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Exploring The Therapeutic Potential Of Natural Herbs In The Management Of Epilepsy: A Review

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Abstract: Epilepsy is a brain disease characterized by recurrent seizures caused by paroxysmal neuronal discharge. It is estimated that one in 10 people will experience epilepsy at some point in their life. Symptoms of epilepsy include loss of consciousness, convulsions and falls. However, most epilepsy patients do not receive appropriate treatment. Seizures can damage the brain, causing cell death and many other physiological changes. As a result, there has been growing interest in the use of natural herbs as alternative or adjunct therapies for epilepsy. Several natural herbs have been studied for their potential antiepileptic effects, including 24 herbal plants in this overview such as Zingiber officinale, Ficus platyphylla, Passiflora incarnata, Desmodium triflorum, Viscum album, Berberis integerrima, Gladiolus dalenii, Marsilea quadrifolia, Lobelia nicotianaefolia, Mussaenda philippica, Lavandula stoechas, Salvia miltiorrhiza, Annona senegalenesis, Biophytum sensitivum, Plectranthus barbatus, Aegle marmelos, Nepeta bractaeta, Milicia excela, Zizyphus jujuba, Valeriana officinalis, Phytol, Anethum Graveolens, Caesalpinia Bonducella, Annona squamosa has been studied for its anticonvulsant effects. These herbs have shown potential in reducing seizure severity and protecting against seizures induced by different convulsant agents. Overall, antiepileptic effect herbal drugs have the potential to provide additional therapeutic options for individuals with epilepsy. However, further research is needed to establish their safety and efficacy and to determine their role in the management of epilepsy.

Index Terms - Epilepsy, neuronal discharge, seizures, natural herbs, antiepileptic effects.

I. INTRODUCTION

Epilepsy is a disease that occurs in many forms and is characterized by seizures caused by paroxysmal neuronal discharge. Epilepsy is a type of brain disease that causes seizures. Seizures alone are rare in children, especially those with fever, and it is estimated that one in 10 people will have a seizure at some point in their life[1]. Symptoms of epilepsy are seizures that occur at random times and can range from loss of consciousness to short-term automatic subconscious behavior, convulsions that can cause the person to fall and lose consciousness completely. There is sufficient evidence that 70 - 80% of people with epilepsy can live a good life if treated appropriately. Unfortunately, there is still evidence that in many countries more than 50% of people with epilepsy (up to 90% in some regions) do not receive appropriate treatment. One of the reasons for this difference in treatment is that it is not sufficiently recognized that the symptoms these people complain about are caused by epilepsy[2]. The danger of seizures is that these attacks can cause brain damage. Brain injury from epilepsy is a dynamic process that involves many factors, including but not limited to genetics and levels of glutamate-mediated toxicity, leading to cell death. Intracellular electrolyte disorders Metabolism, mitochondrial dysfunction, Oxidative stress, development of exhaustion and increase in cytokine concentrations. The danger of seizures is that these attacks can cause brain damage. Seizure-induced brain injury is a dynamic process caused by many factors that cause neuronal cell death, including but not limited to genetic factors and levels of glutamate-mediated toxicity. Intracellular electrolyte disorders Metabolism,

mitochondrial dysfunction, Oxidative stress, development of exhaustion and increase in cytokine concentrations[3].

Herbal medicine has been reported in China, Iran, Europe, Africa and the United States. Unlike other medicines, Chinese herbal medicine is a period that has been tried many times for a long time and is honored as a complex treatment. There are also number of medicinal products used to treat epilepsy in Chinese herbal medicine in the world materia medica. Herbs are now frequently used as supplements and other medications and play an important role in managing seizures or treating problems caused by anti-inflammatory medications[4]. Most antiepileptic drugs (AEDs) do not prevent or reverse the pathological process of seizures, so there is an ongoing need to find new treatments with fewer side effects and better efficacy[5]. Herbs used in drug models to treat epilepsy have been tested to prove effective in animal models for anticonvulsant activity analysis. Herbal medicines are still the basis of medicine about 75-80% of the total population (only in developing countries) need basic medical care because it has higher value,It has similar and less effects with the human body . The global assessment shows that approximately 80% of the 4 billion people do not have access to the fruits of the Western pharmaceutical industry and must rely primarily on the use of derived chemical formula. . from plant material. Consider the huge dependence on herbal plants in the treatment of diseases and their potential for drug discovery; possible, effective and the study of botanical medicine is still effective[6].

