Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/9cf2be03

EXPLORING THE ETIOLOGY OF EPILEPSY: A COMPARATIVE ANALYSIS OF AYURVEDA AND CONTEMPORARY STANDPOINTS

Dr. Priyal Patel[1*], Dr. Swapnil Raskar[2], Dr. Siddhi Patil[3], Dr. Mayank Maniar[4]

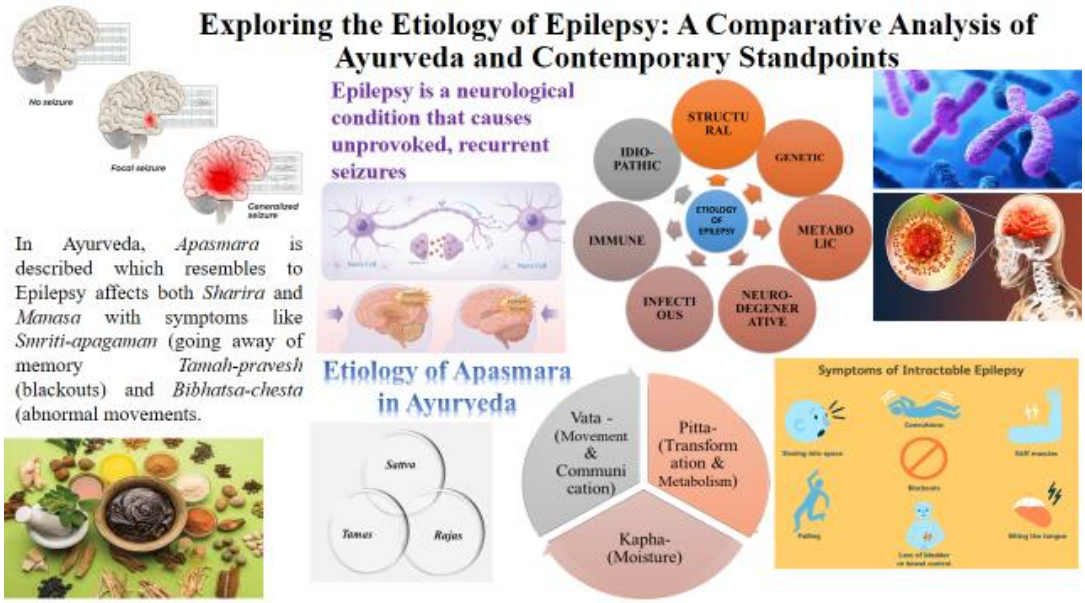
[1*]PG Scholar Department of Kaumarbhritya Parul Institute of Ayurved Parul University Limda Vadodara Gujarat
[2]Professor and Head Department of Kaumarbhritya Parul Institute of Ayurved Parul University Limda Vadodara
[3]PG Scholar Department of Kaumarbhritya Parul Institute of Ayurved Parul University Limda Vadodara Gujarat
[4]Professor and Head Department of Kaumarbhritya Governement Akhandananda Ayurveda College Ahmedabad

***Corresponding Author:** Dr. Priyal Patel
*priyalp26599@gmail.com, +919998810088

ABSTRACT:
Epilepsy, a neurological disorder characterized by recurrent seizures, presents a complex challenge in both diagnosis and treatment. This article explores the causes of epilepsy from the perspectives of Ayurveda, a traditional Indian system of medicine, and contemporary medical science. Ayurveda describes epilepsy, known as *Apasmara*, as a condition arising from imbalances in the body's fundamental energies (*Doshas – Vata, Pitta, Kapha*) and mental states (*Rajas* and *Tamas*). Factors such as improper diet, lifestyle choices, repressed emotions, and sensory overload triggers the imbalance of *Dosha*. *Apasmara* have four types based on the predominant *Dosha* involved, each with distinct clinical manifestations. Modern medicine focuses on identifying specific etiologies for epilepsy, categorized as structural, genetic, infectious, metabolic, immunity, and unknown. Structural causes involve brain lesions or abnormalities, genetic causes includes inherited genes. Infectious etiologies encompass bacterial, viral, and parasitic infections affecting the brain. Metabolic causes involve different encephalopathies. Immune-mediated epilepsy arises from autoimmune diseases affecting the brain. Despite advancements in understanding these causes, a significant proportion of epilepsy cases remain classified as having unknown etiology. Modern medicine emphasizes biological and neurological mechanisms; Ayurveda highlights the interconnectedness of mind and body, suggesting that emotional disturbances and lifestyle factors can significantly contribute to the development of epilepsy. Both perspectives acknowledge the role of stress and sensory overload in triggering seizures. However, Ayurveda's approach is more individualized and holistic, considering the patient's overall constitution and lifestyle. This comparative analysis reveals the strengths and limitations of both perspectives. Modern medicine offers a precise, disease-oriented approach; Ayurveda provides a broader, individualized perspective with emotional, mental, and spiritual well-being. Integrating these viewpoints could lead to a more comprehensive understanding of epilepsy and potentially offer patients a wider range of therapeutic options. Further research, particularly clinical trials evaluating Ayurvedic treatments, is need to explore the potential benefits of this integrative approach.

Key Words: Apasmara, Ayurveda, Dosha, Epilepsy, Etiology.

