THERAPEUTIC EFFICACY OF CYSTICIDE ALBENDAZOLE IN NEURO CYSTICERCOSIS

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ABSTRACT:

Neurocysticercosis is one of the most common cerebral parasitosis with diverse neuropsychiatric manifestation. Out of Eighty four confirmed cases of neuro-cysticercosis (N.C.C.) with the help of M.R.I. & ELISA test, only forty two cases were taken for the study of therapeutic efficacy of Albendazole (ABZ) in various types of neuro-cysticercosis. Twenty-seven cases had solitary benign parenchymal lesion, eleven cases had multiple scattered parenchymal lesions where as four patients had extra parenchaymal & complicated parenchymal lesions with hydrocephalous & cerebral abscess etc. Their most common clinical presentations were seizure, headache & mental deterioration.

Comparative therapeutic responses of ABZ between single parenchymal Vs multiple parenchymal & extra parenchymal with complicated NCC revealed that the efficacy & cure rate was more better i.e. 96% in single parenchymal N.C.C. than 82% in multiple parenchymal N.C.C. & 75% in extra parenchymal N.C.C. So the ABZ therapy was more better & effective in single benign parenchymal N.C.C. than latter two types of multiple parenchymal & extra parenchymal complicated N.C.C. This type of cerebral cysticercosis responses well to ABZ with oral steroid & anticonvulsant.

INTRODUCTION:

Surgeon H. Armstrong first reported Neurocysticercosis in Madras asylum (India) in 1888 from post mortem in neuropsychiatric patients. Since then there have been many case reports from various parts of the world. It is the larval of intermediate state of infection with the Taenia Solium. Ingesting contaminated raw vegetables, salads, undercooked infected meat of the pork & cattle infects hujans, drinking contaminated water. External autoinfection occurs from transmission of eggs from anus to mouth by inadequate personal hygiene. Internal autoinfection results after regurgitation of the ova from small intestine into stomach. Cysticerci emerge from the intestinal wall through mesenteric vessel encysts the brain parenchyma, ventricle, meninges, encephalon, subarachnoid space & eyes. The cysts may be (1) with centrally placed "Mural Nodule" representing the scoles in live cyst (2) edematous "Mural Nodule" with viable parasite (3) granulomatous cysticercous lesions (4) dead parasite with fibrotic capsulated cysts & (5) cyst with calcified ring. The cyst may be (1) Single Parenchymal (2) Multiple Parenchymal cysts scattered throughout the brain parenchymal cysts scattered throughout the brain parenchymal (3) or Multiple Cerebral Parenchymal cysts with secondary complication i.e. cortical atrophy due to neuronal damage & cerabral abscess & ventricular dilatation. Meningeal & intraventricular cyst blocks the C.S.F. pathways producing obstructive hydrocephalous manifesting headache, dementia & seizure. Cysticerci invasion of the brain induces inflammatory reaction to meninges, encephalon & vascular regions, resulting meningo-encephalitis & vasculitis.

Symptoms of nervous system involvement depend upon the (1) site of the cyst (2) & number of the larva or (3) State of the lesion activity & (4) host immune response. Neurocysticercosis is a space occupying lesions of the brain shows the symptoms of brain tumor, cerebral dysfunction like epilepsy, dementia, somatic & behavioral disturbances like headache, dizziness, nausea &

vomitting, voilent behavior, mental disturbances as anxiety, in the symptoms occur in variable combination, mimicking acute or chronic Organic Brain Syndrong symptoms occur in variable combination, mimicking acute or chronic Organic Brain Syndrong symptoms occur in variable combination, mimicking acute or chronic Organic Brain Syndrong symptoms occur in variable combination, mimicking acute or chronic Organic Brain Syndrong symptoms occur in variable combination, mimicking acute or chronic Organic Brain Syndrong symptoms occur in variable combination, mimicking acute or chronic Organic Brain Syndrong symptoms occur in variable combination, mimicking acute or chronic Organic Brain Syndrong symptoms occur in variable combination, mimicking acute or chronic Organic Brain Syndrong symptoms occur in variable combination, mimicking acute or chronic Organic Brain Syndrong symptoms occur in variable combination, mimicking symptoms occur in variable combination of the chronic Organic Brain Syndrong symptoms occur in variable combination of the chronic Organic Brain Syndrong symptoms occur in variable combination of the chronic Organic Brain Syndrong symptoms occur in variable combination of the chronic Organic Brain Syndrong symptoms occur in variable combination of the chronic Organic Brain Syndrong symptoms occur in variable symp symptoms occur in variable combination, mimicking acute of the syndrom syndrom Lack of physical & neurological findings, neurosurgeons & physicians under rate physical causes and the syndrom Lack of physical & neurological findings, neurosurgeons & physical & neuropsychiatric man a possible basis for the mental symptoms. Few patients were studied for the neuropsychiatric man appropriate the neuropsychiatric man appropria festation, site of cerebral lession & therapeutic responses with different cysticides.

