

## Incidence Of Neurocysticercosis Presenting With Seizure In A Tertiary Care Hospital In Western Nepal: A Cross-Sectional Observational Study

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### Abstract

**Objective:** To find out the incidence of neurocysticercosis (NCC) presenting with seizure in a tertiary care hospital in western Nepal.

**Methods:** This was a prospective cross-sectional study. Children age 0-16 years presenting with seizures were included in the study. Neuroimaging of all the children was done. NCC was diagnosed by Computed Tomography (CT) of head. Neuroimaging with cystic lesion showing scolex, ring or disc enhancing lesion and multiple punctate parenchymal brain calcification with or without contrast enhancement were diagnosed as NCC.

**Results:** Out of the total 4962 admitted children, seizure was present in 168 (3.4%) children (104 male and 64 female). The overall incidence of NCC was 42.9%. The incidence was lower among males (40.4%) than females (46.9%). The incidence of NCC was higher among older children. The use of sodium valproate (V) drug (47.3%) increased the incidence of NCC than Phenytoin (P) (42.9%). The incidence of NCC was 25.4% among whom the fever was present. Among the NCC cases, vesicular stage was the most common (76.4%).

**Conclusion:** The study concludes that NCC usually affects children with older age. It is more common among males in comparison to females.

**Keywords:** Neurocysticercosis, Seizure, Incidence

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### I. Introduction

Seizure is a transient occurrence of signs and/or symptoms resulting from abnormal excessive or synchronous neuronal activity in the brain. This is a chronic disorder with important personal, psychological and social consequences. Studies from India suggested that seizures/epilepsy was more common among the children than adults (Singhi and Singhi, 2009).

Epilepsy is widespread throughout the World but higher incidence is reported in studies from developing countries. This may be because malnutrition may lower seizure threshold by its effect on inhibitory neurotransmitters and electrolytes (Hackett and Iype, 2001). Epilepsy in Nepal remains a huge challenge with a prevalence of seven per 1000 population (Rajbhandari, 2004).

Neurocysticercosis (NCC) is a most common parasitic infection of central nervous system (CNS) affecting approximately 50 million people worldwide and has become a major cause of neurological disease. WHO has estimated that more than 50000 people die from NCC alone yearly. This disease is becoming more common in India, China, Indonesia, South and Central America. It has been estimated that 20-50% of epilepsy may be due to neurocysticercosis in the above region. It is the most common cause of acquired epilepsy and neurological morbidity in many developing countries (Prasad et al, 2008).

NCC is a very common pediatric neurological problem in western Nepal. Its magnitude is not adequately known as in most situations, it remains as an iceberg. A study was done in western Nepal by Basu et al (2007) in 124 children having NCC. The most common age group affected was 10-12 years. They suggested that whenever a child with partial seizures presents to a hospital, possibility of NCC should always be as a differentials in a country like Nepal.

Therefore, the present study was conducted to find out the incidence of neurocysticercosis presenting with seizure in a tertiary care hospital in western Nepal.

## **II. Material And Methods**

This was a prospective cross-sectional study conducted in a tertiary care hospital in western Nepal over a period of two years. Children presenting with seizures were included in the study. The children of either sex and aged 0-16 years were included in the study. The study was approved by the Ethical Committee of the Institute. The consent was taken from mother/father/guardian before including in the study.

Neuroimaging of all the children was done. NCC was diagnosed by computed tomography (CT) of head. Neuroimaging with cystic lesion showing scolex, ring or disc enhancing lesion and multiple punctate parenchymal brain calcification with or without contrast enhancement were diagnosed as NCC. Number of lesions were counted in CT scan of head and labeled as single or multiple. Complete blood count, Mantoux test, ESR, X-ray chest and gastric aspirate for AFB were done in all patients to rule out tubercular infection of brain which may have CT finding mimicking NCC.

All the data was recorded in a pre-designed proforma.

### **Statistical analysis**

The results are presented in frequencies and percentages. The Chi-square test was used to assess the associations between categorical/dichotomous variables. The  $p$ -value $<0.05$  was considered significant. All the analysis was carried out on SPSS 16.0 version (Chicago, Inc., USA).

## **III. Results**

Out of the total 4962 admitted children, seizure was present in 168 (3.4%) children (104 male and 64 female). The overall incidence of NCC was 42.9%. The incidence was lower among males (40.4%) than females (46.9%), however, the association was statistically not significant ( $p>0.05$ ). The incidence of NCC was higher among older children and this association was found to be significant ( $p=0.0001$ ). Incidence of NCC was similar in Hindu and Muslim children. The use of sodium valproate (V) drug (47.3%) increased the incidence of NCC than Phenytoin (P) (42.9%) (Table1).

The incidence of NCC was 25.4% among whom the fever was present and the association was statistically significant ( $p=0.0001$ ). There was no significant ( $p>0.05$ ) association of other symptoms with the incidence of NCC (Table-2).

