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A review on Medicinal Plants used for Treatment of Neurological Diseases

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Abstract:-

Neurological disease is a pathologic condition that affects and impairs normal electrical impulses throughout the brain and/or nervous system. Use of medicinal plants for curing human ailments is an ancient practice. Most of the population depends on traditional medicine for primary health care. Neurological diseases include Parkinson' s disease, epilepsy, schizophrenia, Alzheimer' s disease, brain tumors, and cerebrovascular diseases such as stroke and migraine. There are many medicinal plants used in treatment of neurological disease. An important Ayurvedic medicinal plant for PD is Mucuna Pruriens L.(DC). Which offer natural source of levodopa which reduces motor complications. The Vicia faba, other plant with levodopa for treatment of PD Coriandrum sativum L, Caesalpinia bonducella (L.) Roxb. Investigated for their possible anticonvulsant effects using PTZ, MES tests for treatment of Epilepsy . Ocimum americanum Acorus calamus L. (Acoraceae), Cannabis sativa can treat schizophrenia as effectively as antipsychotic medications.lavender has high activity of AChE enzyme and thus reduced amount of acetylcholine and synaptic transmission may contribute in causes of AD. Salvia officinalis (S. officinalis), ginseng can benefit AD by improving brain cholinergic function. Scutellaria baicalensis, Camptotheca Acuminata has effectively used in prevention of Brain Tumor. Hordeum vulgare has used to protect against stroke. Coriandrum sativum, lavender, ginger has safely use for managing headache associated with migraine.

Keyword: Parkinson Disease, Alzmier Disease, Acetyl Choline, Neurological diseases

Introduction:-

Use of plants for curing human ailments is an ancient practice. Most of the population depends on traditional medicine for primary health care.[1] The World Health Organization (WHO) estimates that more than one billion people sufer from central and peripheral nervous system disorders and other neurological disorder globally. More than 6 million people reportedly die each year due to stroke, with over 80% of these deaths occurring in low- and middle income countries.[2]

There is no existence of life without plants. Plants are the essential foundation of medicine. Some important drugs that are still in use today are derived from traditional medicinal herbs being used for the treatment of diseases and for restoring and fortifying body systems in ancient systems of medicine such as Ayurvedic, Unani, and Chinese traditional medicine. The innately desired purpose of the use of herbs was to obtain a positive interaction with body chemistry.[3] The plant kingdom offers a high range of structural diversity in the use of a

variety of biochemical' s. Phytochemical studies on medicinal plants have led to the isolation of a number of new pharmacophores. Pharmacophores have played a priceless role in drug discovery.[3]

Neurological diseases:

Chronic pain is a frequent component of many neurological disorders, affecting 20– 40% of patients for many primary neurological diseases.[4] Neurological disease is a pathologic condition that affects and impairs normal electrical impulses throughout the brain and/or nervous system. General symptoms that may occur during the course of the disease include malfunction of the motor system, voluntary and involuntary movement, sensory network, cognitive function, memory and abstract thinking. Due to their comparably high prevalence, generally unknown mechanisms and significant impact on affected individuals, their family and society, understanding neurological disease etiology and pathophysiology is one of the most important challenges facing medical and biological sciences today.[5]

Diagnosis of neurological diseases is a growing concern and one of the most difficult challenges from modern medicine. According to the World Health Organization' s recent report, neurological disorders, such as epilepsy, Alzheimer' s disease and stroke to headache, affect up to one billion people worldwide. An estimated 6.8 million people die every year as a result of neurological disorders.[6]

Parkinson' s disease :-

In his 1817 ' ' An essay on the shaking palsy' ' , James Parkinson first described the clinical syndrome that was later to bear his name.1 He identified six cases, three of whom he personally examined; three he observed on the streets of London. Previously referred to as ' ' paralysis agitans' ' , Charcot later in the 19th century gave credit to Parkinson by referring to the disease as ' ' maladie de Parkinson' ' or Parkinson' s disease (PD).[7]

Parkinson' s disease (PD) is a progressive neurological disorder characterized by a large number of motor and non-motor features that can impact on function to a variable degree. Parkinson's disease is characterized by the destruction of dopaminergic cells in substantia nigra pars compacta in the midbrain, leading to deficiency of dopamine in the nerve terminals in the striatum in the forebrain.[7]