AIMS:

Present study was undertaken with following aims:-

- (1) To study demographic characteristic.
- (2) To study neuropsychiatric menifestation.
- (3) To study therapeutic efficacy of cysticide & its implication.

<u> MATERIALS & METHODS:-</u>

Samples: Out of eighty- four confirmed patients of Neurocysticercosis, 42 were taken for the study. The patients were selected on the basis of proven Neurocysticercosis by the presence of distinct image of parasite in M.R.I. brain. The patients not satisfying the DSM III criteria of Organic Brain Syndrome were excluded from the study.

METHODS:-

Initially, the especially self-designed socio-demographic data sheet was administered to all the patients for the detail demographic study. The patients underwent complete physical, neuropsychiatric & mental state examination. A symptoms check list & rating scale was administered for all the patients to study cerebral dysfunction, symptoms related behavior, somatic disorders, reactive & neurological symptoms. Folstein Mini Mental State Examination protocol was used twice before & after treatment for assessing the cognitive functioning. Lumber puncture with C.S.F. tap was done to assess the increase intracranial pressure, pleocytosis, elevated protein, blood sample were drawn from all the patients to find out the presence of eosinophilla & leucocytosis. M.R.R Brain was done before & after completion of treatment for the evaluation of drug efficaccy & resolution rate of cerebal lesions. The efficacy of different regimens of therapy for various types of Neurocysticercosis with ABZ was compared in forty-two patients. These patients were subjected to ABZ therapy to evaluate eherapeutic responses of them. These patients were subdivided into three groups according to various modalities of Neurocysticercosis observed in M.R.I. brain. The division was based on the following criteria:-

- (1) 27 Patients with Signle Parenchymal Lesion.
- (2) 11 Patients with Multiple Parenchymal Lesions.
- (3) 04 Patientw with Extra Parenchymal Cysts, Intraventricular Cysts, abscess, cortical atrophy, hydrocephalous, Multiple Parenchynmal with secondary complication.

Two schemes of treatment were used with ABZ 15 mg/Kg/per day for 30 days as short-term therapy. ABZ 15mg/Kg/per day for 60 days as long term therapy. The therapeutic efficacy of ABZ was compared between each different type of Neurocysticercosis. The drug efficacy evaluation for was administered twice before & after treatment. The detail evaluations of the patients were done after completion of each short term & long term therapy. The cysticide efficacy, cure rate, cerebral lesions & resolution rate in various N.C.C. was studied. All the patients were treated in addition with oral steriod as anti edema & anti-inflammatory measures for forty-five days. It was started days prior to starting ABZ & those were tapered off after conclusion of treatment. Those patients

who were under anticonvulsant & psychotropic drug therapy prior to receiving ABZ, continued such previous therapy. Since the purpose of this study was also to find out the cysticidal effect of the ABZ, in the various groups. The uses of more other drugs & surgical approach were availed for the prevention of the interference.

Result:DEMOGRAPHIC CHARACTERISTICS OF THE SAMPLES.

Table No :- 1
Age Distribution

Age Gr	oup Years	No of N.C.C.	%	
Less Th	an 14	20	23.80	
!5	24	26	30/95	
25	34	23	27.38	
35 >	44	15	17.8	
Total		84	100	

Regarding the distribution & its demographic characteristics, this study revealed that the age of the patients was ranging from 5-50 years. Most of the victims were of young age groups less than 34 years. There was no exception for the age group below 10 years in this sample.

Table No :- 2

Sex Distribution

Sex	No	%	
Sex Male	59	70.23	
	25	29.76	
Female Total	84	100	

Most of the male group 59(70.23%) were suffering from N.C.C. in contrast to female groups 25 (29.76%) because of their migratory habit.