II. NATURAL HERBS-

Zingiber officinale:

Zingiber officinale, commonly known as ginger and used in traditional medicine, has been shown to have antioxidant and neuroprotective properties. Researchers investigated the anticonvulsant effects of the hydroethanolic extract of Z. officinale using a PTZ-induced seizure model in mice. The extract was administered intraperitoneally at doses of 25, 50, and 100mg/kg, 2 and 24 hours prior to seizure induction with PTZ. Phenobarbital sodium was used as a reference standard. The results demonstrated that the ginger extract had anticonvulsant effects in all treatment groups tested, significantly preventing generalized clonic seizures ($p<0.001$) and increasing the threshold for forelimb tonic extension seizures ($p<0.01$) compared to the control group[7].

Ficus platyphylla:

Ficus platyphylla, a member of the Moraceae family, is commonly used in Nigeria's folk medicine to manage epilepsy. A study investigated the effects of FP on murine models of behavior and its anticonvulsant effects on pentylenetetrazole (PTZ)-, strychnine (STN)-, and maximal electroshock (MES)-induced seizures in mice. The study found that FP had a significant impact on reducing locomotor activity, including total distance covered, speed, active time, and rearing counts. It also shortened the onset and prolonged the duration of diazepam-induced sleep. However, it did not affect motor coordination on the rota-rod treadmill or beam-walking assay in mice at the doses tested. The intraperitoneal oral LD50 of FP was estimated to be 5000mg/kg. The extract showed potential in protecting mice against PTZ- and STN-induced seizures and significantly delayed the latencies of myoclonic jerks and tonic seizures induced by standard convulsant agents[8].

Passiflora incarnata:

Passiflora incarnata L. (Passifloraceae) has been traditionally used to treat epilepsy. It contains various bioactive compounds including flavonoids (e.g., chrysin), amino acids (e.g., GABA), and harmala alkaloids. Chrysin acts on GABA-benzodiazepine receptors, exhibiting CNS depressant activity. In an animal study, hydroethanolic extract of Passiflora incarnata was administered at different doses (150, 300, and 600mg/kg; i.p.) from the 5th to the 15th day. The extract significantly reduced seizure severity and immobility period in a dose and time-dependent manner compared to the control group. Additionally, the extract treatment maintained serotonin and noradrenaline levels in the brain[9].

Desmodium triflorum:

Desmodium triflorum (L.) from the Fabaceae family was evaluated for its anticonvulsant activity in mice. In a pentylenetetrazole-induced convulsion model, the extract significantly delayed the onset of convulsion, reduced the duration of convulsion ($p<0.05$), and reduced mortality at a dose of 800 mg/kg. Additionally, the extract reduced hind limb tonic extension phase of maximal electroshock-induced convulsion in mice ($p<0.05$). Pre-treatment with the extract significantly inhibited lipid peroxidation and increased reduced glutathione

levels in mice brain tissue ($p<0.001$). These findings suggest that D. triflorum possesses a significant dose-dependent anticonvulsant activity[10].

Viscum album:

Viscum album L. is traditionally used in Himachal Pradesh, India for the treatment of epilepsy and insomnia.extract of Viscum album L. was found to prolong pentobarbital-induced sleeping time and reduce locomotor activity in an actophotometer. These effects indicate the facilitation of GABAergic transmission, which is associated with reduced locomotor activity. Moreover, the extract demonstrated a reduction in MES, INH, and PTZ-induced convulsions, suggesting possible mechanisms such as blocking Na(+) channels, opening Cl(-) channels, or enhancing the GABAergic system. Additionally, the extract exhibited a decrease in apomorphine-induced stereotyped behavior and potentiated HAL-induced cataleptic score, indicating potential antidopaminergic activity[11].

