RECENT UPDATES ON MANAGEMENT OF EPILEPSY THROUGH AYURVEDA: A REVIEW

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ABSTRACT

Epilepsy (Apasmara) is a common neuropsychiatric disorder with major public health problem all over the world. Convulsive activities lead to neuronal cell loss, therefore timely treatment is essential. Present antiepileptic drugs control the epilepsy but long term use generates adverse effects at cognitive level, behavioural and affective disorders. An integrated approach is needed to concentrate on the burden of epilepsy care, prevention, and rehabilitation. Ayurveda has both palliative and curative protocols which recalibrates the body from the pathological to the physiological state. This review is aimed at summarizing the treatment modalities which includes purificatory measures such as therapeutic purgative, Pacificatory therapies like single herb, polyherbal formulations and Non-pharmacological therapies such as psychotherapy along with therapeutic intervention that have been used during the episode and between the episodes which are reviewed as recent developments on epilepsy in the field of Ayurveda that have been published in few databases.

Keywords: Epilepsy, Apasmara, Ayurveda, Rehabilitation, Antiepileptic drugs.

INTRODUCTION

Epilepsy is a condition with recurrent seizures having paroxysmal event due to chronic, abnormal, excessive, hypersynchronous discharges from central nervous system (CNS) neurons in the brain1. Apasmara bears a striking similarity with the disease epilepsy which is defined as sudden abhorrent bodily activities accompanied by momentary blackouts or loss of consciousness owing to disturbance in mental faculties of intelligence, retention and memory2. Approximately 50 million people worldwide have epilepsy making it one of the most common neurological diseases globally. Studies prove that 2.4 million people are diagnosed with epilepsy each year and in India the prevalence is between 5 and 40 per 1000 persons3.

Understanding of Epilepsy in Ayurveda: Apasmara is included under the group of disease affecting both the mind and body4. The aetiology of Apasmara is identified as intake of unwholesome and unclean food, practicing unhealthy behaviours, suppression of attribute of mind representing purity and disturbed equilibrium of Doshas (humours) plays a significant role in manifesting the disease5. Diagnosis of Apasmara is based on the observation of premonitory Symptoms as deviation eyes, auditory hallucinations, loss of interest in food, excessive salivation or nasal discharge, gurgling sound in stomach, feeling of darkness, giddiness and the main presenting features as loss of consciousness, feeling of entering into darkness, unstable clonic tonic movements of limbs, constriction of fingers, tremors, falling on ground, eye and head deviation to one side, teeth biting, dribbling of frothy saliva. On the basis of dominant Dosa (humour) involved in its pathogenesis and clinical manifestations of epilepsy, it classified as Vataja, Pittaja, Kaphaja and Samnipataja5. In Ayurveda, the general management of epilepsy has dual approach, a) During the episode and b) After the episode. These approaches can be considered to have a palliative and curative action which rectifies the body from the pathological to the physiological state.

The present review is an attempt to list out the various research modalities hypothesized as the management of Epilepsy which were updated in various databases. To provide an overview of epilepsy, the recent developments and the role of Ayurveda in its management is been explored.

RECENT UPDATES

After careful examination of the subjects, by considering the disease, Dosh, host factors and stage of pathogenesis of the Apasmara, following outcomes of review are presented below.

Nidana parivarjana (avoiding causative factors): Prevention is better than cure- the general line of management holds good by giving first priority in avoiding the stressful events or psychological trauma caused due to negative emotions like worries, passion, fright, anger, grief, anxiety.

Deepana-Pachana (preparatory therapies): It Stimulates vagus nerve7 which reduces the seizures by about 20–40 percent8. Studies suggest that Deepana-Pachana(stomachic – secretogogue9) with 1 tablet of Aampachakavati (Haritaki- Terminalia chebula, Shunti-Zingiber officinale, Maricha- Piper nigrum Pippali-Piper longum, Suddhakaraskara-Strzchus nuxvomica, Suuddhahingu- Feraula foetida, Cow’s ghee, Rock salt) two times in a day before meal helps in the digestion of stagnant food material and prohibits adhesion of the channels
which is very important in preventing the manifestation of the
disease.\textsuperscript{10}