There are four cardinal features of PD that can be grouped under the acronym TRAP: Tremor at rest, Rigidity, Akinesia (or bradykinesia) and Postural instability. In addition, flexed posture and freezing (motor blocks) have been included among classic features of parkinsonism.[7]

Medicinal plants used in treatment of Parkinson's disease:-

1) *Mucuna pruriens L. (DC) :-*

An important Ayurvedic medicinal plant for PD is *Mucuna pruriens L.(DC*) . Ayurveda offers a natural source of levodopa − the seeds of *Mucuna pruriens L.(DC*)− which have a long standing safe use in the condition. Its clinical studies have shown pharmacokinetic profile distinct from synthetic levodopa, which is likely to reduce the untoward motor complications. Additionally, its seed extracts have shown neuroprotective benefits which are unrelated to levodopa.[8]

2) *Vicia faba :-*

The Vicia faba, other plant with levodopa. content was studied in a small clinical trial with five healthy volunteers and six PD patients. The study showed that *Vicia faba* seeds ingestion produced an increase in the levodopa plasma levels, which correlates with motor performance improvements[9]

Epilepsy:-

The term " epilepsy" is derived from Greek word " epilambanein" , which means " to seize upon" or " to attack" . In this modern world, epilepsy is one of the most frequent neurodegenerative diseases. Epilepsy is a condition in which a person has recurrent seizures. Seizure can defined as an abnormal, disorderly discharging of nerve cells of brain; resulting in a temporary disturbance of motor, sensory, or mental function. Epilepsy is the most common neurological condition affecting people of all ages, race, and social class. There are 50 million people with epilepsy in the world, of which up to 75% live in resource-poor countries with less or no access to medical treatment[10]

Epilepsy is a chronic disease experienced by millions and a cause of substantial morbidity and mortality. A higher proportion of epilepsy characterized by generalized seizures was reported in most prevalence studies. Epilepsy characterized by partial seizures accounted for 20% to 66% of incident epilepsies. Epilepsy is one of the oldest conditions known to mankind (WHO, 2001a) and still the most common neurological condition affecting individuals of all ages. At any given time, it is estimated that 50 million individuals worldwide have a diagnosis of epilepsy (WHO, 2001b).[11] Epilepsy is defined as a condition characterized by recurrent (two or more) epileptic seizures, unprovoked by any immediate identified cause. Multiple seizures occurring in a 24-hour period or an episode of status epileptics (SE) are considered a single event.[11]

Medicinal plants used in treatment of Epilepsy:-

1) *Coriandrum sativum L.*:-

The aqueous and ethanolic seed extracts of C. sativum were investigated for their possible anticonvulsant effects using PTZ and (maximal electro shock) MES tests. The results indicated that both extracts have an anticonvulsant effect, and the maximum non-fatal dose of aqueous and ethanolic extracts, both of which exert activity, were 0.5 g/kg and 5 g/kg. It seems that the anti-seizure profile might be related in part to the coumarin compounds isolated from C. sativum.[12]

2) *Caesalpinia bonducella (L.) Roxb.*:-

The antiepileptic activity of C. bonducella was investigated using MES-, PTZ-, and picrotoxin-induced convulsion models. Petroleum ether extract was active in all tests, and at the dose of 600 mg/kg, it increased the threshold for convulsions and delayed the onset of tonic convulsions. It can be concluded that the extract showed its effectiveness through possibly blocking the chloride ion channel linked to GABA receptors.[12]

3) *Bryonia alba L.*:-

Ethanolic extract of the aerial parts of B. Alba showed moderate affinity to the benzodiazepine-site of the GABA receptor. The GABAA-benzodiazepine site is a primary target in the treatment of epilepsy that enhances the sensitivity of the GABAA receptor for endogenous GABA. After binding GABA to the receptor, the cell is inhibited and an anticonvulsant activity is achieved. Conversely, administration of the aqueous extracts showed no affinity for the GABA– benzodiazepine receptors.[12]

Schizophrenia:-

Schizophrenia is a psychological disorder characterized by psychotic symptoms: hallucinations and delusions that significantly affect emotions, behavior, and, most notably, mental processes and mental contents. [14]

