitis, BCG scars on the deltoid skin. All the patients were further evaluated by Mantoux test, chest X-Rays, Laboratory tests and lumber puncture with CSF routine examination and culturing to know about the causative organism confirmation and to differentiate it from other types of meningitis. In case of any suspicion of hydrocephalus CT scan of the brain was done to know the status of the ventricular system of the brain. All documentation of the patient's demographic features and relevant information's were done according to the pre designed proforma. Patients follow up duration was 6 months. Data analysis was done by SPSS version 19. All the results were represented in the form of tables.

RESULTS

Gender Distribution

38 patients were include in the current study. Males 16 (42.10%). Were less effected than females 22 (57.90%) (Table 1).

Table 1: *Patients categorization according to gender*
N=38.

Gender	Number of Patients	Percentage of Patients
Males	16	42.10
Females	22	57.90

Age Distribution

There was no patient with TBM in first 2 years of the life while it was much prevalent in 5th 5 (13.15%), 6th 8 (21.05%), 7th 7 (18.42%) and 8th 7 (18.42%) year of the life (table 2).

Table 2: Age of the Patients N = 38.

Age of the Patients	Number of Patients	Percentage of Patients
1 st year	0	0
2 nd year	0	0
3 rd year	1	2.63
4 th year	3	7.90
5 th year	5	13.15
6 th year	8	21.05
7 th year	7	18.42
8 th year	7	18.42
9 th year	4	10.52
10 th year	3	7.89

Table 3: Immunization Status of Patients N = 38.

Immunization Status	No of Patients	Percentage of Patients
Vaccination course completed	9	23.68
Vaccination course not completed	29	76.31

Table 4: Clinical Features of TBM N = 38.

Clinical Features	No of Patients	Percentage of Patients
Fever	35	92.10
Headache	37	97.36
Failure to thrive	32	84.21
Poor feeding	30	78.94
Vomiting	31	81.57
Meningism	27	71.05
Altered conscious level	14	36.84
Fits	9	23.68
Neurological deficit	7	18.42

Clinical Features

Vaccination course was completed in 9 (23.68%) while 29 (76.31%) patients vaccination was not

completed (table 3). Fever 35 (92.10%), headache 37 (97.36%), vomiting 31 (81.57%) and failure to thrive 32 (84.21%), Poor feeding 30 (78.94%) were the leading clinical features while less common were Meningism.

27 (71.05%), Altered conscious level 14 (36.84%), Fits 9 (23.68%), Neurological deficit 7 (18.42%) table 4. 14 (36.84%) patients developed hydrocephalus in 6 months follow-up while other 22 (63.16%) had no hydrocephalus 9 (table 5).

Table 5: Frequency of Hydrocephalus in TBM Patients N = 38.

Hydrocephalus	No of Patients	Percentage of Patients
Present	14	36.84
Absent	24	63.15

DISCUSSION

Tuberculous meningitis (TBM) is a serious meningitic infection commonly found to occur in the developing countries endemic to tuberculosis. Based on the clinical features alone, the diagnosis of TBM can neither be made nor excluded with certainty. Unfortunately there is still no single diagnostic method that is both sufficiently rapid and sensitive. Most factors found to correlate with poor outcome can be directly traced to the stage of the disease at the time of diagnosis. The only way to reduce the mortality and morbidity is by early diagnosis and timely recognition of complications and institution of the appropriate treatment strategies.¹⁸ Yaramis A et al¹⁹ in their study on tuberculous meningitis patients has showed that male to females ratio was 1.1; 1 with slight dominancy of males having 112 (52%) cases. All the patients were in the age range of 3 months to 15 years while 4.1 years was the mean age for them. Age groups which were most commonly affected were patients having age less than 5 years (71%) were on the top followed by patients having age between 12 months to 24 months with total number of patients of 44%. According to the address of patients they concluded at the end of the study that villagers (52%) were affected more than the other areas of the country while urban areas (14%) children's were less affected. Regarding status of vaccination Only 25 (12%) patients had a history of single BCG vaccination and in 18 of these patients the vaccination time was .5 years before the admission time. In current

study 38 patients were included. Males 16 (42.10%) were less effected than females 22 (57.90%). There was no patient with TBM in first 2 years of the life while it was much prevalent in 5th 5 (13.15%), 6th 8 (21.05%), 7th 7 (18.42%) and 8th 7 (18.42%) year of the life. Vaccination course was completed in 9 (23.68%) while 29 (76.31%) patients vaccination was not completed.