Table No :- 3

SOCIO-ECONOMICAL STATUS

S.E.S.	No.	%	
Upper	10	70.90	
Upper Middle	15	17.85	
	25	70.23	
Lower Fotal	84	1000	

50 (70.23%) patients belonging to low socio-economical status were exposed maximum to N.C.C. in comparison 15 (17.85%) middle class & 10(11.90%) upper class respectively.

JOB STATUS

Natarra	No	%
Nature	140	50
Employed	42	50
Unemployed	42	100
Total	84	100

All the employed & unemployed N.C.C. patients from Royal Nepalese Army & their family were equally exposed to N.C.C. because they come from similar endemic area.

Table No: 5

FOOD HABIT

Food Habit	No	%
Vegetarian	0	10.71
	75	89.28
Non vegetarian	7.5	100
Total	84	100

Regarding the food habit of the patients our study revealed that 75(89.28%) were non-vegetarian & 9(10.71%) vegetarian. Non-vegetarian groups were commonly exposed to N.C.C. because of their habit of taking infected non-vegetarian food in contrast to vegetarian group.

Table No:-6

CASTE & NEUROCYSTICERCOSIS

CASTE	NUMBER	%
BRAHMINS	19	22.61
NON- BRAHMINS	65	77.38
TOTAL	84	100

Study of frequency of N.C.C. among the Brahmin & non-Brahmin groups 65(77.38%) were more vulnerable to N.C.C. in comparison toe Brahmin group 19(22.61%). Brahmin being strictly vegetarian in food habit was no exception to N.C.C., because they take contaminated green vegetable.

Tuble No:- 7

DURATION OF ILLNESS

DURATION OF ILLNESS	NUMBER	%
0 6 MONTHS	23	27.38
7 12 MONTHS	14	16.66
2 YRS 5 YRS	30	35.7
MORE THAN 6 YRS	17	20.23
TOTAL	84	
412(15)		100

The analysis showed that the onset of the symptoms & diagnosis was variable, earliest case detection less than six month were 23(27.00%), maximum cases 47(55.95%) were detected after two years duration of illness. It may be cause of lack of investigatory tools & prominent mental symptoms masking the neurological condition might have delayed the diagnosis.

NEUROPSYCHIATRIC MANIFESTATION

CLINICAL SYMPTOMS	NUMBER	%
1. CEREBRAL DYSFUNCTIO	N	
Seizure	79	94.04
Mental Deterioration	17	20.30
2. SYMPTOMS, RELATED B	EHAVIOR	
Violent Behavior	4	4.76
Automatic Behavior	2	2.38
3.SOMATIC SYMPTOMS		
Head Ache	45	53.57
Lethargy	8	9.52
Excessive Sleep	2	2.33
4. REACTIVE SYMPTOMS		
Depression	13	15.47
Anxiety	4	4.76
Suicidal Attempt.	1	1.19
M.D.P. Mania	1	1.9
5. NEUROLOGICAL SYMP	TOMS	
Visual Disturbances	4	4.76
Facial Palsy, Monoparesis	6	7.14
Hemiplegia	5	5.95

Regarding Neuropsychiatric Manifestation (1) Cerebral dysfunction-79 patients had Generalized Seizure mainly of solitary Parenchymal lesions involving Parietal & Frontal, Ventricular regions associated with increase intracranial pressure, cerebral edema, obstructive hydrocephalous & abscess. (2) Mental deterioration-17 cases of mental deterioration were detected with demeaning features with behavioral abnormalities i.e.violent behavior & visual disturbances. Hydrocephalous. cortical atrophy, cerebral abscess, scattered multiple parenchymal lesion, with edema & uncontrolled epilepsy was detected in three patients. (3) Symptoms Related Behavior- The analysis showed that violent & automatic behavior were the common presentation, mainly the lesions were in parietal regions associated with uncontrolled seizure. Somatic Symptoms analysis showed that headache was predominant presentation i.e. 45(53%), but lethargy 8(9.52%) & excessive sleep 2(2.23%) was in lesser frequency. They had lesion mainly in parietal, frontal, multiple parenchymal lesions & intraventricular lesions with hydrocephalous. Headache was diffused in nature, some were hemicranial type. It was also noted during treatment period. may be due to inflammatory reaction inducing meninges & encephalon by the protein liberation after the death of the cysts. (5) Reactive symptoms profile documented 13(15.47%) patients had depression, 4 anxiety, 1.M.D.P. Mania & 1 attempted to commit suicide. Their lesion, were mainly in parietal, frontal & intraventricular respectively (6) Neurological Symptoms analysis revealed that out of 15 patients who had neurological symptoms,4 had visual disturbances, diplopia & visual hallucinatory behavior. They had lesions in parietal, occipital lesions & intraventricular cysts with obstructive hydrocephalous. Most of them hud papilleodema & were disappeared after treatment. 6 patients had monoplegia i.e. facial palsy, sensory & motor palsy & aphasia presented only following after seizure which were sudden onset & gradually disappeared over a period of week after treatment. Correlation between cerebral lesions & neurological deficit revealed the lesions in parietal, frontal lobe & few multiple parenchymal complicated lesions. 5 patients had hemiplegia following after seizure, lasted for a few weeks. They had mainly single parietal parenchymal lesions & one had complicated parenchymal lesions.

