

# **Epilepsy and Neurocysticercosis in Nepal: a hospital-based questionnaire study**

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# Introduction

- Human Cysticercosis develops following accidental ingestion of eggs of the pork tapeworm *Taenia solium*, in contaminated food or by faeco-oral route.
- The adult *T. solium* occurs in the small intestine of man; pigs are the natural intermediate hosts.
- The cysticerci in man may develop in the muscles, subcutaneous tissues and organs, but also in the brain and ocular tissue, which may lead to Neurocysticercosis (NCC) and blindness, respectively.
- Worldwide, more than four million people harbor the pork tapeworm and 50 million individuals are infected with cystic stage.

# Introduction.....(Cont.)

- An estimated 50,000 people die from cysticercosis each year because of CNS or cardiac complications.
- Neurocysticercosis is the commonest neuroparasitic infection in humans.
- Cysticercosis is one of the leading causes of acquired epilepsy in Asia.
- Neurocysticercosis has been reported in several hospitals in and around Kathmandu.
- Out of 23402 biopsy cases examined sixty two cases were cysticercosis in Patan Hospital.
- At TUTH hospital only 66 cases were of seizure.

# Introduction.....(Cont.)

- Out of 54 cases of seizure disorder 24 cases have been of Neurocysticercosis in Om Hospital and Research centre.
- It was reported that 61% of all seizure cases presented at the Kathmandu Model Hospital were caused by NCC.
- Few data are available on the prevalence of cysticercosis in pigs (add some data).
- Cysticerci collected from pigs in Nepal were reported as belonging to the Asian genotype.
- The parasite's life cycle is completed, resulting in human tapeworm infection, when humans ingest undercooked pork containing cysticerci.
- Adult *T. solium* in man causes abdominal pain, digestive disturbances, diarrhea, constipation, nervousness, nausea and vomiting as well as loss of weight.

# Objectives

1. To determine seroprevalence of cysticercosis by EITB in human serum.
2. Retrospectively collect data on the occurrence of neurocysticercosis in humans in selected hospital of the Chitwan and Kathmandu valleys.

# Materials and Method

- In order to collect baseline information on the prevalence of human cysticercosis a questionnaire survey was done in five hospitals of the Kathmandu valley and two hospitals of the Chitwan Valley.
- These are the T.U. Teaching Hospital (TUTH), Bir Hospital, Patan hospital, Norvic Escorts International hospital and Nepal Medical College (NMC) Teaching hospital, from Kathmandu valley and the College of Medical Science (CMS) Teaching Hospital and the B.P. Memorial Cancer Hospital (BPMCH) from Chitwan Valley.

# Materials and Method.... (Cont.)

- The data from B.P. Memorial Cancer Hospital were obtained from the Out Patients Department as only cancer patient were admitted, whereas as the data from the other 6 hospitals were from admitted patients.
- About 5 ml blood samples were collected from 50 patients of CMC College Bharatpur for serological testing.
- The Enzyme-linked immunoelectrotransfer Blot (EITB) was used to determine the presence of specific antibodies.

# Results

- The distribution of number of patients, epileptic patients and NCC patients in the seven hospitals for the period of 2002 to 2006 is shown in Table 1. Most of the hospitals are using the CT scan for the diagnosis of NCC. MRI is an advanced tool and used by only few hospitals in doubtful cases, as it is very costly and not available easily.



**Table 1: The distribution of total patients, epileptic patients and NCC patients in the seven hospitals of Kathmandu and Chitwan valleys for the period of 2002 to 2006.**

Year	Hospital	TUTH	Bir	Patan	Norvic	NMC	CMS	Cancer
2002	Total	15900	8646	17976	1213	6504	7877	46669
	Epileptic	78	19	117	35	42	16	393
	NCC	7	7	1	6	5	4	118
2003	Total	16706	10228	19143	1324	6202	9178	51154
	Epileptic	96	13	59	38	32	34	639
	NCC	7	4	4	9	2	18	192
2004	Total	17508	10010	19173	1629	5601	7565	50213
	Epileptic	108	7	57	47	28	14	540
	NCC	3	3	8	4	4	8	180
2005	Total	17897	10510	19263	1889	4727	5674	65327
	Epileptic	152	5	51	47	13	30	270
	NCC	5	2	3	17	1	9	90
2006	Total	17884	10639	19315	2672	5218	10591	65116
	Epileptic	126	5	37	43	9	59	216
	NCC	6	0	9	10	2	21	72