Berberis integerrima:

Berberis integerrima is a plant belonging to the Berberidaceae family. Its anticonvulsant properties were evaluated using pentylenetetrazole (PTZ)-induced seizure models. The methanolic extract was administered at a dose of 302.676 mg/kg. Results showed that the methanolic extract (140 and 200 mg/kg, i.p., $p<0.01$), hydromethanolic fraction (200 mg/kg, $p<0.01$), and chloroform fraction (200 mg/kg, $p<0.01$) increased the onset time of hind limb tonic extensions (HLTEs) in the PTZ test. The protective effect against mortality (convulsion survivors/animals tested) was observed in the methanolic extract (2/8) and hydromethanolic fraction (3/8) at a dose of 200 mg/kg, and in the chloroform fraction at a dose of 140 mg/kg. These findings suggest that B integerrima has anticonvulsant activity in PTZ-induced seizures in mice, and may be useful in treating petit mal epilepsy[12].

Gladiolus dalenii:

Gladiolus dalenii Van Geel is a plant that is commonly used in African traditional medicine to treat epilepsy. The extracts of G. dalenii were found to be effective in protecting mice against seizures induced by PTZ and MES, with protection rates of 100% and 83.3%, respectively. The aqueous and lyophilized extracts of G. dalenii showed similar protective effects. When administered with diazepam, G. dalenii had an additive effect, while co-administration with flumazenil or FG7142 resulted in antagonistic effects. In addition, the macerate of G. dalenii showed sedative activity by reducing the latency time to sleep and increasing the total duration of sleep induced by diazepam. These findings suggest that G. dalenii may have anticonvulsant and sedative properties that could be effective against seizures and insomnia in humans[13].

Marsilea quadrifolia:

The extract of Marsilea quadrifolia Linn (MQ) has been traditionally used in India as a sedative and antiepileptic drug. In this study, the anticonvulsant potential of MQ extracts was evaluated using behavior and electroencephalographic (EEG) analysis on a pentylenetetrazole (PTZ) induced seizure model in rats. The rats were administered with MQ extracts, and 60 minutes later, behavior and EEG were analyzed during PTZ-induced seizures. The study found that both the water and ethanol extracts of MQ increased the latency of seizure, decreased the duration of epileptic seizure, and reduced the seizure severity score. EEG power analysis also showed a reduction in seizure severity. The ethanol extract of MQ was found to be more effective than the water extract. These findings support the traditional use of MQ as an antiepileptic drug[14].

Lobelia nicotianaefolia:

The anticonvulsant activity of lobeline, which was isolated from Lobelia nicotianaefolia, was investigated in chemoconvulsant-induced seizures. The study also examined the biochemical mechanism by investigating the relationship between seizure activities and altered gamma amino butyric acid (GABA) in the brain of mice in Pentylenetetrazol (PTZ) seizure models. The results showed that isolated lobeline (10, 20, and 30 mg/kg, i.p.) significantly delayed and antagonized the onset of PTZ-induced seizures. It also antagonized strychnine-induced seizures and prevented mortality in the test group of animals. In addition, isolated lobeline (5, 10, and 20 mg/kg, i.p.) significantly increased the brain GABA level. However, at a dose of 30 mg/kg, the GABA level showed a slight decrease in the PTZ model. These findings suggest that lobeline may have potential as an anticonvulsant agent through its effects on GABA levels in the brain[15].

Mussaenda philippica:

The anticonvulsant activity of hydroalcoholic extracts of leaves and sepals of Mussaenda philippica (M. Philippica) and its fractions (methanol, dioxin, and aqueous) was investigated against pentylene tetrazole (PTZ), maximal electroshock (MES), strychnine (STR), and picrotoxin-induced convulsions at different dose levels. The study found that the extract at 100 and 200 mg/kg produced a significant ($P < 0.01$) dose-dependent increase in the onset of convulsion compared to the control in MES, PTZ, strychnine, and picrotoxin-induced seizures. These findings suggest that hydroalcoholic extracts of M. philippica leaves and sepals may help to control grandmal and petitmal epilepsy[16].