**Shodhana Chikitsa (purificatory method):** It allows the
biological system to return into normalcy by eliminating toxins
from the body and facilitating the pharmacokinetic effect of
therapeutic remedies administered\textsuperscript{11}. These modalities have
demonstrated significant effects on psychoneuroimmunologic
parameters in studies of neuropsychiatric illness. Use of
Teekshna (drastic, Shodhana clears the obstruction, by
eliminating the Doshas (humours) and thus, it controls
Apasmaras. In Vataja Apasmara -Basti (medicated enemas),
Pittaja Apasmara-Virechana (Purgation) and in Kaphaja
Apasmaras -Vamanas (Emesis) - is administered\textsuperscript{12}.

**Vamana (emesis):** It is the process where vitiated Doshas are
forcibly expelled through the oral route. It is very evident that
Vamana is contraindicated in Vata dominant diseases, the
diseases involving vital organs and which may further impair the
control of the drug. Following the use of enemas, the patient is important.

**Virechana (purgation):** It is the process where elimination of
morbid humors achieved through the downward track from the
body\textsuperscript{13}. Virechana is the process that leads to evacuation of
toxins. Some of the research data correlated acetycholime with
Vata, catecholamine with Pitta, and histamine with Kapha.
Studies observed that after Virechana, there was reduction in the
plasma catecholamine contents in the patients to a significant
level. When the Aggravated Manasika Doshha influences the
Vata Dosha which results in repeated attack. Virechana
eliminates all morbid Doshas from all micro to macro
nourishing channels and regulates Vata Dosha, thus decreases
the symptoms of Vata, Pitta and Kapha at Srotas level\textsuperscript{14}.
Virechana is less stressful procedure when compared with
Vamana, which has less possibility of complications and easy
to conduct.

**Basti (medicated enema):** It is the treatment modality where
the medicine is administered through the anal canal having
curative, preventive and promotive action. Epilope is chronic
disease with aggravated Vata Dosha which results in repeated
attack. Basti is considered as prime and complete treatment
modality for Vata dosha. Yapanas Basti namely Madhutilakita
Basti is indicated in all seasons and all diseases which nourishes
as well as serves the purpose of purification\textsuperscript{15}.

**Nasya (errhine therapy):** It is a therapeutic measure where the
medicated drugs are administered through the nose. Here lipid
soluble small molecules result in direct movement of the drug
from the sub-mucous space of the nose into the CSF. Following
diffusion across the nasal mucosal barrier. The drug may cross
the arachnoid membrane and enter into olfactory CSF and then
to the blood via CSF absorption at the superior sagittal sinus.
Formulations containing therapeutic agents and attached with
receptor epitopes and antigens have been reported to provide a
means for enhanced delivery to selective regions of the CNS
after transnasal administration.

In Apasmaras, regaining consciousness is achieved by irritative
effect of Dhammad Nasya (blowing of fine powder like Marica
(Piper nigrum), Sigru (Moringa oleifera), Damanaka (Artemisia
vulgaris). Studies prove that ingredients administered through
the nasal route reduce the frequency, duration and the severity of
attacks rapidly. This probably is due to the fact that Nasya is
believed to be a therapy which delivers drugs directly to the
head.\textsuperscript{16}

**Siravedha (venesection):** It is the Procedure of removing the
vitiated blood using surgical or parasurgical measures.
The measure recommended in epilepsy is blood-letting from veins
of temples (Sira Shanka Keshanasandhi), middle vein adjacent
to the joint of the jaw bones (Hau Sandhi), tips of the eyes
(Apanga)\textsuperscript{17}.

**Bahi Parimarjana Chikitsa (external therapy):**

**Anjana (collyrium):** Collyrium is the application of medicines
to the eye. Use of Anjana (collyrium) and Anjana Vartika
(collyrium stick) to regain the consciousness has been
mentioned. The prepared Guitika/Vataka of Sarshapa (Brassica
Campestris), Kanchanara (Bauhinia Variegata), Ajumutra (Goats
urine) is applied as Anjana to eye lids\textsuperscript{18}.

