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AN INTEGRATED APPROACH IN THE MANAGEMENT APASMARA AS A SEQUELA OF TUBERCULOUS MENINGITIS: A CASE STUDY

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ABSTRACT :

Tuberculous meningitis (TBM) is an air-borne infectious disease caused by the bacteria Mycobacterium tuberculosis that affects the central nervous system (CNS). Among all the incident cases of Tuberculosis (TB), Central Nervous System Tuberculosis (CNS TB) represents approximately 1% with Tuberculous Meningitis (TBM) as the most grievous among all. Tuberculous meningitis results from the haematogenous spread of primary and postprimary pulmonary Tuberculosis (TB) or from the rupture of a sub-ependymal tubercule into a subarachnoid space. In more than half of cases, evidence of pulmonary lesions or a military pattern is found on CXR. The disease often presents subtly as headache and slight mental changes after a prodrome of weeks of low grade fever, malaise, anorexia, weight loss and irritability. If not recognized, tuberculous meningitis may evolve acutely with severe headache, confusion, lethargy, altered sensorium, and neck rigidity. Typically disease evolves over 1-2 weeks, a course longer

than that of bacterial meningitis. Paresis of cranial nerves is frequent finding and involvement of cerebral arteries may produce focal ischaemia.

This case study elaborates the treatment line and observations made in a 19 year old male patient who presented with Generalized Tonic and Clonic Seizures episodes and significant sensory deficit. Patient was admitted in ICU for further evaluation and management. Initially on admission, all emergency medicines were administered to stabilize the patient. Then MRI brain was done, suggestive of multiple conglomerate round to oval lesions in bilateral cerebellar hemispheres and left frontal region with extensive leptomeningeal enhancement s/o infective etiology like tuberculosis, with chest X-ray revealing multiple small opacities in bilateral lung fields. Along with allopathy treatment, *Ayurvedic* management in the form of *Abhyantara* and *Bahya chikitsa*, were successively done allied with physiotherapy. *Yogabastikrama* with Sandnyasthapana gana as *Kashaya* and *Kalka* was done intervened by *Anuvasana basti*. Succeedingly, *Marsha nasya* were also incorporated with periodical neurological, hematological and biochemical assessment. On discharge, *Brahmi ghrita* were advised inclusive of Anti-tubercular drugs & physiotherapy.

KEYWORDS: *Apsmara*, Tuberculous Meningitis, *Vatavyaadhi*.

INTRODUCTION:

Tuberculous meningitis (TBM) is one among the extra-pulmonary presentations of Tuberculosis that typically affects the Central Nervous System.. Tuberculous meningiti (TBM) is caused by seeding of *Mycobacterium tuberculosis* (MTB) and is characterized by inflammation of the membranes (meninges) around the brain or spinal cord.

Nuchal rigidity, photophobia and headache constitute the triad of meningism with the Kernig's sign and Brudzinski's sign as the marked clinical signs. Depressed levels of consciousness, diplopia and hemiparesis from focal ischaemia of cerebral arteries are also common occurrences. Lumbar puncture is the cornerstone of diagnosis. In general examination cerebrospinal fluid (CSF) reveals a high leukocyte count (upto 1000/uL), usually predominance of lymphocyte, a protein content of 1-8 g/L(100-800 mg/dL); and a low glucose concentration. However any of these three parameters can be within the normal range. AFB's are infrequently seen on direct smear of CSF sediment. Culture of CSF is diagnostic in 80% of cases and remains the gold standard. Real time automated nucleic acid amplification(the Xpert MTB/RIF) has a sensitivity of up to 80% and is the preferred initial option. Treatment should be initiated immediately upon a positive Xpert/RIF result. A negative result does not exclude a diagnosis of TB and requires further diagnostic workup.

Imaging studies (CT and MRI) may show hydrocephalus and abnormal enhancement of basal cisterns or ependyma. If unrecognized, tuberculous meningitis is uniformly fatal. This disease responds to chemotherapy; however neurologic sequel are documented in 25% of treated cases, in most of which the diagnosis has been delayed.

TBM presents varying symptomatology in its prodromal, meningitic and paralytic phases. Initially manifesting symptoms are *Manda jwara* (low grade fever), *Aruchi* (anorexia), *Shirshoola* (headache), *Bhaarkshaya* (weight loss), *Chhardi* (vomiting), *Daurbalya* (generalized weakness). The low grade fever (*jwara*) generally progresses in 1-2 weeks with aggravation of headache (*shirshoola*) and altered sensorium (*moha*) that depicts a *Vata-paittika dosha* state with *Ashrayasthana* as *Shiras*. Among the complications convulsions (*Apsmara*), hemiparesis (*Pakshaghata*), with sensory impairment (*Vichetanatva*) are not uncommon. Here, the treatment principles of *Apsmara* with focus on *Urdhwanga Chikitsa* (treatment for diseases in the head and neck region) can be adopted with conservative techniques of physiotherapy.