Lavandula stoechas:

Lavandula stoechas L. (Lamiaceae) has been traditionally used as an anticonvulsant and antispasmodic in traditional medicine. The aqueous-methanolic extract of L. stoechas flowers (LS) was investigated for its anticonvulsant and antispasmodic activities. In mice, LS at a dose of 600 mg/kg significantly reduced the severity and increased the latency of convulsions induced by pentylene tetrazole (PTZ). LS also reduced PTZ's lethality. LS was found to be devoid of any hypnotic effect in mice up to a dose of 600 mg/kg, but the animals were observed to be dull, calm, and relaxed. The sedative effect of the plant extract was confirmed as it prolonged the pentobarbital sleeping time in mice similar to that of diazepam. In isolated rabbit jejunum preparations, LS caused a dose-dependent (0.1-1.0 mg/ml) relaxation of spontaneous contractions and inhibited K(+)-induced contractions in a similar dose range, suggesting calcium channel blockade. This effect was confirmed when pretreatment of the jejunum preparation with LS produced a dose-dependent shift of the Ca(2+) dose-response curve to the right, similar to the effect of verapamil, a standard calcium channel blocker[17].

Salvia miltiorrhiza:

Danshen, also known as Chinese red sage (Salvia miltiorrhiza, Bunge), is utilized by traditional Chinese medicine (TCM) practitioners for the treatment of neurological, cardiovascular, and cerebrovascular disorders. It is also included in certain TCM formulations to control epileptic seizures. Acetonic crude extracts of danshen were found to inhibit pentylenetetrazol (PTZ)-induced seizure activity in zebrafish larvae. Further fractionation of the extract using zebrafish bioassay-guided techniques led to the isolation of four major tanshinones, which exhibited varying degrees of suppression on PTZ-induced activity. Tanshinone IIA, one of the active tanshinones, was also observed to reduce c-fos expression in the brains of PTZ-exposed zebrafish larvae. In rodent seizure models, tanshinone IIA demonstrated anticonvulsive activity in a biphasic manner in the mouse 6-Hz psychomotor seizure test, and it modified seizure thresholds in a complex manner in the mouse i.v. PTZ seizure assay[18].

Annona senegalenesis:

Annona senegalenesis Pers is a sprawling shrub from the Annonaceae family, widely used in ethnomedicine. In folk medicine, the decoction of A. senegalenesis is commonly employed to manage various conditions, including bacterial infections, worm infestations, snake bites, pyrexia, and febrile convulsions. To understand its mechanism of action, animal models were utilized to investigate the effects of A. senegalenesis. The aqueous extract of A. senegalenesis root demonstrated safety at high doses (LD50 954.99±2.86 mg/kg body weight) and exhibited protective effects against drug-induced convulsions in mice. It also showed efficacy in preventing electroshock-induced seizures, being more effective against generalized seizures than partial seizures. Additionally, it prolonged drug-induced sleep in mice. These findings indicate that A. senegalenesis possesses significant anticonvulsant activity, providing a valid pharmacological basis for its traditional use in managing seizures by local communities[19].

Biophytum sensitivum:

Biophytum sensitivum (L.) is a member of the Oxalidaceae family and is widely distributed in tropical regions of Africa and Asia. This herb is traditionally used to treat diabetes, phthisis, inflammatory diseases, asthma, hypoglycemia, and immune modulation. It is also known for its apoptotic activity, chemoprotective cell-mediated immune response, hypocholesterolemic, antitumor activity on prostaglandin biosynthesis, antibacterial activity, and antioxidant activity. B. sensitivum has been found to prevent prostaglandin synthesis and exhibit antioxidant activity, which may prevent the generation of free radicals. In animal models, the extract of B. sensitivum has been shown to reduce the duration of tonic hind limb extension and delay the onset of tonic-clonic convulsions induced by pentylenetetrazol. In this study, a dose of 200 mg/kg provided protection to all animals. The anticonvulsant activity of B. sensitivum may be attributed to the presence of

flavonoids and sterols in the extract. The ethanolic leaf extract of B. sensitivum may be beneficial for both tonic-clonic and absence seizures[20].