Graphical Abstract



INTRODUCTION:

Epilepsy is a condition with recurrent seizures having paroxysmal event due to chronic, abnormal, excessive, hyper synchronous discharges from central nervous system (CNS) neurons in the brain. Apasmara disease entity explained in Ayurveda classics exhibits a notable resemblance to epilepsy which is defined as sudden abhorrent bodily activities (tonic, clonic, tonic-clonic, myoclonic) accompanied by momentary blackouts or loss of consciousness owing to disturbance in mental health, intelligence, retention and memory. [1] Modern medicine has made strides in understanding and treating epilepsy, while Ayurveda offer unique insights into its causes and management, as the onset of epilepsy is not merely a result of physical factors but a manifestation of deeper imbalances within the body's constitutional factors called as *Dosha* (humour), and particularly psychological and emotional factors (*Rajasa* and *Tamasa*). In this article, we will explore the Ayurvedic perspective on the causes of epilepsy, delving into how humoral (*Doshika*) imbalances, lifestyle choices, emotional factors, and environmental influences contribute to this condition. By understanding these underlying causes, we can gain a holistic view of epilepsy and consider more integrative approaches to its management with Ayurveda complimentary therapies. It is estimated in various studies that the overall prevalence of epilepsy in India is 5.59-10 per 1000. [2] According to the World Health Organization (WHO), of the 50 million people with epilepsy worldwide, 80% reside in developing countries. Epilepsy was estimated to account for 0.5% of the global burden of disease, accounting for 7,307,975 disability adjusted life years (DALYs) in 2005. [3], [4],[5] Therefore, identifying an underlying etiology is a crucial subsequent step in the diagnosis and treatment of epil epsies; which helps to identify the seizure recurrence risk [said to be of 60% in many research articles] [6].

Overall Review on Epilepsy [7],[8],[9]

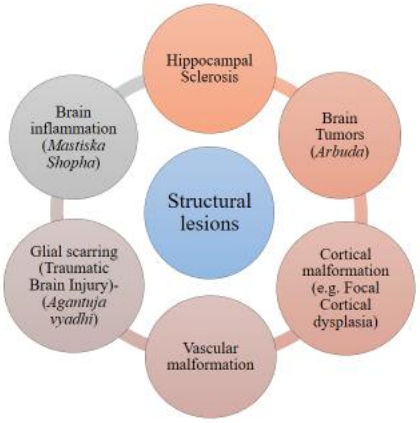
Cutting-Edge Science:

A seizure is typically described as a sudden change in behavior caused by a temporary alteration in the brain's electrical activity. In individuals experiencing seizures, abrupt and synchronized spikes of electrical energy that can shortly influence their awareness, movements or sensations interrupt the regular electrical pattern. Such neurological condition marked by repeated seizures or in episodic manner at regular interval with or without psychological sequel like loss of consciousness and memory is considered under the umbrella term ***the epilepsy***. International Classification of epilepsies

defined criteria as any of following condition: (a) at least two unprovoked seizures occurring >24 hours apart; (b) one unprovoked seizure and a probability of further seizures similar to the general recurrence risk after two unprovoked seizures; and (c) diagnosis of an epilepsy syndrome. [10],[11]

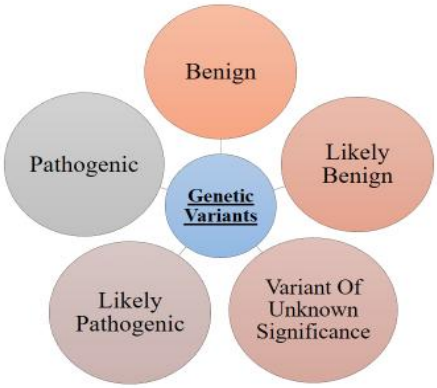
CAUSES OF EPILPESY AS PER CONTEMPORY VIEW: The 2017 Classification of the Epilepsy replaced the terms "idiopathic," "cryptogenic," and "symptomatic" with more straightforward language, and defining six etiology categories: genetic, structural, metabolic, immune, infectious, and unknown. [12],[13]. These categories are not mutually exclusive and many etiologies fall into multiple category. For example, some genetic disorders, such as tuberous sclerosis, cause structural damage, or inborn errors of metabolism can often be included in both genetic and metabolic etiological categories. Ultimately showing the complexity of the understanding the etiologies of epilepsy.

1. **Structural etiology:** Any structural lesion affecting the cortex can result in seizures and epilepsy However, seizure *semiology depends on the location of the lesion, not on the type of lesion*. Structural lesions that are typically resected to treat focal epilepsy can be divided into six major disease categories. [14]



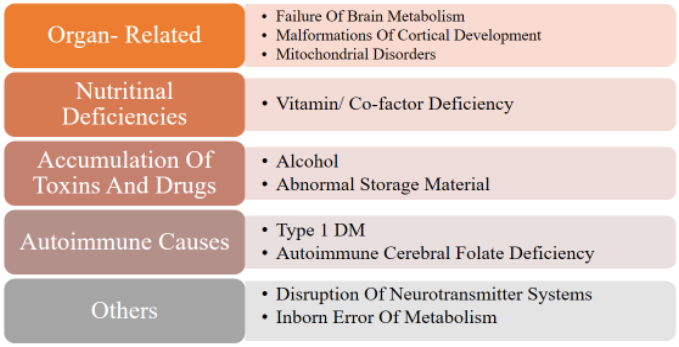
The ILAE Commission on Diagnostic Methods has proposed a histopathological classification scheme, acknowledging that hippocampal sclerosis is a heterogeneous disorder with distinct patterns of neuronal cell loss that likely result from different aetiologies [15]. A frequent cause of focal-onset seizures are brain tumours, accounting for 10% to 15% of all adult-onset and 0.2% to 6% of all child-onset epilepsies [16], [17]. *Most malformations of cortical development present with drug-resistant seizures in early childhood*. [18] Vascular malformations associated with seizures include cortically located cavernous haemangiomas (cavernoma) and arteriovenous malformations. [19] Secondary phenomena, such as intracranial haemorrhage and/or haemosiderin deposition, in surrounding cortex are necessary to generate seizures. SturgeWeber syndrome is also associated with seizures; the meningeal angiomatosis can result in chronic hypoxaemia and transient hypoxaemic insults to the underlying neocortex [20]. Glial scarring is another common disease category in focal epilepsies and results from an exogenous brain insult, often stroke & traumatic brain injury (usually presenting as glio-mesodermal scar) [21]. Acute symptomatic seizures occurring ≤seven days after stroke are defined as early, whilst late seizures (>seven days after stroke) are considered unprovoked.[22], [23] Less common overall, but a preventable cause of acquired epilepsies is traumatic brain injury. [24] Early post-traumatic seizures are predictive factors of post-traumatic epilepsy. [25]

2. **Genetic etiology [26]:** With the revolution in next-generation sequencing (NGS), many genes have been identified that contribute to the etiology of epilepsy.



