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Frequency of Hydrocephalus in Cases of TBM

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ABSTRACT

Tuberculosis meningitis (TBM) is a serious public health problem in developing countries as it leads to significant mortality and residual neurological squeal. The estimated mortality due to TBM in Asia is 1.5 per 100,000 populations. **Objectives:** To determine the frequency of hydrocephalus in cases of TBM. **Methodology:** This was a cross sectional study conducted during July 2016 to December 2016 conducted at Department of Medicine Services Hospital, Lahore. The detailed demographic data was collected. Cases fulfilling the criteria of TBM underwent CT scan of brain (with IV contrast) for confirmation of TBM at the Department of Radiology, Sheikh Zayed hospital Rahim Yar Khan. **Results:** In this study there were 93 cases, out of which 54 were males and 39 females with mean of 34.13±9.45 years. Hydrocephalus was seen in 61 (65.59%) out of 93 cases of TBM. It was seen significantly higher in male group where it caused it in 40 out of 54 males (74.1%) with p value of 0.04 (table 1). In context of age groups with respect to hydrocephalus it was seen maximum in patients with age group of 31 to 40 years affecting 12 (80%) out of 15 of its respective group. It was followed by 41 to 50 years affecting 28 (68.3%) of 41 cases, though this difference was not found statistically significant with p value of 0.24. Hydrocephalus was observed maximum in stage I of TBM where it affected 4 out of 5 cases followed by stage II with 36 of 52 cases and then stage III with 21 of 36 patients. This difference was also not significant with p= 0.44. **Conclusion:** Hydrocephalus is an important and deadly complication of tuberculous meningitis and is noted in every 2 (65.59%) out of 3 cases. There is significant association of male gender with hydrocephalus.

Keywords: Tuberculosis meningitis, hydrocephalus.

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INTRODUCTION

Tuberculosis (TB) is a formidable disease worldwide. This is of high concern due to its highly infectious nature especially in the form of respiratory involvement. The increasing prevalence of TB in under developed and their re-emergence in developed countries due to rising counts of HIV in recent years makes this disease a topic of universal concern. Pakistan has an incidence rate of 275/100000 population.[1]

Tuberculosis is mainly the disease of lungs but it can involve any part of the body including brain and TB meningitis (TBM) is one of its salient entities. TBM is a highly devastating form, which even in the setting of appropriate anti tuberculous therapy (ATT), leads to unacceptable levels of morbidity and mortality. Despite the development of promising molecular diagnostic techniques, the diagnosis of TBM relies largely on microbiological methods that consist of Acid Fast Bacilli (AFB) smear on cerebrospinal fluid (CSF) or CSF culture for AFB, both of which are relatively insensitive, and pose a diagnostic challenge. That is the reason why TBM is diagnosed late and result in serious complications.

TBM can present with complaints of fever, weight loss, photophobia, headache, vomiting, cranial nerve palsies and altered level of consciousness that can be classified on the basis of British Medical Research Council contemporary clinical criteria (BMRC) for TBM into three stages.[2] Furthermore, TBM can complicate into seizure disorder, hydrocephalus, hearing loss, tuberculous rediculomyelitis (rare) with different degree of prepordance. The rate of hydrocephalus in TBM varied from 20%[3] to 65%[4] in countries where TB prevalence is high.

In a study conducted in PIMS hospital, Rawalpindi on 100 patients of TBM. Majority of the patients presented in BMRC stage I and II and revealed hydrocephalus in 58% of the cases.[5]

In another study at Karachi on 93 TBM patients, whose maximum number of patients presented in stage II of BMRC, hydrocephalus was seen in 60% of cases overall and in 72.3% patients in their respective BMRC stage II.[6] Moreover in a study from India on 45 cases of TBM revealed hydrocephalus in 33.3 % of cases only.[7]

OBJECTIVE:

To determine the frequency of hydrocephalus in cases of TBM.