# **NCC cases among total admission episodes and total epileptic admission episodes.**

- The distribution of NCC cases in terms of total admission episodes and total epileptic admission episodes.
- NCC per 1,000 admission episodes was the highest (5.27) in Norvic Hospital followed by College of Medical Sciences Teaching hospital and the lowest (0.26) in Patan Hospital.
- The percentage of NCC in terms of epileptic admission episodes was the highest (39.22) in College of Medical Sciences Teaching hospital, which was followed by the Bir hospital (32.65) and the lowest (5.00) in T.U. Teaching hospital.

# Neurocysticercosis

cysticerci develop in S/C tissues, eye and brain

Oncospheres develop into cysticerci in brain

Cysticercosis

# Cysticercosis

Oncospheres hatch, penetrate intestinal wall, and circulate to muscles

Egg and proglottid ingested by pig / human

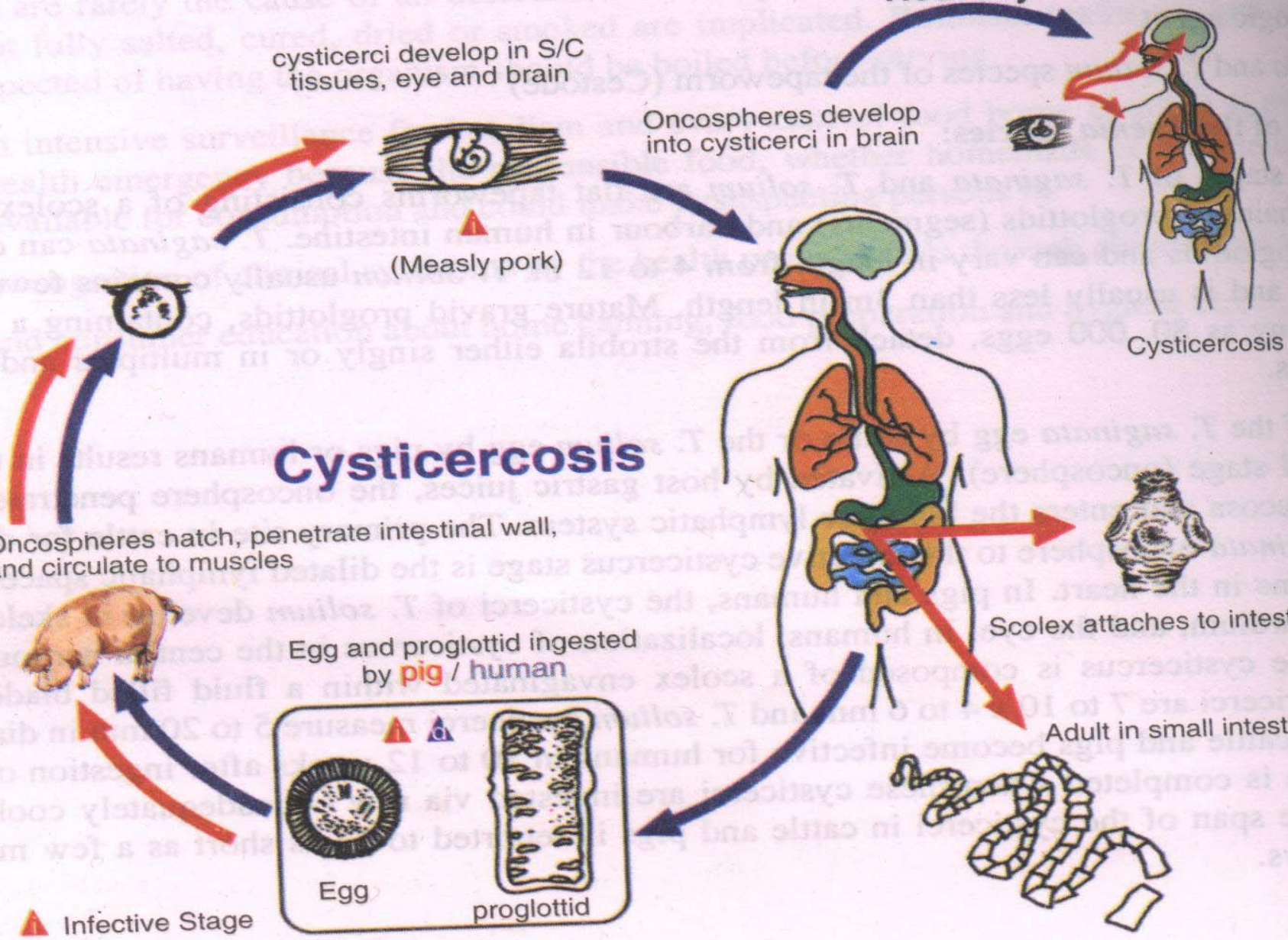
Scolex attaches to intestine

Adult in small intestine

▲ Infective Stage

▲ Diagnostic

*Taenia solium* in feces





**Photo no. 1: Pig and piglets are in open garbage and wastage feeding.**



**Photo no. 2: Photo showing pigs are feeding on open toilet and garbage disposal place.**



**Photo no. 3: Landrace pig breed with local cross bred pig**



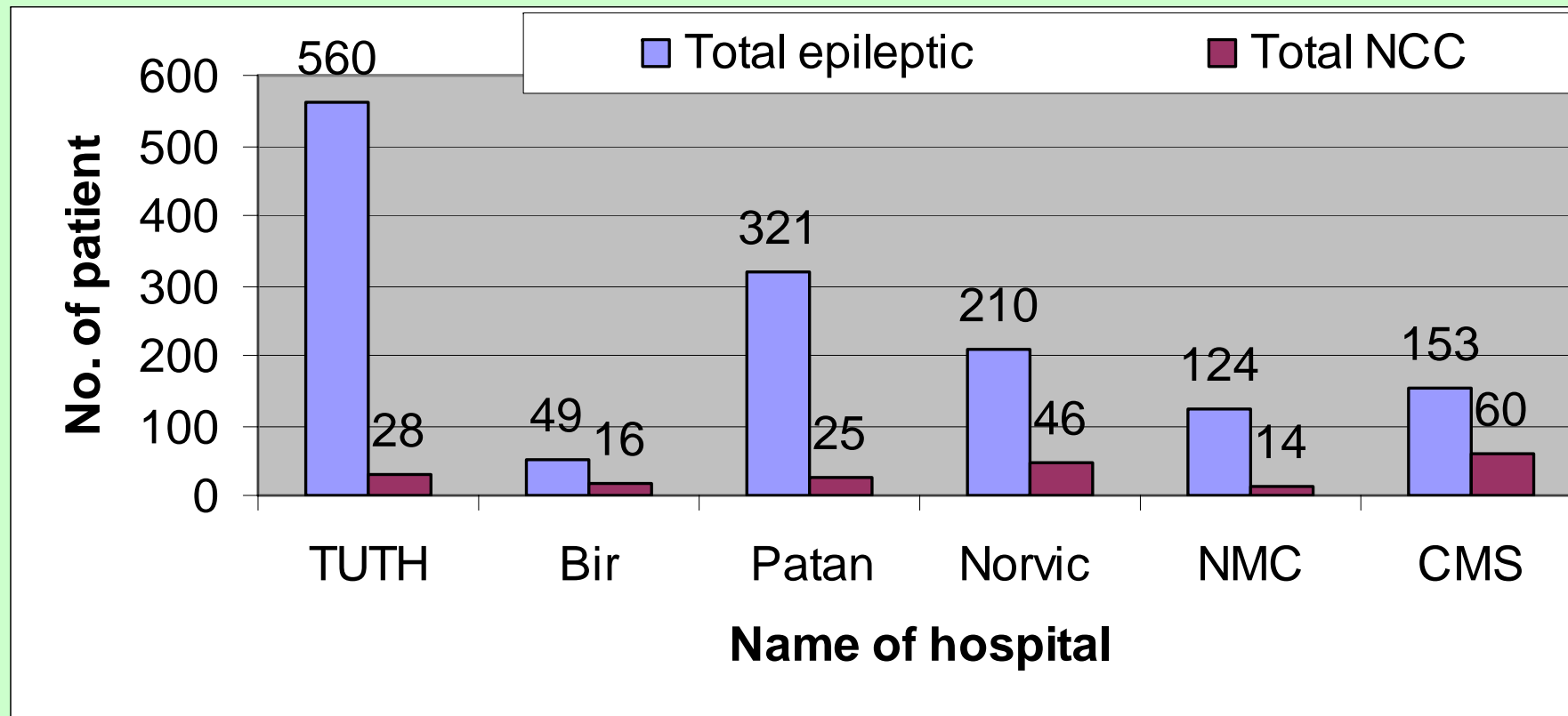
**Photo no. 4: Cross bred pig who were bred with two local breeds.**