3. **Infectious Etiology:** Severe systemic infections, even if they do not directly affect the brain, can predispose to seizures though pyrexia, the release of cytokines, metabolic dysfunction, and triggering of autoimmunity [27]. Cerebral infections caused by bacteria, viruses, fungi and parasites are among the commonest causes of seizures and epilepsy worldwide and are particularly prevalent in developing countries. They can cause seizures via several different mechanisms including the direct effects of infection and damage to brain tissue, the production of toxins by the organism, and the induction of inflammation. Acute seizures are common in all types of viral encephalitis and the risk of epilepsy depends on the type of virus and the occurrence of early seizures. The commonest identified cause of sporadic viral encephalitis is herpes simplex virus (HSV) type 1. Endemic encephalitis is often the result of arthropod-borne viruses, which show specific regional distributions, and include Japanese B encephalitis, West Nile virus, and Nipah virus [28]. Bacterial meningitis worldwide annually, is much more common in developing countries and carries a high risk of neurological sequelae [29]. Infectious causes of epilepsy have important implications for treatment because of complex drug interactions. [30]

4. **Metabolic etiology:** Metabolic causes of seizures and epilepsy can be either acquired or genetic (inborn). The acquired metabolic causes of seizures are described below [31]. Many of these result in acute seizures (often with an acute encephalopathy) rather than epilepsy unless they cause permanent damage to the brain which may occur, for example, with hypoglycaemia or hyperammonaemia [32].Inborn errors of metabolism are a rare cause of epilepsy, but conversely, epilepsy and seizures commonly occur in inborn errors of metabolism (there are over 200 genetic metabolic disorders associated with epilepsy [33],[34].



5. **Immune etiology:** The immune system is divided into a non-specific immune response, termed innate immunity, and a pathogen-specific immune response, termed adaptive immunity. There is increasing evidence that innate immunity through the release of certain cytokines, such as IL-1β, TNF-

α, and TGF-β, can play an important role in the development and maintenance of epilepsy in a large range of pathologies [35], including hippocampal sclerosis and FCD. *Targeting these cytokines could thus have an anti-epileptogenic effect*. Seizures have long been recognized to be associated with certain autoimmune diseases, such as systemic lupus erythematosus, sarcoidosis, coeliac disease, Behcet's, and Hashimoto's encephalopathy [36]. Autoimmune-associated seizures have also been described in paraneoplastic syndromes. An increasing number of autoantibodies specifically associated with seizures [37]. These antibodies have varying association with tumours. For example, ovarian cancer is associated with NMDA receptor antibodies, small cell lung cancer is associated with AMPA receptor and GABA (B) receptor antibodies and Hodgkin lymphoma is associated with mGluR5 antibodies. [38]

6. Common neurodegenerative causes of epilepsy: Common neurodegenerative causes includes diseases such as Alzheimer's disease, Parkinson's disease, Huntington's disease, or multiple sclerosis.
7. Unknown Causes: Idiopathic

AYURVEDA VIEW:

In classical Ayurveda Sanskrit terminology, "*Apa*" stands for denial or absence and "*Smara*" for memory and consciousness. [39] Further, *Acharya* Charaka describes *Apasmara* as the condition associated with physical symptoms such as *Bibhatsa Cheshta* (alarming movements, the involuntary movements during the seizures) and psychological symptoms like *Smriti-Buddhi Sattva Samplava* (loss/perversion of memory and cognition & mental function) and *Tamah Pravesh* (temporary loss of consciousness). [40] In brief, *Apasmara* is psychosomatic disease affecting the memory; consciousness; long-term afflicted quality of life with social restrictions and taboos. *Apasmara* is considered as *Astha Mahagada* in Ayurveda Classical texts means among eight most lethal diseases, which may cause fatality to suffering individuals. As the Apasmara has multiple dimension involving physical body, mental status, emotions and additional traumatic factors; its etiology is more complex to understand in superficial way. Ayurveda *Samprapti* (Pathogenesis) defines the all these etiological factors in synchronizing and integrating manner along with ripple effect in symptoms manifestation and disease prognosis in fundamental manner. It is condition, which influence both *Shareera* and *Manasa*. Both *Shareerika Doshas* i.e., *Vata*, Pitta and Kapha as well as *Manasika* Doshas i.e., Rajasa and Tamasa are primordial etiological factors in the manifestation of disease Apasmara.

CONCEPT OF DOSHA & ITS IMPORTANCE IN AYURVEDA:

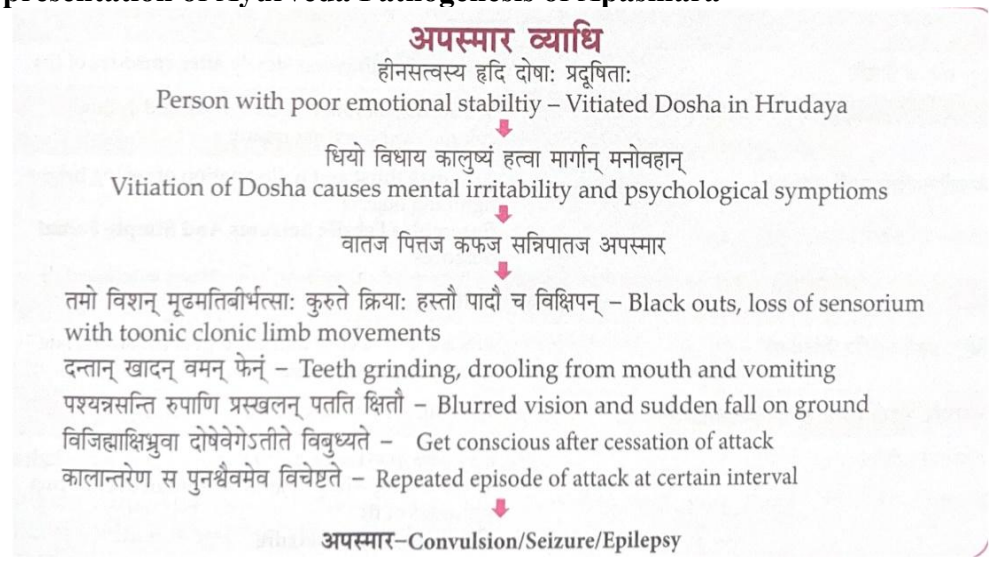
In Ayurveda, the concept of dosha is fundamental to understanding health and disease. The three doshas—Vata, Pitta and Kapha —govern various physiological and psychological functions in the body. Each individual has a unique dosha constitution, which influences their health, temperament, and susceptibility to ailments. Understanding these dosha imbalances helps practitioners identify the root causes of Apasmara or any other disease ailments. By addressing these, underlying issues through diet, lifestyle changes, Ayurveda aims to restore balance and promote overall well-being, offering a holistic approach to managing epilepsy.

