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NEUROLOGICAL MANIFESTATIONS OF HIV POSITIVE PATIENTS PEDIATRIC AGE GROUP - A CROSS-SECTIONAL STUDY FROM CENTRAL INDIA

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ABSTRACT

Introduction: Acquired Immunodeficiency Syndrome is a disease of the twenty-first century, one of the most recent and well-studied diseases in history. In youngsters, the scope of the problem is constantly expanding. Although the true frequency of CNS involvement is unknown, it is assumed to occur in the majority of HIV-positive children and is at least three times higher than in adults. At least 40% of infants with acquired immunodeficiency syndrome will have or present with at least one neurological impairment, according to estimates.

Objective: To determine the prevalence of neurological manifestations in HIV-positive paediatric patients and to investigate neurological manifestations.

Study design: A cross-sectional investigation was conducted. The duration of the programme is three years. Medical College in Central India, where the research was conducted. Data was gathered from paediatric ward case documents kept indoors. Data entry was carried out using the Microsoft Office-Microsoft Excel suite. Statistical analysis was performed with the use of statistical measures such as percentages and proportions, as well as SPSS software.

Results: During the study period, 400 HIV + paediatric patients were brought to wards, with 96 (24%) of them having neurological involvement. Once the Central Nervous System (CNS) is involved, the prognosis is poor. When compared to non-CNS involvement, mortality is three times higher. Convulsions (46%) and altered Sensorium (22%) were the most common symptoms (23 percent). On neuroimaging, the most prevalent finding was generalised cerebral atrophy.

Conclusions: Neurological involvement is found in 24 percent of HIV-positive paediatric patients. Once the CNS is involved, the prognosis is poor.

Keywords: acquired immunodeficiency syndrome, HIV, Neurological Manifestations, Pediatric HIV.

INTRODUCTION

The goal of the study was to look into how the Human Immunodeficiency Virus (HIV) infection affects children's brains[1]. HIV infection manifests differently in youngsters than it does in adults. It's possible that the following factors are to blame for this phenomenon: 1) The prenatally infected young infant's immune system is undeveloped. This could allow for extensive seeding in different organs. 2) Some organs, like as the brain, may be more vulnerable to the virus's effects than those seen in adults. 3) Children's opportunistic infections have a distinct pattern than adults'[2]. Although CNS involvement is one of the most common systems, data on paediatric patients is limited. Symptoms of the Nervous System CNS symptoms are a common symptom of HIV infection in children[3]. The frequency of these events is determined by the stage of HIV infection. Physicians should have a strong index of suspicion when it comes to recognising these issues and linking them to HIV infection. The availability of facilities for conducting neuropsychiatric and neurodevelopmental evaluations Acquired Immunodeficiency Syndrome in early diagnosis as well[4]. At least 40% of infants with ACQUIRED IMMUNODEFICIENCY SYNDROME will

have or present with at least one neurological impairment, according to estimates. The clinical picture induced by encephalitic lesions in these young children is encephalopathy[5]. Lesions, on the other hand, can affect any part of the nervous system, resulting in myelitis and peripheral neuropathy. HIV suppresses the immune system, making it easier for microbes to cause opportunistic illnesses[6]. These infections can cause neurological problems. Tuberculous meningitis, cytomegalovirus (CMV) encephalitis, and other encephalitic vascular strokes, neoplasia of the nervous system, peripheral neuropathy, and myopathy are instances of such a mechanism[7]. HIV encephalopathy can appear early in HIV/ACQUIRED IMMUNODEFICIENCY SYNDROME infection, although it becomes more common as the disease progresses. Its progression is variable; it could be progressive.

Clinical Significance: Static encephalopathy (non-progressive encephalopathy): Microcephaly, psychomotor development delay Cognitive decline, signs of pyramidal tract malfunction (paresis, hypertonia, hyper-reflexia) (delay in speech, intellectual delay). Clinical features stated above, but with a progressive course, psychomotor regression, and other symptoms. A trifecta of symptoms includes slowed brain growth, growing motor dysfunction, and the loss or plateauing of developmental milestones. Atrophy, gliosis, and microglial foci of necrosis with or without infiltrate around them, loss of myelin, vacuolation and perivasculitis, vascular and parenchymal calcification, and characteristic multinucleated giant cells in the parenchyma and perivascular location are all pathological features noted in the brain. Mononuclear cells are most likely the source of the multi-nucleated giant cells. These damages are linked to HIV, as evidenced by electron micropathy and in situ hybridization in the brain. Stoler and colleagues used in situ hybridization to pinpoint the virus's location in macrophages, microglia, and giant cells, as well as glial cells and neurons. The link between HIV infection and encephalopathy in mononuclear cells in the brain is unclear[8]. One of the ways of brain injury could be the release of neurotoxic chemicals by inflammatory cells. Even if anti-HIV therapy is given, the resulting damage and atrophy to the brain may not be totally repairable in terms of morphologic features. The lympho-reticular system and brain show lesions associated to two other categories, such as involvement in opportunistic infections and foci of necrosis, in addition to the primary lesions of HIV infections. Two children were found to have vacuolar myelopathy caused by swelling within myelin sheaths, which was characterised by vacuolar degeneration and the presence of lipid-laden macrophages, especially in the lateral and posterior columns of the thoracic spinal cord. The cause of vacuolar myelopathy is unknown. It could be linked to HIV directly or to HIV's sequelae, such as metabolic abnormalities due to ACQUIRED IMMUNODEFICIENCY SYNDROME' chronic debilitating illness process, or it could be linked to both HIV and its sequel.

