

## Evaluation of Antiepileptic Effect of Saindhava Hinguvadi Ghrita in Pentylene Tetrazole (PTZ) Induced Swiss Albino Mice

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**ABSTRACT:** Bhaishajya Kalpana is a branch of Ayurveda which deals with the preparation of many formulations. Sneha Kalpana is a unique method of preparation which coming under Bhaishajya Kalpana. Sneha Kalpana helps to utilise fat soluble and water soluble properties of drugs. Among four snehas, Ghrita is the best one. It is stated as Sarvasnehottama and Samskarasyanuvartanam. The present study is concerned with the formulation Saindhava Hinguvadi Ghrita which is mentioned in Charaka Apasmara Chikitsa. In classics many ghrita preparations are mentioned under Apasmara Chikitsa. Many are not explored for its therapeutic efficacy. Till now no scientific studies have been carried out in this formulation. The aim of the study is to scientifically establish the anti epileptic effect of Saindhava Hinguvadi Ghrita. Experimental study revealed as follows: - Saindhava Hinguvadi Ghrita showed statistically nonsignificant results in experimental study.

**KEYWORDS:** Bhaishajyakalpana, Sneha kalpana, Saindhava Hinguvadi ghrita, Antiepileptic effect, Experimental study.

### I. INTRODUCTION

Ayurveda is a system of healing unlike any other, offering a unique approach to health care in the form of self discovery with its roots in ancient India. Ayurveda is a tradition thought to be over five thousand years old [1]. The name Ayurveda is derived from two words in Sanskrit, 'ayuh' meaning 'life' or longevity and 'veda' meaning 'science' or sacred knowledge. So it is the science of longevity. The earliest known references of Ayurveda appeared in scholarly texts from the time called vedic era [2]. The word Bhaishajya Kalpana is composed of two words - 'bhaishajya' and 'bhaishaja' and kalpana. The word bhaishaja or bhaishajya means that which wins the

fear of disease or restores the health of a person by stabilizing the doshas. The word kalpana means the process or the method employed for the preparation of pharmaceutical products.

Sneha Kalpana is a unique dosage form in Ayurveda. It may be defined as — A pharmaceutical process to prepare oleaginous medicaments from the substances like kalka, kwatha, dradraya taken in specific proportion and by subjecting them to unique heating pattern and duration to fulfill certain pharmaceutical parameters, according to the need of therapeutics [3].

Sneha Kalpana helps to utilise the fat soluble and water soluble properties of drugs. In classics many sneha preparations are mentioned under Apasmara Chikitsa. Saindhava Hinguvadi Ghrita is such a preparation mentioned by Charakacharya in Apasmara Chikitsa.

Approximately fifty million people currently live with epilepsy world wide. Globally estimated 2.4 million people are diagnosed with epilepsy each year [4]. Prevalance in India is 5.59-10/1000. Prevalance is higher in rural compared to urban. There is high of premature mortality in people with epilepsy [5]. Epilepsy contributes a variety of medical, social, physiological and economic burdens. The impact of disease is experienced in all aspects of patient's life and also some extend to the family [6]. In classics it is mentioned that among four snehas, Ghrita is the best one and it is stated as sarvasnehottama, samskarasyanuvartanam [7]. Its daily usage increases dhi, smriti, medha [8]. Many ghrita preparations mentioned in classics are still not proved for its therapeutic efficacy. The experimental study of Saindhava Hinguvadi Ghrita is a trial to assess its antiepileptic effect in animal model.

## II. MATERIALS AND METHODS

In the current study, the test drug Saindhava Hinguvadi Ghrita was evaluated for its anti-convulsant activity through two models. PTZ induced chemo convulsion in mice and PTZ induced kindling in mice.

**Aim:** The current study was aimed to evaluate the anti-epileptic activity of Saindhava Hinguvadi Ghrita by generalised PTZ induced seizure method and PTZ induced Kindling and staging method.

**Objectives:** To compare and evaluate the anti-epileptic activity of Saindhava Hinguvadi Ghrita through experimental study.