**Abhyanga (massage therapy):** Anointing the body with simple or
medicated oil by external manipulations. It is said to increase
the blood amino acids like tryptophan, reduces the stress,
stimulates nervous system, muscular system glands governed by
the particular nerve\textsuperscript{19}. Abhyanga can be done with Katabhyadi
Taila (mustard oil cooked with four times of goat’s urine)\textsuperscript{20}.

**Shirodhara:** The procedure where Particular pressure and
vibration is created over the forehead by continuous dripping of
the oil or any liquid media. Vibration along with considerable
temperature results in activating the functions of thalamus thus
brings the amount of serotonin and catecholamine to normal
level in order to achieve the anticonvulsant effect\textsuperscript{21}.

**Udavartana (powder massage):** Friction of the body with
powdered medicine without mixing oil or other liquids. Studies
reports that use of Yavatriphala Churna for Udvartana, induces
friction of the drug to the skin thereby increases local
temperature, opens the circulatory channels and facilitates the
metabolic activity\textsuperscript{22}.

**Dhoopana (fumigation):** Smoke produced at high temperatures is
considered as a simple way of administering a drug, which
exhibits rapid pharmacological activity when inhaled. Dhoopana
has direct biochemical healing effect on CNS tissue diseases &
complexities. Dhoopana seems to have multiple actions in
preventing Apasmaras (Seizure disorder/ Epilepsy) through
scavenging of free radicals, increase in antioxidants, decrease in
nitric oxide and other underlying mechanisms helpful in
reducing the epileptic seizures\textsuperscript{23}.

**Rasayana Chikitsa (rejuvenation therapy):** The concept of
Rasayana therapy is oriented to enhance quality of health in an
individual. Rasayana drugs have antioxidant, anti-ageing and
anti-stress effect act as scavengers helping to prevent cell and
tissue damage. Rasayana drugs like Mandookaparni (Centella
asiatica), Yashtimadhu (Glycyrrhiza glabra), Guduchi (Tinospora
cordifolia), Shankpushpi (Convolvulus plaricaulis), Brahma
(Bacopa monnieri), Kustha (Saussurea lappa) Swarasa or
Vacha (Acorus calamus) with honey are beneficial in
epilepsy\textsuperscript{24}.

**Daiivyaprashraya Chikitsa (divine therapy):** In this category
incantation, wearing sacred herbs, wearing precious gems,
sacrifice is considered. Homa (Oblation) is the religious offering
has been designed to fight against diseases related to brain. Most
of the active components of Homa Samagri are abounded with
volatile oils which volatilize due to high temperature of the fire. Most of these components observed for its anticonvulsant activity with their mechanism. Most of the herbs used in Homa are having the action like benzodiazepines, Phenobarbital, valproate which enhances GABA-ergic inhibition. These herbs are also seeming to have a multiple action in preventing epilepsy through scavenging of free radicals, increasing the level of antioxidants, decreasing the level of nitric oxide and other underlying mechanisms.

**Sattvavajaya Chikitsa (psychotherapy):** It is the non-pharmacological approach for treating the mental disorder. It falls under Adravya-bhutaChikitsa. Sattvavajaya Chikitsa is administered through Jnana (knowledge), Vijnana (analytical thinking), Dhairya (courage), Smriti (memory) and Samadhi (concentration). It is recommended, when epilepsy is associated with extrinsic factors. It is apart from these, measures like calming the patient with assurances and words of religious and moral will be of greater benefit. It is also important to improve the emotional intelligence through positive training and programming of mind and brain to cope with the adverse situation by the cognitive behaviour therapy, rational emotive behaviour therapy. Epilepsy is known to have adverse effect on education, employment, marriage, and other essential social opportunities. Economic burden associated with epilepsy is very high with treatment and travel costs emerging as an important contributing factor. The huge treatment gap and poor quality of life is further worsened by the associated co-morbidities and conditions. Thus, a multidisciplinary response is needed to address the burden and impact of epilepsy which calls for an integrated and multipronged approach for epilepsy care, prevention, and rehabilitation. Service delivery, capacity building, integration into the existing program, mobilizing public support, and increasing public awareness will be the hallmarks of such an integrated approach in a public health model.