Latent Tuberculosis Infection (LTBI) is also common in subjects with no marked symptoms but investigations revealing Tuberculosis (TB) infection. LTBI can develop into the disease whenever the bodily immunity is significantly compromised. This can be considered as a state of *Leenadosha* (the state where *Dosha* remains dormant or concealed) progressing to manifest the disease with the re-surge of the specific etiological factors. Among the *Kriyakala* (consecutive stages of manifestation of disease), latency can be considered as the first stage -*Chaya* (stage of accumulation of *Dosha*), that shifts to the stage of *Prakopa* (stage of aggravation of *Dosha*) on manifestation of TBM syndrome. Thus enhancing *Vyadhikshamatva* or host immunity becomes the prime need to resist the infection.

CASE PRESENTATION:

A 19 year old male patient, presented in OPD of Sane Guruji Arogya Kendra, complaining of fever with chills, headache and vomiting(4-5 episodes per day) since last 6-7 days. He had feeling of generalized fatigue accompanied by anorexia. Patient had been experiencing these symptoms for last 6-7 days. He had consulted his family physician for the same, but didn't get relief hence visited the hospital. In OPD , during examination, patient suddenly had an episode of generalized tonic clonic seizure with twitching of bilateral upper & lower limbs, frothing from mouth and uprolling of eyes. Hence, in emergency, patient shifted to ICU for further management.

He had no history of any comorbidity or any other medical or surgical illness. There was no history of any visual disturbances or trauma. There was no history of any any known drug or food allergies and had no kind of addictions. In family history, his father was a known case of pulmonary tuberculosis.

CLINICAL FINDING:

On physical examination, patient was in post ictal phase. Having body weight 49 kgs, height 148 cm and body temperature was 100⁰ F. Patient had *Vata Pitta* dominance *Prakriti* with *Heena sara* (mild strength), *Alpa samhanana* (lean built), *Vishama pramana* (Disproportionate body), *Alpa satva*, *Alpa vyayamshakti* (less capacity to to carry on physical activities), *Alpa Ahara Shakti* (minimal food intake capacity) and *Avara jaranshakti* (minimum digestive power).

On cardiovascular examination, pulse was 112/min. Blood pressure measured was 90/60 mmHg. Auscultation of chest revealed bilateral basal crepitation. Heart rate and respiratory rate 112/min and 24/min, respectively.

NEUROLOGICAL EXAMINATION:

A) Cranial Nerves: Preserved sensation to pain, light, touch and temperature along the branches of cranial nerves.

B) Sensory system examination: Preserved sensation pain, light, touch, temperature and vibration were observed over left lower limb.

C) Motor System Examination: Revealed no marked difference in muscle bulk bilaterally. Muscle power: Right Upper Limb: 5/5 ; Right Lower Limb: 5/5; Left Upper Limb: 5/5; Left Lower Limb: 5/5.

D) Deep Tendon Reflex:

	Right	Left
Biceps	Normal	Normal
Triceps	Normal	Normal
Brachio-radialis	Normal	Normal
Knee jerk	Normal	Normal
Ankle	Normal	Normal

E) Superficial Reflex: Plantar Reflex: Elicited normal over bilateral lower limbs. Abdominal reflex : Elicited normal over all four quadrants.

LAB INVESTIGATIONS AND DIAGNOSIS:

MRI BRAIN(PLAIN AND CONTRAST) : Revealed multiple conglomerate round to oval peripherally enhancing lesions in bilateral cerebellar hemispheres and left frontal region with extensive leptomeningeal enhancement. Findings are suggestive of an infective etiology like tuberculosis.