**Test drugs:** The sample of Saindhava Hinguvadi Ghrita was prepared as per standard references in Department of Rasasashtra and Bhaishajya Kalpana, MVR Ayurveda Medical College, Parassinikadavu, Kannur.

**Experimental animal :-** 48 Swiss albino mice were randomly selected and divided into 4 groups for PTZ induced chemoconvulsion study and into 4 groups for PTZ Induced Kindling study respectively.

**Inclusion criteria:** a) Animals will be selected are adult Swiss albino mice having weight from 30-40 g. b) Animals selected will be of both sexes. c) Active and healthy mice. **Exclusion criteria:** a) Weight range below 30g and above 40g. b) Mice, which were used for other studies previously. c) Pregnant and diseased mice.

**Mice maintenance:** Swiss Albino mice were obtained from animal house attached to S.D.M. Centre for Research in Ayurveda and Allied Sciences, Udipi, Karnataka. They were maintained on feed of —Sai Durga Feed and Food, Bangalore and tap water was given ad libitum. The temperature and humidity were kept at optimum and animals were exposed to natural day-night cycles. The experiments were carried out in a conformity with guidelines of Institutional Animal Ethical Committee (SDMCRA/IAEC/MV-R-10) after obtaining its permission.

**Examination of the animals prior to the experiment:** All the Swiss Albino mice were subjected to general check for weight. Weight of each animal was checked by using weighing machine and the dose was calculated according to Paget and Barne's formula (Paget and Barne's 1964) involving body surface area ratio and human dose. The cages were labelled with name of the group and drug.

**Reference and Standard Drug:** The reference standard drug used for antiepileptic

activity evaluation was Diazepam. It was purchased from the market-Diazepam tablets I.P 5mg, Mfd- July 2019, Exp-June 2022, Manufactured by Elkem Pharmaceuticals

Pvt(Ltd), Ganthinagar(Dt), Marketed by Dellwiche Healthcare LLP, Ahmedabad, Gujarat.

**Chemical for inducing seizure:** Pentylentetrazole was used as a chemical for inducing the seizures in mice for evaluating the anti-epileptic activity experimentally. Chemical procured from HiMedia laboratories Pvt.Ltd, Mumbai, India with the name Pentamethylene tetrazole (5 gm), PKD; 04/2011 and is of analytical grade regularly used in the laboratory.

**Equipments:** 1. Physical balance 2. Animal weighing machine 3. Measuring jar 4. Syringes 5. Stop watch 6. Animal cages.

**Grouping of animals :**

A day prior to dosing, the selected animals were divided into different groups by randomization method.

**Groups of animals :**

Group 1 Positive control ; Group 2 Standard drug: Diazepam ; Group 3 Test drug: Saindhava Hinguvadi Ghrita (TD); Group 4 Test drug : Saindhava Hinguvadi Ghrita (TD×2).

**Dose fixation Dose calculation of trail drug for mice =**  $0.0026 \times \text{human dose} \times 50/\text{kg body weight}$ .

Here the human dose of Saindhava Hinguvadi Ghrita is 48ml (1 pala).

Therefore Dose =  $\text{Human dose} \times 0.0026 \times 50/\text{kg body weight}$

=  $48 \times 0.0026 \times 50/\text{kg body weight}$

= 6.24ml/kg body weight.

**Dose calculation for Reference Standard (Diazepam) :** Mice dose = 8mg/kg body weight.

**Dose calculation of Pentylentetrazole for Generalised PTZ induced seizure :** Mice dose = 80mg/kg body weight.

**Dose calculation of Pentylentetrazole for PTZ induced kindling and staging study:** Mice dose = 40mg/kg body weight.

**Drug preparation**

**Test drug:** The samples of Saindhava Hinguvadi Ghrita were prepared as per standard references in Department of Rasasashtra and Bhaishajya Kalpana —MVR AMC, Kannur

**Diazepam:** The solution of diazepam was prepared by taking 5mg tablet and dissolving in 10ml distilled water.

**PTZ Solution :**

a.For Generalised PTZ Induced Seizure study (80mg/kg):A stock solution containing 80mg of PTZ and 10ml of distilled water was prepared.

b.For PTZ Induced Kindling (40mg/kg) :A stock solution containing 40mg of PTZ and 10ml of water was prepared.

