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Meningitis in HIV positive and negative patients: A comparative demographic profile.

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Meningitis in HIV positive and negative patients: A comparative demographic profile.

Abstract

Background: Meningitis is a serious infection in HIV patients claiming millions of lives across the world. Comparative studies of meningitis in HIV positive and negative patients are scarce. Methods: We performed a comparative study of the demographic features of meningitis in HIV positive [116] and HIV negative [218] patients at a tertiary hospital over a period of four years. Results: In HIV seropositive patients the percentage of women was lesser [29.6% vs. 42.5%], the proportion of students was lesser [4.8% vs.14%], but the proportion of professionals was higher [17.5% vs. 10.8%] when compared to HIV seronegative group. Even though Tuberculosis [82.6% vs. 68.5%] was the predominant organism causing meningitis in both the groups, Cryptococcosis [5.2% vs. 1%] was more common in the seropositive individuals. Conclusions: The study highlights the differences in the demographic profile of meningitis in a large cohort of HIV positive and HIV negative patients.

Keywords

HIV positive, meningitis, HIV seropositive, cryptococcal meningitis, HIV demography

Introduction

HIV seropositive individuals are prone to serious infections due to their immunocompromised state. Meningitis is a deadly infection of the central nervous system in these people. Thousands of people die due to this complication worldwide every year(1).

Though South Asia has over four million HIV seropositive people(2), studies comparing meningitis in HIV positive patients with that in HIV negative patients are few in number(3). The detailed analyses of the demographic factors such as age, gender have not been compared between HIV positive and HIV negative patients afflicted with meningitis. Only by comparison, the factors responsible for the high mortality of meningitis in HIV patients can be ascertained

The potentially fatal nature of the disease in such a huge population at risk requires careful study of these factors. Informed public health policies at the targeted populace can only be planned with factual data. In resource limited settings, clinical suspicion and algorithms for diagnosis also depend on accurate information on the demographic features of the disease.

Objectives

To present the comparative profile between meningitis affected HIV positive and negative patients from a tertiary hospital.

Methods

From Jan 2022 to April 2022 at the Govt General Hospital, Guntur, a 1200 bedded tertiary referral hospital catering to 20 million people in a semi urban locality in South India we studied the demographic features of 423 in-patients diagnosed with meningitis by standard criteria(4)(5)(6)(7). Diagnosis of HIV was done in the hospital as per protocol(8). We compared the features between 116 HIV seropositive and 218 HIV seronegative patients. The study was a cross sectional descriptive observational study. All missing data was omitted from the analysis. Data was collected in MS Excel 2010 and analyzed with IBM SPSS version 21. Data is presented with mean [SD] and proportions. For categorical variables comparisons were made between the groups to test for statistical significance with a 2 sided $p<0.05$ with chi square test. For qualitative variables student independent t test was used. All the patients provided written informed consent. The study was approved by the Institutional Ethics Committee at Guntur Medical College, Guntur.

Results

We studied 423 patients with meningitis out of which we included 334 patients [Fig 1] after exclusion due to inadequate or missing vital data.

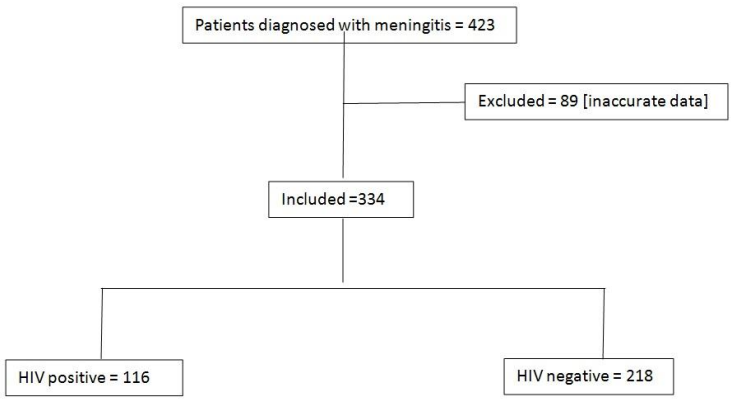

Figure 1: Recruitment and study diagram

The mean age and the distribution of youth and elderly of the patients were similar in both the groups [Table 1]. The percentage of women was less [29.6% vs. 42.5%] in HIV seropositive patients [Table 1].While the proportion of students was less in HIV seropositive patients, the proportion of professionals was high when compared to HIV seronegative group [Table 1].

