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Bridging The Gap: Shleepada And Primary Amoebic Meningoencephalitis (PAM) Through Ayurvedic And Modern Lenses

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ABSTRACT

The dynamic nature of diseases requires flexible approaches to health and treatment, especially for emerging conditions like amoebic meningitis caused by Naegleria fowleri.This article explores the Ayurvedic concept of Anuktha vyadhi (unspecified diseases), which accommodates the evolution of new diseases through principles derived from texts such as Charaka Samhita and Susrutha Samhita. Ayurvedic frameworks like Adidesha and Arthapatti[1] enable the adaptation of classical principles to modern pathologies.

Amoebic meningitis, or Primary Amoebic Meningoencephalitis (PAM)[2], is a rare and fatal brain infection often contracted through exposure to warm freshwater contaminated with N. *fowleri*. Its rapid progression from fever and meningismus to seizures and coma, coupled with a high mortality rate, underscores the urgency of exploring both modern and traditional approaches to understanding and managing this disease. Modern diagnostic techniques, such as CSF analysis and PCR, alongside antifungal therapies, are highlighted for their clinical relevance.

The article draws a conceptual parallel between Primary amoebic meningoencephalitis and Ayurvedic conditions like Shleepada and Mastishka jwara, emphasizing similarities in symptoms, causative factors and pathogenesis. Ayurvedic principles such as the involvement of aggravated Kapha and Pitta, explain the inflammation and obstruction observed in PAM. Additionally, the Shleepada nidana in Ayurvedic texts closely aligns with the environmental risk factors for PAM, such as exposure to stagnant or contaminated water.

Treatment considerations in Ayurveda, including Sira vyadha and Roga-Rogi pareeksha (disease and patient examination), are discussed as potential complementary approaches. By integrating insights from Ayurveda with modern medical practices, this article advocates for a holistic understanding of rare and emerging diseases like amoebic meningitis, bridging ancient wisdom and contemporary science.

KEYWORDS Anuktha vyadhi, Primary amoebic meningoencephalitis (PAM), Shleepada

INTRODUCTION

Diseases which are described in Samhitha were only those which were prevalent in that time period. Change in kala, lifestyle, dietary habits, sleeping habits resulted in various new emerging diseases. Hence newley evolved causative factors and diseases which emerge from bacteria, virus, fungi, amoeba which were not mentioned in old era can be considered as Anuktha vyadhi. The principle of ayurveda can be modified as per the time changes as explained in tantrayukti -terms like Adidesha /indication-a specific statement might indicate non specified objects and Arthapatti/implications-a statement may imply an unspecified object-helps to derive unsaid things. Vyadhi which are not explained in text are called as anuktha vyadhi and the parameters[3] of pareeksha required for anuktha vyadhi is also explained in charaka vimana sthana.Principle that are explained for understanding and assessment[4] of anuktha vyadhi again divided into three, vikara prakriti, adhistana, samuthana which can be assessed with the help of roga-rogi pareeksha. Also, about importance of diagnosing a disease based upon the aggravated dosha and dusya rather than naming[5] it. A knowledgeable physician diagnoses and treats diseases using key parameters such as Prakopa (aggravation), Yoni (origin), Uthana (progression), Adhishthana (site of manifestation), Vedana (pain), Samsthana (structure), Shabda, Sparsha, Rupa, Rasa, and Gandha (sound, touch, appearance, taste, and smell), as well as associated factors like Upadrava (complications), Vriddhi (growth), Sthana (location), and Kshaya (degeneration).

Understanding Primary amoebic meningoencephalitis[6]

Primary amoebic meningoencephalitis (PAM) is a rapidly progressive central nervous system (CNS) infection caused by the free-living amoeba N*aegleria fowler*i, which thrives in warm freshwater lakes and rivers. PAM typically occurs after exposure to water contaminated with trophozoites or cysts, either through aspiration or inhalation of contaminated dust, allowing the amoeba to invade the olfactory neuroepithelium. Once in the CNS, it causes meningitis, primarily affecting healthy children or young adults with a history of recent swimming in lakes or heated pools. After an incubation period of 2-15 days, symptoms such as severe headache, high fever, nausea, vomiting, and meningismus appear, often accompanied by photophobia and cranial nerve palsies (3rd, 4th, and 6th). The disease progresses rapidly, often leading to seizures, coma, and death within a week. Diagnosis should be considered in cases of purulent meningitis where Gram's staining, antigen detection assays, and cultures fail to identify bacteria. The prognosis remains poor.

Ayurvedic Correlation -Conceptual Linking:

Even though Comparing meningitis with Ayurvedic conditions such as Mastishka jwara (brain fever) or Sira shula (head ache) based on symptoms and pathology is available, here an attempt to compare the shleepada with that of amoebic meningitis is being carried out. According to Acharya Susrutha in Nidana Sthana, although Shleepada primarily affects the feet, it can also occur in the hands. Some experts believe it may also develop in other areas such as the ears (Karna), eyes (Akshi), nose (Nasa), and lips (Aousta)[7].