Route of drug administration: Positive control,standard drug and test drug would be administered according to body weight of the animals by oral route and PTZ was injected intraperitoneally for inducing seizures.

Methodology :Antiepileptic activity was assessed by two different methods:

a) Pentylenetetrazole Induced Seizure Method: The animals were administered test drug and reference standard drug to respective group by oral route for 21 days.On the 22nd day,one hour after drug administration,they were subjected to chemo-convulsion by injecting Pentylenetetrazole(PTZ) intra peritoneal in the dose of 80mg/kg.The effect of different treatment on PTZ convulsion profile was noted down.The parameters to be measured were-

- Latency of onset of clonic and tonic convulsions
- Reccurence of clonic or tonic convulsion • Myoclonic twitches,mortality• Any other abnormal changes in the behavior. Abolishing of the clonic convulsion was considered as the index of convulsion activity.

b) Pentylenetetrazol Induced Kindling Method: For kindling induction,Pentylenetetrazole (PTZ) was freshly dissolved in normal saline and a sub-convulsive dose of 40mg/kg,ip was

administered every other day for a total of around 12 injections.After each injection of the subconvulsive dose of PTZ,mice in different groups was observed for 35 min and PTZ induced seizures was evaluated and classified according to the scoring system of Fischer and Kittner-1998.

- 1-Ear and facial twitching,head nodding;
- 2-Myoclonic jerks;
- 3-Generalized clonic convulsions rearing,jumping and falling down,
- 4-Clonic-tonic convulsions,tonic hind limb extensions.

The mean seizure stages were calculated for all groups after each PTZ injection.

The scores from the test formulation and reference standard groups were compared to positive control group.

**III. RESULTS**

Observations and results are analysed by one way anova followed by Dunnets multiple comparison t-test as post-hoc test,if  $p < 0.05$  using grah pad instatsoft ware.

A = Control test group

B = Standard group

C = Test group I

D = Test group II

If P value is  $< 0.05$  - Statistically significant,denoted by \*

If P value is  $> 0.05$  - Statistically non significant

If P value is  $< 0.01$  - Statistically very significant,denoted by \*\*

Parameter	Group A(Positive control)	Group B(standard)	Group C(test group I)	Group D(test group II)
LOS	58.016±12.98	0±0	114±23.74	105.83±28.01
MJ	10±.8367	0±0	31.25±15.92	15.8±6.24
ST	6.16±1.04	0±0	20±12.81	6.83±2.61
CC	5.66±1.47	0±0	1.2±0.73*	3.16±1.01
RT-CC	0±0	0±0	1.2±0.58*	0.66±0.21
DD	8.31±1.19	0±0	0±0	7.64±1.53
ET and HN	245.5±52.17	246.83±50.81	461±70.24	415.16±126.54

MJ	453 ± 181.51	105.5± 42.77	105.5±42.77	450.66± 90.96
FLC	5.66± 1.28	0 ± 0	2 ±1.512	1.83 ± 0.87*
GCC R,J,F	1.83±0.47	0±0	0.42± 0.2** Data:Mean±SEM **p<0.01**p<0.01	1± 0.4
CTC,THLE	0.16± 0.16	0 ± 0	0 ± 0	0 ± 0
TC	706.83± 154.37	352.33± 79.76	1274.37± 227.08	870.5±168.32
TMJ	453 ±181.51	104.66 ±42.71	812.75 ±177.45	451± 89.98
ET and HN(peak10-20min)	89.83 ±17.77	82.83± 17.46	155.37± 24.86	146.16 ±45.29
MJ(peak10-20min)	146.66± 68.32	32± 11.24	312.12 ±78.46	145± 32.52
FC(peak 10-20min)	1.66± 0.42	0 ± 0	0.12 ±0.12** DATA:Mean±SEM **p<0.01**p<0.01**p<0.01	0.33± 0.21**
GCC R,J,F(peak10-20min)	0.5± 0.34	0 ± 0	0.12± 0.12	0.66± 0.49
CTC,THLE(peak10-20min)	0± 0	0± 0	0± 0	0± 0
TC(peak10-20min)	238.6± 62.12	114.83± 24.11	467.97 ±91.66	292.16± 61.17

Interpretation of tables:-

Table i : There was an increase in number of myoclonic jerks in Group C,Group D when compared to positive control group,absence in Group B .The observed increase was found to be statistically non significant.

