

# Spectrum of epilepsy in Neurocysticercosis

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## Abstract

**Introduction:** Neurocysticercosis (NCC) is one of the most common parasitic cause of neurological disease in developing countries. NCC is the infestation of the central nervous system with the larvae of pork tapeworm, *Taenia solium*. It is endemic in South Asia, Africa, and Latin America. Due to increasing international travel and immigration, NCC is no more a health issue limited to the developing countries but also to the rest of world. **Material and methods:** A total of 70 patients of seizures presenting with ring enhancing lesion in CT scan of brain suggestive of neurocysticercosis, attending outpatient department or admitted in wards of Medicine Department of S.R.N. Hospital. A detailed seizure history as well as neurological examination was done according to the working proforma. **Results:** Maximum number of patients 34 (48.57%) were presented with simple partial seizures with secondary generalization. Generalized tonic-clonic seizure was present in 22 patient (31.43%) patients. Simple partial seizure without secondary generalization was presented in 12 patients (17.14%). Two patients (2.86%) were presented with complex partial seizure. **Conclusion:** Neurocysticercosis is more common in young, rural population and in lower socioeconomic class. Vegetarians were significantly more affected than non-vegetarians which suggest other mode of transmission. By combining hygiene education and better sanitation, we will interrupt or reduce the cycle of direct person-to-person transmission. Thus, probably we will succeed to reduce the burden of disease from the society.

**Keywords:** Dietary habits, Epilepsy, Neurocysticercosis, Seizures.

## Introduction

Neurocysticercosis (NCC) is one of the most common parasitic cause of neurological disease in developing countries. NCC is the infestation of the central nervous system with the larvae of pork tapeworm, *Taenia solium*. It is endemic in South Asia, Africa, Latin America [1]. Due to increasing international travel and immigration, NCC is no more a health issue limited to the developing countries but also to the rest of world [2]. It has been estimated that 50 million people are infected with the *Taenia/cysticercosis* complex in the world and that 50,000 die each year [3].

The clinical presentation of the neurocysticercosis is diverse, depends upon the number, location, size, viability or stage of degeneration of cysts and intensity of the immune response of the host to the parasites [4].

Seizure (particularly late onset seizure) are the most common presentation (50-80% of cases) followed by headache (40%) visual changes (20%) confusion (15%), and less frequently cranial nerve palsies or other focal neurological deficits [5,6].

Complex neurological and neurosurgical syndrome have been described as a result of infestation with NCC [7] including a number of uncommon clinical presentations such as stroke [8], mid brain syndrome [9] and Weber syndrome [10]. Neurocysticercosis also presented with psychiatric symptoms or syndromes including mutism [11], mood and psychotic symptoms [12].

Thus, this study was conducted in Medicine Department, M .L. N. Medical College, Allahabad to evaluate spectrum of epilepsy in neurocysticercosis patient.

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## Material and Methods

### A. Inclusion Criteria:

All patients of seizures presenting with ring enhancing lesion in CT scan of brain suggestive of neurocysticercosis, (according to the criteria given by Del Bruto, 2001) [13] including outpatient department or admitted patients in wards of Medicine Department of S.R.N. Hospital, Allahabad. Classification of seizure based on the International classification of epileptic seizure given by International league against of epilepsy [14].

### B. Exclusion Criteria :

a. Patient with primary seizure disorder.

b. Patient with history of seizure disorder due to other cause like tuberculoma, space occupying lesions, cerebrovascular accident etc.

**Methodology-** A detailed seizure history as well as neurological examination was done according to the working proforma. Classification of seizure based on the classification given by International league against epilepsy and diagnosis of neurocysticercosis based on the criteria given by Del Bruto, (2001) [13]. The relevant investigation like electro-encephalography and computed axial tomography were also done. Besides these routine blood and urine investigation, X-ray chest PA view, CSF examination was done.

## Results

Age of neurocysticercosis (NCC) patients (n=70) varied from 6 years to 80 years. Mean age of presentation was  $23.18 \pm 6.12$ . Mean age of presentation of male (n=47) was  $24.10 \pm 4.00$  (CI 95%) while for female (n=23) was  $21.30 \pm 7.71$  (CI 95%). Most of the patients, 81.43% (n=57) were less than 30 years of age i.e. in the first three decades. Male and female ratio was 2.04:1.

Out of 70 patients of neurocysticercosis 3 patients (4.29%) belonged to upper class, 25 patients (35.71%) belonged to middle class while 42 patients (60%) belonged to lower class. Out of 70 patients of neurocysticercosis, 65.71% (n=46) were of rural population and 34.29% (n=24) were urban.