Schizophrenia is a devastating mental illness that impairs mental and social functioning and often leads to the development of comorbid diseases. These changes disrupt the lives of patients as well as their families and

friends. [13] Schizophrenia is characterized by positive and negative symptoms that can influence a patient's thoughts, perceptions, speech, affect, and behaviors. Positive symptoms include hallucinations, voices that converse with or about the patient, and delusions that are often paranoid. Negative symptoms include flattened affect, loss of a sense of pleasure, loss of will or drive, and social withdrawal.[13]

Medicinal plants used in treatment of schizophrenia :-

(1) *Ocimum americanum :-*

Ocimum americanum possessed relaxant effects and can be considered as beneficial to patients with mental disorders.[14]

(2) *Acorus calamus L. (Acoraceae):-*

A. calamus is also used to make brahmyadiyoga (an Ayurvedic medicine system) and has been used for the treatment of schizophrenia. [14]

(3) *Cannabis sativa:-*

A compound found in Cannabis sativa can treat schizophrenia as effectively as antipsychotic medications, with far fewer side effects, according to a preliminary clinical trial.[14]

Alzheimer' s disease (AD):-

Alzheimer' s disease is a progressive, irreversible neurological disorder that occurs gradually and results in memory loss, unusual behavior, personality changes, and loss of the ability to thinking. It is estimated to affect 15 million people worldwide. AD is the cause of dementia in the elderly. AD is a progressive neurological disorder with duration of around 8.5 years between onset of clinical symptoms and death. [15]

AD is characterized clinically by cognitive impairment and pathologically by the deposition of β amyloid plaques and neurofibrillary tangles, and the degeneration of the cholinergic basal forebrain. During the progression of AD patients may produce changes in personality and behavior, such as anxiety, paranoia, confusion, hallucinations and also to experience delusions and fantasies. [15]

AD starts with loss of short term memory, forgetting names and addresses. as this condition progresses, the change become more marked and even individuals forget the home way. Unfortunately, AD has not any cure but can be prevented from progressing. Seventy percent of causes for AD are genetic and 21% is environmental. Most cases of Alzheimer' s, approximately 95%, are the late-onset form, which develops after age 60. [15]

Medicinal plants used in treatment of AD:-

1) *Lavandula officinalis:-*

Lavandula officinalis known as lavender has been traditionally considered. It is proved that the high activity of AChE enzyme and thus reduced amount of acetylcholine and synaptic transmission may contribute to the loss of spatial memory and cause AD.[15]

2) *Ginseng:-*

Use of ginseng extract may enhance cognitive and psychomotor functions and can benefit AD by improving brain cholinergic function, reducing the level of Aβ, and repairing neuronal networks damage [15]

3) *Salvia officinalis:-*

S. officinalis has a very old reputation for improving memory. It is singularly good for the head and brain. S. Officinalis have a long history of use as memory enhancing agents coupled with cholinergic properties that may be relevant to amelioration of the cognitive deficits associated with AD. Based on clinical evidence S. officinalis may help to prevent or alleviate symptoms of AD.[15]

Brain Tumor:-

A brain tumor is a mass of cells that have grown and multiplied uncontrollable growth of solid mass formed by undesired cells either normally found in the different part of the brain such as glial cells, neurons, lymphatic tissue, blood vessels, pituitary and pineal gland, skull, or spread from cancers mainly located in other organs .[16]

Brain tumors are classified based on the type of tissue involved in the brain, the positioning of the tumor in the brain, whether it is benign tumor or malignant tumor and other different considerations. Brains tumors are the solid portion permeate the surrounding tissues or distort the surrounding structures. There are different type of brain tumor they are i) Gliomas, ii) Medulloblastoma, iii) Lymphoma, iv) Meningioma, v) Craniopharyngioma, vi) Pituitary adenoma.[16]

Medicinal plants used in treatment of brain tumor:-

1) *Camptotheca Acuminata:-*

CPT- 11 Extracted from the Camptotheca Acuminata plant, CPT-11 is a compound administered in patients with brain tumors through the drug Irinotecan. It contains antineoplastic, used to prevent the mutation of cells into cancerous cells with the possibility of preventing or reducing the disease into one that is benign.[17]