Table ii) : There was an increase in number of straub tail occurrence in Group C,Group D when compared to positive control group,absence in Group B. The observed increase was found to be statistically non significant.

Table iii) : There was a decrease in number of clonic convulsions in Group C,Group D when compared to positive control group,absence in Group B.The observed decrease was found to be statistically non significant.

Table iv) : There was an increase in number of recurrence of tonic-clonic convulsions in Group C,Group D when compared to positive control group,absence in Group B. The observed increase was statistically non significant.

Table V : There was increase in duration of recurrence of tonic-clonic convulsions in Group C.Group D when compared to positive control group,absence in Group B.The observed increase was found to be statistically non significant.

Table Vi) : There was decrease in duration of death in Group C,Group D when compared to positive control group,absence in Group B. The observed decrease was found to be statistically non significant.

Table Vii) : There was an increase in number of ear twitching and head nodding in Group C,Group D when compared to positive control group,absence in Group B. The observed increase was found to be statistically non significant.

Table Viii) : There was decrease in number of myoclonic jerks in Group C,GroupD,Group B when compared to positive control group. The observed decrease was found to be statistically non significant.

Table IX): There was decrease in number of forelimb clonuses in Group C, Group D when compared to positive control group, absence in Group B. The observed decrease was found to be statistically non significant.

Table X) : There was decrease in number of generalised clonic convulsions in Group C, Group D when compared to positive control group, absence in Group B. The observed decrease was found to be statistically very significant.

Table Xi) : There was absence of clonic-tonic convulsions in all the Groups.

Table Xii) : There was increase in number of total convulsions in Group C, Group D when compared to positive control group, absence in Group B. The observed increase, decrease was found to be statistically non significant.

Table Xiii) : There was increase in total number of myoclonic jerks in Group C, decrease in Group B and Group D when compared to positive control group. The observed increase and decrease was found to be statistically non significant.

Table XiV): There was increase in number of ear twitching and head nodding in Group C and Group D, decrease in Group B when compared to positive control group. The observed increase and decrease was found to be statistically non significant.

Table XV) : There was increase in number of myoclonic jerks in Group C, decrease in Group D and Group B when compared to positive control group. The observed increase and decrease was found to be statistically non significant.

Table XVI) : There was decrease in number of forelimb clonuses in Group C and Group D when compared to positive control group. The observed decrease was found to be statistically very significant. Absence in Group B.

Table XVii) : There was decrease in number of generalised clonic convulsions in Group C and Group D compared to positive control group, absence in Group B. The observed decrease was statistically non significant.

Table XViii); There was absence in all the groups.

Table XiX) : There was increase in total number of convulsions in Group C and Group D when compared to positive control group, decrease in Group B. The observed increase and decrease was found to be statistically non significant.

#### IV. DISCUSSION

Sneha kalpana is considered to be the protuberant kalpana when it comes to the management of Manasika vyadhis like Apasmara, Unmada etc. It has been clearly quoted by

Acharya Chakrapani that the therapeutic attribute of a drug can be modified by subjecting the drug to various procedures and converting it into a desirable kalpana. The main aim of these procedures is to bring about a change in the properties of the dravya or transformation of a crude drug into pharmacologically active compound.