**Photo no. 5: Muscle of hind limb of pig showing the cyst of *Taenia solium***



•NCC patients at these 6 hospitals were found at the overall rate of 0.61 per 1,000 admission episodes during the period of 2002-2006 where as the occurrence of NCC was 13.34% of epileptic admission episodes (See fig.1 and 2.



**Figure no.1: Bar diagram showing the hospital wise distribution of epileptic and NCC patients**

# Relationship of hospital in the incidence of admitted neurocysticercosis patient.

The relationship of hospital in the incidence of neurocysticercosis was studied with the help of Pearson's  $\chi^2$  and P value. The findings are shown in table 2. This study has clearly shown that NCC was major contributory factors in the occurrence of Epilepsy in Nepal.

**Table 2: Relationship of hospital in the incidence of Neurocysticercosis.**

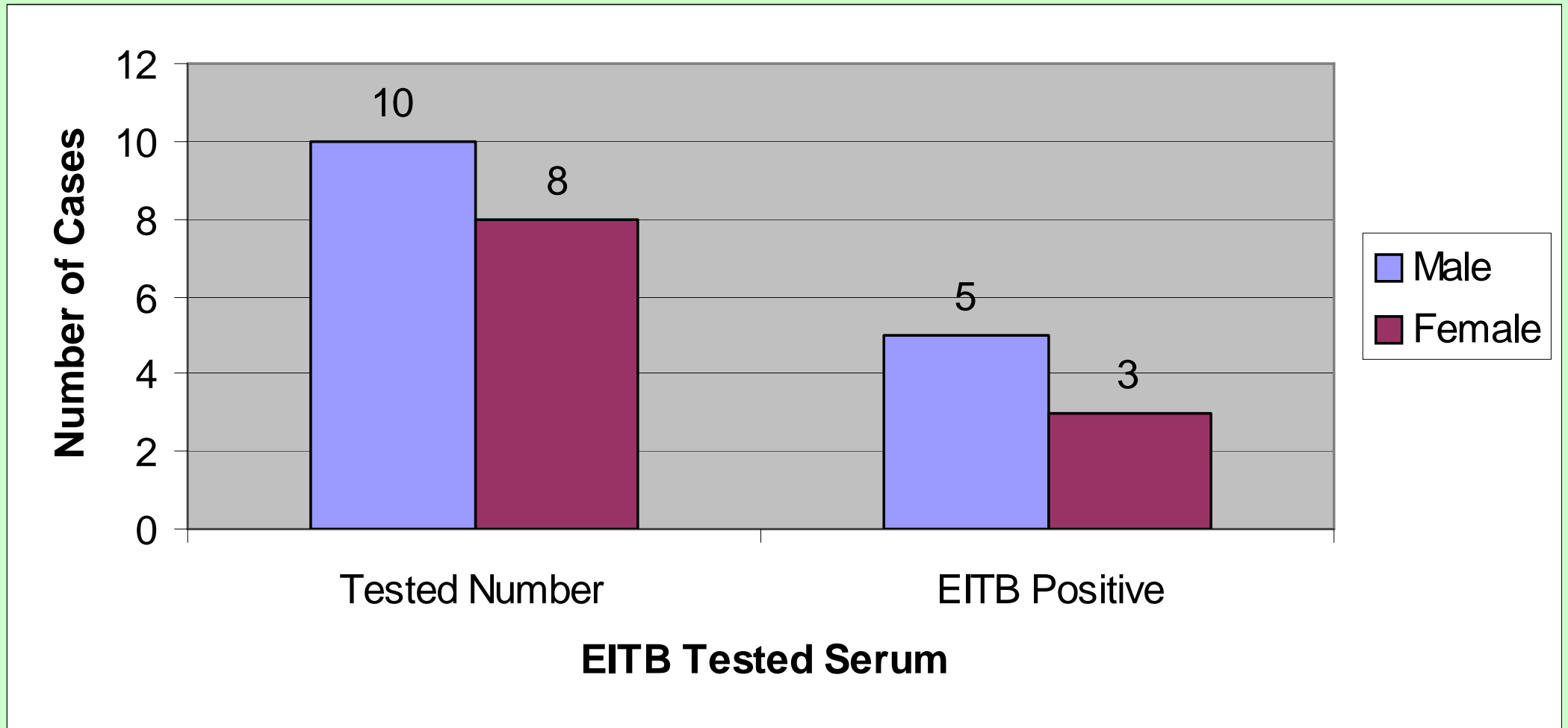
S.N.	Hospital	Positive	Negative	$\chi^2$
1	TUTH	28	85867	
2.	Bir	16	50017	
3.	Patan	25	94845	396.373
4.	Norvic	46	8681	(P0.000)
5.	NMC	14	28238	
6.	CMC	60	40825	