Plectranthus barbatus:

Plectranthus barbatus Andr., a member of the Lamiaceae family, is a perennial shrub grown in Africa and traditionally used as a medicine to treat various disorders. It is effective in treating digestive, respiratory, circulatory, and nervous system disorders, infections, gastritis, intestinal spasms, nausea, stomach aches, and as a purgative. Its uses in respiratory disorders include relief from colds, coughs, and bronchitis, while its uses in the circulatory system include treatment of myalgia, angina, and hypertension. The aqueous-alcoholic formulation of Plectranthus barbatus leaves has been found to exhibit anticonvulsant activity against both strychnine and pilocarpine-induced seizures. Strychnine-induced seizures are thought to engage direct antagonism of strychnine-sensitive glycine receptors in the brainstem and spinal cord, leading to motor activity, elevated muscle tone, visual and auditory perception, tonic convulsions, hyperactivity of sensory and death through respiratory or spinal paralysis or by cardiac arrest. P. barbatus treatment can partly inhibit strychnine-induced seizures[21].

Aegle marmelos:

Aeglemarmelos is a member of the Rutaceae family and has been traditionally used for treating inflammation, asthma, hypoglycemia, fevers, hepatitis, and pain relief. In a study conducted on mice, the extract of Aegle marmelos was found to have protective effects against seizures induced by MES and PTZ at a dose of 200 mg/kg. It is believed that MES and PTZ exert their convulsant activity by inhibiting the action of gamma-aminobutyric acid (GABA) at GABA-A receptors. GABA is an important inhibitory neurotransmitter that is implicated in epilepsy. Diazepam, a standard antiepileptic drug, exerts its antiepileptic effects by enhancing GABA-mediated inhibition in the brain. It is possible that Diazepam antagonizes MES and PTZ convulsions in this study by increasing GABA neurotransmission[22].

Nepeta bractaeta:

Nepeta bractaeta is, an aromatic perennial herbaceous plant that belongs to the family Lamiaceae; it is a brightly colored shrub or sub-shrub that ranges from 30-100 cm in height. Found in western temperate Himalayas from Garhwal to Kashmir at altitudes of 1800-2400 m. It is also reported to be used in boils and abscesses, cystitis, gastritis, fever, rheumatism, cold, cough, asthma, earache, insect bites, flatulence, and characterized by unprovoked, recurring seizures. The anticonvulsant activity of Nepeta bractaeta may involve GABAergic transmission and glutaminergic transmission or Na+ channel blockage. The methanolic and aqueous extracts of the flowers of Nepeta bracteata were observed for their antiepileptic activity by raised current Electroshock seizures (ICES) test and Pentylenetetrazole (PTZ) test using Swiss albino mice. In ICES model, NBAE at a higher dose demonstrate 16.7%, and NBME at a higher dose demonstrate 33.3% protection against seizure, and in PTZ model, NBME at a higher dose demonstrate 33.3% protection against seizure. From the experiments performed, it can be said that Nepetabractaeta does obtain anticonvulsant property[23].

Milicia excela:

Milicia excelsa, also known as Iroko tree or African teak, belongs to the Moraceae family. It has been traditionally used to treat various ailments such as malaria, anemia, sexual dysfunction, rheumatism, lactation failure, mental illnesses, and convulsions. The anticonvulsant activity of Milicia excelsa was evaluated using AF as the most active fraction in PTZ and PTX-induced convulsion models. At the highest dose of 1000 mg/kg, p.o., AF provided the highest percentage protection of 83.3 and 100 in PTZ and PTX-induced convulsion models, respectively.In another set of mice, flumazenil (GABAA receptor antagonist, 3.0 mg/kg, i.p.), cyproheptadine (5-HT receptor antagonist, 4 mg/kg, i.p.), and L-NNA (Nitric oxide synthase inhibitor, 10 mg/kg, i.p.) were administered for 15 minutes prior to oral administration of AF (1000 mg/kg, p.o.). One hour later, the mice were given PTX (10 mg/kg, i.p.). The onset of clonic, tonic convulsion, and death latency were recorded for each mouse. Animals that survived beyond 30 minutes were prominently protected. Therefore, it can be concluded that Milicia excelsa possesses anticonvulsant properties[24].