In vide infra *Apasmara* is sub classified into four types. *Vataja Apasmara, Pittaja Apsmara*, *Kaphaja* Apasmara (in which there is loss of equilibrium of function of Vata, Pitta and Kapha Dosha respectively causing fits) and *Sannipata* (loss of functional equilibrium of all three Doshas). All these four subtypes vary according to the intensity, frequency and duration of fits, additionally there is specific morphological features and specific Aura in different subtypes. [41]

There are abundant references to all aspects of Apasmara (epilepsy) defining etiology of Apamaa in the Ayurvedic literature. Table given below defines the symptomatology of all 4 different types of *Apasmara* [42],[43],[44],[45],[46],[47]

***Dosha* (Humour)**	**Vikrita (Apasmara) – Unbalanced or non-equilibrium dosha**	
	Physical	**Psychological**
Vata	Disturbance in functions of nervous system, loss of consciousness, involuntary movements, darkening of limbs, face and sclera	Loss of memory, fear, anxiety, restlessness
Pitta	Disturbances in endocrinal and metabolic functions, perspirations, black outs and filling of Aura, migraine, headache, yellowing of limbs, face and sclera	Post ictal irritability, restlessness, aggression, anger
Kapha	Disturbances in anabolic biochemical reactions, drooling of saliva, heaviness in head, post ictal drowsiness and lethargy, prolonged loss of consciousness, whitening of nails, sclera and	inability to concentrate, loss of memory
Sannipataja	Mix symptoms of all above 3 Vikrit Dosha causing complexity of symptoms	Mix psychological symptoms causing complex complications

Graphical presentation of Ayurveda Pathogenesis of Apasmara



Graphical Presentation of Ayurveda Pathology of Epilepsy (Apasmara)[48]

Discussion:

Epilepsy, a neurological disorder characterized by recurrent seizures, has been a subject of extensive research and varied interpretations across different medical paradigms. In the article ***Comparative Review Study on Causes of Epilepsy - Ayurveda and Contemporary View***, a thorough examination of the causes of epilepsy from both the Ayurvedic and modern medical perspectives provides valuable insights into the differences and potential integrative approaches for treatment. In about 70% of cases of epilepsy, no etiology can be determined even after all investigations. In the remaining 30%, the etiology is multi factorial depending upon the age of onset and type of epilepsy. Genetic etiology described earlier shows resemblance with the *Beeja Dusti Janya Vyadhi* or said as *Aadibala Pravritta Vyadhi* [49]. The deranged paternal or maternal genes develops the structural anamolies in developing organs at the time of conception. Structural causes occurs when Gharbhini Paricharya had not been followed during ante-natal period or there may be presence of Garbha-Upaghatakar Bhava during pregnancy. This will lead to Tridosha-prakopa and affects Manas and sharira leads to various deformities in organs of developing embryo also called as Janma-bala pravritta vyadhi in Ayurveda classics. Immune causes resembles with the Doshabala Pravritta Vyadhi, which occurs due to

imbalance of the Humors and affects the psychosomatic homeostasis of individual. [50] These causes are often described in terms of disruptions to the mind-body connection, improper lifestyle choices, and emotional disturbances. Below, we compare the specific Ayurvedic causes of epilepsy with contemporary scientific perspectives:

1. Excessive, Inadequate, and Improper Contact with the Objects of the Senses (Indriya & Indriyaartha) and Their Actions (Karma)

- **Ayurvedic View**: Ayurveda suggests that overstimulation or improper engagement with the sensory objects (*Shabda, Sparsha, Roopa, Rasa, Gandha*) or excessive mental actions (*Karma*) can disturb the equilibrium of the mind and lead to an imbalance in the doshas [51]. This results in disorders like epilepsy (*Apasmara*), where the mind becomes overwhelmed, leading to erratic behavior, including seizures.
- **Contemporary View**: Excessive exposure to sensory stimuli, particularly in individuals with epilepsy, can trigger seizures in certain cases. For instance, flashing lights (such as in photosensitive epilepsy) can trigger seizures in susceptible individuals [52]. However, the focus in contemporary science is more on the neurological mechanism—specifically, how overstimulation leads to abnormal electrical activity in the brain.

2. Incompatible (Viruddha), Impure (Malina) Food (Aahar) and Regimen of Conduct (Vihara)

- **Ayurvedic View**: Consumption of incompatible foods (e.g., milk and fish together), impure food (stale, contaminated, or unclean food), and improper conduct (such as irregular sleep patterns or excessive physical exertion) are believed to aggravate the *Doshas*, particularly *Vata*, leading to a disruption of the nervous system affecting the neuronal functions of brain and triggering conditions like epilepsy.
- **Contemporary View**: Modern science recognizes that diet and lifestyle play a significant role in neurological health. Certain foods, like those high in sugar or those causing food intolerances, can influence the frequency and severity of seizures in some individuals [53]. However, the scientific explanation typically focuses on metabolic factors or neurological responses to specific foods, which shows systemic effects seen in Ayurveda [54]. While there is evidence that dietary factors (e.g., ketogenic diet [55]) can help manage epilepsy, there is no direct scientific equivalent for the concept of "incompatible food" as seen in Ayurveda.