Haematological Investigations Value:

Haemoglobin(g/dL)	13.6
WBC	13030/uL
Neutrophils(%)	87.6
Lymphocytes(%)	33.2
Monocytes(%)	8.6
Eosinophils(%)	0.8
Basophils(%)	0.6
RBC	6.74 million/uL
Platelets	391 thousand/uL
ESR(mm/hr)	48

Total Protein(g/dL)	7.85
Albumin(g/dL)	4.35
Globulin(g/dL)	3.5
Total Bilirubin	0.4 (mg/dL)
Direct Bilirubin	0.23(mg/dL)
Urine routine	
Indirect Bilirubin	0.17(mg/dL)
1) Colour	Pale yellow
2) RBCs	Absent
3) Bile salt	Absent
4) Bile pigment and salt	Absent
ALP (U/L)	240.3
PHOSPHATASE(U/L)	
SERUM SODIUM	140 mmol/L
SERUM POTASSIUM	4.0 mmol/L
IONIC CALCIUM	1.24 mmol/L
DENGUE (IgG)	NEGATIVE
DENGUE(IgM)	NEGATIVE
NS 1 Antigen	Non-Reactive
RAPID M.P.	Non-Reactive

CSF STUDY-

Quantity	10 ml
Colour	Colorless
Appearance	Clear
Clot	Absent
Coagulam	Absent
Cobweb	Absent
Blood	Absent
Pus	Absent

Total Cell Count	90/cmm
RBC count	40/cmm
Differential count	Neutrophils:8% Lymphocytes:92%
Gram Stain	No Organism Seen
ZN Stain	No AFB seen
Chemical Examination	
Protein	256 mg/dl
Sugar	45 mg/dl

USG(A+P): USG study does not show any abnormality.

SPUTUM FOR AFB: NEGATIVE

SPUTUM FOR GENE XPRT: NEGATIVE

Chest Xray: reveals bilateral small opacities in lung parenchyma.

TREATMENT: MODERN MEDICINE COMBINATION

Sr.No.	Medicine	Dose	Route	Time
1)	Inj. Levetiracetam	500mg	IV	BD
2)	Inj. Eptoin	1000mg	IV	STAT
3)	Inj. Lacosamide	100mg	IV	BD
4)	Inj. Monocef	2gm	IV	BD
5)	Inj. Levoflox	500mg	IV	OD
5)	Inj. Dexamethasone	0.4 mg/Kg/day	IV	1 st week
		0.3 mg/kg/day	IV	2 nd weeK
		0.1 mg/kg/day	IV	3 rd week
6)	Inj. Paracetamol	1000mg	IV	STAT & SOS
7)	Inj. Mannitol 20%	100mg	IV	STAT
8)	Inj. Omez	40mg	IV	OD
9)	DAILY DOTS(ATT)	3 TABLET	P.O.	OD(empty stomach)

10)	Tab.Benadon	40mg	P.O.	OD(After food)
11)	Tab.Supradyn	-----	P.O.	OD(After food)

AYURVEDIC MEDICINE:

	Medicine	Dose	Route	Time
1)	<i>Ekangveer Rasa</i>	250mg	P.O.with <i>Koshna jala</i>	TDS (After meal)
2)	<i>Vishtinduka Vati</i>	250mg	P.O.with <i>Koshna jala</i>	OD (After breakfast)
3)	<i>Madhumalini Vasanta</i>	250mg	P.O.with <i>Koshna jala</i>	BD (After meal)
4)	<i>Brahmi Ghrit</i>	2TSP	P.O.with <i>Koshna jala</i>	<i>Rasayan kala</i>

PANCHAKARMA:

No.	Day	<i>Snehan</i>	<i>Swedan</i>	<i>Niruha</i>	<i>Anuvasana</i>	Symptoms
1)	D1	Yes	Yes	No	<i>Anuvasana</i>	3 Hours-1 <i>vega</i>
2)	D2	Yes	Yes	<i>Niruha</i>	No	5 Minutes-1 <i>vega</i>
3)	D3	Yes	Yes	No	<i>Anuvasana</i>	4 Hours-1 <i>vega</i>
4)	D4	Yes	Yes	<i>Niruha</i>	No	5 Minutes-2 <i>vega</i>
5)	D5	Yes	Yes	No	<i>Anuvasana</i>	2 Hours-1 <i>vega</i>
6)	D6	Yes	Yes	<i>Niruha</i>	No	5 Minutes-1 <i>vega</i>
7)	D7	Yes	Yes	No	<i>Anuvasana</i>	2 Hours-1 <i>vega</i>
8)	D8	Yes	Yes	No	<i>Anuvasana</i>	4 Hours-1 <i>vega</i>

NASYA: Marsha Nasya with Panchendriya vardhana taila.

Here the *Sarvang Snehana karma* is preferably done with *Bala taila* and *Swedana* achieved with *Bashpa Sweda*. *Sahachara taila* used for the *Anuvasna basti*, whereas for *Niruha*, *kwatha* prepared from the *dravyas* mentioned in *Sandnyasthapana Gana* were used. The *Yogbastikrama* was followed here.

