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Detection of IgG antibodies in Radiologically proven and unproven Clinically Suspected cases of Neurocysticercosis

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Abstract

Crysticercosis was caused by the larval stage of tapeworm Taenia solium and a major public health problem, especial-ly in the developing world. A total number of 92 subjects were requited in the present study among which they have been clinically suspected cases of Crysticercosis of both sexes between the age group of 10 to 60 years . Study Group I consisted of 70 patients, among which 42 were males and 28 were females, 57 adult and 13 paediatric cases. 30 cases from rural where as 40 were from urban areas. Study Group II consisted of 22 patients with 14 males and 8 females, 19 adults and 3 paediatric cases, 13 urban cases and 9 rural cases. All the cases with habit of pork eating are seropositive 4 out of 14 pure vegetrains are seropositive 50 out of total 92 cases of belonging to both groups are having non-vegetrain food habits other than pork. Among 50 of these cases 43 are seropositive (86%)of these cases 43 are seropositive (86%). In the current study there is a significant difference between the two groups i.e. group I radiologically proven subjects and radiologically unproven cases and no significance was observed within the group, however the screening of IgG antibodies for Neurocysticercosis is recommended and further studies has to be initiated for better diagnostic approach in cysticerosis.

Keywords: Neurocysticercosis, seropositive, ELISA.

Introduction

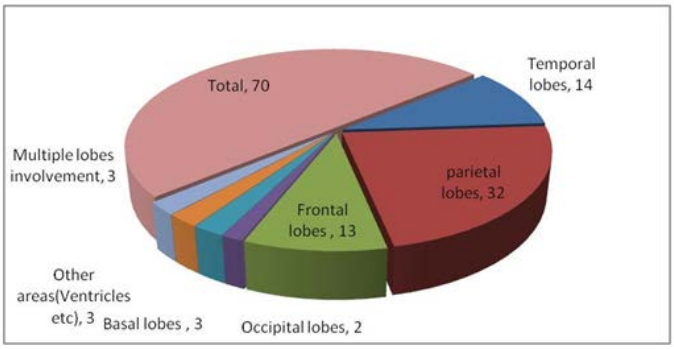
Crysticercosis was caused by the larval stage of tapeworm Taenia solium and a major public health prob-lem, especially in the developing world. Neurocysticer-cosis (NCC) is considered to be the most common para-sitic infestation of the central Nervous system and the single most common cause of Epilepsy in the developing countries[1]. Cysticercosis is considered as a biological marker of social and economic development. The clini-cal manifestations are highly Variable and depend on the number, location and viability of cysts. They include via Convulsions and seizure, Meningitis & Intracranial hypertension along with Complications that include In-tracranial herniat ions, stroke and status epilepticus.

The varied clinical presentations of neurocysti-cercosis (NCC) result from a series of factors, which include the number, stage, size, and location of parasites in the nervous system of the human host, factors which also influence case management and prognosis. In this context, the utility of immunodiagnosis as a tool on which to base clinical decisions by itself is quite limited. Diagnosis and characterization of human NCC should be based on a brain imaging examination to observe the characteristics of the lesions, accompanied by a serologi-cal test result to confirm the etiology. In the best possible scenario, the immunological test should not only be highly sensitive

and highly specific for etiological con-firmation but also be able to discriminate infections with living parasites from inactive infections, and correlate the characteristics of the infection with parasite load, for patient management and follow-up. A century of sero-logical assay development for *Taenia soli-um* cysticercosis has provided some tests which fulfill several of the above requirements, albeit the ideal assay has yet to be developed. The current study focused on Screening of IgG antibodies on radiologically proven and unproven cases of Neurocysticercosis.

Material and methods

A total number of 92 subjects were requited in the present study among which they have been clinically suspected cases of Crysticercosis of both sexes between the age group of 10 to 60 years attending to outpatient and inpatient Departments of Neurology and pediatrics of king George Hospital – Visakhapatnam during a span of one year. And further they are classified into 2 Groups via Group I - radiologically proven cases (n=70) and Group II - radiologically unproven cases (n=22). 5 ml of blood was drawn from vein into a sterile Dis-posable syringe under strict aseptic conditions. Serum was separated from it by centrifugation and stored at - 700 C for further analysis. All the samples were tested by ELISA since, it is a highly sensitive and specific test used for the detection of a variety of antigens and antibodies of microbial and human origin along with the patient history regarding age, sex, occupation, address, marital status, education, history of present ill-ness, past illness, personal and food habits including history of pork and wild boar consumption apart from leafy vegetables and other vegetables which have possi-bility of getting contaminated with eggs of Taenia solium in the soil. In Group I all the symptoms and radiological finding compatible with Neurocysticercosis like Sei-zures as the presenting symptom, Head ache, No evi-dence of raised intracranial pressure, No Neurological deficit, No active systemic disease. In Group II as of Group I but with out any radi-ologically investigation for neurocysticercosis . Tubercu-lous Granuloma, Cerebral abscesses, Cerebral tunours and other calcified Granulomas of brain not in favour of Neurocysticercosis are excluded from the present study. Results: Study Group I consisted of 70 patients, among which 42 were males and 28 were females, 57 adult and 13 paediatric cases. 30 cases from rural where as 40 were from urban areas.Study Group II consisted of 22 patients with 14 males and 8 females, 19 adults and 3 paediatric cases, 13 urban cases and 9 rural cases.