Zizyphus jujuba:

The hydroalcoholic extract of Zizyphus jujuba (HEZJ) fruit was evaluated for its anticonvulsant effect in rats using experimental seizure models. Four different doses of HEZJ (100, 250, 500, and 1000 mg/kg, orally) were administered, and the effect on seizure-induced cognitive impairment, oxidative stress, and cholinesterase activity was also investigated. HEZJ at a dose of 1000 mg/kg showed maximum protection (100%) against

generalized tonic-clonic seizures in the pentylenetetrazole (PTZ) seizure model and 66.7% protection against tonic hindlimb extension in the maximal electroshock (MES) seizure model. Cognitive impairment was observed in rats challenged with both PTZ and MES seizures. However, pretreatment with HEZJ resulted in a significant improvement in learning and memory. HEZJ also reversed the oxidative stress induced by both PTZ and MES and significantly decreased cholinesterase activity observed in the PTZ and MES models. Therefore, the study concludes that HEZJ possesses anticonvulsant properties and can ameliorate cognitive impairment induced by seizures in rats[25].

Valeriana officinalis:

Valeriana officinalis, an herbal medicine, has been found to possess anticonvulsant properties. To test its anticonvulsant activity, zebrafish were pretreated with various substances, including anti-epileptic drugs, valerenic acid, and different valerian extracts. Seizures were then induced using pentylenetetrazole (PTZ), and a behavioral scale was developed to score the PTZ-induced seizures in adult zebrafish. The latency period was evaluated for all pretreatments and control, untreated fish. The study found that the ethanolic valerian extract was a more potent anticonvulsant than the aqueous extract. Valerenic acid and both valerian extracts also interacted synergistically with clonazepam to extend the latency period to the onset of seizure. Phenytoin showed interaction only with the ethanolic valerian extract. Additionally, the study evaluated the ability of valerenic acid and both valerian extracts to improve survival after pentylenetetrazole-challenge[26].

Phytol:

The study examined the impact of phytol on seizures induced by pilocarpine in mice. The researchers recorded the latency for convulsion development and mortality rates. The results showed that phytol (25, 50, and 75 mg/kg, i.p.) increased the time to the first seizure and reduced the percentage of seizures. Furthermore, phytol protected the animals from status epilepticus caused by pilocarpine and decreased the mortality rate. Mice treated with pilocarpine (n=24) had a 100% mortality rate in the first hour of observation. However, phytol-pretreated animals remained alive during the first hour of observation after receiving pilocarpine (400 mg/kg) within 30 minutes of phytol pretreatment. Additionally, the pretreatment with phytol blocked the mortality rate during the first hour of seizures and significantly reduced this rate in a dose-dependent manner ($p<0.05$), indicating an anticonvulsant effect[27].

Anethum Graveolens:

The objective of this research was to investigate the anticonvulsant properties of the hydro-alcoholic extract of Anethum graveolens seed on male mice induced with pentylenetetrazol (PTZ) seizure. A total of 56 albino male mice were randomly distributed into seven groups, including negative control (saline), positive control (Phenobarbital), and treatment groups that received hydro-alcoholic extract of Anethum graveolens seed was administered at various doses, including 50, 100, 300, 500, and 1000 mg/kg. To induce convulsions, PTZ was administered to all groups, and the time of onset of myoclonic and tonic-clonic seizures as well as monitoring after 24 hours were recorded. The findings demonstrated that the hydro-alcoholic extract of Anethum graveolens seed (AGS) delayed the onset time of myoclonic and tonic-clonic seizures in comparison to the saline group. The latency was significant for myoclonic and tonic-clonic seizures at all doses of AGS extract, except for the lowest dose. Additionally, the AGS extract's protective effect against mortality was statistically significant at all doses, except for 50 mg/kg[28].