3. Ahita-Asuchi-Bhojana (Unhealthy, Unclean Food)

- **Ayurvedic View**: Ayurveda emphasizes the importance of hygiene and the quality of food consumed. Food that is unhealthy or unclean is believed to disturb the doshas and the digestive fire (Agni), leading to the accumulation of toxins (*ama*) in the body, which can affect the nervous system and lead to conditions like epilepsy. [56]
- **Contemporary View**: Modern medicine also acknowledges that poor nutrition and toxin buildup in the body can have negative effects on health, including brain function [57]. For instance, neurotoxins or heavy metals (such as lead or mercury) are known to contribute to neurological damage and may increase susceptibility to seizures [58]. However, contemporary science focuses on specific toxins and nutritional deficiencies, while Ayurveda takes a more generalized approach to the impact of food quality on the body's balance.
- The dietary causative factors may act on the gut-brain axis to affect the neuro pathology in case of epilepsy [59].
- **It can also be stated as Ahita-Asuchi Bhojana is a cause of** Infectious causes can be correlated with the Sanghata Bala Pravritta Vyadhi (Adibhautik) or Daiva Bala Pravritta Vyadhi (contagious infection) in ayurveda classification of disease.

4. Repression of Natural Urges of the Body (Veganigraha)

- **Ayurvedic View**: Ayurveda stresses the importance of responding to the natural urges of the body, such as hunger, thirst, and the need to eliminate waste. Repression of these urges can disturb the doshas, especially Vata, leading to an imbalance in the body and mind, which may result in conditions like epilepsy.
- **Contemporary View**: Contemporary science does not explicitly link the repression of natural urges to the onset of epilepsy. However, it is well understood that chronic stress, emotional repression, and physical discomfort can negatively impact the brain and lead to neurological symptoms. For example, prolonged stress can increase cortisol levels, which in turn can affect brain function and potentially trigger seizures in some individuals [60]. The connection to epilepsy is more indirect in modern science, often tied to overall mental health rather than a specific cause.
- It is told in our Science that *Vegadharana* is one among the Nidana of Apasmara. So, Nidra Vegadharana cannot be neglected as far as epilepsy is concerned. When a person's sleep is reduced, the neurons in the brain are more likely to cause large changes in the electrical activity and these changes can become abnormal and lead to seizures.

5. Aggravation of the Rajas and Tamas (Emotional Disturbance)

- **Ayurvedic View**: The states of Rajas (activity, restlessness) and Tamas (inertia, darkness) are mental states that, when aggravated, disturb the doshas and can lead to neurological disorders. Stress, anxiety, fear, anger, and grief—emotions associated with Rajas and Tamas—are believed to disturb the mind-body balance and can result in the occurrence of seizures.
- **Contemporary View**: Modern science has increasingly recognized the impact of emotional and psychological factors on neurological health. Stress and emotional trauma are well-established triggers for epilepsy in certain individuals. Emotional disturbances such as anxiety, depression, or anger can provoke neurological responses in the brain, including seizures [60]. This aligns with the Ayurvedic understanding of emotional imbalance affecting the mind and body, though the mechanisms are understood differently, focusing more on neurotransmitters and brain activity rather than dosha imbalance.

6. Fright, Anxiety, Anger, or Grief

- **Ayurvedic View**: Emotional disturbances like fear, anxiety, anger, and grief are seen as major contributors to an imbalance in the doshas. These emotions are thought to have a profound effect on the mind (Chetas), causing stress that may trigger epilepsy by disturbing the nervous system.
- **Contemporary View**: Modern science supports the idea that intense emotional distress can precipitate seizures in certain individuals. Psychological stress, anxiety, and emotional trauma have been shown to influence brain activity and can act as seizure triggers, particularly in individuals with a predisposition to epilepsy. Neurobiological mechanisms, such as the release of stress hormones (e.g., cortisol), and changes in brain circuitry during emotional responses, are central to this understanding. [61]
- In the classics, there is also mentioning about affliction of mind by *Chinta*, *Bhaya*, *Kroda*, *Udvega*, as *Manasika Nidana* of Apasmara. These are nothing but the psychological stress and whenever there is a stressful situation, our body reacts to it naturally to create a physical and emotional response. Emotional responses will be in the form of frustration, panic, worry, etc, while the physical response to stress is the reason that can trigger seizures in the person. [62],[63]
- *Grahabadha* – Balagraha (Ashtang Hriday): *Bala Graha* like *Skanda*, *Skandapasmara* and *Pitru Graha* having the features of epilepsy, hence treatment and etiologies of *Balagraha* should also take into consideration in the treatment of epilepsy. In contemporary view there is no direct correlation of Graha Roga.

After analysis of different classical Ayurveda literature and different modern research article few points comes into light that –

The etiology, pathogenesis and clinical manifestation of epilepsy is highly complex and there is persistent change in the diagnostic protocols and medical management of disease.

Complexity of neurological pathways and diverse (varied) interconnections of neuronal bundles (tracts and laminas and pathways) and its direct influence under the emotional and endocrinal control is the fundamental cause behind this complexity. Therefore multiple times it's controversial to define and correlate the exact cause effect relation between the etiology and occurrence of seizure, which force the clinician to diagnose the epilepsy under the umbrella of idiopathic category.

Ultimately there is persistent changes in the classification and etiological categorization of epilepsy in recent past decades.

Conversely in Ayurveda the disease is considered as *Mano Vikara* (Primarily psychological disorder) causing physical manifestation. *Manasa* (mind) and *Vata Dosha* plays core role in the healthy psychological condition and mindfulness of individual. In Hatha Yoga the correlation between mind and *Vata Dosha* has been established. According to Hatha Yoga the causative factors responsible for vitiation of *Manasa* (mind), are responsible the vitiation of Vata and vice a versa, same principal is applicable in treating the mind and Vata Dosha. Both Vata Dosha and Mind have predominant of *Rajo Guna*, which make both of them Chala, Sukshama and *Vishada Guna Pradhana*.

In nut shell, the comparative study underscores the strengths and weaknesses of both the Ayurvedic and contemporary views on the causes of epilepsy. While contemporary medicine offers a precise, disease-oriented approach based on scientific evidence, Ayurveda provides a broader, individualized perspective that considers not just physical but also emotional, mental, and spiritual well-being [64], [65].