**Avasthika Chikitsa:** During Episodes, the primary aim is to bring back the consciousness of the patient. So different modalities are used in order to regain the consciousness. Treatment After episode or between the episodes is aimed at keeping the threshold value of the anti-seizure elements in the body & help in preventing Epilepsy.

Formulations used during the episodes are
1) Fumigation through the root of Vacha (Acorus calamus) and fruit of Matrica (Piper nigrum) to nose,
2) Anjana & Nasya from the equal parts of the powder of roots of Madhuyasti (Glycyrrhiza glabra) and Vaca (Acorus calamus), rhizome of Tagara (Valeriana wallachii), bark of Sirsra (Albizia lebbeck) and bulb of Rasona (Allium sativum)
3) Abhyanga with Sarsapataila (oil of Brassica campestris) boiled in 4 times goat’s urine and prepare taila by taila Paka method. Whole body of the patient is to be massaged with it and between the episodes of seizure
1) Svarasa of whole plant of Brahma (Bacopa monnieri) is to be taken in 14 to 25 ml. doses with 4 to 6 g. honey twice a day.
2) Bulb of Rasona (Allium sativum) is to be taken in 1 g. dose with 5 ml. Tila taila twice a day. Powdered root of Madhuyasti (Glycyrrhiza glabra) is to be taken in 3 to 6 g. dose with 7 to 14 ml.
3) Svarasa of fruits of Kusmanda (Bentinca hispida), twice a day for three days.

**Shamana Chikitsa (palliative therapy):** Oral use of different Herbo-mineral formulation is suggested after Shodhana Chikitsa. As shown in the table 1 & 2, following single and compound formulations can be used for the management of the Apathama. Phytomedicine consists of many organic chemical constituents with complex pharmacological effects on the body. These conclusions validate the traditional use of the plant in the control and treatment of convulsions in epilepsy. The link between herbal medicines and seizure activity are compelled below.

| SI | Botanical name | Sanskrit name | Active principle | Comments |
|----|----------------|---------------|------------------|----------|
| 1 | Mangifera indica | Aamra | Polyphenolics, triterpenoids, mangiferin, catechin, iso-mangiferin, alanine, glycine, γ-aminobutyric acid, kinic acid, | Inhibit PTZ and MES induced convulsions, increases GABA levels, Anticonvulsant action. |
| 2 | Crocus sativus | Kunkuma | Crocetin, picrocrocin, safranal, isophorone, | Increases seizure threshold, block PTZ induced convulsions, increases GABA-ergic neurotransmission, Inhibit absence seizure, Improve tonic clonic seizures. |
| 3 | Nardostachys jatamansi | Jadamsi | Valeranone, Calerene, patchouiol, α-gurjunene, aristolone, β-maallien, spathulenol, | Increases seizure threshold, inhibit the electroshock convulsions Increases GABA, 5-HT, 5-HIAA. |
| 4 | Cocos nucifera | Narikela | Mono unsaturated fatty acids, Saponins. | Inhibit PTZ induced convulsions. Increase GABA level, serotonin level. |
| 5 | Sesamum indicum | Tila | Propanone, ethanone | Decrease ROS, MDA in epileptics |
| 6 | Eugenia caryophyllus | Lavanga | Eugenol, acetylgenol, β-caryophyllene, vanillin, crategolicaci, tannins, gallotonic acid methylsalicylate, flavonoids, eugenin, kaempferol, rhamnetil, eugenin & tripteroidslike oleonol. | Increases onset of convulsions. Reduce duration of convulsions. Delay onset on seizures. Increase GABAergic and glycineergic activity. |
| 7 | Myristica fragrans | Jatphala | Myristicin and Macelignan | Inhibit seizures and uses the severity of seizures. |
| 8 | Acorus tatarinowii Schott | Vacha | Essential oils and asarone | Prevents convulsion related GABA -ergic neuron damage in the brain, Neuro protective aginst N-methyl-D-asapate or Glu-induced excitotoxic neuronal cell, Recepting-binding assay act as specific binding to striatal dopamine D1 and D2 receptors |
| 9 | Mesua ferrea | Nagkesara | Sesquiterpene, diterpenes, | Reduce HLFTE. Inhibit MES induced convulsions. |

Table 1: Herbs having anticonvulsant activity for the management of Epilepsy described in Ayurveda.