Tuberculosis was the most common cause of meningitis in both the groups. Cryptococcal meningitis was more common in the seropositive individuals. Aseptic and Bacterial meningitis were less common in the HIV positive patients when compared to the negative patients [Table 1].

The etiological profile was different in women. Tuberculous meningitis was very high in women with seropositive status with no cases of cryptococcal or bacterial meningitis. In seronegative women other causes were also prevalent.

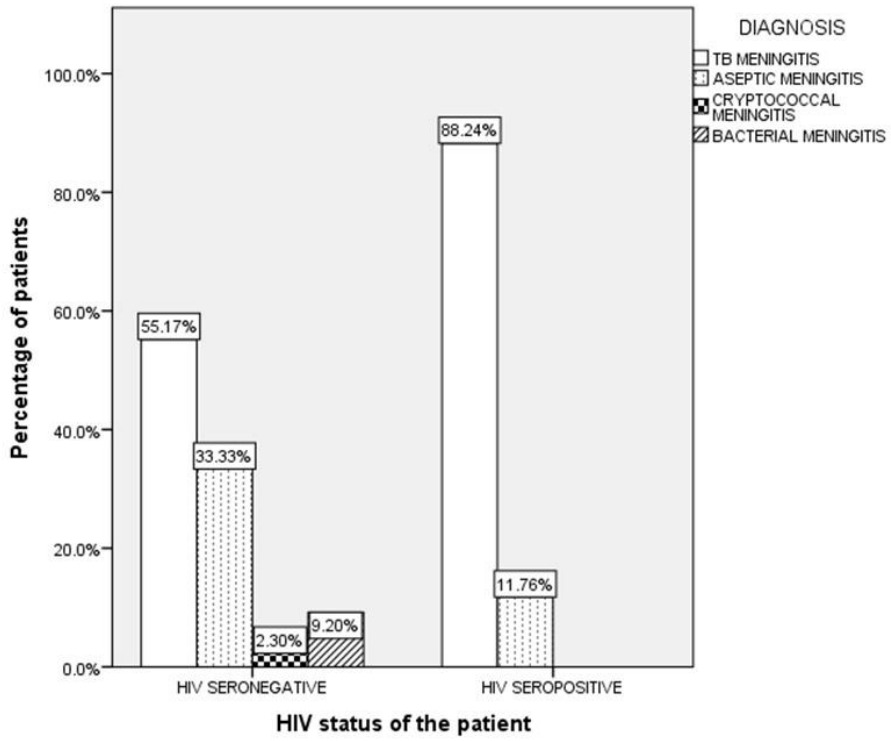

Figure 2: Comparison of etiology of meningitis in women.

Table 1: Comparison of demographic features

Characteristic	Hiv seronegative[218]	Hiv seropositive[116]	P value
Mean age[sd]	30[17]	35[9]	0·003
<35 yrs	59%	46·6%	0·004
35-49	26·9%	44%	
50-65	10·4%	9·5%	
>65	3·8%	0	
Females%	42·5	29·6	0·02
Occupation%			0·11
Student	14	4·8	
Housewife	9·7	6·3	
Manual labor	62·4	71·4	
Professional	10·8	17·5	
Not working	3·2	0	
Diagnosis%			<0·001
Tb meningitis	68·5	82·6	
Aseptic meningitis	24	10·4	
Cryptococcal meningitis	1	5·2	
Bacterial meningitis	6·5	1·7	

Discussion

This comparative study of the demographic features between meningitis patients with and without HIV showed that there was no difference in age groups, that the proportion of women is less in HIV positive meningitis and that there were differences in the occupational and etiological profiles.

Whereas women formed 42.5% of the patients in the HIV negative meningitis cohort, they formed only 29.6% in the HIV seropositive group. This is also seen in many studies from India and across the world. One of the factors may be due to lower proportion of women with HIV infection than men(9). It may also be due to the inherently stronger immune system in females(10). More over the progressive destruction of the immunity may be slower in women(11)(12).