Out of 47 male patients of neurocysticercosis, 47.14% (n=33) were of rural origin and 20% (n=14) were of urban origin. Out of 23 female patients of neurocysticercosis 18.57% (n=13) were of rural origin and 14.29% (n=10) were of urban origin.

Out of 70 patients, 37.14% (n=26) were non-vegetarian and 62.86% (n=44) were vegetarians. 25.71% (n=18) male were non-vegetarians while 41.43% (n=29) were vegetarian.

**Table-1: Distribution of patients according to age at onset of seizures due to NCC**

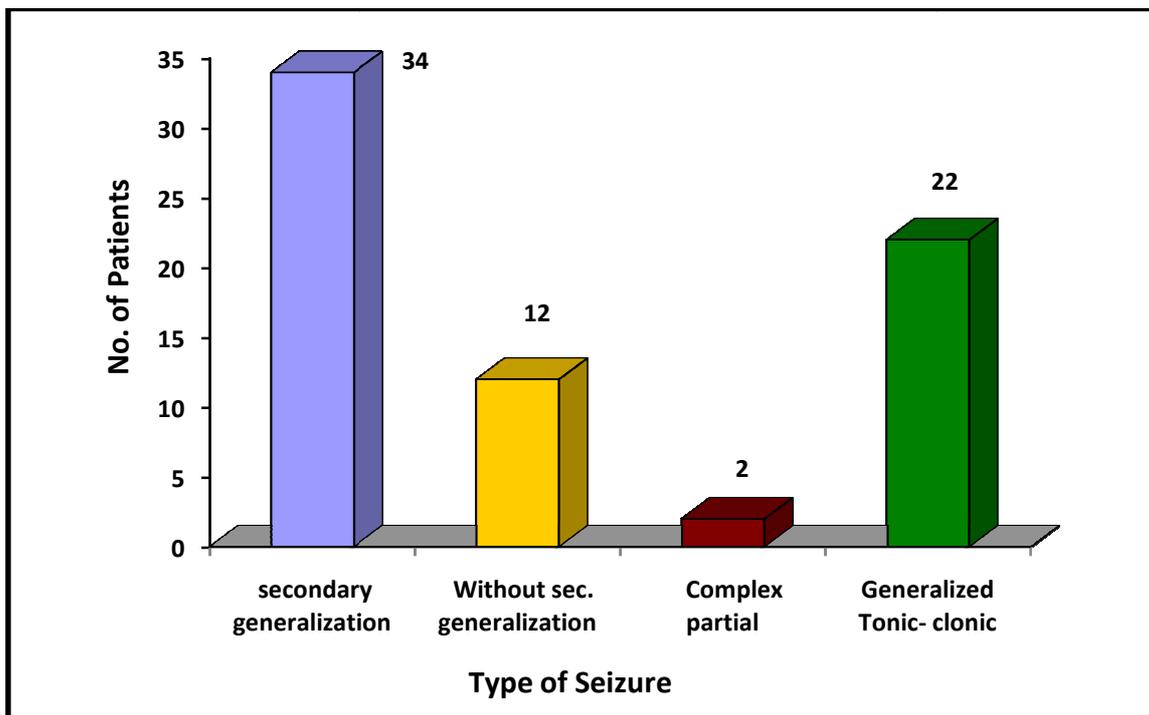
Age Group(in year)	Male		Female		Total	
	n	%	n	%	n	%
1-10	2	2.86	7	10	9	12.86
11-20	24	34.28	8	11.43	32	45.71
21-30	12	17.15	4	5.71	16	22.86
31-40	3	4.28	1	1.43	4	5.71
41-50	5	7.14	2	2.86	7	10
51-60	0	0	0	0	0	0
Above 60	1	1.43	1	1.43	2	2.86
<b>Total</b>	<b>47</b>	<b>67.14</b>	<b>23</b>	<b>32.86</b>	<b>70</b>	<b>100</b>

From above table it is evident that 12.86% (n=9) patients presented with seizure in first decade of life, 45.71% (n=32) in second decade, 22.86% (n=16) in third decade, and 5.71% (n=4) in fourth decade of life. Maximum incidence, 42.71% (n=32) was found in age group of 11-20 years.

**Table-2: Distribution of patients according to site of beginning of seizures.**

Site of origin	Male		Female		Total	
	No.	%	No.	%	No.	%
Upper limb	35	50	15	21.43	<b>50</b>	<b>71.43</b>
Face	4	5.71	3	4.29	<b>7</b>	<b>10.00</b>
Lower limb	8	11.43	5	7.14	<b>13</b>	<b>18.57</b>
<b>Total</b>	<b>47</b>	<b>67.14</b>	<b>23</b>	<b>32.86</b>	<b>70</b>	<b>100</b>

From the above table it is clear that majority of patients 71.43% (n=50) seizures were began from upper limb, followed by lower limb, 18.57% (n=3).