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| Plant Name                  | Part Used                                      | Description                                                                                               | Activity                                                                                       |
|----------------------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Valeriana wallichii        | Tagra                                         | Valerian, valpatriates GABA sesquiterpene, diterpenes, triterpenes, carboxylic acids and saturated hydrocarbons | Sedative action. Decrease HLTE. Anticonvulsant activity.                                         |
| Cyperus rotundus           | Musta                                         | Cyperone, seline, cypere, cyperotundone, patchuleneone, sugeronol, kobusone and isokobusone, nornuciferine (monoterpene) derivatives of sesquiterpenes such as cyperol, isocyperol and cypere. | Anticonvulsant action.                                                                        |
| Ziziphus jujube            | Karkandu                                      | Flavonoids, saponins, tannins, vitamin A, vitamin B, sugars, mucilage, calcium, phosphate & iron.         | Anticonvulsant action.                                                                        |
| Nelumbo nucifera           | Kamala                                        | N-nornuciferine, O-nornuciferine, nuciferine, and roemerine, protein, amino acids, unsaturated fatty acids, minerals, starch, and tannins. | Decrease tonic extensor convulsions. Anticonvulsant action                                     |
| Acorus calamus             | Vacha                                         | Methanol and acetone extract of roots and rhizomes.                                                       | Psychoactive substances which act as CNS depressant in nature prevent the development of FeCl3-induced rat epileptogenesis by modulating antioxidant enzymes. |
| Albizia lebbeck            | Shirisha                                      | Saponins from leaves.                                                                                      | Nootropic and anxiolytic activity.                                                             |
| Anacysus pyrethrum          | Akarakarabha                                  | Hydroalcoholic extract.                                                                                    | Prevents seizure induced oxidative stress and cognitive impairment. Regulate the decrease in cholinesterase activity caused by seizures. |
| Anisomelesmala barica      | Mahadrona                                     | Ethyl acetate flavonoids fraction from leaves.                                                              | Antiepileptic potential.                                                                     |
| Anreopephalus cadamba      | Kadamba                                       | Ethanolic extract from bark.                                                                               | Sedative and antiepileptic activity.                                                           |
| Argyreia speciosa          | Vruddadaruka                                  | Hydroalcoholic extract from root.                                                                          | Anti-stress activity and anticonvulsant effect.                                               |
| Asparagus racemosus         | Shatavari                                     | Methanol extract and Aqueous extract.                                                                       | Anticonvulsant effect by decreasing the duration of hind limb extension (extensor phase), clonus and also the duration of stupor phase. |
| Bacopa monnieri            | Brahmi                                        | Bacoside A.                                                                                               | Neuroprotective role in glutamate mediated excitotoxity during seizures and cognitive damage occurring in association with pilocarpine-induced epilepsy. |
| Benincasa hispida          | Kushmanda                                      | Ethanol extract.                                                                                          | Anticonvulsant effect.                                                                        |
| Berberis vulgaris          | Ddaruhanra                                    | Isoquinoline alkaloid.                                                                                     | Anticonvulsant activity by modulating neurotransmitter systems.                                |
| Butea monosperma           | Palasha                                       | Triterpene(TBM) present in the n-hexane ethyl acetate fraction of the petroleum ether.                      | Anticonvulsant effect.                                                                        |
| Calotropis gigantean       | Arka                                          | Alcoholic extract of peeled roots                                                                          | Analgesic, anticonvulsant, anxiolytic and sedative effect.                                     |
| Cannabis sativa            | Bhanga                                        | Cannabidiol.                                                                                              | Block the release of K+from the hippocampus caused by afferent stimulation which act as anticonvulsant activity. |
| Capparis zeylanica         | Vyaghranakha                                  | Ethanolic and alcoholic extract.                                                                           | Decreases the duration of tonic hind leg extension in maximal electroshock-induced seizures.  |
| Cedrus deodara             | Devadaru                                      | Alcoholic extract of heart wood                                                                           | Anxiolytic and anticonvulsant activity.                                                        |
| Centella asiatica          | Mandookaparni                                 | Asiatic acid.                                                                                              | Anticonvulsant and neuroprotective activity.                                                    |
| Cissus quadrangularis      | Anilishirnaka                                 | Aqueous extract from the stem.                                                                             | Protection of mice against maximal electroshock, pentylenetetrazol, strychnine and n-methyl-d-aspartate induced seizures and delayed the onset time of seizures induced by isonicotinylhydrazid acid. |
| Convolvulus pluricaulis    | Shankha pushpi                                | Methanolic extract.                                                                                        | Antioxidant activity (by using DPPH free radical scavenging model) and anticonvulsant activity (by using maximal electroshock seizure model) & reduces the mean recovery time from convulsion. |
| Cyperus rotundus           | Mustaka                                       | Flavonoids.                                                                                               | Antioxidant properties and exerts a potent antiepileptic drug.                                  |
| Emblica officinalis        | Amalaki                                       | Hydroalcoholic extract.                                                                                    | Completely abolishes the generalized tonic seizures and improves the retention latency in passive avoidance task as well as ameliorated the oxidative stress. |