It is not inexplicable that the proportion of professionals was high in HIV positive group [17.5%] when compared to HIV negative group [10.8%]. Professionally employed skilled personnel may have more interaction with either sex and therefore are more likely to be infected with HIV. They are financially independent and free to mingle under minimal restrictions. Heterosexual contact being the most common mode of HIV transmission in this region(13), the skilled employees are prone to sexually transmitted infections(14) due to their relative access to all societal planes and freedom from monetary constraints. The National AIDS control organization reports that professionals such as businessmen have the highest [37%] rates of HIV prevalence(9). This affliction of the prime economic movers of the country is a serious threat needing urgent attention.

In contrast students constituted a very small percentage in HIV positive [4.8%] cohort compared to the negative [14%] group. In the comprehensive NACO survey(9) of the

HIV hard hit Indian states students constitute only 2.4-10%. The education system in our region segregates the sexes and students are under strict surveillance(15). This may reduce the exposure to HIV infection. This explains the difference in the percentage of students between the two groups.

In this study, cryptococcal meningitis appears to be more common in HIV positive individuals. This is in line with the high proportion cryptococcal meningitis in HIV positive patients in India(16)(17) and in other countries(18). In a detailed histopathological comparison of cryptococcal meningitis with and without HIV infection, Sunhee etal(19) described the inflammatory response to cryptococcal meningitis in patients with and without HIV infection. Acquired immunodeficiency syndrome (AIDS) patients with cryptococcal meningitis had less granulomatous inflammation and more numerous visible accumulations of fungi in and around the brain parenchyma. The authors suggest that in AIDS patients altered immune functions allow *Cryptococcus neoformans* to accumulate within the brain and that deficient macrophage function may be responsible for the altered pathology. The unique predilection of the fungus to the meninges(20) and the brain in the susceptible HIV population makes it a deadly disease.

Aseptic meningitis was low in HIV positive individuals [10.4%] compared to HIV negative patients [24%]. The infection of the brain by opportunistic organisms like Cryptococcus neoformans and Mycobacterium tuberculosis is more common than aseptic inflammation of the meninges in HIV seropositive individuals. This pattern is widely reported in many studies(21)(20).

The percentage of patients with bacterial meningitis was low in HIV positive individuals [1.7%] than in HIV negative subjects [6.5%]. Large scale studies(22)(1) of

meningitis in HIV infected regions have also shown that bacterial meningitis is less common in HIV patients.

We found that in HIV positive women, there were no cases of cryptococcal or bacterial meningitis. Erin etal(23) in 2013 have shown that “differential interaction between Cryptococcus neoformans and macrophages within different gender environments contribute to the increased prevalence of cryptococcosis in males”. Also various studies show that infectious attacks on the body are subject to gender specific influences(24). These effects might explain the difference in infectious etiologies in the women sub group of HIV positive subjects.

Higher prevalence of infection in the immunologically weaker male sex and affliction by virulent pathogens like tuberculosis and cryptococcosis might explain part of the high mortality noted in HIV seropositive patients.

Conclusion

Our study presents the demographic features of a fairly high number of HIV positive and HIV negative meningitis patients. It may be constrained by the hospital based data collection. But it demonstrated that significant differences of gender, occupation and etiology exist between the two groups. The percentage of women and students was less in HIV seropositive patients. The proportion of professionals was high when compared to HIV seronegative group. Cryptococcal meningitis was more common in the seropositive individuals. Aseptic and Bacterial meningitis were less common in the HIV positive patients when compared to the negative patients. Hence both clinical acumen and public health planning should draw on this knowledge for best outcomes.

What is already known on this topic?

Meningitis is a serious infection in HIV positive individuals.

What this study adds?

There is no difference in age distribution of meningitis in HIV positive and negative patients.

HIV positive women are less prone to meningitis

Tuberculous meningitis is the most common cause of meningitis.

Authors contributions

Sridhar, Jyothi, Sagar developed the concept and designed the study, Sridhar and Sagar were involved with acquisition of data and its analysis. Sridhar and Jyothi were involved in the interpretation of data; Sridhar drafted the article, Jyothi revised it critically for important intellectual content and Sridhar, Jyothi and Sagar were involved in the final approval of the version to be published.

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Conflicts of Interests The authors declare that they have no competing interests

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