COMPETITIVE STUDY OF COGNITIVE FUNCTION MEASURED BY FMMSE PRE & POST TREATMENT WITH ABZ

	TO SCOPE %	POST TMT SCORE %	RESULT %
TYPE OF NCC & CO.		90	14.34
L SINGLE PARANCYMAL NCC-27	75.66	87.86	13.63
2 MULTIPLE PARENCHYMAL NCC-11	74.23	92.5	25
B EXTRA PARENCHYML & COMPLICATED NCC-	4 67.5		

Folstein Mini Mental State Examination rating scale revealed that patients scoring poor value before treatment had scored above normal by 17.65% value after treatment with ABZ in different types of N.C.C. Significance gains of the score indicate the therapeutic efficacy of the cysticide & help to evaluate the prognosis of N.C.C. In an early stage patients had shown significance deterioration of I.Q. due to cortical atrophy, neuronal damage & hydrocephalous. The improvement of I.Q. was significance after ABZ therapy.

Table No:- 10

COMPARATIVE THERAPEUTIC RESPONSES OF ABZ IN N.C.C. ABZ-15/Kg.

	30 Days		S. Charles	60 Days
YPE OF N.C.C.	IMPROV.NO%	NPRV NO %	IMPRV NO %	NPRV NO%
SINGLE PARENCHYMAL NCC-27	26(96.3)	1(3.7)	193.7)	NIL
MULTIPLE PARENCHYMAL NCC-11	9(81.81)	2(18.2)	2(18.2)	NIL
EXTRA PARENCHYMAL COMPLICATED NCC-4	3(75)	1(25)	1(25)	NIL
OIAL	38(90)	4(9.52)	4(9.52)	NIL
OTAL CURE RATE	38(90)		4(9.52)	
OTAL FAILURE RATE		499.52)		NIL

Therapeutic responses of ABZ in different types of N.C.C., this analysis showed the efficacy of ABZ was more effective for Single Parenchymal N.C.C. in contrast to Multiple Parenchymal N.C.C. & extra Parencymal N.C.C. i.e. 26(96.29%) Vs 9(81.81%), 26(96.29%) Vs 3(75%). ABZ was more effective in all cases of N.C.C. because of increased plasma C.S.F. levels of ABZ as report of the Jung & et al 1990. Dexamethasone increase plasma levels of ABZ resulting increased efficacy of ABZ agrees with the findings of Medina et al 1990.

Table No: 11

TOTAL ASSESSMENT OF ALBENDAZOLE THERAPEUTIC EFFICACY IN N.C.C.

REATMENT	CURE	RATE	-	
DURATION	30 DAYS	60 DAYS	FAILU	JRE RATE
ALBENDAZOLE	38(90.%)	4(9.52%)	30 DAYS 4(9.52%)	60 DAYS

Total assessment of ABZ therapeutic efficacy revealed cure rate 38(90%) in three different types of N.C.C. by 30 days & 4(9.52%) by 60 days where as failure rate was 4(9.52%) by 30 days only.