Hydroalcoholic extract, Flav: Flavonoids, Methanolic extract: Triterpenes, carboxylic acids and saturated hydrocarbons.

Increases the onset time of seizures and decreases the duration of seizure.

Decrease tonic extensor convulsions. Anticonvulsant action.

Anticonvulsant action.

Anticonvulsant action.

Anticonvulsant action.
ticonvulsant activity, also showed significant modulation of GABA levels in cerebellum and also in whole brain other than cerebellum.

6. Glycyrrhiza glabra
- Ethanolic extract
  - Act as anticonvulsant when used in Pentyleneetetrazole and Isoniazid induced convulsions.

7. Hemidesmus indicus
- Ethanolic extract
  - Reduces the duration of tonic extensor phase and postictal depression.

8. Hypericum perforatum
- Methanolic extract
  - Anticonvulsant effect which may be partially mediated by nitric oxide.

9. Hyoscyamus niger
- Ethanolic extract
  - Useful in controlling lithium/ pilocarpine-induced status epilepticus.

10. Mimoso pudica
- Acalypha indica
- Shigru
- Ethanolic extract
  - Helps to control grand mal and petit mal epilepsy.

11. Mucuna pruriens
- Kapikacchu
- Antiepileptic activity in haloperidol-induced, MES, pilocarpine-induced status epilepticus.

12. Myristica fragrans
- Saahasra Yoga
- Effective against grand mal and partial seizures.

13. Acalypha indica
- Haritha manjari
- Methanolic extract
  - Anticonvulsant activity anti-oxidant. FeCl3 induced epilepsy, decrease in the duration of tonic hind limb extension.

14. Nerium oleander
- Karaveera
- Anticonvulsant activity in MES and PTZ induced convulsions.

15. Nigella sativa
- Upakunchika
- Anticonvulsant activity in MES and PTZ induced convulsions.

16. Nilambo navifera
- Pankaja
- Mild to moderate anticonvulsant property due to involvement of GABA.

17. Ocimum tenuiflorum
- Tulasi
- Extracts of stem, leaf and stem callus
  - Anticonvulsant activity in MES induced convulsions.

18. Pongamia pinnata
- Karanja
- Leaf extract, Petroleum ether extract
  - Anticonvulsant action.

19. Pueraria tuberosa
- Vidarikanda
- Alcoholic extract of tubers
  - Anticonvulsant activity in MES, PTZ, and strychnine induced convulsions.

20. Ricinus communis
- Eranda
- Significantly (p < 0.05) reduction of convulsion by MES-induced seizures in albino mice when compared with the standard drug diazepam.

21. Rubia cordifolia
- Manjishta
- Triterpene (isolated from the acetone soluble part of petroleum ether extract).
  - Elevates the seizure threshold through GABAergic mechanism.

22. Sesbania grandiflora
- Agasthya
- Triterpene
  - Anticonvulsant profile and anxiolytic activity.

23. Withania somnifera
- Ashwagandha
- root extract
  - Enhances the antiepileptic effect of diazepam and clonazepam & anticonvulsant activity in a lithium- pilocarpine model of status epilepticus in rats.

24. Solanum sarattense
- Kantakari
- Methanolic and aqueous extracts
  - Anticonvulsant activity when used against MES and PTZ induced seizure.