DISCUSSION:

In *Ayurvedic* concept, *Apasmara* as complication of Tuberculous Meningitis (TBM) can be managed following the treatment line of *Apasmara*. In this case the presentations are convulsions which indicates the significant role of *Vatadosha* in *Roga Samprapthi*. Owing to *Rogi lakshana* such as *Agni mandya*, *Balahani* and *Sareera dharana ashakti*, the *Dhatus* involved are possibly *Rasa*, *Rakta*, *Mamsa*, *Asthi* and *Majja*. On assessing the disease course, the *Ashraya sthaana* of *Dosha* is the *Shiras* with loss of *Sneha saara* in *Mastishka* (or *Mastulunga majja*). The resulting *Dhatukshaya* manifests as *Apasmara*.

Considering the immune compromised status and evident *Dosha Dushti* in *Shakha*, *Shodhanakarma* was done after adequate *Deepana-Pachana*. After the elimination of accumulated *Dosha* (*Sanchita dosha nirharana*), treatment with regard to *Kevala vata vyaadhi*, incorporating *Apasmara chikitsa* and *urdhwang chikitsa* were implemented. *Brahmi ghrita* with scientifically studied roles as antioxidant, anti-inflammatory and immune modulator was advised on discharge.

Ekangveera Rasa has ability to pacifying vitiated *Vata Doshaas* it is having *Madhura Rasa*, *Snigdha Guna*, *Ushna Veerya* and *Madhura Vipaka*. It pacifies vitiated *Kapha Dosha* by *Tikta, Katu, Kashaya Rasa, Laghu Guna, Ruksha Guna, Ushna Veerya and Katu Vipaka*. In the *Samprapti* (Pathogenesis) of *Vatvyadhis* described that the *Vatvyadhis* a resultant of *Srotorodha* (obstruction of body channels), *Dhatukshaya* (emaciation) or *Marmaabhighata* (damage to the vital points).

Vishtinduk Vati is an *ayurvedic* medicine which is made up of purified *Kupilu* (Poison Nut) seeds and acts on nerves, senses, and muscles. It contains a single ingredient purified *Kupilu* (*strychnos nux-vomica*). *Ayurvedic* Properties of *Vishtinduk Vati Rasa* (*Taste*) is *Tikta* (Bitter) and *Katu* (*Pungent*), *Guna* (Main Quality) is *Ruksha* (Dry), *Laghu* (Light) and *Tikshna* (Sharp), *Virya* (Potency) is *Ushna* (Hot), *Vipaka* (Resultant) is *Katu* (Pungent) . It improves muscle tone and strengthens nerves. Stimulates sense organs, blood vessels, nerves and muscles. It helps in reduced *Vata and Shrotoavrodh*.

Vasant Kalpas are unique combination of *Sheeta* and *Ushna Dravya*. They help to improve *Agnivyapara* at various levels hence cellular rejuvenation takes place so acts as *Rasayana* and immune buster. That's why it is rightly said that "*Sarvaroge Vasanta*".

Sandnyasthapan Gana are predominant of *katu, tikta rasa and katu vipak*. Most of the plants are of *ushna-virya* but some are *sheeta-virya*. Most of the plants are having *ushna-tikshna guna*. Most of the plants have action on central nervous system. Plants like *hingu, vacha, guggullu* are predominantly used for *Sandnyasthapan* by *Ayurvedic practitioner*.

Nasa is considered as the gateway of *Shiras*, drug administered through this way in *Nasya* therapy reaches to the brain & pacifies *Doshas*. Drug reaches *Shringhataka* which is described as the inner side of middle head. The drug through this route spreads in the *Marma, Netra, Shrotra, Siramukha* and *Kantha*, etc. and pacifies morbid *Dosha*. This therapy clears *Uttamanga* in supra clavicular region.

Brahmi Ghrita as Rasayana: contains *Brahmi Ghrita* contains *Bacopa monneri* (L.) *Pennell, Acorus calamus L., Convolvulus pluricaulis Choisy, Saussurea lappa DC.* and 10-year-old cows clarified butter. It has been used in *Ayurveda* to treat memory disorders. *B. monneri* has been used as a well-known medicine for a number of disorders.

CONCLUSION:

Tuberculous meningitis (TBM) is the most common among Central Nervous System Tuberculosis (CNS TB) that leads to varying complications including neurologic deficits such as seizures. Along with Antitubercular Treatment (ATT), introducing Ayurvedic management in conjunction aids in early recovery and enhances the quality of life (QOL) of subjects who survive the disease. This case study elaborates the role of *Sodhana, Samana* and *Rasayana chikitsa* in the management of Tuberculous meningitis and associated sensory deficits as sequelae of TBM.

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The authors declare that there was no conflict of interest regarding the publication of manuscript.

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