

Original Research Article

Clinical and epidemiological profile of neurocysticercosis in children

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ABSTRACT

Background: This study was done to describe the clinical and epidemiological profile of neurocysticercosis in children of Rohilkhand region.

Methods: The study was carried out in the Paediatric Department (Paediatric Intensive Care Unit and General Ward) of Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, Uttar Pradesh. It was a prospective clinical observational study. After IEC approval and written informed consent, all children between the age group of one month to sixteen years, who fulfilled the inclusion criteria, that is, presented with unprovoked seizure and had evidence of active and ring enhancing lesion or mixed lesion on CT Scan/MRI of brain were enrolled in the study. Detailed history and clinical examination were carried out. Seizures due to any other CNS pathology were excluded. Simple tests for measures of dispersion were the statistical tests that were used.

Results: Statistically forty children fulfilled the inclusion criteria. Of the total children enrolled in the study, 63% were males. Male to female ratio was 1.7. Almost three fourths of the population belonged to rural backgrounds. The mean age of studied children was 10.5 years. More than half of the affected children belonged to the school going age group. Generalised tonic clonic seizures were more common in all age groups than partial seizures. Headache (52.6%), loss of consciousness (42.1%), vomiting (31.5%) and focal neurological deficit (15.7%) were the most common presenting complaints in order of decreasing frequency.

Conclusions: There should be a high index of suspicion of NCC in any child presenting with unprovoked seizures.

Keywords: Headache, Loss of consciousness, Neurocysticercosis, Seizures, *Status epilepticus*

INTRODUCTION

Taenia solium is also known as the pork tapeworm, because of its wide distribution in areas where pigs are raised and have contact with the human faecal matter. Children can acquire the tapeworm by consuming undercooked pork containing the larval stage of the worm or by faeco-oral route through eggs shed by the tapeworm carriers. After ingesting the eggs, larvae released invade the intestines and migrate through the bloodstream to form tissue cysts. Infection with the cystic form and involvement of the central nervous system is termed as neurocysticercosis. Thirty percent cases of seizures may be a result of cysticercosis in the Central and South

America, southern and Southeast Asia and most of Sub Saharan Africa. Seizures are the most common presenting feature of neurocysticercosis.¹

Developing nations, including India are at an increased risk of such a disease due to poor hygiene and sanitation where untreated human faeces are used as fertilizer in the farms.² However, there is limited data of neurocysticercosis in the paediatric population in our country.³

The present study intended to describe the clinical and epidemiological profile of neurocysticercosis in children of the Rohilkhand region.

METHODS

A prospective observational clinical study was conducted in the Paediatric Department (Paediatric Intensive Care and general ward) of Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly from October 2018 to March 2019. After Institutional Ethic Committee (IEC) approval and written informed consent, all children between the age group of one month to sixteen years, fulfilling the inclusion criteria, that is, presenting with unprovoked seizures and having evidence of active and ring enhancing lesion(s) or mixed lesion(s) on CT Scan/MRI of brain were enrolled in the study. Detailed history and clinical examination were carried out. Seizures due to any other CNS pathology were excluded. CT or MRI with contrast was done on a 3 Tesla machine. Definitive diagnosis of neurocysticercosis was based on the findings of neuroimaging such as smaller, regular rounded outline with less cerebral edema ring enhancing lesions located in the supratentorial region. Midline shift is usually not seen. No lipid peak on magnetic resonance spectroscopy (MRS). T2 relaxation time is longer in NCC.⁴ After calculating the sample size using the standardized formula and a working error of 10%, forty children were enrolled in this study over a period of six months. The data obtained was collated, compiled, entered in MS Excel Office 2016 and analysis was performed. Appropriate statistical tools were used percentages and proportions.

RESULTS

Statistically forty children fulfilled the inclusion criteria, five were excluded as they did not undergo neuroimaging, three left against medical advice and two did not give consent and thus, thirty children were enrolled. Of the total children enrolled in the study, 63% were males. Male to female ratio is 1.7. Almost three fourths of the population belonged to rural backgrounds.

The mean age of studied children was 10.5 years. Maximum cases of neurocysticercosis were seen in the age groups 9 to 12 years (19 children) (Table 1).

Table 1: Demographic profile.

Patient characteristics	n (%)
Age group	
1 to 3 years	2 (6.6%)
4 to 6 years	6 (20%)
6 to 10 years	12 (40%)
10 to 14 years	7 (23%)
14 to 16 years	3 (10%)
Gender	
Male	23 (77%)
Female	7 (23%)
Background	
Rural	22 (73%)
Urban	8 (27%)

More than half of the affected children belonged to school going age group. Among the school going children, males (63%) were affected more than females (Table 1).

Children having unprovoked afebrile seizures were further divided into five groups: 1-3 years, 4-6 years, 6-10 years, 10-14 years, 14-16 years. Forty percent children presented with generalised tonic clonic seizures followed by simple partial (27%) and then complex partial (23%). The least common was deviation of angle of mouth accounting for 10%. Generalised tonic clonic seizures were more common in all age groups than partial seizures.