- The age and sex wise distribution of the 841 NCC patients diagnosed between 2002 and 2006 in the 7 hospitals is shown in figures 3 and 4.
- The age wise distribution of NCC cases shows the highest 47.09% (396) in the age group of 15-35, which was followed by the age groups of 0-14 years 29.37% (247) and the lowest in the age groups of above 35 years 23.54% (198).
- Out of total 841 NCC patients from seven hospitals, 58% (490) were males whereas 42% (351) were females.

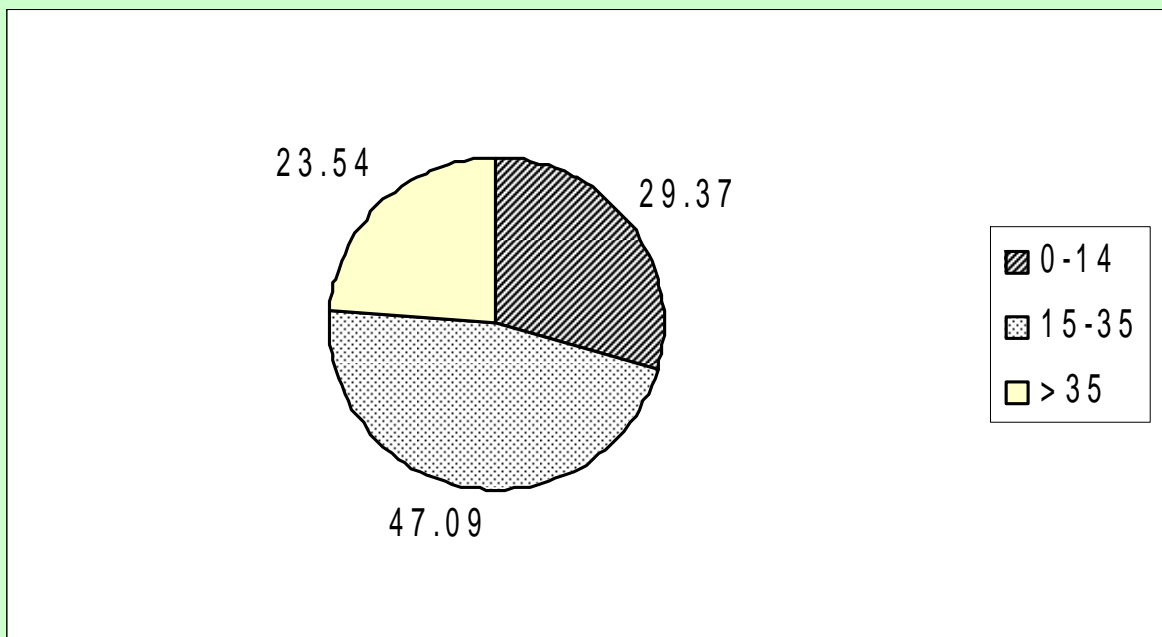
**Total positive = 8 (44.44)**

**Total negative=10 (55.56)**

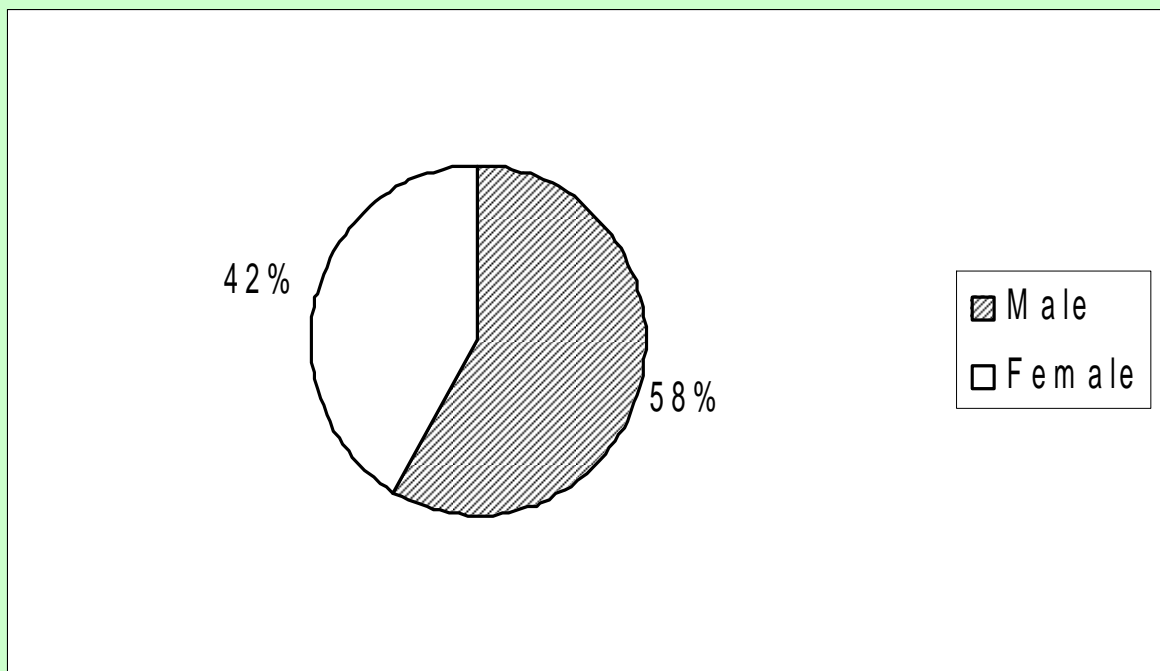
**Note:** 7 diagnostic band 50,(43-39), 24,21,18,14 &13



**Figure no. 2: Graph is showing Immunoblot results for cysticercal Antibody detection in human serum**



**Figure 3: Age wise distribution of NCC patients**



**Figure 4: - Sex wise distribution of NCC Patients.**

# Discussion

- The distribution of pig population in different ecological belt of country is 9.47% in mountain, 55.58% in hill and 34.95% in Tarai.
- Per capita meat consumption pattern in Nepal is 8.7 kg/per person/year.
- Pork contributes about 7.32% of total share in Nepal and other as buff 64.68%, Chevon 19.41% and poultry 7.18%.
- The major causes of parasitic diseases to both humans and livestock are the poor sanitary and hygienic condition.

## Discussion..... (Cont.)

- It was reported that 14.28% of porcine cysticercosis by meat inspection in Kathmandu in 1997.
- The prevalence rate of porcine cysticercosis in Chitwan valley has been found as 6.66%.
- Pig vaccination, treatment of porcine cysticercosis, human mass treatment against taeniasis as well as health education campaigns are the possible measures of prevention and control of *T. solium* and cysticercosis.

# Conclusion

- The incidence of admitted NCC patient was highly significant ( $P < 0.001$ ) among the hospital. The NCC per epileptic admission episodes was found as 13.34 percent in 6 hospitals and 31.68 percent per OPD visits in BPKCH.
- Though Slaughterhouse and meat Inspection Act and Regulation has been approved by Government of Nepal, there is still no enforcement of act and provision of hygienic slaughtering and meat inspection practices in Nepal.
- Cysticercosis can be overcome by effective health education, use of widely available modern diagnostic tools, elimination of taeniasis by chemotherapy namely niclosamide and praziquantel, improved sanitation, cooperation of veterinary and medical services, linkage with programs against epilepsy and cooperation of better educated communities.



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**Namaste**

**Thank You**