M.R.I.BRAIN FINDINGS OF N.C.C.C IN PRE& POST TREATMENT WITH ABZ

1. Single Parenchymal N.C.C.: -

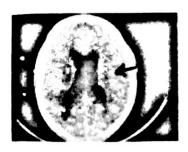


Before Treatment



After Treatment

2. Multiple Parenchymal N.C.C.: -



Before Treatment

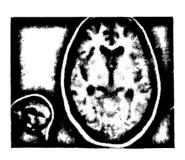


After Treatment

3. Complicated Parenchymal N.C.C. with Abscess: -



Before Treatment



After Treatment

M.R.I.BRAIN FINDINGS OF N.C.C. IN PRE & POST TREATMENT WITH

F	R.TMT		ST TMT DAYS	POST 7	Vo
TYPE OF N.C.C.	NO%	DISAP NO %	N.DISAP NO %		N.DISAP NO.
L SINGLE PARENCHYMAL NCC-27 2 MULTIPLE PARENCHYMAL N.C. C.11	64 26	26(96) 9(82)	1(4) 2(18)	1(4) 2(18)	NIL NII
3 EXTRA PARENCHYMAL & COMPLICATED N.C.C14 TOTAL RESULUTION RATE	9.52	3(75) 38(90.47)	1(25)	1(25) 4(9.52)	NIL NIL

The study of M.R.I. brain findings after ABZ treatment showed that out of 27(64%) Single Parenchymal N.C.C., 26(96%) resolved within 30 days 1(4%) resloved after 60 days treatment, It is 11(26%) Multiple Parenchymal N.C.C., 9(82%) lesions resolved by 30 days, 2(18%) lesions resolved by 60 days. Out of 4(9.52%) Extra Parenchymal N.C.C. & complicated N.C.C., 3(75%) lesions resolved by 60 days treatment. Comparative study of resolution rate with ABZ in between Single, Multiple, Extra Parenchymal & complicated N.C.C., the former was better than last two types of cerebral lesion i.e. Single Parenchymal N.C.C. 26(96%%) Vs Multiple 9(82%) Vs Extra Parenchymal 3(75%).

Study of side effects reported with ABZ had minimum side effects. It showed CNS undesired effects i.e. one patient had encephalitis, another one altered sensorium, 3 hyperpyrexia, 2 status epilepticus, 4 cases had G.I.T. disorder & all were improved by one week.

C.S.F. analysis revealed that 34(40%) patients had increase intracranial pressure, 58(69%) had pleocytosis, 77 (91.66%) had more than 30 mg% protein, 52 (61.90%) patients had more than 50 mg% sugar, 84 patients had total WBC count more than 5000 cu mm, 39 patients had eosinophil more than 10 cells.

DISCUSSION:

Cursed area with inadequate sanitation & fecal contamination leads to the spread of the eggs to the ignorant consumer i.e. pigs, cattle, humanbeings, chicken & fishes etc. Ingestion of unhygienic undercooked, infected tissues, infection by an oral route or regurgitation of matured segments of cysts from small intestine into the stomach leads to cysticercosis involving subcutaneous tissues, brain, eyes, skeletal muscles, heart, lung & abdominal cavity. It represents a great health hazard in Nepal.

This study revealed that it usually affects the young man less than 34 years ole, because of their migratory habit. The children below 10 years of age also had N.C.C. incontrast to previous report. This indicates severe health problem in undeveloping country like Nepal. So urgent need is felt to understand its pathophysiology, therapeutic implication of N.C.C. Mostly male patients 50(70.23%) were affected by N.C.C. incontrast to female patients 25(29.76%) because of their frequent transfer from one unit to another, they are mostly vulnerable to N.C.C. from the endemic area & also having migratory habit for better job. Low socio economical status groups 59(70.23%) were more susceptible to N.C.C. in contrast to middle & upper class patients because of poor personal hygiene. Non vegetarian group 75(89.28%) had higher frequency of N.C.C. in contrast to Brahmin & vegetarian groups possibly they were consuming undercooked, infected meat. Most of the Hindu, Brahmin, vegetarian groups do not take non-veg food more so pork's meat. Brahmin, vegetarians were equally predisposed to the infestation as, non-brahmin who consume pork, may be due to deculturation, change of pattern of food habit, using contaminated green vegetable, water or poor personal hygiene.

In this series of study, majority of cases 56% were diagnosed above 2 years of onset of symptoms, few were diagnosed even after 20 years of onset illness, it may be due to pleomorphic Neuropsyhiatric manifestation, lack of proper investigatory tools as C.T. scanner or M.R.I. technique, underrating by general physician & surgeons, physical etiopathogenesis as a possible basis for mental symptoms accounts for missed or under diagnosis or late identification of cases. It may be also due to lack of mental health consciousness & superstitious belief for N.C.C. is rapidly increasing in our unsociety. Still it could not be used commonly because of its price value.

