



## ORIGINAL RESEARCH ARTICLE

### THE EPIDEMIOLOGY AND HEALTH BURDEN OF NEUROCYSTICERCOSIS IN TERTIARY HOSPITAL OF NEPAL

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#### ABSTRACT

Neurocysticercosis (NCC) is the most common parasitic infestation of the central nervous system and is one of the major public health problems in developing nations like Nepal. This study was conducted to find out total number of neurocysticercosis cases in BPKIHS from 2005 to 2013 AD and to know the duration for which cases were admitted and improvement seen in them. This is a hospital based retrospective study conducted from 31st March to 13th April 2014 to see the number of NCC in B P Koirala Institute of Health Sciences, Dharan of Nepal, a tertiary level referral hospital in the Eastern Nepal. It was study in which secondary data, consistent with the diagnosis of Neurocysticercosis was collected from the Medical Record Section of BPKIHS and reviewed. One hundred fourteen cases of neurocysticercosis were enrolled. The patients were predominantly males (nearly 63.2%) and it was more commonly seen in 2-20 years age group (42%). Most of the cases were from Sunsari District. Most of the patients (63.2%) were admitted in Medicine wards. Almost 90.4% of admitted Neurocysticercosis cases were improved in BPKIHS. The trend of Neurocysticercosis cases did not show any showed any consistent pattern in the past nine years. We conclude that the problem of Neurocysticercosis is common and has become a key public health concern for all.

**Key Words:** *Epidemiology, Health Burden, Nepal, Neurocysticercosis.*

#### INTRODUCTION

The WHO has classified neurocysticercosis (NCC) as the most important neurologic disease of the parasitic origin in humans.<sup>1</sup> About 50 million people are infected worldwide and 50000 die from NCC yearly.<sup>1</sup> NCC is a major cause of adult onset symptomatic epilepsy in areas where pork tapeworm *Taenia solium* is endemic.<sup>2</sup> With the increasing availability of neuroimaging studies in the area of endemicity and the use of EITB assay in epidemiological studies, it has become evident that the global morbidity and mortality associated with cysticercosis have been grossly underestimated.<sup>3</sup>

NCC is endemic in Central and South America, Sub-Saharan Africa, in some regions of Far East including Indian Sub-continent, Indonesia and China. It is rare in Eastern and central Europe, North America with exception of South Coast of USA and Australia, Japan, New Zealand and is non-existence in Israel and in Muslim countries of Africa and Asia.<sup>4</sup>

There are very limited data on epidemiology of cysticercosis from Nepal. Heap (1990) reported that NCC is a common cause of epilepsy among Nepalese soldiers stationed with British Army in Hongkong.<sup>4</sup> The available data suggest that the prevalence

ranges from 0.002-0.1 % in general population in Nepal.<sup>5</sup> Many clinical studies reported from Nepal had variable presentations, outcome in terms of diagnosis and treatment response.<sup>5-11</sup> Most of the studies were hospital based retrospective and diagnosis was based mainly on clinical presentation and neuroimaging. EITB serology was hardly used in any study except one.<sup>9</sup> However the results were not mentioned. Therefore, this study was conducted to find out total number of neurocysticercosis cases in BPKIHS from 2005 to 2013 AD and to know the duration for which cases were admitted and improvement seen in them.

#### MATERIAL AND METHODS

This was a hospital based retrospective study conducted from 31<sup>st</sup> March to 13<sup>th</sup> April 2014 to see the number of NCC in BP Koirala Institute of Health Sciences, Dharan of Nepal. A total of one hundred fourteen cases between the ages of 2 to 76 years from 01/03/2005 to 31/08/2013 AD who have undergone CT scan of head because of various clinical presentations. It was study in which secondary data was collected from the Medical Record Section of BPKIHS. Patients without complete medical records were excluded from this study. All the patients were recorded in as format age wise and sex wise.

The variables were used in the study was age, gender, address, patients admitted in different wards with year, duration of stay in wards and their outcome etc. The written consent was taken from the Hospital Director of BPKIHS.

The collected data was coded and entered in MS Excel 2007. The analysis was done by using statistical software SPSS (statistical package for social science) version 17. Percentage and proportion was calculated where ever applicable.

## RESULTS

**Table 1: Distribution of study population by different sociodemographic variables.**

Characteristics	Frequency	Percentage
<b>Age in years</b>		
2-20	48	42.1
21-39	37	32.5
40-59	22	19.3
60-76	7	6.1
<b>Gender</b>		
Male	72	63.2
Female	42	36.8
<b>Address</b>		
Sunsari	44	38.6
Ilam	5	4.4
Morang	14	12.3
Dhankuta	8	7.0
Siraha	5	4.4
Others	38	33.3
Total	114	100%

A study subject consists of 114 patients which were admitted in wards of BPKIHS from 2005 to 2013 AD. The study subjects consist of 63.2% of male and 36.8% of female. Majority of Neurocysticercosis patients belongs from Sunsari District of Nepal and Others (Panchthar, Jhapa, Dhanusha, Taplejung, Khotang, Udayapur, Okhaldhunga, Sankhuwasava, Bhojpur, Terathum, Rautahat, Dang, Saptari and India) (Table 1 & 2)

**Table 2: Distribution of study population by different variables**

Characteristics	Frequency	%
<b>Patients admitted in ward in Year</b>		
2005	18	15.8
2006	19	16.7
2007	17	14.9
2008	13	11.4
2009	16	14.0
2010	8	7.0
2011	9	7.9
2012	9	7.9
2013	5	4.4
<b>Admitted in different wards</b>		
Medicine	72	63.2
Paediatrics	31	27.2
Ophthalmology	2	1.8
Surgery	8	7.0
Orthopedics	1	0.9
<b>Duration of stay in wards in days</b>		
<6	69	60.5
6-10	33	28.9
11-15	7	6.1
≥ 16	5	4.4
<b>Outcome</b>		
Improved	103	90.4
Others (Unchanged, LAMA, Recovered)	11	9.6
<b>Total</b>	<b>114</b>	<b>100</b>

Table 2 shows most of the patients (16.7%) admitted in 2006 AD. Most of the patients were admitted in Medicine wards. Almost 90.4% of admitted Neurocysticercosis cases were improved in BPKIHS.