Saindhava Hinguvadi Ghrita – It is mentioned in Charaka Apasmarchikitsa. The ingredients mentioned are ghrita, saindhavalavana, hingu, rishabhamutra, basta mutra (male goat urine). Sneha kalpana – Almost every classics of Ayurveda define very systematically about the preparation of medicated taila and ghrita (oil and ghee), worth to mention here are Charaka Samhita, Sushruta Samhita and Ashtanga Hridaya. However, Sharangdhara Samhita is considered as best book for pharmaceutical details of different herbal dosage forms. Sneha Kalpana, ghritakalpana can be considered as sreshtha, because of special property of ghritaie, samskarasyaanuvartanam, that means it is having the power to assimilate the properties of other substances effectively with which it is processed. There is no other snehadravya except ghrita which has this tremendous property. It also has the capacity to transform itself when added with other substances as the qualities of these substances get imbibed into it. Ghrita does not give up its own properties even if it is mixed with substances possessing other properties [9].

Study of Anti-convulsant activity - According to Charaka Samhita the test drug Saindhava Hinguvadi Ghrita can be used in Apasmarchikitsa. In order to ascertain its anti-epileptic activity, experimental study was carried out in 2 models; PTZ Induced Generalised Seizures in Swiss Albino mice and PTZ Induced Kindling in Swiss Albino mice. The results obtained in these models can be interpreted as follows.

1. Anti-convulsant activity by pentylenetetrazol (PTZ) induced generalised seizures :

On evaluating the anti-convulsant activity by PTZ induced convulsions it was observed that in the positive control group the survival rate was zero. In Test Group I and standard group death was absent. In Test Group II survival rate was zero. Latency of death was less compared to positive control group. Test Group I exhibited increased latency of onset of seizures compared to

positive control group and increased number of myoclonic jerks, increased number of straub tail occurrence. There was a decrease in number of clonic convulsions compared to positive control group. There was an increase in number of recurrence of tonic-clonic convulsions and duration of recurrence. In Test Group II there was an increase in latency of onset of seizures compared to positive control group. Number of myoclonic jerks and number of straub tail occurrence was also increased and decrease in number of clonic convulsions. There was an increase in number of recurrence of tonic-clonic convulsions and duration of recurrence. On assessing the efficacy of Saindhava Hinguvadi Ghrita in Test Group, it was effective in controlling some of the parameters even though the results were statistically non significant. Survival rate of Test Group I was 100%. So a moderate effect of Test Drug was observed in Test Group I. In test group II it was effective in controlling some of the parameters even though the results were statistically non significant, but the survival rate of Test Group II was zero and there was no effect on latency of death. So only a mild effect of test drug was observed in Test Group II.

Thus Saindhava Hinguvadi Ghrita can be administered as a markable adjuvant for main stream Anti-epileptic drugs.

## 2. Anticonvulsant activity by pentylenetetrazol (PTZ) induced kindling mice :

The positive control group mice developed all grades of convulsions and seizures were more severe. The seizure severity after successive injections were increased and day by day mice became weak. Repeated kindling decreased the resistance to sustain convulsions. The test drug Saindhava Hinguvadi Ghrita exerted inhibition of kindling effect from the first day of injection. The stages of convulsions were very well controlled even though there was no complete cessation of seizure activity. Ear and facial twitching, myoclonic jerks and forelimb clonus ie, upto 3rd grade of convulsion were the stages of convulsions that were exhibited by most of the mice till the last injection. There was an increase in number of face twitching/head nodding in Test Group I, Test Group II and Standard Group compared to positive control group and the observed increase was statistically non significant. There was a decrease in number of myoclonic jerks in Test Group I, Test Group II and Standard Group compared to positive control group. The observed

decrease was statistically non significant. The number of forelimb clonus were decreased in Test Group I and Test Group II compared to positive control group. The observed decrease was statistically non significant. In standard group there was absence of forelimb clonus. The number of clonic-tonic convulsions in Test Group I, Test Group II and Standard Group were decreased compared to positive control group. The observed decrease was statistically non significant. According to the present study, the test drug Saindhava Hinguvadi Ghrita proved to be significantly helpful in suppressing the development of kindled seizures in mice i.e. it is helpful for inhibiting epileptogenesis and developing a potential seizure threshold.

One of the major differences found in both the test groups was that all the mice were active till the last day of kindling indicating that long term administration of these drugs may not produce psychological or sedation effect. It was observed that in standard group all the mice became weak day by day after kindling and sedation effect was evident in standard group.