Caesalpinia Bonducella:

The petroleum ether extract of Caesalpinia bonducella was found to contain saponins, glycoside, starch, sucrose, proteins, sterols, homoisoflavone (bonducillin), and a non-alkaloid bitter principle (natin). The extract was found to be non-toxic even at the highest dose level tested (3000mg/kg LD50). In PTZ, strychnine, and picrotoxin-induced convulsion models, medium and high doses (600 and 800mg/kg) of the extract showed significant anticonvulsant activity by delaying the onset of convulsions and increasing the latency of clonus and tonic-extensor convulsion. The anticonvulsant effect of the high dose (800mg/kg) was found to be better than the medium dose (600mg/kg). In the MES-induced convulsion model, medium and high doses (600 and 800mg/kg) of the extract exhibited significant anticonvulsant effects by decreasing the duration of the tonic-extensor phase and increasing the latency of clonus convulsion[29].

Annona squamosa:

Annona squamosa leaf extract. Doses are 250 and 500 mg/kg PO. A significant dose-dependent anticonvulsant effect was found on pentylenetetrazole and picrotoxin-induced convulsions, whereas there was no significant protection in MES. Also the amount of cherimoya doesn't help. The extract ameliorates the negative response to diazepam (1 mg/kg, i.p.). This study clearly shows that custard apple leaf extract squamosa Linn. It has an anticonvulsant effect on convulsions caused by pentylenetetrazol and picrotoxin. The study concluded that it may be effective as an adjunctive treatment and reduce the side effects of diazepam and phenytoin[30].

Table 1: Effect of herbal drugs in the treatment of epilepsy

Herbs	Family	Model	Effect
Zingiber officinale	*Zingiberaceae*	PTZ	The ginger extract had anticonvulsant effects in all treatment groups tested, significantly preventing generalized clonic seizures ($p<0.001$) and increasing the threshold for forelimb tonic extension seizures ($p<0.01$) compared to the control group
Ficus platyphylla	*Moraceae*	PTZ Strychnine MES	FP had a significant impact on reducing locomotor activity, including total distance covered, speed, active time, and rearing counts. It also shortened the onset and prolonged the duration of diazepam-induced sleep
Passiflora incarnata	*Passifloraceae*	PTZ	The extract significantly reduced seizure severity and immobility period in a dose and time-dependent manner compared to the control group. Additionally, the extract treatment-maintained serotonin and noradrenaline levels in the brain
Desmodium triflorum	*Fabaceae*	PTZ MES	The extract significantly delayed the onset of convulsion, reduced the duration of convulsion ($p<0.05$), and reduced mortality at a dose of 800 mg/kg. Additionally, the extract reduced hind limb tonic extension. with the extract significantly inhibited lipid peroxidation and increased reduced glutathione levels in mice brain tissue ($p<0.001$).
Viscum album	*Santalaceae*	MES Isoniazid PTZ	The extract exhibited a decrease in apomorphine-induced stereotyped behavior and potentiated HAL-induced cataleptic score, indicating potential antidopaminergic activity
Berberis integerrima	*Berberidaceae*	PTZ	The protective effect against mortality (convulsion survivors/animals tested) was observed in the methanolic extract (2/8) and hydromethanolic fraction (3/8) at a dose of 200 mg/kg, and in the chloroform fraction at a dose of 140 mg/kg
Gladiolus dalenii	*Iridaceae*	PTZ MES	The macerate of G. dalenii showed sedative activity by reducing the latency time to sleep and increasing the total duration of sleep induced by diazepam
Marsilea quadrifolia	*Marsileaceae*	PTZ	Ethanol extracts of MQ increased the latency of seizure, decreased the duration of epileptic seizure, and reduced the seizure severity