In our country especially KPK province majority of population is in the villages and there are very few cities in it. Therefore in our tertiary care hospital the major bulk of patients come from rural areas which have also been mentioned in the study of Yaramis A et al.¹⁹ Although the trends have been finished that females were kept deprived from education and other needs of the life as compared to males in our set up but still there is slight difference in living standards of males females in our pathan society this may be a reason that female pediatric patients were more affected by tuberculosis as compared to males which is opposite to Yaramis A et al¹⁹ study. Due to decrease literacy rate of our population as compared to other countries of the world most of the peoples show resistance to the concept of vaccinating their children's. This is because of their wrong ideas about the vaccines and less community education. This is why in our study unvaccinated children's were more as compared to Yaramis A et al study.¹⁹ In current study clinical presentation pattern of TBM was fever 35 (92.10%), headache 37 (97.36%), vomiting 31 (81.57%), failure to thrive 32 (84.21%), Poor feeding 30 (78.94%) meningism 27 (71.05%), altered conscious level 14(36.84%), fits 9 (23.68%) and neurological deficit 7 (18, 42%). Miftode EG et al²⁰ conducted a study on total 204 patients of TBM in 2015 in which both adults and pediatric patients were included. 77 patients out of 204 were children's. In their study fever 56 (73%), headache 46 (60%), vomiting 39 (51%), confusion 21 (27%), systemic symptoms 6 (8%) and cough 10 (13%) were the most common clinical features. In another study of Boaz MM et al²¹ the pre dominant features were headache 60 (100%), fever 49 (81.7%), vomiting 38 (63.3%), weight loss 34 (56.7%), altered mental status 33 (55%), neck stiffness 45 (75%), photophobia 25 (41.7%). Similarly Christensen ASH et al²² conducted a study on patients of tuberculosis meningitis in Denmark in which total 50 patients were included. This study was on mixed population type in which Danes were 11 while immigrants were 39. Over half the patients presented with fever and headache. The classic sign of meningeal stiffness was found in

less than half the patients. Neurological signs upon admission were affected in the majority of cases: 52% of the patients were described with a general altered mental state (i.e. confusion), 36% had cranial nerve paralysis (predominantly facial nerve or abducens nerve affection) and 16% presented with generalized convulsions upon hospitalization. So it can concluded from all the studies that most common symptoms of tuberculus meningitis are Headache, Fever and vomiting which are also shown in our study.

In our study when all the included patients were followed till to 6 months after discharge from the hospital 14 (36.84%) patients developed hydrocephalus while other 22 (63.16%) had no hydrocephalus. Initial studies using air encephalography in patients with TBM found hydrocephalus in 62% of the patients.²⁴ Schoeman *et al*²³ found computer tomography (CT) evidence of hydrocephalus in 83% of 193 children with TBM. In a CT study, only three of 60 children and adults with TBM were found to have normal ventricles, giving an incidence of 95%.²⁵ Significantly, 87% of children in this study had severe hydrocephalus. Compared to an incidence of 71% in children, only 12% of adults with TBM had hydrocephalus. Thus, it is evident that hydrocephalus is more common in children with TBM compared to adults. Hydrocephalus is also more common in the later stages of the disease. As compared to the studies²³⁻²⁵ incidence of hydrocephalus development in TBM children's is less this is because our data follow up period is much shorter than the other studies.²³⁻²⁵

CONCLUSION

Tuberculosis meningitis is common in our set up mostly in females pediatric patients. Although it occurs in both vaccinated and unvaccinated patients but the major bulk of the patients are unvaccinated patients. Every TBM patient should be followed in order to detect its complications especially hydrocephalus so that it could treated in time.

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