## Interpretation of PTZ induced kindling mice

The basic features of human epilepsy are spontaneity and recurrence of seizures. Hence, chronic models like kindling are advantageous over acute models. There is only few evidence for the basic neuronal mechanisms underlying PTZ-kindled seizures. In the present study, investigation was done about the effect of Saindhava Hinguvadi Ghrita on PTZ-induced kindling in mice. Kindling is a model of epilepsy that has plusses of both an epileptogenic and a spontaneous seizure model. Chemical kindling is the development of seizure following repeated administration of convulsant substance at a dose that is sufficient to produce convulsions following a single administration.

Kindling produced by PTZ in mice has features very similar to those described for electrical kindling, that is the reaction to PTZ is proportional to the stimulus intensity. The PTZ kindling model is generally used as laboratory model of human partial complex epilepsy. The present study covered anticonvulsant and antiepileptic properties of test drug Saindhava Hinguvadi Ghrita against PTZ-kindled seizures in mice.

Seizures can arise when there is an imbalance of mechanisms that normally create a balance between excitation and inhibition. Kindled

seizures are widely accepted as an animal model for temporal lobe epilepsy wherein repeated sub-threshold brain stimulation, electrical or chemical, leads to behavioural signs of clonic and tonic seizures. This model of epilepsy has the advantages of both epileptogenic and a spontaneous seizure model.

Pentylenetetrazole (PTZ) kindling is an accredited model for epilepsy and refers to a phenomenon in which repeated injection of a convulsant causes gradual seizure development resulting in generalized tonic-clonic seizures allied with a cognitive deficits.

### Discussion on probable mode of action of drugs

#### A. Probable mode of action of Diazepam (Reference Standard Drug)

Benzodiazepines play protuberant roles in the therapy of Epilepsy. Although many benzodiazepines are alike chemically, subtle and structural alterations result in variances in activity and pharmacokinetics. They have two mechanisms of antiseizure actions.

GABA is a major inhibitory neurotransmitter in the CNS. Electro physiologic studies have revealed that benzodiazepines potentiate GABAergic inhibition at all levels of neuronal axis, including the spinal cord, hypothalamus, hippocampus, substantia nigra, cerebellar cortex, cerebral cortex. Benzodiazepines seems to increase the adaptiveness of GABAergic synaptic inhibition. The benzodiazepines do not substitute for GABA but appear to enhance GABA's effect in high level but without directly activating GABA receptors or opening the associated chloride channels. The augmentation in chloride ion conductance induced by the interaction of benzodiazepines with GABA takes the form of an increase in the frequency of channel-opening events.

Benzodiazepines accarate the action of GABA in the central nervous system. Diazepam acts at GABA<sub>A</sub> synapses and its action in reducing spasticity is at least partly mediated in the spinal cord because it is marginally effective in patients with cord transection. Although diazepam can be used in patients with muscle spasm of almost any origin (including local muscle trauma), it also produces sedation at the dose required to reduce muscle tone.

Diazepam is highly effective for stopping continuous seizure activity, especially generalized tonic-clonic status epilepticus.

#### B. Probable mode of action of PTZ :

The exact mechanism of pentylenetetrazole (PTZ) action is not well understood. It is believed that its main action is mediated by its binding to the post synaptic GABA receptors. By competing inhibition, PTZ antagonizes the GABA activated current and reduces the frequency of chloride channel in a concentration-dependent manner. Thus, PTZ lowers the depolarization threshold which results in hyper-excitability of the cells or group of cells in the critical areas in the CNS leading to convulsive episodes.

Lukomskaya and co-workers have proposed that glutamatergic synaptic transmission plays an imperative role in the weakening of GABAergic inhibitory processes induced by PTZ. It is likely that the test drug Saindhava Hinguvadi Ghrita modulate these neurotransmitter systems to produce the observed effect. They may be interfering with the PTZ induced lowering of excitatory threshold or they may be acting directly to counteract the threshold decreasing effect of PTZ by modulating the ion-channels involved. The exact mechanism needs to be elucidated.