**Figure-1: Distribution of patients according to type of seizures.**

From the above figure it is evident that maximum number of patients 34 (48.57%) were presented with simple partial with secondary generalization. Generalized tonic-clonic seizure was present in 22 patient (31.43%) patients. Simple partial seizure without secondary generalization was presented in 12 patients (17.14%). Two patients (2.86%) were presented with complex partial seizure.

**Table- 3: Distribution of patients according to neurological examination**

Findings	Patients	Percentage
Normal	60	85.71
Focal neurological deficit	8	11.43
(a) Monoparesis	7	10
(b) Hemiparesis	1	1.43
Papilloedema	2	2.86
<b>Total</b>	<b>70</b>	<b>100</b>

## Discussion

**Age and sex:** In the present study, maximum number of patients 45.71 % (n=32) is encountered in the age group of 11-20 years followed by 22.86% (n=16) in 21-30yrs age group. Majority of the patients 81.43% (n=57) were below 30 years of age. The mean age was 23.18yr  $\pm$  6.71yrs. These results are closely resembled with studies of RS Wadia et al (1987); Pazzaglia et al (1981) in which the patients below age of 20 years were 42.4% and 50% respectively. There were 47 males (67.47%) and 23 females (32.86%). The male: female ratio is 2.04:1 which closely resemble with the study conducted by OH Del Brutto et al (1988) [15] in which they reported male: female ratio of about 2:1.

**Rural urban, Socio-economic class and dietary habits:** In the present study, 65.71% (n=46) patients were from rural origin and 34.29% (n=24) were from urban origin. 60.0% (n=42) patients in this study belonged to lower socioeconomic class.

Thus, it is evident that in present study more than 60% of the patients are from rural origin and belong to lower socioeconomic classes which are similar to the other study [16], where 70% patients are from rural origin and belonged to lower socioeconomic classes. In the Verma [17] series, 63.5% patients are from rural origin and lower socioeconomic classes. In the present study, 37.14% (n=26) were non-vegetarian and 62.86% (n=44) were vegetarian. Singh et al. (2001) [18] reported that 59% of the cases from Uttaranchal were vegetarian and only 17.6% of them were pork eaters.

**Age at onset of seizure:** In this study, age at onset of seizure was found 11-20 years group in 45.71% (n=32) cases, followed 21-30 years in 22.86% (n=16) cases and 1-10 years in 12.86% (n=9) cases. These results are closely in resemblance with the studies of Wadia, R.S. et al. (1987) [19] and Pazzaglia et al. (1981) [20] in which the patients below age of 20 years were 40% and 50% respectively.

**Type of seizures:** In this study, all patients presented with seizures. 48.57% (n=34) patients presented as simple partial seizures with secondary generalization, 31.43% (n=22) patients presented as generalized tonic-clonic seizure, 17.14% (n=12) presented as simple partial seizure without secondary generalization and only 2.86% (n=2) patients presented as complex partial seizure which was similar to the study conducted by Kotokey, R.K.; Lynrah, K.G. and De, A. (2006) [21].

**Site of beginning of seizure:** The site of beginning of seizure in present study was upper limb in 71.43% (n=50) followed by lower limb 18.57% (n=13), face 10% (n=7). Kumar et. al. [22] observed that in 59% of their patients, seizures began from upper limb or face.

**Neurological examination:** In present study, on neurological examination, 85.71% (n=60) were found to be normal, 11.43% (n=8) had focal neurological deficit. Out of which 10% (n=7) have monoparesis and 1.43% (n=1) have hemiparesis. Papilloedema was found in 2.86% (n=2). In an another study conducted by OH Del Brutto et al. [23] 80% patients were normal by neurological examination, 16% patients had focal neurological deficit and 4% patients had papilloedema, which is similar to our study where monoparesis and hemiparesis were the most frequent neurological signs.

## Conclusion

Our study revealed that epilepsy is most common clinical manifestation in neurocysticercosis in which simple partial seizure with secondary generalization is most common type of seizure presentation.

Neurocysticercosis is more common in young, rural population and in lower socioeconomic class. Vegetarians were significantly more affected than non-vegetarians which suggest other mode of transmission than meat eating.

By combining hygiene education and better sanitation, we will interrupt or reduce the cycle of direct person-to-person transmission. Thus, probably we will succeed to reduce the burden of disease in the society.

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**Permission from IRB:** Yes

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