2) *Scutellaria baicalensis:-*

Results indicated that Scutellaria baicalensis not only inhibits cellular growth in recurrent and drug resistant brain tumor cell lines, but also demonstrates an increased inhibitory effect when used in conjunction with BCNU. [18]

Cerebrovascular disease:-

Cerebrovascular disease may be caused by infarction or hemorrhage affecting the brain. Underlying disorders that may be associated with cerebrovascular disease include Stroke and Migraine. Clinical signs consist of a sudden onset of neurologic deficits referable to a focal lesion in the brain. Diagnosis is based on clinical features and neuroimaging procedures.[19]

Stroke:-

A stroke is a clinically defined syndrome of rapidly developing symptoms or signs of focal loss of cerebral function with no apparent cause other than that of vascular origin, but the loss of function can at times be global.Symptoms last more than 24 h or lead to death. Like other clinical syndromes, such as pneumonia or meningitis, stroke is highly heterogeneous, and its numerous causes influence the prognosis, the type of treatment required, and the preventive strategies.[20] Stroke is the third commonest cause of death after coronary heart disease and all cancers, not only in developed countries, but worldwide.[20]

Approximately 85% of strokes are ischemic and rest are hemorrhagic There are many causes of stroke. Hypertension is the leading cause of ischemic stroke. In the younger population, there are numerous causes of

stroke including clotting disorders, carotid dissection, and illicit drug abuse. The incidence of stroke is around 800,000 people annually. The incidence of stroke has declined, but the morbidity has increased. Due to longer life expectancy, the lifetime risk of stroke is higher in women. Globally, at least 5 million people die from strokes and millions of others remain disabled.[21]

Medicinal plants used in treatment of stroke:-

1) *Hordeum vulgare:-*

This plant belongs to Poaceae family. Until now, this plant is eaten by people as functional food. It is present on beers, pasta and baked products. This plant is known by her cereal grains (barley). Barley contains phenolic compounds and vitamins As medicinal plant, it is used to protect against stroke and other diseases.[22]

Migraine:-

Migraine is a common, chronic, incapacitating neurovascular disorder, characterized by attacks of severe headache, autonomic nervous system dysfunction, and in some patients, anaura involving neurologic symptoms. Migraine is characterized by episodes of head pain that is often throbbing and frequently unilateral and may be severe. It is a form of neurovascular headache a disorder in which neural events result in the dilation of blood vessels, which, in turn, results in pain and further nerve activation. [23]

Migraine is a multifactorial, spiking brain disorder which is characterized by intermittent attacks of pulsating quality, severe or moderate intensity lasting 4-72 hours. Attacks are mostly associated with vomiting, nausea, phonophobia or photophobia. 10 Migraine headache is a most common brain disorder and is pervasive and spiking in nature. [24]

A recent survey by the World Health Organization rates severe migraine, along with quadriplegia, psychosis, and dementia, as one of the most disabling chronic disorders.Although attacks of migraine may start at any age. 5 percent of the general populations have at least 18 days of migraine per year, and at least 1 percent —that is, more than 2.5 million persons in North America —have at least 1 day of migraine per week. [23]

Medicinal plants used in treatment of Migraine:-

1) *Coriandrum sativum:-*

Coriandrum sativum fruit has been commonly used for treating headache in Persian medicine. Kasmaei et al evaluated C. sativum syrup for its effectiveness in severity, frequency and duration of migraine.several study revealed that recurrence, pain and extent of migraine attacks gets reduced with *C. sativum* fruit.[24]

2) *Lavender*:-

Through a placebo-controlled trial in humans Rafie et al determined the effectiveness of essential oil of lavender in inhalation form for treating migraine. Several study revealed that lavender essential oil inhalation can be safely use for managing headache associated with migraine. [24]

3) *Ginger:-*

Martins et al evaluated the efficacy of ginger in treating acute type of migraine and concluded that when ginger is given along with non-steroidal anti-inflammatory drugs it helps in treating migraine attack.[24]

Conclusion:

The identified natural products used for the managements of mental and neurological disorders. Many of the plant species used have been investigated for their mental. However, the most prominent and often used plant, some plant like ginger which is also use to treat migraine like disorder. As per the whole study it was concluded that there are so many plant having the use in the neurological disorder having lout of beneficial as well as safety effect.

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