Nidana[8] which is quoted for shleepada is same as that of amobic meningitis, reference about use/playing in stagnant water or lake water and consuming cold food after that etc becomes the nidana. Acharya Bhela categorizes Shleepada under Janapadodhwamsa Vyadhi. Stagnant water, polluted environment (Dushita desha), unfavorable seasons (Kala), contaminated water (Jala), and improper dietary habits (Mithya ahara) contribute to its manifestation. All three types of Shleepada arise due to an increase in Kapha, primarily because of its heavy nature[10].

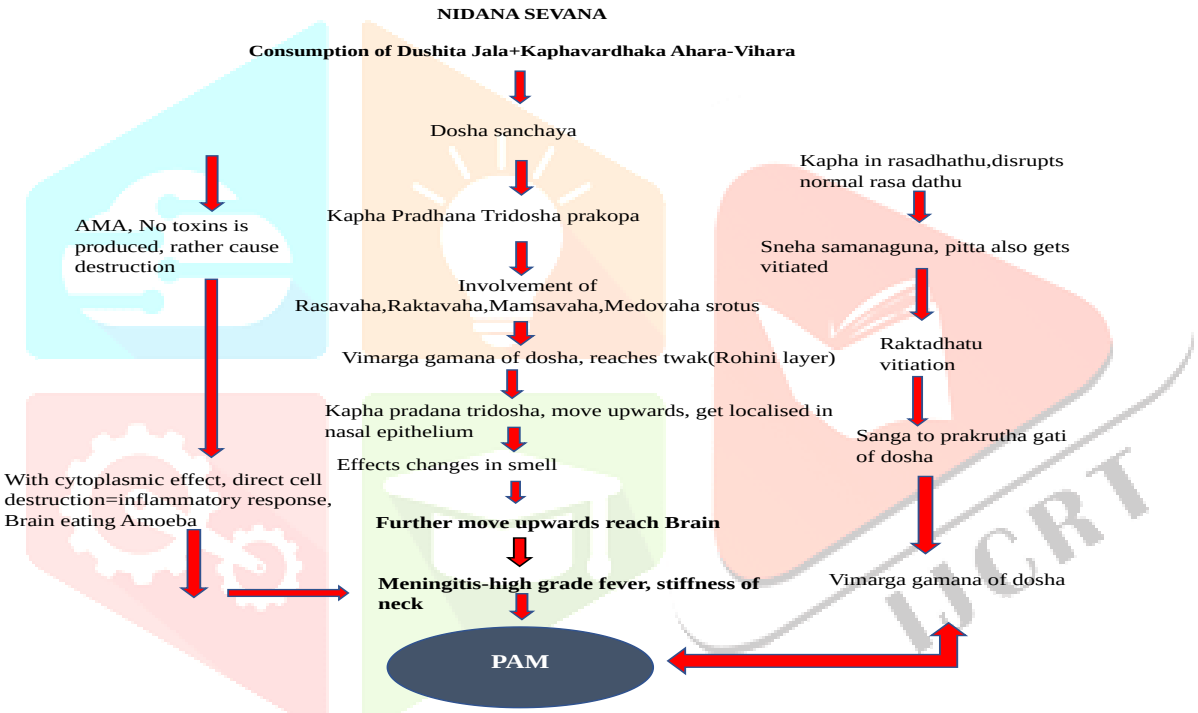
Shleepada, mainy correlated as filariasis[11] in the present era which is produced by the bite of a kind of mosquito, having microfilariae, develop into larval stage inside them and passed on to the human host in whom the larvae grow to adult worms, Wucheria bancrofti[12].

Similarly in amoebic meningitis when it enters to the brain through nasal canal which is endemic (occurring in certain areas) in coastal areas causing heaviness in brain, especially stiffness of neck and high-grade fever. All the 3 kinds of Shleepada are to be understood as produced by Kapha because heaviness and larger size cannot be without Kapha.It is clinically relevant in case of PMS regarding stiffness of neck and severe headache.

Ayurvedic Pathogenesis

Consumption of Dushita Jala (contaminated water) and Kaphavardhaka Ahara-Vihara (diet and lifestyle that increase Kapha dosha) predominantly aggravates Kapha dosha along with the Tridoshas. Since Kapha resides in Rasa dhatu, it disrupts the normal function of Rasa dhatu. Due to the Sneha samana guna of Kapha, Pitta also becomes vitiated, affecting Rakta dhatu, where Pitta resides, leading to the vitiation of Rakta. Additionally, Kapha disrupts Mamsa dhatu and Medo dhatu, where it resides. Consequently, Rasavaha, Raktavaha, Mamsavaha, and Medovaha Srotas are involved. This disruption leads to Sanga (blockage), derangement of the normal flow (Prakruta Gati) of the Doshas, and Vimarga Gamana (abnormal movement). Ultimately, it affects the Twak (Rohini Layer), the primary site of Shleepada[13].

