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Analysis of posterior reversible encephalopathy syndrome in a patient with HIV/AIDS and schistosomiasis

***Corresponding Author: William Van Neymer**
Department of Neurology, Tshwane University of Technology, South Africa.
Email: williamneymer214@gmail.com

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Abstract

We present the case of a patient from South Africa who had HIV and posterior reversible encephalopathy syndrome. Despite the fact that schistosomiasis and PRES have common pathophysiological molecular processes, there have been no earlier descriptions relating the two illnesses. This lecture emphasises the importance of additional inquiry into this probable link. In endemic locations, the interaction between HIV and schistosomiasis remains a significant research topic.

Introduction

However, there are earlier mentions of bilharzia in ancient Egyptian papyri, as well as literature from ancient mesopotamia [1]. The World Health Organisation (WHO) noticed a collection of communicable diseases affecting rural impoverished communities that were not prioritised on the global agenda in the early 2000s, fittingly dubbed neglected tropical diseases (NTDs). Schistosomiasis, also known as Bilharzia, affects roughly 230 million people globally, with an estimated 85% of cases occurring in Sub-Saharan Africa, where the main species are schistosoma hematobium and mansoni, which are discharged in urine and faeces, respectively. The WHO set lofty targets for schistosomiasis control by 2020 and a "schistosomiasis-free world" by 2025 [2].

The parasites that cause schistosomiasis are waterborne and can be found in rivers, ponds, and dams. They have a well-defined lifecycle that begins when the fluke penetrates human skin and ends when the eggs are excreted in urine or faeces. An estimated 20-55% of the eggs are effectively expelled, while the remainder lodge in various organs such as the liver, kidney, brain, and even the eyes, causing granulomas with fibrotic damage [3]. The schistosome causes a cascade of immunological reactions in the host cell, including the activation of type 2 cytokines such as interleukins 4 and 5 and a slew of others [4]. Schistosomiasis mortality remains high, with global estimates of 2,00,000 deaths per year [5].

South Africa has roughly 4.5 million people afflicted with schistosomiasis, with the north eastern areas of the country accounting for a quarter of the total [6]. However, the spatial distribution of schistosomiasis in South Africa has been demonstrated to be in flux, influenced by a variety of variables such as rural-urban mobility and cross-border movements from endemic regions [7]. Weather patterns are another documented predictor of schistosomal geographical distribution, implying that global climate change may have an impact on current schistosomiasis trends [8].

Case presentation

A female from Soshanguve, one of pretoria's northwestern townships, was discovered unresponsive. She had previously reported a headache followed by unpredictable behaviour over a two-week period. On arrival at the hospital, the glasgow coma scale was 7/15. She also had bilateral papilloedema and no deep tendon reflexes. A CT scan of the brain revealed large hypodense regions in both cerebral hemispheres, indicating posterior reversible encephalopathy syndrome (PRES). She also exhibited iron deficient anaemia (9.5 g/l haemoglobin) and a high C-reactive protein (CRP) of 54 mg/l. She was also found to be infected with the human immunodeficiency virus (HIV), with a CD4 count of 13 cells/l and a viral load of 2,84,772 copies/ml. Due to clinical and radiographic evidence of rising intracranial pressure, a lumbar puncture was postponed, and the patient was treated empirically for bacterial and cryptococcal meningi-

tis, the latter due to the patient's very poor immune level. Urine microscopy revealed schistosoma haematobium eggs and hematuria, prompting the administration of an antihelminth.

Discussion

There is a molecular overlap between the host response to schistosomal infection and the underlying pathophysiology of PRES. Schistosomiasis causes an increase in vascular permeability by upregulating intercellular adhesion molecule 1 (ICAM 1), a transmembrane protein present on the surface of leukocytes and endothelial cells [9]. Cytokine activation and ICAM 1 overexpression have both been demonstrated and hypothesised to be major contributors to PRES [10]. The latter is a radiologically confirmed acute illness characterised by bilateral cerebral edoema, usually greatest in the occipital lobes, and no discernible solid brain lesions (e.g., abscesses, granulomas, or tumours). Neuroschistosomiasis is a rare helminth infection with a variety of clinical symptoms including headaches, disorientation, and coma [11]. Current definitions of neuroschistosomiasis do not always rely on helminth isolation in the central nervous system (peripheral isolation and neurological clinical characteristics suffice), prompting some writers to bring out a diagnostic gap [12]. A search of the literature on schistosomiasis and PRES produced no findings. HIV, on the other hand, has been documented with PRES and is thought to be caused mostly by endothelial damage in the brain [13]. Endothelial dysfunction may have occurred in the index patient as a result of an interaction between HIV and schistosomiasis.

Sub-Saharan Africa, which is endemic for both HIV and schistosomiasis, spurred researchers to look into a possible link between the retrovirus and bilharzia. Urogenital ulceration caused by schistosomiasis has been shown to make females particularly sensitive to HIV transmission during intercourse [14]. The schistosoma hematobium infection explained our patient's hematuria and iron deficient anaemia. Upregulation of CD4 receptors, which act as docking stations for HIV, has been linked to schistosomiasis, implying further molecular interaction between the two illnesses. People who have HIV and schistosomal infection as a co-morbidity have a greater viral load than those who do not have schistosomiasis [15]. This is not ubiquitous, with some research finding no such link [16]. In order to have informed preventive programmes, the Sub-Saharan African region would benefit from a thorough understanding of the interaction between schistosoma and HIV.

The type of patient serves to indicate that city regions such as Pretoria, South Africa's capital city, may have a silently rising schistosomiasis problem. Our patient was a rural-urban migrant from a schistosomiasis-endemic area. Informal settlements along river banks, especially townships on the fringes of cities (e.g., Jukskei and Moretele rivers in Alexandra and Mamelodi townships, Johannesburg and Pretoria, respectively) provide a danger of schistosomiasis outbreaks in previously quiet places.

Conclusion

The researchers recognise that a single case report is insufficient to establish a link between schistosomiasis and PRES. This is, however, a demand for more rigorous research into a probable relationship between the two illnesses. An up-to-date national disease burden record for schistosomiasis would be critical for South Africa in order to inform government preventive programmes far in advance of potential future outbreaks. In endemic locations, a better knowledge of the possible relationship between schistosomiasis and HIV is critical. A total global eradication of bilharzia, as per WHO targets, can only be achieved by well-founded prevention programmes, which must be implemented from an informed stance.

Declarations

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