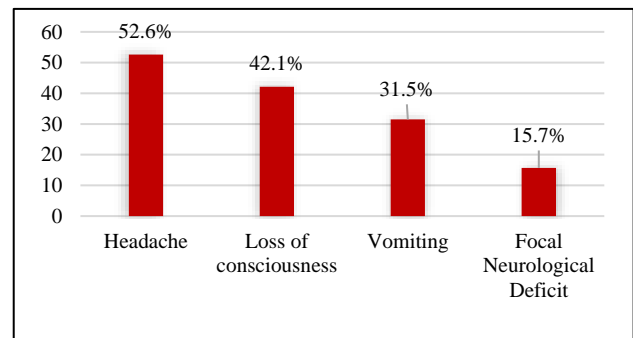


Figure 1: Clinical features of neurocysticercosis.

Headache (52.6%), loss of consciousness (42.1%), vomiting (31.5%) and focal neurological deficit (15.7%) were the most common presenting complaints in order of decreasing frequency. Of the 16 cases who presented with headache, 6 of them had generalised tonic clonic seizures (Figure 1).

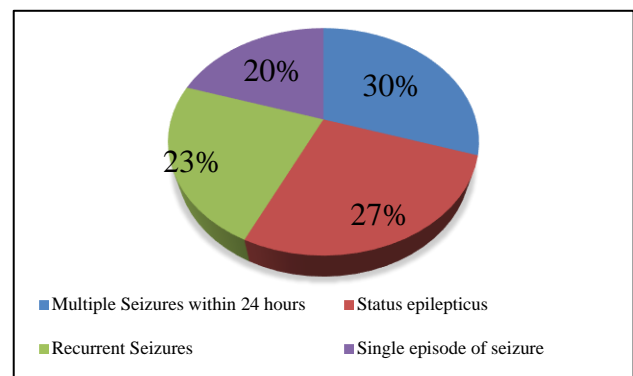


Figure 2: Types of seizures.

Number of seizures occurring in children with neurocysticercosis were categorized as shown in Figure 2.

DISCUSSION

Neurocysticercosis is one of the most common causes of acquired unprovoked epilepsy and neurological impairment in developing nations.

In our study, maximum number of cases was in the age group of 9 to 12 years. The mean age was 10.5 years. This is in accordance with some previous studies. More than half (63%) of the children affected with neurocysticercosis were males. The male to female ratio was 1.7. Male preponderance has been reported with many studies reported from countries from similar demography.^{5,6} Male dominance is because of the social customs and taboos leading to males seeking healthcare facilities. However, Gupta et al have reported a higher number of females being affected in their study done in similar demographic country.² The reason for this inconsistency stated is their traditional role as domestic workers and not maintaining adequate standards of hygiene.

Seizures were the most the common presenting symptom in this study. Headache was the next most common symptom followed by loss of consciousness and vomiting. The least common symptom was focal neurological deficit. Kumar et al reported seizures, vomiting, headache, fever and hemiparesis/monoparesis as the clinical manifestations of NCC in order of decreasing frequency.⁶ Loss of consciousness, vomiting, fever and headache was the top four presenting complaints with neurocysticercosis with seizures reported by Gupta et al.² Fever in these studies could be following the seizures due to increased muscular activity and not as a primary presenting symptom.

Forty percent children had generalised tonic clonic seizures. This was more common than partial seizures in all age groups. Our findings were consistent with study done in Nepal in 2018 which reported three fourths of the cases with neurocysticercosis presenting with generalised tonic clonic seizures.² Chaudhary et al reported 82% cases of NCC with generalised seizures. The remaining had partial seizures. They also reported generalised seizures being more common in all age groups than partial seizures. Contrary to this, a study reported simple partial seizures accounting for almost 70% of the cases of neurocysticercosis.⁵ Similar findings were shown by other authors.⁷⁻¹⁴ Indian study done in Andhra Pradesh found generalised seizures in majority cases as compared to partial seizures.³ In 2015, a study done in the neighbouring area of the current study found partial seizures being a common manifestation in children with neurocysticercosis.⁶

Children with multiple seizures in twenty-four hours and *Status epilepticus* were almost the same. Recurrent seizures were seen in 23% cases. Single seizure was the least common presenting symptom. No study has evaluated the number of seizures occurring in neurocysticercosis. This was done to highlight the variation in seizure pattern in neurocysticercosis and we found four patterns of seizures in our study with almost same frequency.

This study had few limitations. The duration of study was short. Secondly, most of the ring enhancing lesions on neuroimaging were attributed to neurocysticercosis due to a large local population of a specific religious beliefs and eating habits predisposing them to neurocysticercosis.

CONCLUSION

Unprovoked seizures are often missed by parents and clinicians in the rural population, mostly due to social taboos and beliefs. Neurocysticercosis is a common cause of unprovoked seizures and a treatable cause. There should be a high index of suspicion of Neurocysticercosis in any child presenting with unprovoked seizures. This study is the first study to evaluate the number of seizures to highlight that neurocysticercosis can cause recurrent seizures and *status epilepticus*.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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