Conclusion:

Ayurvedic causes of epilepsy focus on a holistic, mind-body approach that integrates physical, emotional, and environmental factors, contemporary science primarily attributes the causes of epilepsy to biological and neurological & psychological stress factors. Both perspectives agree on the influence of emotional and sensory overload on the nervous system, but Ayurveda emphasizes a more comprehensive understanding of the individual's lifestyle, diet, and mental state. The modern medical approach, however, tends to focus on measurable factors such as brain activity and genetic predisposition. One of the limitations of this comparative review is the scarcity of robust, peer-reviewed clinical trials that rigorously evaluate Ayurvedic treatments for epilepsy in modern scientific terms [66]. Despite this, the growing body of research into integrative medicine and the combination of conventional and alternative therapies presents a promising future for epilepsy treatment. The integration of both viewpoints might lead to a more holistic, effective management of epilepsy, offering patients a broader array of therapeutic options and fostering a more comprehensive understanding of this complex neurological disorder.

REFERENCES:

1. Sharmitesh R Tripathi, Savitha H P, Suhas Kumar Shetty. Efficacy of Shatavaritaila Nasya and Brahmi Gritha in the management of Apasmara. Journal of Pharmaceutical & Scientific Innovation; 2016; 5(6):181-184.
2. Manjari Tripathi, Uma Prasad Padhy, Deepti Vibha, Rohit Bhatia, M.V. Padma Srivastava, Mamta Bhushan Singh, Kameshwar Prasad, Sarat P. Chandra, Predictors of refractory epilepsy in North India: A case–control study, Seizure, Volume 20, Issue 10, 2011, Pages 779-783, ISSN 1059-1311, https://doi.org/10.1016/j.seizure.2011.07.010.
3. Santhosh NS, Sinha S, Satishchandra P. Epilepsy: Indian perspective. Ann Indian Acad Neurol. 2014 Mar; 17(Suppl 1):S3-S11. doi: 10.4103/0972-2327.128643. PMID: 24791085; PMCID: PMC4001222.
4. Hauser WA. The prevalence and incidence of convulsive disorders in children. Epilepsia. 1994; 35 Suppl 2:S1-6. doi: 10.1111/j.1528-1157.1994.tb05932.x. PMID: 8275976.

5. Bharucha NE, Bharucha EP, Bharucha AE, Bhise AV, Schoenberg BS. Prevalence of epilepsy in the Parsi community of Bombay. *Epilepsia.* 1988; 29:111–5.
6. Zelano J. Recurrence risk after a first remote symptomatic seizure in adults: Epilepsy or not? Epilepsia Open. 2021 Dec; 6(4):634-644. doi: 10.1002/epi4.12543. Epub 2021 Oct 3. PMID: 34561959; PMCID: PMC8633470.
7. Ghai Essential Pediatrics, 10th edition, CBS Publishers &Distributers, Reprint 2016, Ch.No. 19, Page No.581 mentioned information regarding Myoclonic Epilepsy.
8. R.M.Kliegman (2016), Nelson's textbook of Peadiatrics, Reed elesvier India PVT LTD., Ch.No.26, Page No.3086. New Delhi, 21st Edition.
9. IAP text book of pediatrics, A Parthasasathy. National publication house, fifth edition, jaypee medical publishers, 2013, page no.455, mentioned information regarding Myoclonic Epilepsy.
10. Pressler RM, Cilio MR,Mizrahi EM, et al. The ILAE classification of seizuresand the epilepsies: Modification for seizures in theneonate. Position paper by the ILAE Task Force onNeonatal Seizures. Epilepsia. 2021; 62: 615–628. https://doi.org/10.1111/epi.16815.
11. Fisher RS, Cross JH, D'Souza C, French JA, Haut SR, Higurashi N, et al. Instruction manual for the ILAE 2017 operational classification of seizure types. Epilepsia. 2017; 58(4):531–42.
12. Wirrell EC, Nabbout R, Scheffer IE, Alsaadi T, Bogacz A, French JA, et al. Methodology for classification and definition of epilepsy syndromes with list of syndromes: Report of the ILAE Task Force on Nosology and Definitions. Epilepsia. 2022; 63: 1333–1348. https://doi. org/10.1111/epi.17237.
13. Fisher and Robert S: "Epileptic seizures and epilepsy: definitions proposed by the International League against Epilepsy (ILAE) and the International Bureau for Epilepsy (IBE)." Epilepsia 2005; 46(4): 470-2. doi:10.1111/j.0013- 9580.2005.66104.x
14. Blumcke I, Spreafico R, Haaker G, Coras R, Kobow K, Bien CG, et al. Histopathological Findings in Brain Tissue Obtained during Epilepsy Surgery. N Engl J Med 2017; 377(17): 1648-56.
15. Blümcke I, Thom M, Aronica E, Armstrong DD, Bartolomei F, Bernasconi A, et al. International consensus classification of hippocampal sclerosis in temporal lobe epilepsy: a Task Force report from the ILAE Commission on Diagnostic Methods. Epilepsia 2013; 54(7): 1315-29.
16. Van Breemen MSM, Wilms EB, Vecht CJ. Epilepsy in patients with brain tumours: epidemiology, mechanisms, and management. Lancet Neurol 2007; 6(5): 421-30.
17. Blümcke I, Aronica E, Becker A, Capper D, Coras R, Honavar M, et al. Low-grade epilepsy-associated neuroepithelial tumours - the 2016 WHO classification. Nat Rev Neurol 2016; 12(12): 732-40.
18. Blümcke I, Thom M, Aronica E, Armstrong DD, Vinters HV, Palmini A, et al. The clinicopathologic spectrum of focal cortical dysplasias: a consensus classification proposed by an ad hoc Task Force of the ILAE Diagnostic Methods Commission. Epilepsia 2011; 52(1): 158-74.
19. Josephson CB, Leach J-P, Duncan R, Roberts RC, Counsell CE, Al-Shahi Salman R. Seizure risk from cavernous or arteriovenous malformations. Neurology 2011; 76(18): 1548-54.
20. Thomas-Sohl KA, Vaslow DF, Maria BL. Sturge-Weber syndrome: a review. Pediatric Neurology 2004; 30(5): 303-10.
21. Hauser WA, Annegers JF, Kurland LT. Incidence of epilepsy and unprovoked seizures in Rochester, Minnesota: 1935-1984. Epilepsia 1993; 34(3): 453-68.
22. Beghi E, Carpio A, Forsgren L, Hesdorffer DC, Malmgren K, Sander JW, et al. Recommendation for a definition of acute symptomatic seizure. Epilepsia 2010; 51(4): 671-5.
23. Fisher RS, Acevedo C, Arzimanoglou A, Bogacz A, Cross JH, Elger CE, et al. ILAE official report: a practical clinical definition of epilepsy. Epilepsia 2014; 55(4): 475-82.
24. Christensen J, Pedersen MG, Pedersen CB, Sidenius P, Olsen J, Vestergaard M. Long-term risk of epilepsy after traumatic brain injury in children and young adults: a population-based cohort study. Lancet 2009; 373(9669): 1105-10.