Diagnosis: All children infected with HIV should undergo a neurological examination, which should be supplemented by neuropsychological testing and cranial computed tomography (CT) scanning. The HIV encephalopathy was characterised by cerebral atrophy and, on rare occasions, calcification of the basal ganglia. Asymptomatic children should be checked for neurological problems at least once a year. Children with HIV who are symptomatic should be assessed more frequently, at least twice a year.

If new symptoms arise, particularly those that are not compatible with HIV encephalopathy, these individuals should be assessed with the use of further investigations such as cerebro-spinal fluid evaluation and magnetic resonance imaging (MRI).

Objective: To find the prevalence of neurological manifestation and study neurological manifestations in HIV positive pediatric patients.

MATERIALS AND METHODS

It is a cross-sectional study of children who have been diagnosed with HIV infection in youngsters. A total of 200 patients were included in the study, who were admitted to a

tertiary care centre in Central India for a three-year period.

Criteria for Acceptance: The study included children aged 18 months to 12 years old who tested positive for HIV using an ELISA test.

Children under the age of 18 months who had been diagnosed with HIV infection and had a positive ELISA test were excluded from the study because their HIV status could not be confirmed by PCR due to funding constraints. The Institutional Ethics Committee gave their approval to the project. Before interviewing, Parents/Guardians gave their informed consent. The procedure included demographic information, clinical aspects at presentation with a focus on the neurological system, diagnostic information, and management status. After considering the parents' medical history and HIV serological status, the assumed mechanism of transmission was determined. Complete blood counts, serum chemistry, cerebro spinal fluid evaluation including microscopy for bacteria, AFB, and fungus, including Cryptococcus neoformans neuro-imaging were among the findings of the inquiry. Due of funding constraints, no CD4/CD8 counts were performed. All patients that needed to be admitted to the hospital were admitted to the paediatric ward and treated by the admitting unit. Anti-medication Koch's was used to treat tuberculosis in children. According to the published guidelines, prophylaxis with co-trimoxazole was recommended. SPSS software was used to analyse the data, which was entered into Microsoft Office Excel Spreadsheets. The importance P value was determined.

OBSERVATIONS AND RESULTS

Clinical Presentations: HIV infection manifests itself in a variety of ways, depending on the diseases that have been exposed to. In our investigation, the following were the most common presenting characteristics: RESULTS: Of 96 patients with neurological symptoms, 69 percent (66) were discharged, 23% (22) died, 4% (4) were discharged against medical recommendation, and 4% (4) absconded.

Table 1: Clinical Presentations

Sr. No.	Clinical presentations	% (n)
1	Convulsion	56 % (54)
2	Altered Sensorium	23 % (2)
3	Delayed milestones	8 % (8)
4	Headache	6 % (6)
5	Involuntary movements	4 % (4)
6	Gait disturbances	4 % (4)
7	Aphasia	2 % (2)
8	Diplopia	2 % (2)

Convulsions, altered sensorium, delayed milestones, headache, involuntary movements, gait abnormalities, aphasia, and diplopia were the most common clinical symptoms, with convulsions being the most common.

Table 2: SIGNS

Sr. No.	Signs	% (n)
1	Thrush	19 % (18)
2	Hepatomegaly	33 % (32)
3	Splenomegaly	4 % (4)
4	Hepatospenomegaly	27 % (26)
5	Pallor	46 % (46)
6	Lymphadenopathy	31 % (31)
7	Focal neurological deficit	6 % (6)
8	Neck stiffness	15 % (14)
9	Brisk Deep tendon reflexes	21 % (20)
10	Depressed Deep tendon reflexes	6 % (6)
11	Absent Deep tendon reflexes	2 % 2)

Thrush, Hepatomegaly, Splenomegaly, Hepatospenomegaly, Pallor, Lymphadenopathy, Focal neurological impairment, and others were among the symptoms. rigidity of the neck Brisk Deep tendon responses, which are either depressed or nonexistent.