The main clinical manifestation of N.C.C. in this study was seizure 79(94%), head ache 45(53.5%), mental deterioration 17(20.2%) & depression 13(15.4%). N.C.C. should be considered in the presence of above symptoms in the individual from endemic area. This finding agrees with the report of Venkataraman et al, Medina & Gonzalo et al 1990. Among three types of seizures, generalized seizures 50(63.29%) were more higher than partial & unilateral seizures. They had mostly Solitary Parenchymal lesion, Multiple Parenchymal lesions & Extra Parenchymal lesions with hydrocephalous. Seizures without any other active lesions indicate increase intracranial pressure, hydrocephalous, cerebral edema & underlying irritation foci.

In this study, Neuropsychiatric manifestation was earliest symptoms & severe enough to dominate the picture. Lack of Neurological deficit, complex mental pictures like depression, anxiety, suicidal attempt, manic features associated with violent behaviour, somatisation as headache in N.C.C. complicated for the earliest diagnosis. Affective disorder, psychotic & behavioral problem equally hard to evaluate with regard to the etiological role of the space occupying lesions & its location. Those cases had mainly Parietal, Frontal Parenchymal N.C.C. lesions. The clinicopathological correlation that emerge tend to be imprecise. It is hard to disentangle the effects, generalized effects of N.C.C. lesions. A good deal is contradictory from one report to another but certain mental symptoms emerged repeatedly representing the lesions, which can be the diagnostic important.

Neurological deficit which appeared only after the post ictal period was first to disappear after a few weeks, predominantly the neurological deficits were facial palsy, hemiplegia, diplopia, visual disturbances, in the background of mental symptoms. Fronto pariental lobe & intra ventricular lesions were most common in this study, correlated with neurological deficit. Prominent earliest appearance mental symptoms & puzzling & unconvincing nature of neurological deficit appearing only after post epileptic period readily invites to label functional psychiatric condition & might have delayed the diagnosisof N.C.C. Significant mental deterioration were recording in this study which reflects the underlying irritating lesions, cortical atrophy, cerebral edema, hydrocephalous which reflects the underlying MMSE tools used to evaluate cognitive functioning revealed the improved performance by Single Parenchymal N.C.C. in contrast to Multiple & Extra Parenchymal N.C.C. after treatment which can used for evaluating the prognosis of the patients.

Standard plan for the management of N.C.C. with cysticides is yet debatable but this study revealed that therapeutic efficacy of ABZ with oral cortisone 100% was more effective & least toxic the various types of N.C.C. agrees with the findings of Alarcon et al 1990. The cure rate & resolution rate of cerebral lesions with ABZ was 100% is documented by Brutto et al 1990. As per the therapeutic responses with ABZ the N.C.C. may be classified into three groups (a) Solitary Benign Parenchymal (b) Multiple Benign Parenchymal were relatively simple to treat with ABZ, cortisone & anti convulsa therapy in contrast to (c) Malignant Extra Parenchymal & complicated. C.S.F. analysis, total blood count was useful only in active form of N.C.C. but normal in inactive from N.C.C. also reported by Medina et al 1990.

CONCLUSION:

Neurocysticercosis in one of the serious public health problems in Nepal. Need of community.
Mental Health, Public Health care awareness regarding this conditions is urgently felt.

2. Aggressive multidimensional approach for early identification of N.C.C. with M.R.I & C.T.

scan etc, should be considered before invasive neurosurgical approach & antitubercusous therapy. It may improve the general outcome & prognosis of patients afflicted by this condition.

3. N.C.C. should be considered in all cases of Epilipsy, Headache, and mental deterioration if the N.C.C. should be considered in all cases of Ephipsy, recently a suggested for eradication of patients from endemic area. Short-term mass therapy with ABZ is suggested for eradication of Tapeworm infestation in endemic area.

4. Single Parenchymal N.C.C. may be treated with ABZ. ABZ is more safe, effective, least toxic may be also used for Multiple Parenchymal, Extra Parenchymal & Complicated Parenchymal N.C.C.

5. The doses of ABZ is 15mg/kg/day to be given for 30 days, may be extended upto 60 days depending on the cerebral lesions.

- 6. Oral steroid is suggested for 45 days & to be started 2 days prior to starting ABZ & tapered of after conclusion of treatment. Anti-convulsant & analgesic medication needs to be given as per requirement.
- 7. Serological study is urgently needed for early identification of N.C.C.

8. Serial sequences of M.R.I. brain are emphasized to study efficacy of cysticides.

9. Short-term prophylactic ABZ therapy should be considered for the immigrant of the endemic area.,

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