25. Tubi MA, Lutkenhoff E, Blanco MB, McArthur D, Villablanca P, Ellingson B, et al. Early seizures and temporal lobe trauma predict post-traumatic epilepsy: A longitudinal study. Neurobiol Dis 2019; 123: 115-21.
26. Richards S, Aziz N, Bale S, Bick D, Das S, Gastier-Foster J, et al. Standards and guidelines for the interpretation of sequence variants: a joint consensus recommendation of the American College of Medical Genetics and Genomics and the Association for Molecular Pathology. Genet Med 2015; 17(5): 405-24.
27. Vezzani A, Fujinami RS, White HS, Preux P-M, Blümcke I, Sander JW, et al. Infections, inflammation and epilepsy. Acta Neuropathol 2016; 131(2): 211-34.
28. Michael BD, Solomon T. Seizures and encephalitis: Clinical features, management, and potential pathophysiologic mechanisms. Epilepsia 2012; 53(s4): 63-71.
29. Preux P-M, Druet-Cabanac M. Epidemiology and aetiology of epilepsy in sub-Saharan Africa. Lancet Neurol 2005; 4(1): 21-31.
30. Carpio A, Chang M, Zhang H, Romo ML, Jaramillo A, Hauser WA, et al. Exploring the complex associations over time among albendazole treatment, cyst evolution, and seizure outcomes in neurocysticercosis. Epilepsia 2019; 60(9): 1820-8.
31. Angel MJ, Young GB. Metabolic encephalopathies. Neurol Clin 2011; 29(4): 837-82.
32. Sander JW, Hart YM, Johnson AL, Shorvon SD. National General Practice Study of Epilepsy: newly diagnosed epileptic seizures in a general population. Lancet 1990; 336(8726): 1267-71.
33. Rahman S, Footitt EJ, Varadkar S, Clayton PT. Inborn errors of metabolism causing epilepsy. Dev Med Child Neurol 2013; 55(1): 23-36.
34. Wolf NI, Bast T, and Surtees R. Epilepsy in inborn errors of metabolism. Epileptic Disord 2005; 7(2): 67-81.
35. Vezzani A, Friedman A. Brain inflammation as a biomarker in epilepsy. Biomark Med 2011; 5(5): 607-14.
36. Devinsky O, Schein A, Najjar S. Epilepsy associated with systemic autoimmune disorders. Epilepsy Curr 2013; 13(2): 62-8.
37. Geis C, Planagumà J, Carreño M, Graus F, Dalmau J. Autoimmune seizures and epilepsy. J Clin Invest 2019; 129(3): 926-40.
38. Simona Balestrini, Alexis Arzimanoglou, Ingmar Blümcke, Ingrid E. Scheffer, Samuel Wiebe, Johan Zelano, Matthew C. Walker. The aetiologies of epilepsy. Epileptic Disorders. 2021; 23(1):1-16. doi:10.1684/epd.2021.1255.
39. Jain S and Tandon PN: "Ayurvedic medicine and Indian literature on epilepsy." Neurology Asia 2004; 9(1): 57-58.
40. Singh RH. Charak Samhita, Chikitsa Sthana 10/3. Delhi, India: Chaukhambha Surbharati Prakashana; 2006. p. 474.
41. Shripathi H. Adiga, Ramya S. Adiga, Kumar M.R. Bhat, Dinesh Upadhya, Ayurveda therapy in the management of epilepsy, Epilepsy & Behavior, Volume 159,2024, 110026, ISSN 1525-5050, https://doi.org/10.1016/j.yebeh.2024.110026. (https://www.sciencedirect.com/science/article/pii/S1525505024004086)
42. Charaka Samhita by Chakrapani, “Ayurveda dipika”, Prologue by Prof. R.H.Singh, Chukhambha Surbharati Prakashana, Charaka Samhita Nidanasthana-8.
43. Charaka Samhita by Chakrapani, “Ayurveda dipika”, Prologue by Prof. R.H.Singh, Chukhambha Surbharati Prakashana, Charaka Samhita Chikitsasthana-10/3; 474p.
44. Sushruta Samhita by Dalhanacharya “Nibandhsangraha” vyakhya nidanasthana and Shri Gayadasa “Nyayachandrika”, Krishnadas Academy, Varanasi/Edition Reprint 1/ Sushruta Samhita Uttarasthana 61/2-3/ 799p.
45. Chakrapanidatta,Chakradatta, with Vaidyaprabha English Commentary by Dr.G. Prabhakar Rao, Edited by Aharya Ramanath Dwivedi, Published by Chaukhambha Sanskrit Sansthana, Varanasi, 1st Edition-2014, Chapter 21.
46. Vrudda Vagbhata, Ashtanga Sangraha, Indu Commentry of Ashtangasangraha, Edited by Dr.Shivaprasad Sharma, Reprint-2008, Uttaratantra, Chapter-10,Pg- 681.