			score. EEG power analysis also showed a reduction in seizure severity
Lobelia nicotianaefolia	*Campanulaceae*	PTZ Strychnine	Isolated lobeline (10, 20, and 30 mg/kg, i.p.) significantly delayed and antagonized the onset of PTZ-induced seizures. It also antagonized strychnine-induced seizures and prevented mortality in the test group of animals
Mussaenda philippica	*Rubiaceae*	PTZ Strychnine MES Picrotoxin	The extract at 100 and 200 mg/kg produced a significant (P <0.01) dose-dependent increase in the onset of convulsion compared to the control in MES, PTZ, strychnine, and picrotoxin-induced seizures
Lavandula stoechas	*Lamiaceae*	PTZ	In mice, LS at a dose of 600 mg/kg significantly reduced the severity and increased the latency of convulsions induced by pentylene tetrazole (PTZ)
Salvia miltiorrhiza	*Lamiaceae*	PTZ	Tanshinone IIA, one of the active tanshinones, was also observed to reduce c-fos expression in the brains of PTZ-exposed zebrafish larvae
Annona senegalenesis	*Annonaceae*	PTZ MES	The aqueous extract of A. senegalenesis root demonstrated safety at high doses (LD50 954.99±2.86 mg/kg body weight) and exhibited protective effects against drug-induced convulsions in mice
Biophytum sensitivum	*Oxalidaceae*	PTZ	The extract of B. sensitivum has been shown to reduce the duration of tonic hind limb extension and delay the onset of tonic-clonic convulsions induced by pentylenetetrazol
Plectranthus barbatus	*Lamiaceae*	Strychnine Pilocapine	Strychnine-induced seizures are thought to engage direct antagonism of strychnine-sensitive glycine receptors in the brainstem and spinal cord, leading to motor activity, elevated muscle tone, visual and auditory perception, tonic convulsions, hyperactivity of sensory and death through respiratory or spinal paralysis or by cardiac arrest
Aegle marmelos	*Rutaceae*	MES PTZ	It is believed that MES and PTZ exert their convulsant activity by inhibiting the action of gamma-aminobutyric acid (GABA) at GABA-A receptors.
Nepeta bractaeta	*Lamiaceae*	ICES PTZ	ICES model, NBAE at a higher dose demonstrate 16.7%, and NBME at a higher dose demonstrate 33.3% protection against seizure, and in PTZ model, NBME at a higher dose demonstrate 33.3% protection against seizure
Milicia excela	*Moraceae*	PTZ Picrotoxin	The onset of clonic, tonic convulsion, and death latency were recorded for each mouse. Animals that survived beyond 30 minutes were prominently protected
Zizyphus jujuba	*Rhamnaceae*	PTZ MES	HEZJ at a dose of 1000 mg/kg showed maximum protection (100%) against generalized tonic-clonic seizures in the pentylenetetrazole (PTZ) seizure model and 66.7% protection against tonic hindlimb

			extension in the maximal electroshock (MES) seizure model
Valeriana officinalis	*Caprifoliaceae*	PTZ	Valerenic acid and both valerian extracts also interacted synergistically with clonazepam to extend the latency period to the onset of seizure
Phytol	*Solanaceae*	Pilocarpine	Phytol blocked the mortality rate during the first hour of seizures and significantly reduced this rate in a dose-dependent manner ($p<0.05$), indicating an anticonvulsant effect
Anethum Graveolens	*Apiaceae*	PTZ	The latency was significant for myoclonic and tonic-clonic seizures at all doses of AGS extract, except for the lowest dose. Additionally, the AGS extract's protective effect against mortality was statistically significant at all doses, except for 50 mg/kg
Caesalpinia Bonducella	*Caesalpiniaceae*	PTZ Strychnine picrotoxin	The extract showed significant anticonvulsant activity by delaying the onset of convulsions and increasing the latency of clonus and tonic-extensor convulsion
Annona squamosa	*Annonaceae*	PTZ Picrotoxin MES	Custard apple leaf extract squamosa Linn. has an anticonvulsant effect on convulsions caused by pentylenetetrazol and picrotoxin. it may be effective as an adjunctive treatment and reduce the side effects of diazepam and phenytoin

III. CONCLUSION-

Traditional herbal medicines have been used for decades as a cure for many diseases. There are 24 herbal plants in this overview treatment of antiepileptic activity. Natural herbs plays an important role in epilepsy showed anticonvulsant properties and low toxicity in an experimental model at doses used. However, further studies are needed to be transported at the extract exhibition to people and is used in folk remedies to control seizures should be included in the regular assessment level of consciousness and blood pressure. This summarizes the overview of antiepileptic activity in traditional medicinal plants as able to be used for development of new drugs used in protection against epileptic activity. However, we can safely claim that herbal medicines have extremely capable of providing some remarkable drugs.

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