Drugs defending against tonic-clonic seizures induced by PTZ are considered useful in controlling myoclonic and absence seizures in humans. Based on the observed results, it can be recommended that the test drug possesses moderate anticonvulsant activity which is supportive of the use of this drug in the traditional systems of medicine.

Epilepsy is one of the most common neurological disorders around the globe. Since, pathogenesis of Epilepsy is highly complicated involving several neurotransmitter systems and difficulties are being experienced in introducing drugs with better controlling seizure capability. Several neurotransmitter systems may be involved in Epilepsy. It is also been observed that epilepsy and depression often co-exist. Nor adrenaline and 5-hydroxytryptamine, (5-HT) are considered to play the key role in their co-existence. Several lines of confirmation suggest that the central histaminergic neuron system plays an important role in inhibiting convulsions in animals. Elevated extracellular levels of limbic, nor-adrenalin, 5-HT, dopamine (DA) are allied with both anti-depressant and anti-convulsant actions. It can be recommended that the test drug may be producing the above type of neurotransmitter modulation to produce the observed effect.

A person is said to be suffering from Epilepsy if he/she has two or more recurrent

unprovoked seizures. Seizure is a paroxysmal event that is due to abnormal, excessive and hyper synchronous discharge from an aggregate of CNS neurons. The most effective way of controlling it would be to intervene hyper synchronous discharge in the distinct areas of the CNS is likely that the test drug may retain modulatory effect on this phenomenon and it is worthwhile to explore this possibility through further studies.

Probable mode of action of Saindhava Hinguvadi Ghrita:-

Probable mode of action of ghrita :- Sneha Kalpana is widely explained by acharyas under the contexts related to the vikaras of dhi, buddhi, sattvavibhrama. Some of the qualities of ghrita mentioned by acharyas are:- samskarasyanuvartanam, dhivardhaka, smritivardhaka, medhavardhaka, agnivaradhaka, unmadaharam, apasmaharam, mathivardhaka, rasayanam, vishaharam, hridayam.

The action of ghrita on mental functions is already proved. Snehakalpana is given due consideration because of its digestibility coefficient which is proven to be highest of all oils and fats. Along with digestibility, absorption and delivery to a target organ system are very crucial in obtaining the maximum benefit of any formulations.

Lipophilic action of ghee assists transportation to a target organ and final delivery inside the cell because the cell membrane also contains lipid. This lipophilic action of ghee aids in the absorption of the active principles of the drugs in a formulation into the cell and its delivery to the mitochondria, microsome and nuclear membrane. It is proven that when herbs are processed with ghee, there will be potentiation of activity.

Ghee also contains Vitamin-A, D, E, K. It thus imparts anti-oxidant effect to the body. Also formulations with ghee as base can cross blood-brain barrier which may be the probable reason for the wide spectrum of both psychological and neurological indications under the umbrella of ghritaprayoga in diseases. Acharya Sushruta has specifically quoted the indication as Apasmara in the context of Ghrita. The other potential gunas of ghrita explained in various treatises which exhibit its effects in a chiravyadhi - Smritivardhaka, Agnideepaka, Balavardhaka, Ayushya, Vishahara, Medhya, Rakshoghna, Ojovridhikara, Unmadahara, Hridya, Dhidayaka etc.

Probable mode of action of Hingu:-

Hingu is having a katurasa, ushnvirya, tikshnalaghuguna, karma of Dipana pachanakrimighnamhridiyamsamjnasthapanam.

On analysing the Rasa panchaka of Hingu, it can be concluded that the Antiepileptic effect may be because of the properties like:

Deepana-Pachana-Since Apasmara is a chronic disorder, agni should be corrected throughout the disease. So this guna will be helpful for maintaining the agni and thus can be helpful for treating the disease.

Hridya: According to the classical references, Hridaya which is considered to be the sreshhtaayatana along with other dhamanis are afflicted in Apasmara. So drugs having Hridya property might have a positive impact on Apasmaravyadhi.

Samjnasthapanam- Samjna means budhi. As impairment of budhi is one of the features in apasmaravyadhi, this guna will enhance the apasmarahara property of the formulation.