METHODOLOGY

This was a cross sectional study conducted during July 2016 to December 2016. This was conducted at Department of Medicine, Services Hospital, Lahore. The detailed demographic data like age, gender, and weight were collected. An informed consent to be included in the study was taken from the patients who were conscious and their next of kin in case of uncociousness. Every patient fulfilling the criteria of TBM underwent CT scan of brain (with IV contrast) within two days after confirmation of TBM at the Department of Radiology of same institute and was reported by consultant radiologist. The hydrocephalus was labeled according to the operational definition.

SAMPLE SELECTION:

Inclusion Criteria:

All adults 15-50 years of age of either sex who were diagnosed case of Tuberculosis Meningitis were included in this study.

Exclusion Criteria:

1- Age less than 15 years or more than 50 years.
2- Meningitis other than TBM or Culture positive for any other organism other than Mycobacterium Tuberculosis.
3- Diagnosed case of brain tumor or cyst of any type or size.
4- History of head trauma in last 1 year.
5- Bleeding disorder or platelet count <50,000.

Tuberculous Meningitis (TBM);

Presence of any two or more of the clinical features lasting for any duration of time along with any of the positive laboratory data were labeled as TBM.

Clinical features;

1. Fever more than 99^0F occurring about at least 6 hours/ 24 hour for more than two weeks
2. Headache dull in nature persisting for at least 3 hours per day for 7 consecutive days
3. Vomiting of any amount at least 3 times per day for 3 consecutive days
4. History of contact with TB patient in family (living in same house) in last 2 years

Laboratory data;

a) Positive AFB smear on CSF (This was labeled positive when isolating any Acid Fast Bacilli (AFB) on florescence staining of the CSF at the laboratory of Sheikh Zayed Hospital. Rahim Yar Khan)
b) Positive AFB culture on CSF (It was labeled when the Mycobacterium Tuberculosis was isolated after their growth on Bactec media used for culture and assessed at 4 to 6 weeks.
c) Typical CSF picture of lymphocytic pleocytosis (20 – 500 lymphocyte per cubic mm) with increased CSF protein (more than 100 mg/dl) and decreased CSF glucose concentration (less than 60% of corresponding plasma level checked at same time as CSF examined).

BMRC contemporary clinical criteria for TBM;

It was divided into 3 stages.
Stage I: Alert and oriented without focal neurological deficits and GCS is 15/15.
Stage II: Glasgow coma score of 11-14 or 15 with focal neurological deficits.
Stage III: Glasgow coma score of 10 or less, with or without focal neurological deficits.
Hydrocephalus; It was labeled as yes where there was dilatation of any ventricle in the brain (3^{rd}, 4^{th} or lateral ventricle), when dilated more than 25% of their normal value diagnosed on CT brain (plain) by radiologist.
This was a cross sectional study conducted during July 2016 to December 2016. This was conducted at Department of Medicine, Services Hospital, Lahore. The detailed demographic data like age, gender, and weight were collected. An informed consent to be included in the study was taken from the patients who were conscious and their next of kin in case of uncociousness. Every patient fulfilling the criteria of TBM underwent CT scan of brain (with IV contrast) within two days after confirmation of TBM at the Department of Radiology of same institute and was reported by consultant radiologist. The hydrocephalus was labeled according to the operational definition.

STATISTICAL ANALYSIS:

Data was analyzed with the help of SPSS version 21. Quantitative variables like age and weight were presented in terms of mean ± SD (Standard Deviation). Frequency & percentages were calculated for gender, age groups, stage of TBM and outcome variable i.e. hydrocephalus detected (yes or not). Effect modifiers will be controlled through stratification and post stratification Chi-Square test was applied taking P-value < 0.05 as significant.

RESULTS

In this study there were 93 cases, out of which 54 were males and 39 females with mean of 34.13±9.45 years. Hydrocephalus was seen in 61 (65.59%) out of 93 cases of TBM. It was seen significantly higher in male group where it caused it in 40 out of 54 males (74.1%) with p value of 0.04 (table 1). In context of age groups with respect to hydrocephalus it was seen maximum in patients with age group of 31 to 40 years affecting 12 (80%) out of 15 of its respective group. It was followed by 41 to 50 years

affecting 28 (68.3%) of 41 cases, though this difference was not found statistically significant with p value of 0.24 as in Table 2. Hydrocephalus was observed maximum in stage I of TBM where it affected 4 out of 5 cases followed by stage II with 36 of 52 cases and then stage III with 21 of 36 patients. This difference was also not significant with p= 0.44 (table 3).