25. Sphaeranthus indicus
- Gorakhmundi
- Hydroalcoholic extract
  - Anticonvulsant as well as anxiolytic and central nervous depressant activities intrail rodents.

26. Tephrosia purpurea
- Sharapunkha
- Ethanolic extract
  - Controls lithium pilocarpine induced status epilepticus in albino rats.

27. Terminalia chebula
- Hartiaki
- Ethanolic extracts
  - Anticonvulsant activity against MES and PTZ induced seizures in rats.

28. Vitex negundo
- Nirgundi
- Alcoholic extract of root
  - Anticonvulsant activity when used against MES and PTZ induced seizure.

Table-2: Ayurvedic Formulations used for the management of Epilepsy

| Formulation | Name of formulation | Reference | Comments |
|-------------|---------------------|-----------|----------|
| Churna      | Sarvasweta          | Sahasra yoga | Nootropic and cognition enhancer. |
|             | Jatamansi           | Sahrasa yoga | Sedative and anxiolytic effect. |
|             | Ashwagandha         | Sahasra yoga | 1 to 2 grams with milk. |
|             | Sarpagandha         |             | Used in hysterical fits, insomnia |
| Taila       | BalaTaila           | Sahasra yoga | For external application, Apasmarampranashayet. |
|             | Shatatvari         | Sahasra yoga | It predominantly Vata Shamaka, have Anulomana (carminative) property. |
|             | Shirisha            |             | Apasmaramhanyat. |
### Pathyapathy (do's and don’ts)

**Pathya (diet):** Rice, wheat, milk, ash gourd, leafy vegetables, snake gourd, pomegranate, cow’s ghee, cow’s milk, green gram soup, drumstick, grapes, figs, gooseberry etc.

**Ketogenic Diet:** The ketogenic diet is the therapy in patients with deficiencies in the GLUT-1 glucose transport, where glucose cannot be transported into the cerebrospinal fluid for use by the brain; it also useful in those with pyruvate dehydrogenase (E1) deficiency for the treatment of seizures due to glucose transporter protein deficiency. The ketogenic diet provides nutrition with 1 g/kg protein and 5–10 g of carbohydrate per day, with the remainder of calories (usually 75% of the recommended daily allowance) as long-chain triglycerides. Meal plans are carefully tailored. The ratio of fat to carbohydrate and protein ranges from 2:1 to 4:1, with higher ratios seen as more restrictive and possibly more effective. Meals can be quite palatable, including bacon, eggs, tuna, shrimp, vegetables, mayonnaise, and sausages. Ketogenic diet which covers the seizures along with the dense energy provider for the brain during seizures (hypoxic conditions) preventing the brain/CNS (Majjadhatu) damage.

**Atkins diet:** In general, the ketogenic diet is 80% fat, 15% protein, and 5% carbohydrate; whereas the Atkins diet is 60% fat, 30% protein, and 10% carbohydrate.

**Apathya (contra indications):** Incompatible, dirty, contaminated food, Spicy, deep fried food items, fish, excessive meat, canned-processed food items, excessive intake of coffee, irregular, unaccustomed adventurous, strenuous activities and pouring hot water on head should be avoided.

**Yoga:** Studies have shown that the practice of yoga stimulates the central nervous system to release endorphins, monoamines and brain derived neurotrophic factor (BDNF) in the hippocampus. It also decreases cortisol levels by increasing melatonin production and improves physical and mental health through down regulation of the hypo-thalamo-pituitary-adrenal axis and the sympathetic nervous system. These poses are Balasana, Kapotanasana, Uttanasana, Matsyasana, Pavanamuktasana, Halasana, Savasana.