Among the NCC cases, vesicular stage was the most common (76.4%) followed by calcified (18.1%), colloidal & nodular (2.8%) (Table-3).

## **IV. Discussion**

Epilepsy is a common childhood problem in developing nations. In a study, it was estimated that 70 million people have epilepsy worldwide and nearly 90% of them are found in developing regions (Ngugi et al, 2010). Data on the prevalence of seizures in hospitalized children in western Nepal is scarce. The present study was undertaken with the objective to find out the incidence of neurocysticercosis presenting with seizure and encephalopathy in a tertiary care hospital in western Nepal.

The prevalence of seizures among the children admitted in this tertiary care hospital was 34 per 1000 children. The prevalence of epilepsy in developing countries have been reported up to 57 per 1000 children (Senanayake and Roman, 1993). The prevalence of epilepsy in India ranges from 3-12 per 1000 population with the incidence rate of 0.2-0.4 per 1000 population per year (Amudhan et al, 2015).

The male-female ratio was 1.4:1 in all NCC cases in this study. Similar finding were also noted in an Indian study where male-female ration was 1.2:1 (Singhi et al, 2000). A study from western part of Nepal showed high predominance of males compared to females (1.5:1) (Gauchan et al, 2012). Male-female ratio in a study done by Ojha et al (2015) was 2.5:1 which was much higher than the present study.

In the present study, the incidence of NCC increased as the age with advancing age. A study Shrestha et al (2013) from Chitwan, Nepal showed that NCC occurred in the age groups 2-15 years with peak incidence in the age group 10-15 years which was almost 47.8%. In the present study, the incidence was higher in the age group 9-16 years accounting for 59.7%. Also, 9.7% of children had NCC in the age group 0-4 years. This finding of this study is consistent with the study by Thakur and Ananda (1991).

The reason of lower incidence of NCC in younger age groups may be due to prolonged incubation period of *Taenia solium* and probably of their dietary habits. Generally, the children of lower age have poor hygienic practices.

Loss of consciousness, vomiting, fever and headache were the top 4 leading clinical manifestations in children having NCC with seizures in this study. This finding is in agreement with the study conducted in the western part of Nepal (Gauchan et al, 2012). The finding of this study is also consistent with the studies conducted in other countries (Shrestha, 2008; Singhi et al, 2000; Kalra and Sethi, 1992).

The most common stage of NCC observed in this study was vesicular stage on CT which constituted 76.4%. This was in agreement with the other studies (Talukdar et al, 2002; Mondal et al, 2015; Shrestha et al, 2013). In this study, the incidence was higher among whom sodium valproate was used. One of the limitations of this study was only admitted cases were included in the study. Out-patient departmental cases were not included which could affect the exact incidence of NCC in this geographic area.

### V. Conclusion

The study concludes that NCC usually affects children with older age. It is more common among males in comparison to females.

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**Table-1:** Association of socio-demographic characteristics and antiepileptic drug use with incidence of NCC

Characteristics	No. of children	NCC				p-value <sup>1</sup>
		Yes		No		
		No.	%	No.	%	
No. of children	168	72	42.9	96	57.1	
<b>Gender</b>						
Male	104	42	40.4	62	59.6	0.41
Female	64	30	46.9	34	53.1	
<b>Age in years</b>						
0-4	45	7	15.6	38	84.4	
5-8	44	22	50.0	22	50.0	0.0001*
9-12	44	23	52.3	21	47.7	
13-16	35	20	57.1	15	42.9	
<b>Religion</b>						
Hindu	154	66	42.9	88	57.1	
Muslim	14	6	42.9	8	57.1	1.00
<b>Antiepileptic drugs#</b>						
Phenytoin (P)	98	42	42.9	56	57.1	0.99
Sodium valproate (V)	55	26	47.3	29	52.7	0.52
Both P and V	11	4	36.4	7	63.6	0.89
More than above two	4	0	0.0	4	100.0	0.21

<sup>1</sup>Chi-square test, #Multiple response, \*Significant

**Table-2:** Association of clinical characteristics with incidence of NCC

Clinical symptoms*	No. of children	NCC				p-value <sup>1</sup>
		Yes		No		
		No.	%	No.	%	
Fever	67	17	25.4	50	74.6	0.0001*
Vomiting	59	24	40.7	35	59.3	0.67

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Headache	27	13	48.1	14	51.8	0.54
Meningeal irritation	7	1	14.3	6	85.7	0.11
Unconsciousness	93	38	40.9	55	59.1	0.56
Speech disorder	4	0	0.0	4	100.0	0.08
Pallor	6	2	33.3	4	66.7	0.63

<sup>1</sup>Chi-square test, #Multiple response, \*Significant

**Table-3:** Distribution of different stages of NCC on CT scan

Stages on CT scan	No. (n=72)	%
Vesicular	55	76.4
Calcified	13	18.1
Colloidal	2	2.8
Nodular	2	2.8

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