Table 1: Hydrocephalus with respect to gender (n=93)

Gender	Hydrocephalus		Total
	Yes	No	
Male	40 (74.1%)	14 (25.9%)	54 (100%)
Female	21 (53.8%)	18 (46.2%)	39 (100%)
Total	61 (65.6%)	32 (34.4%)	93 (100%)

Chi – Square Value = 4.10 P Value = .04

Table 2: Hydrocephalus with respect to age groups (n=93)

Age Group	Hydrocephalus		Total
	Yes	No	
15 to 30	21 (56.8%)	16 (43.2%)	37 (100%)
31 to 40	12 (80.0%)	03 (20.0%)	15 (100%)
41 to 50	28 (68.3%)	13 (31.7%)	41 (100%)
Total	61 (65.6%)	32 (34.4%)	93 (100%)

Chi – Square Value = 2.79 P Value = .24

Table 3: Hydrocephalus with respect to stage of TBM (n=93)

Stage of TBM	Hydrocephalus		Total
	Yes	No	
I	04 (80.0%)	01 (20.0%)	05 (100%)
II	36 (69.2%)	16 (30.8%)	52 (100%)
III	21 (58.3%)	15 (41.7%)	36 (100%)
Total	61 (65.6%)	32 (34.4%)	93 (100%)

Chi – Square Value = 1.60 P Value = .44

DISCUSSION

Tuberculosis meningitis (TBM) is a serious public health problem in developing countries as it leads to significant mortality and residual neurological squeal. The estimated mortality due to TBM in Asia is 1.5 per 100,000 populations.

Hydrocephalus was seen in 61 (65.59%) out of 93 cases of TBM in this study. Similar percentages were seen in a study by Nabi S et al and Thwaites GE et al who had it in around 60% of the cases.[8-10] However lower percentages were seen in a study conducted by Chan et al who found it in 29% of the cases.[11] Why is this hydrocephalus found higher in our study as compared to the ones with lower percentages, it might be the cut off value used in this study, which was quite on the lower side, that's why it reflected in a very higher number. And the other studies with similar percentages also had lower threshold to label it.

Hydrocephalus was seen significantly higher in male group where it caused it in 40 out of 54 males (74.1%) with p value of 0.04. A higher percentage of males were seen in other studies by Kumar R and Christensen AS et al but they did not find any significant association.[12-13] Why this was higher in our study, this might be because the males presented maximum in stage II of TBM, which was the groups who showed maximum hydrocephalus in this study where out of 104 cases 72 were males.

In context of age groups with respect to hydrocephalus it was seen maximum in patients with age group of 31 to 40 years affecting 12 (80%) out of 15 of its respective group. It was followed by 41 to 50 years affecting 28 (68.3%) of 41 cases, though this difference was not found statistically significant with p value of 0.24. Similar higher percentages were seen in other studies by Hoşoğlu S, Anderson NE and Molavi et al.[14-16] But they used slight different age groups like 25 to 40 years where higher number of TBM was found. Why this age group was found more vulnerable to disease is not known. This might be because this group contained only 15 cases as compared to 37 and 41 out of total 93 in this study. This low number with some positive yield would have highlighted more in terms of percentages.

Hydrocephalus was observed maximum number in stage II with 36 out of 52 cases and then stage III with 21 of 35 patients. This difference was also not significant with p= 0.44. This was similar to a study b Chan et al who found maximum cases in stage II and III affecting 89% of the cases combined.[75] Similar patterns were also noted by study done by Salekeen S and Newton RW who also did not find any significant association.[17-18] This reinsures our belief that higher the disease process and higher is the chances to develop hydrocephalus

However, there were few limitations of the study as well. It did not include other neurological manifestation of TBM which are also common, though relatively at lower side.

CONCLUSION

Hydrocephalus is an important and deadly complication of tuberculous meningitis and is noted in every 2 (65.59%) out of 3 cases. There is significant association of male gender with hydrocephalus.

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