Vata pitta and sleshma getting aggravated move downwards in case when it is affected in pada, and if it is affected to nasa Akshi etc. It may move upwards, becomes localised in nasal epithelium causing changes in smell, move upwards and reach brain in due course of time and give rise to swelling and producing symptoms like meningitis- high grade fever, stiffness of neck etc. Instead of involvement of Ama which can correlated as the toxin released from amoeba, here dushti of dosha along with rakta occurs. Because amoeba Naegleria fowleri does not produce any toxins but cause tissue destruction with cytoplasmic effects, direct cell membrane destruction which leads to inflammatory response.



Treatment approaches in Ayurveda

Sira vyadha is the classical treatment mensioned in Susrutha samhita chikitsa sthana considering pada as the area. But in case of urdwa shareera it can be considered according to the area of localization. Shamana oushadhi especially Kakadani (*Momordica dioica*), Kakajangha (*Martynia annua*), Brhati (*Solanum indicum*), Kantakari (*Solanum xanthocarpum*),Kadambapushpa (*Neolamarckia cadamba*),Mandari (*Erycibe paniculata*), Lamba (*Sida cordifolia*), Sukansa (*Cuscuta reflexa* or similar parasitic plants in Ayurveda) are made into ashes and mixed with madanaphal- ksara preparation-indicated for shleepada[14.] Above mentioned drugs can also be made to taila and used as nasal drops and anointing cures all the septic conditions[15]. Antibacterial, antiviral, Antiprotozoal, antimicrobial, antifungal, anti-inflammatory, analgesic, antiulcer, anti-exudative, wound healing, and smooth muscle relaxant properties of the ingredients also supports this highly significant external action of this oil on four acute clinical findings viz. lymphangitis, pain, tenderness, and ulcer. It may also help to reduce toxins.[16]

Modern and Ayurvedic Integration

Challenges in Diagnosis and Treatment: Primary Diagnosis: • Non-specific Signs: Initial signs of the infection, such as headache, fever, and nausea, are like those of common viral or bacterial infections, making early diagnosis difficult. • Swift Progression: The infection progresses quickly, often within few days, leaving a narrow gap for accurate diagnosis and effective handling. • Inadequate Alertness: Many healthcare providers may not instantly consider amoebic infections, particularly N. *fowleri*, due to their rarity

It takes about two to 15 days of incubation period after exposure to the amoeba for symptoms to develop. to primary amoebic meningoencephalitis (PAM). As it is a serious infection of the central nervous system that is almost always fatal even though it is very rare.

The preferred treatment for primary amoebic meningoencephalitis (PAM), caused by the brain-eating amoeba (Naegleria fowleri), involves a combination of antifungal amphotericin B, rifampin, fluconazole, and miltefosine—a drug originally approved for leishmaniasis, a parasitic disease transmitted by sandflies. Early diagnosis and prompt treatment with these medications, along with therapeutic hypothermia to reduce brain swelling, have shown the best outcomes, as seen in two children who fully recovered. Given the fatal nature of PAM, modern diagnostics and emergency treatment are critical. Additionally, there is potential for Ayurveda medications to play a supportive role in enhancing immunity and aiding recovery when integrated with conventional care.

Preventive aspects involve abating exposure to potentially contaminated water.

Recommendations include: • Avoiding events in warm freshwater during high-temperature months. • By means of nose clips or keeping the head directly above water when swimming in warm freshwater. • Safeguarding proper maintenance and chlorination of swimming pools and other leisure water facilities[17]. • Avoiding the use of unprocessed tap water for nasal irrigation or sinus rinsing. Be Thoughtful about the biology, life cycle, and infection mechanisms of N. *fowleri* which is crucial for emerging effective prevention and treatment approaches against this deadly pathogen. Along with strengthening immunity through dietary recommendations (e.g., including spices like turmeric and ginger) and lifestyle practices like Dinacharya (daily routine) and Ritucharya (seasonal regimen).

Conclusion:

The Ayurvedic correlation between Shleepada and conditions such as Primary amoebic meningoencephalitis provides a novel perspective on understanding pathogenesis and treatment. By integrating the classical texts and modern interpretations, this analysis highlights the role of vitiated doshas, primarily Kapha, and the involvement of Srotas in disease manifestation. The connection to external factors such as Dushita Jala Sevana and inappropriate dietary habits underscores the relevance of preventive measures in both conditions. Ayurvedic treatment principles, including Sira Vyadha and herbal preparations, showcase a holistic approach addressing both localized and systemic manifestations. Fatal and rare combination of the disease makes the condition crucial where the modern diagnostics and emergency treatment is at top priority. But in case of early detection and treatment, Ayurveda drugs can be considered to have a vibrant role in complete recovery of the patient along with supportive care to boost immunity.

This synthesis of ancient wisdom and modern pathology not only broadens the understanding of Shleepada but also offers potential therapeutic insights for conditions like Primary amoebic meningoencephalitis, emphasizing Ayurveda's contribution to integrative medicine under the shade of Anuktha vyadhi which our Acharyas gave an open end to enhance innovative globules of emerging disease according to the kala.

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