Temporal lobes	14
parietal lobes	32
Frontal lobes	13
Occipital lobes	2
Basal lobes	3
Other areas(Ventricles etc)	3
Multiple lobes involvement	3
Total	70

Table 1- Shows occurrence and location of cysts in the brains of NCC patients , evident on CT/MRI of brain. Out of the total 70 cases of study group I,14 cases were found to have cysts in Temporal lobes ,32 cases in Parietal lobes , 13 cases in Frontal, lobes , 2 cases in Occipital lobes ,3 cases each in Basal gangalia and other areas like Ventricles , respectively. In 3 cases multiple lobes were involved.

Group-I : Seropositivity of samples		
	No.of samples	%
Seropositive	69	98.50%
Seronegative	1	1.50%
Total	70	100%

Out of 70 cases only one case in group-I is seronegative making the seropositivity 98.5%.

Group-II : Seropositivity of samples.

	No. of samples	%
Seropositive	6	27.00%
Seronegative	16	73.00%
Total	22	100%

Out of 22 radiologically unproven cases 6 cases showed Seropositivity making the positivity in group-II (27%).

Comparison of results between Group-I and Group-II.

	% of Seropositivity	% of Seronegativity
Group - I	98.50%	1.50%
Group - II	27.00%	73%

Comparison of seropositivity with food habits of patients.

Type	No. of samples	No. of seropositive (%)	No. of seronega-tives (%)
veg	14	4(28.5%)	10 (71.5%)
Pork	28	28(100%)	0
Other Non-veg	50	43(86%)	7(14%)
Total	92	75	17

All the cases with habit of pork eating are seropositive 4 out of 14 pure vegetrains are seropositive 50 out of total 92 cases of belonging to both groups are having non-vegetrain food habits other than pork. Among 50 of these cases 43 are seropositive(86%)of these cases 43 are seropositive (86%).

Discussion

A practical problem in evaluating any diagnos-tic test for neurocysticercosis is that no single gold stand-ard is available for diagnosis of all cases. Diagnostic criteria has been enumerated with degrees of certainty for diagnosis of NCC2. Magnetic resonance imaging and CT scans are diagnostic only when the scolex can be visualised within the multiple or single ring lesions in CT scan3. However in many cases the scolex is not seen and the differential diagnosis, in India and other regions endemic for tuberculosis, is frequently tuberculoma4. Small cystic gliomas5 and parenchymal abscesses may also, sometimes, present as ring enhancing lesions. Hence only cases with ring lesions having a positive commercial cysticercus ELISA or scolex in MRI/CT scans were included in the study for evaluation of the new test. The sensitivity and specificity of ELISA for detection of antibodies in serum has varied from poor to 80%.6 Better results have been reported for detection of IgM antibodies as compared to IgG antibodies7. We have observed a similar sensitivity in IgM and IgG ELI-SA. It is interesting to note that in the current study, either or both antibodies were present in 70/92 cases. Thre is a need of further studies to evaluate of both IgG and IgM antibodies in sera of patients to increase the sensitivity of ELISA. As with other parasitic infestations of the body, one would expect the IgM antibodies to be present in the early stages of infection, both IgG and IgM positivity in active stages of disease and IgG to persist in disease of long duration8. Direct immune diagnosis (detection of products of the infective agent in the host) has the advantage of demonstrating active infection and in most cases, the antigen levels are associated with the infective burden and thus the severity of the infection, so this type of test can be used to determine therapeutic decisions and guide the prognosis of the patients9. Cure is frequently associated with negative antigen results, and on the other hand, relapses, reinfections, or complications result in increases in circulating antigen levels. Unfortunately, in most cases, the sensitivity of antigen detection assays is inferior to that of indirect, antibody-detecting assays. The initial reports on finding T. solium antigens in the CSF of patients with NCC used ELISA assays with rab-bit polyclonal antisera raised against crude cysticercal extracts10. Their results were promising, particularly in terms of specificity. As expected, circulating antigen cannot be demonstrated in

the CSF of all NCC patients. Also, only a fraction of all antigens present in the cyst fluid can be detected in the patient's CSF. Circulating antigen can also be detected in serum, as initially demonstrated for T. saginata cysticercosis in cattle and later in human samples.

Monoclonal antibody (MoAb)-based antigen detection greatly improved the performance of these assays. The initial tests for T. solium antigen detection originated from assays developed against T. saginata and per-formed well thanks to an unexpected interspecies cross-reaction. In 1989, Harrison et al. developed a MoAb against a repetitive epitope from excretory/secretory glycoprotein products of the T. saginata metacestode, HP10. In an ELISA format, HP10 detected circulating antigen in cattle with 200 or more live cysts, with levels detecta-ble in cattle serum as early as 4–5 weeks post-infection. No cross-reactions other than the above described with T. solium were reported. The sensitivity of the HP10 ELISA in CSF of confirmed NCC cases was 72%. A similar method was pursued by Brandt et al. in 1992. They found eight MoAbs of IgM isotype, which when used in combination, had a lower detection limit of 88 live cysts in infected cattle, and also were able to detect antigens as late as 5 weeks post-infection11. These Mo-Abs were also directed against repetitive glycoprotein epitopes. Further studies generated IgG MoAbs, which improved the antigen assay performance, reaching 92% sensitivity and 98.7% specificity in sera from cysticerco-sis-infected cattle. They also showed that the target anti-gen was thermostable. Heat treatment of samples prior to testing gave better results, in particular fewer non-specific reactions12. However such a correlation is not possible in cases of neurocysticercosis since the duration of the infestation does not frequently correlate with the duration of symptoms which may appear very early or late in the stage of the disease13. In the current study there is a significant difference between the two groups i.e. group I radiologically proven subjects and radiologically unproven cases and no significance was observed within the group, however the screening of IgG antibodies for Neurocysticercosis is recommended and further studies has to be initiated for better diagnostic approach in Neurocysticerosis.

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