47. Pt HSS Paradakara, editor. Ashtanga hridaya of Vagbhata with Sarvanga sundara and Ayurveda Rasayana commentaries. Varanasi: Chaukhamba Sanskrit Sanstan; 2010. p.802.
48. Dr. Swapnil CR and Dr. Jayesh Purohit, Text Book of Balaroga Chapter 12 Miscellenous pediatric disorders, topic 1 Apasmara; Chaukhambha Vishvabharati Prakashan Varanasi Bharat 2022: p.277.
49. Kumar Ashvini. Shodhana from the Perspective of Utpatti-Sthana of Vyadhi. AYUSHDHARA, 2019; 6(5): 2365-2368.
50. Arun Kumar M, Srikantacharya, Subramanya P, Nagaraj S. A Review on Concept of Karmaja Vyadhi. RGUHS Journal of AYUSH Sciences. 2021; 8(2):8-12. DOI:10.26715/rjas.8_2_3.
51. Santoshkumar B. Utlaskar, GKS Dutta Sharma, Channabasavva D. Totad. Conceptual study of Anukta Vyadhi & importance of Ayurvedic Compendia in present era for the treatment of Anukta Vyadhi. J Ayurveda Integr Med Sci 2023;11:97-103.http://dx.doi.org/10.21760/jaims.8.11.14.
52. Fisher RS, Acharya JN, Baumer FM, French JA, Parisi P, Solodar JH, Szaflarski JP, Thio LL, Tolchin B, Wilkins AJ, Kasteleijn-Nolst Trenité D. Visually sensitive seizures: An updated review by the Epilepsy Foundation. Epilepsia. 2022 Apr; 63(4):739-768. doi: 10.1111/epi.17175. Epub 2022 Feb 7. PMID: 35132632.
53. Almannai M, Al Mahmoud RA, Mekki M, El-Hattab AW. Metabolic Seizures. Front Neurol. 2021 Jul 6;12:640371. doi: 10.3389/fneur.2021.640371. PMID: 34295297; PMCID: PMC8290068.
54. Tényi D, Janszky J, Jeges S, Schulze-Bonhage A. Food intake precipitates seizures in temporal lobe epilepsy. Sci Rep. 2021 Aug 13;11(1):16515. doi: 10.1038/s41598-021-96106-z. PMID: 34389785; PMCID: PMC8363749.
55. D'Andrea Meira I, Romão TT, Pires do Prado HJ, Krüger LT, Pires MEP, da Conceição PO. Ketogenic Diet and Epilepsy: What We Know So Far. Front Neurosci. 2019 Jan 29; 13:5. doi: 10.3389/fnins.2019.00005. PMID: 30760973; PMCID: PMC6361831.
56. Vijay Madhukarrao Maske, Mayuri Narayanrao Manwatkar. A critical review on concept of Vyadhi Veg Avastha in Ayurveda. J Ayurveda Integr Med Sci 2023;05:66-71.http://dx.doi.org/10.21760/jaims.8.5.11
57. Ismail RS, Kishk NA, Rizk HI, El-Kholy T, Abd El-Maoula LM, Ibrahim El-Desoky O, Shaheen S, El-Sawy E. Nutritional intake and its impact on patients with epilepsy: an analytical cross-sectional study. Nutr Neurosci. 2022 Sep; 25(9):1813-1822. doi: 10.1080/1028415X.2021.1905371. Epub 2021 Mar 29. PMID: 33779528.
58. Sanders T, Liu Y, Buchner V, Tchounwou PB. Neurotoxic effects and biomarkers of lead exposure: a review. Rev Environ Health. 2009 Jan-Mar; 24(1):15-45. doi: 10.1515/reveh.2009.24.1.15. PMID: 19476290; PMCID: PMC2858639.
59. Ding M, Lang Y, Shu H, Shao J, Cui L. Microbiota-Gut-Brain Axis and Epilepsy: A Review on Mechanisms and Potential Therapeutics. Front Immunol. 2021 Oct 11; 12:742449. doi: 10.3389/fimmu.2021.742449. PMID: 34707612; PMCID: PMC8542678.
60. Espinosa-Garcia C, Zeleke H, Rojas A. Impact of Stress on Epilepsy: Focus on Neuroinflammation-A Mini Review. Int J Mol Sci. 2021 Apr 14; 22(8):4061. doi: 10.3390/ijms22084061. PMID: 33920037; PMCID: PMC8071059.
61. Reddy DS, Thompson W, Calderara G. Does Stress Trigger Seizures? Evidence from Experimental Models. Curr Top Behav Neurosci. 2022; 55: 41-64. doi: 10.1007/7854_2020_191. PMID: 33547597.
62. Ashwini P. K. , Geetha B. Markande, Prashanth Jain. APASMARA – DIAGNOSIS THROUGH NIDANA PANCHAKA. World Journal of Pharmaceutical Research, Volume 11, Issue 2, 2310-2317. ISSN 2277– 7105. DOI: 10.20959/wjpr20222-23117.
63. Fauci AS, Kasper DL, Hauser SL, Jameson JL, Loscalzo J. Harrison's Principles of Internal Medicine. Twentieth Ed. New York: McGraw-Hill Medical Publishing Division, 2018; II: 2360.
64. Chauhan P, Tantray J, Chauhan P, Alok S, Nagdev S, Kosey S, Kumar G and Pal P: A comprehensive review on recent advancement in Allopathy and Ayurveda in the management of

epilepsy. Int J Pharm Sci & Res 2024; 15(1): 66-77. doi: 10.13040/IJPSR.0975-8232.15(1).66-77.

65. Ricotti, Valeria and Norman Delanty: "Use of complementary and alternative medicine in epilepsy." Current neurology and neuroscience reports 6, 4 (2006): 347-53. doi: 10.1007/s11910-006-0029-4.
66. Shripathi H. Adiga, Ramya S. Adiga, Kumar M.R. Bhat, Dinesh Upadhya, Ayurveda therapy in the management of epilepsy, Epilepsy & Behavior, Volume 159, 2024, 110026, ISSN 1525-5050, https://doi.org/10.1016/j.yebeh.2024.110026.