## DISCUSSION

Cysticercosis is a serious disease; with varied incubation period and multiple signs and symptoms. Infected people may remain asymptomatic for years. Although Cysticercosis infection is possible at any age, children are observed to be more vulnerable.<sup>12</sup>

Though there are very limited data on epidemiology of cysticercosis from Nepal, the available data suggest that the prevalence of taeniasis in syangja and Tanahun were 43% and 18% respectively.<sup>13</sup> Beside this, epilepsy in Nepal are increasing, with studies showing that up to 7.3 per 1,000 population may suffer from epilepsy, and almost 50% of the cases are due to neurocysticercosis.<sup>14</sup> These days NCC seems to be increasing in frequency among the Nepalese population based on the data conducted in different hospitals in Kathmandu.<sup>14</sup> This may rather reflect the more accurate diagnosis as a result of better knowledge of the biological cycle of *Taenia solium*, improved understanding of the endemic poor environmental conditions, and the availability of precise neuro-radiological and immunological studies, however, the actual data on NCC in children not known.

Current Study showed that there were more boys suffering from NCC as compared to girls (63.2% vs 36.8%). This finding is similar to those studies carried out by Morales et al, where male were predominant.<sup>15</sup> Another study conducted by Shrestha B et al in 2013 showed male predominance compared to female (55% Vs 45%).<sup>16</sup> Similarly results of male outnumbering female have been shown in many other studies conducted previously.<sup>17,18</sup> However, in contrast to these results, some studies have shown that girls are more affected compared to male.<sup>19,20,21</sup> Another study conducted by Shrestha SP et al in Charak hospital Pokhara, Nepal in 2013 showed there were more girls suffering from NCC as compared to boys (60% vs 40%).<sup>22</sup> Another studies done by Ruiz-Garcia, et al<sup>23</sup>, Kossoff and Thakur et al.<sup>24,25</sup> also showed that there were more girls suffering from NCC as compared to boys. Lower prevalence of NCC in toddlers is probably due to prolonged incubation period of TS and might have contributed to the dietary habits in those children where they are little exposed with food from outside as well as contamination to some extent.<sup>26</sup> In fact, we believe that such sexual predilection should not have occurred and are purely coincidental.

This study showed the age ranging from 2 to 76 years and it was more commonly seen in 2-20 years age group (42%). A study conducted by Shrestha BM in Lumbini Zonal Hospital showed affected age group ranged between 2 and 14 years and nearly 70% of children being older than 7 years.<sup>27</sup> The study showed that majority of patients were school going children between the ages of 10-15 years comprising 47.83% followed by the age group of 5-10 years. In majority of cases NCC are mostly seen after the age of seven. There were no children below 2 years.<sup>22</sup> The reason why it is common in these age groups could be because of their tendency to intake outside food and poor hygiene.

In our study, we have observed that the disease occurs more in Sunsari district (38.6%) followed by Morang District (12.3%). A study conducted by Shrestha B in 2013 in western region

of Nepal which showed that the disease occurs more in Kaski district (28.6%) followed by Tanahun (26.53%) and Baglung (12.24%).<sup>16</sup> Their hospital is located in the central part of the Pokhara valley within Kaski district, which is considered to be the portal of entry to Western region of Nepal, this geographical convenience for people residing in the area might have been the reason for maximal disease distribution in Kaski region. People of all economic strata are inhabited in Pokhara. So habit of eating outside food and unawareness of the personal habit could be the some of the reasons of its occurrence. Most of the households did not have a proper latrine or sewage disposal system and had a very low level of sanitary practice. This might be the reason for the transmission of the parasite in this geographic area.<sup>16</sup> Previous studies conducted in the same western region of Nepal also revealed similar findings with the maximum cases of NCC being observed in Kaski district.<sup>28</sup>

We have observed that the 90.4% of NCC cases improved and majority of them staying in wards up to 6 days. Spontaneous resolution of NCC without the need for cysticidal treatment has been reported before also, by Morales et al.<sup>15</sup> In fact most lesions of NCC resolve spontaneously within 2-3 months.<sup>24</sup> Although none of the patients in the study conducted by Ruiz-Garcia M et al was died, deaths have been reported because of chronic arachnoiditis.<sup>23</sup>

Despite the amount of very useful statistics we were able to extract from this study, there did exist some limitations. Since it's a retrospective study, we were not able to review the details about patient's dietary habit such as pork-eating behavior and were also not able to inquire about pork farming in their household.

## CONCLUSION

The problem of Neurocysticercosis is common and has become a key public health concern for all. The trend of Neurocysticercosis cases did not consistently showed increasing or decreasing order in the past nine years. Most of the cases were from Sunsari District affecting children and up to 20 years of age. The male was affected more than female. Around 90% of cases showed improvement, most of them discharged from Medicine wards.

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