Krimighna-Acharya has explained the Aharajanidanas in which samala, asuchi, ahara have been included which may further lead to the involvement of krimi; eg in case of Epilepsy due to parasitic CNS, involvement of krimi is considered as an etiology.

Probable mode of action of Saindhava Lavana:-

Sindhavalavana is having Madhura rasa, laghusukshmaguna, Sita virya, having karmas of Dipana pachanatrividoshaharamhridiyampathya.

Trividoshahara-This quality of the dravya will help in balancing the shareerika doshas and also manasika doshas to an extent.

Hridya-According to the classical references, hridaya which is considered to be the sreshhtaayatana along with other dhamanis are afflicted in apasmara. So drugs having hridya karma might have a positive impact on Apasmaravyadhi.

Probable mode of action of mutras :-

In classics acharyas mentioned about properties of animal mutras, female animal mutras. There is no mentioning about basta mutra (male goat urine) and rishabha mutra (bull's urine). It is mentioned that female mutras are sreshhta because they possess more tikshna and laghuguna. Male mutras having less tikshnaguna and guru guna, so it is not sreshhta. In apasmarachikitsa acharyas mentioned about preparations containing animal mutras (female mutras). But here in this preparation —Saindhava Hinguvadi ghrita Charakacharya mentioned that female mutras should not be taken for the preparation. This may be the reason:- Apasmara is a

chirakalinavyadhi, so for the treatment purpose drugs possess more tikshna, laghu, sukshmagunas should be used. Here in this particular preparation Hingu and Saindhava are other ingredients which possess more tikshna, laghu, sukshmaguna. While adding female mutras in to this there will be further increase in tikshna, laghu, sukshmaguna. It may cause adverse effects in human body.

According to samanya mutra gunas mentioned by acharyas, probable mode of action of mutras can be due to:-

Tridosahara – This will help to balance both saririka and manasika doshas up to an extent. So this can promote the apasmarahara property of the ghrita.

Hridya – As hridaya and dhamanis are involved in apasmarasampraptihridyaguna can enhance the apasmarahara property of the formulation.

Dipana-Pachana – As apasmara is a chirakalinavyadhi treatment duration is also more. So during the treatment period agni of patient should be maintained.

So this will be helpful to maintain the agni and there by enhance the apasmarahara property.

To sum up, SaindhavaHinguvadighrita may not have highly significant role as an anti-convulsant. It may act upon the seizure threshold of the individual. It can also be administered as an adjuvant with other commonly used A E Ds to check its cognitive and psychological side effects.

### REFERENCES

- [1]. Essential medicines and health products information portal: A World Health Organization. Resource: <http://apps.who.int/medicine/docs/en/al/Jh2943e/8.4.html>.
- [2]. Ayurveda- healing science. <https://www.banyanbotanicals.com>.
- [3]. Pandit Sarngadhara Acharya. Sarngadharasamhita, Krishnadasacademy, chauhamba press Varanasi, Reprint 2013, Madhyama khanda, p.214.9/22
- [4]. Pandit Sarngadhara Acharya. Sarngadharasamhita, Krishnadasacademy, Chaukamba press Varanasi, Reprint 2013, Madhyama khanda; p.213.9/10
- [5]. Edited by Vaidya Jadavji Trikamji Acharya & rest by Narayan ram Acarya kavyatirtha Susrutha samhita, Chaukhambakrishnadas

- academy, Reprint, 2004, chikitsasthana, p.50 9.31/10
- [6]. Pandit Sarngadhara Acharya, Sarngadharasamhita, Krishnadasacademy, Chaukamba press Varanasi, Reprint 2013, Madhyama khanda, p.213.9/9
- [7]. Indradeva Tripathi. Vaidyakaparibhashapradipa (Vidyotini, comme, Hindi) Varanasi: Chaukhamba orientalia; p.47.15.
- [8]. Edited by Vaidya Jadavji Trikamji Acharya, Narayan ram Acarya, Kavyatirtha Susrutha samhita, chikitsasthana, Chaukhambakrishnadas academy, Reprint, 2004, p.509.31/10