**Pranayama (deep diaphragmatic breathing):** In this technique person who slips into a seizure will be trained to catch reflexively and hold their breath as if startled or frightened. This causes changes in metabolism, blood flow, and oxygen levels in the blood. The practice of Nadi shodana Pranayama helps to

| Ghrita          | Panchagavya | C.S.Ci.10/17 | Controls the frequency of convulsions and Duration of convulsions. It can be given for a long duration of time in therapeutic dosage without the fear of any side-effects. |
|-----------------|-------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Kashmunda       | A.H.U.7/27-28 | Increases memory and reduces stress.                                                                                                      |
| Brahma          | C.S.Ci.10/26 | Reduces the extensor tonus phase of convolution in their standard doses, as a Shamana Sneha provided significant relief in severity, frequency of attack, salivation, pre and post ictal features in comparison to other groups. Brahma Ghrita in the form of Brumohana Sneha shown better relief in duration of attack and impaired higher mental functions. |
| Mahapancha gavya | A.H.U.7/19-22 | Especially for epilepsy and it controls the frequency of convulsions.                                                                          |
| Mahachaitasa    |             | Contents are Jeevanya Dravyas which plays Rasayana effect on body and also effective for cognitive development of patient. Specially for insanity & epilepsy. |
| Kwatha          | Manasyadi   | Siddhayoga Sangraha                                                                                                                           |
|                 | DasamulaKashaya | Siddhayoga Sangraha | Used in hysterical fits.                                                                                                                      |
|                 |              | Used as anupana in Apasmara along with Kalyanaka Ghrita.                                                                                     |
| Aasava-Arista   | Aswagandharista | B.R moorchadhikara 13-17 | Antipsychotic drug Especially for epilepsy.                                                                                                    |
|                 | Saraswatarista | B.R rasayanadhikara AFL Part L1:36 | Intellect promoting &Antipsychotic drug.                                                                                                                                                           |
| Rasausadhi      | Chaturbhuja rasa | Rasendra Sara Sangraha,Umamada Chikitsa | Anticonvulsant effect.                                                                                                                         |
|                 | Smritisagara rasa | Yoga Ratuakara | Intellect promoting, reduces the stress.                                                                                                        |
|                 | Unmada Gajakaresi Rasa |             | Antiepileptic activity after prolonged administration and also balances the excitatory and inhibitory neurotransmitters in CNS, the main action being GABAergic action and additional antioxidant activity of herbs. |
|                 | Tantupashana |             | Tantupashana is affective against MES seizures in animals and it may be used in generalized tonic clonic seizures/grandma epilepsy in human beings. |
|                 | Kausheyashma Bhasma |             | Useful in Epilepsy.                                                                                                                               |
|                 | Apasmararai rasa |             | Act as an anti-convulsant drug. on MES animal model of convolution preceded by LD 50 determination. It also has some significant result when compared to other drugs like Phenytoin and Smritisagara rasa. |
| Avaleha         | Chandravaleha | Yadavji Trikamji |                                                                                                                                                    |
| Arka            | Rasonadi Arka |             | As adjuvant drug.                                                                                                                                  |

C.S.Ci.-Charaka Samhita Chikitsasthana, A.H.U.- Ashtanga Hrudaya Uttaratanta, B.R.-Bhaishajya Ratnavali
restore normal respiration, which can reduce the chances of going into a seizure or stop the seizure before it becomes full blown\(^1\).

**Dhyana (meditation):** Stress is a well-recognized trigger of seizure activity. Meditation improves blood flow to the brain and regulates the production of stress hormones. It also increases the levels of neurotransmitter, like serotonin, which act as definitive aid in seizure control\(^2\).

**CONCLUSION**

Epilepsy is a clinical syndrome chiefly affecting the central nervous system. It influences the physical, psychological, familial and occupational spheres of life. Hence apart from focusing on understanding the aetiology of the condition and managing it through anti-epileptic drugs it is also important to focus on other issues related such as social stigma, wide socioeconomic inequity, it is important to counsel not only the individuals suffering from epilepsy but also people associated with the patients. Prompt stress management, yoga, meditation, diet etc can reduce the severity and duration of the attack and also improve the quality of life. Treatment of epilepsy in Ayurveda aimed at the time of attack and in between the attack which includes pharmacological and non-pharmacological measures with many herbal, herbo-mineral formulations in different dosage forms with variety of techniques is reviewed to provide good control of seizures for most people with epilepsy. Though several single herbs and compound formulations combined with various measures of Ayurveda have been tested to get desired and optimum results, still a comprehensive and integrated research designs and outcome are still awaited to get a potential area in the future research to stimulate national and international collaborative researches to gain more impact and recognition.

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