Table 3: Neuroimaging:

Sr. No.	Impression	% (n)
1	Generalized atrophy	54 % (12)
2	Infarct	27 % (6)
3	Tuberculoma	18 % (4)
4	Encephalomalacia	9 % (2)
5	Hydrocephalus	9 % (2)
6	Calcification	9 % (2)
7	Encephalitis	9 % (2)
8	Meningeal cyst	9 % (2)

Generalized atrophy, infarct, tuberculoma, encephalomalacia, hydrocephalus, calcification, encephalitis, and meningeal cyst were all found on neuroimaging, with infarct seen in more than half of the patients.

Table 4: Clinical diagnosis

Sr. No.	Clinical diagnosis	%(n)
1	Convulsion	8 % (8)
2	Tuberculous Meningitis	19 % 18)
3	Tuberculoma	2 % (2)
4	Hemiparesis	2 % (2)
5	Paraparesis	2 % (2)
6	Encephalopathy	15 % (14)
7	Encephalitis	6 % (6)
8	Developmental Delay	4 % (4)
9	Status Epilepticus	2 % (2)

Clinically most of the cases were having tubercular meningitis & encephalopathy.

Table 5: Clinical Diagnosis in Patients died

Sr. No.	Clinical Diagnosis	Number	Percentage % (n)
1	Tuberculous Meningitis	4	18%
2	Status Epilepticus	2	9%
3	Convulsion ↓	2	9%
4	Encephalopathy	2	9%
5	Encephalitis	2	9%

In deceased patients, tubercular meningitis was seen in most of the cases (4) along with Status Epilepticus, Convulsion ↓, Encephalopathy & Encephalitis 2 each.

DISCUSSION

Our study included 400 patients, 236 of whom were men and 164 of whom were women. According to our research, neurological symptoms are present in 24% of people. In one study, 14% of the patients met the HIV encephalopathy criteria. According to B. Bhandari and Suresh Goyal's study, 9 percent of individuals had HIV encephalopathy[9]. According to Shirin Mullan's research, 31% of patients with neurological problems. Children can appear at any age, although the incubation

time for a perinately acquired infection is substantially shorter than for other types of transmission. In our study, 40% of patients were aged two to five years, 47% were aged five to ten years, and 13% were aged ten to twelve years. In our study, 62.5 percent of the participants were males and 37.5 percent were girls. Various investigations have demonstrated that there is no gender preponderance. The male to female ratio in our study was 1.6:1. In a study by Udgirkar VS, Tullu MS, Bavdekar S, 75% (6) of patients had convulsions, 50% (4) had altered Sensorium, 25% (2) had delayed milestones, 25% (2) had Aphasia, and 12.5 percent (1) had gait disruption, which is similar to our findings. 1st Table 87.5 percent (7) of patients had brisk deep tendon reflexes, 75 percent (6) had localised neurological deficits, and 12.5 percent (1) had depressed deep tendon reflexes, according to the same study. Table 2: Neuroimaging results 62.5 percent of the patients had widespread atrophy, 37.5 percent had an infarct, 37.5 percent had hydrocephalus, and 25 percent had calcification. Cerebral atrophy occurs in up to 85% of children with neurologic symptoms, increased ventricular size, and calcification of the basal ganglia[10]. Infarcts, both hemorrhagic and non-hemorrhagic, have struck six to ten percent of patients in major clinical series10. Overall mortality is 11.5 percent, but in the Neurology group it is 23 percent, which is more than double, and in the non-Neurology group it is only 8%. As a result, the death rate in the neurology group is three times higher than in the non-neurology group. Because encephalopathy is a symptom of advanced disease, it increases the risk of death by 28 times; more than half of patients die within three years of diagnosis, and the median survival rate for HIV encephalopathy patients is roughly 11 months[11, 12].

CONCLUSIONS

Neurological involvement is found in 24 percent of HIV-positive paediatric patients. Once the CNS is involved, the prognosis is poor. When compared to other system involvement, mortality is three times higher. In HIV-positive youngsters, neurological manifestations might be the first sign of infection. Convulsions account for 56% of neurological symptoms, while altered Sensorium accounts for 23%. In 21% of patients, tuberculous CNS infections, primarily Tuberculous Meningitis and Tuberculoma, are discovered. The most common finding in neuro-imaging of these patients was generalised brain atrophy.

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