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Review Article

A REVIEW ON THE MEMORY POTENTIAL EFFECT OF "*POLYGALA TENUIFOLIA, LYCII FRUCTUS* AND *CENTELLA ASIATICA*"

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ABSTRACT

Traditional medicines have been used as memory enhancers worldwide since ancient times. There are a number of herbs used for this purpose due to their memory potential property. Sage, *Ginkgo Biloba*, brahmi, ginseng, cinnamon, ginger, rosemary, Salvia Herbs, and Chinese celery are some examples of memory enhancer plants. In this article, we have reviewed the role of three medicinal plants (*Polygala tenuifolia*, *Lycii fructus*, and *Centella asiatica*) in the treatment of memory disorders. These plants have magical effects to increase memory function. There are several studies that show their memory potential effect.

Keywords: Memory enhancer, Impairment, *Polygala tenuifolia, Lycii fructus, Centella asiatica.*

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INTRODUCTION

Every day, we learn new things. Our brain is not able to store all that information, so it has to choose what is worth remembering. Our memory is the tool for storing and remembering that information. There are two types of memory:

- Short-term memory: It stores information for a shorter period (a few seconds or minutes).
- Long-term memory: It stores information for a longer period.

However, our memory does not work perfectly all the time. As we grow older, it may become hard to remember things. Forgetting things for once in a while is normal. If you start forgetting things more than other persons of your age, you may be suffering from mild cognitive impairment GGGt [1]. Forgetting how to perform your daily activities may be a symptom of more serious problems, such as [2]:

- Alzheimer's disease
- Different types of dementia
- Stroke
- Depression
- Head injuries

Memory dysfunction can be a result of neuropathologies. This condition decreases mental ability and is more common in older age.

The following are some symptoms of memory impairment [3]:

- Language problems
- Memory loss
- Lose in focus
- Complex decision-making. The causes of memory dysfunction:
- Depression
- Stress
- Anxiety

Affected blood flow in the brain

- Kidney, thyroid, or liver problems
- Eye or hearing problems
- Alcohol Risk factors [4]:
- Older age (65 years or more)
- Down syndrome
- Family history
- Cardiovascular diseases
- Diabetes
- Smoking
- Sleep apnea Lab tests [5]:
- Neurological evaluation
- Cognitive and neuropsychological tests
- CT scan or MRI
- Blood test
- PET scan

Doctor for the diagnosis of memory disorders:

- Psychiatrist
- Neurologist

Pathological expertise involves:

- Brain atrophy from regional neuronal and synaptic loss,
- Extracellular beta-amyloid deposition in the form of neuritic plaques,
- Intraneuronal tau protein deposition in the form of intraneuronal neurofibrillary tangles [15].

METHODS

The information in this review article was collected from "PubMed, Google Scholar, Web of Science, and Scopus" databases till the end of August 2021. The search terms included "*Polygala tenuifolia*", "*Lycii fructus*", and "*Centella asiatica*". All of the studies with the outcome of changes in the neurotransmitter releasing, behavioral changes, oxidant/antioxidant parameters, and pro-inflammatory cytokines were included in the study. Letter to the Editor and unpublished data were the exclusion criteria from the study.

MEMORY POTENTIAL EFFECTS OF *P. TENUIFOLIA, L. FRUCTUS,* AND *C. ASIATICA*

P. tenuifolia

P. tenuifolia is a Chinese herb. There are a number of studies available that show the *P. tenuifolia* roots can enhance cognitive function. This is prescribed for the treatment of amnesia, palpitation, nocturnal emission, neurasthenia, and insomnia. Tenuigenin is the active component of the *P. tenuifolia* root. Tenuifoliside B (1) is an acylated oligosaccharides present in the *P. tenuifolia* roots responsible for its cerebral protective effect [6]. The mechanism of action is inhibiting AChE activity, enhancing

synaptic plasticity, and improving antioxidation. The root extract of *P. tenuifolia* improves scopolamine-induced impairment of rat's spatial memory. It can also enhance hippocampus-dependent memory. Hence, it is a potential cognition-enhancing therapeutic drug. Polygalasaponins extract of the roots of *P. tenuifolia* has anxiolytic and sedative-hypnotic activities. Hence, this can also be used as an anxiolytic and sedative-hypnotic medicine. The homogeneous hetero-polysaccharide (PTP70-2) isolated from the *P. tenuifolia* inhibits the formation of nitric oxide. In addition, to NO; PTP70-2 significantly decreased the formation of pro-inflammatory cytokines. According to this information, the study suggests PTP70-2 has an anti-neuroinflammatory activity and can be used in the prevention and treatment of Alzheimer's disease. CA study shows the root extract of *P. tenuifolia* does not cause genotoxicity at the normal dose [7].

P. tenuifolia extract has demonstrated the capability to enhance the release of nerve growth factor in astroglial cells, which are specialized brain cells. Furthermore, a compound known as PGS32 has been shown to elevate the levels of brain-derived neurotrophic factor (BDNF) through the activation of specific signaling pathways within the brain. This elevation of BDNF has multifaceted advantages, including its potential to ameliorate memory deficits in mice subjected to Alzheimer's-like symptoms induced by the drug scopolamine. PGS32 achieves this by bolstering the brain's capacity to fortify synaptic connections between nerve cells and by safeguarding these nerve cells from harm caused by various substances, such as glutamate and reactive oxygen species (1).

L. fructus

L. fructus is also known as *Lycium barbarum* berries, wolfberry, and Goji berries. It is a Chinese herbal medicine and food supplement. It has been confirmed that *L. fructus* contains plenty of nutrients such as amino acids, trace elements, and fatty acids. *L. fructus* has a number of bioactive properties some of them are anti-aging, anti-oxidant, anticancer, immunoregulation, neuroprotective effect, improving hepatic functions, and antidiabetes [8].

L. fructus improves the memory and learning function of aging mice caused by D-galactose. The mechanism of action may be related to the effects of anti-oxygen free radicals. Its high antioxidant activity is mainly associated with flavonoids, carotenoids, ascorbic acid, and polyphenols.

Immune system control is also a main activity of *L. fructus*. Studies show that the bioactive components are complexes of glycoprotein and their glycans. It also helps to reduce blood sugar levels and is used in the treatment of diabetes [10].

C. asiatica

C. asiatica is an important and widely used medicinal herb. Its primary constituents are saponins. These constituents are responsible for the therapeutic actions of *C. asiatica*. It is highly used in the treatment of wound healing. It is also used for various skin conditions including lupus, leprosy, varicose ulcers, psoriasis, eczema, diarrhea, fever, diseases of the female genitourinary tract, amenorrhea, anxiety, and improving cognition [10]. It is also a widely used blood purifier. Furthermore, used for the treatment of high blood pressure, and memory improvement. In addition, it is one of the main herbs used for revitalizing brain cells and nerves. Eastern healers trusted CA to treat emotional disorders, such as depression, that were thought to be rooted in physical problems.

In the middle of the 20th century, in Western medicine, CA and its alcoholic extracts showed positive effects in the treatment of leprosy. A laboratory study reported that the aqueous extract of CA inhibits gastric lesions caused by ethanol ingestion.

C. asiatica also has antinociceptive, anti-inflammatory, and radioprotection properties [10].

WHICH FACTORS ARE INVOLVED FOR THE MEMORY IMPAIRMENT?

- Mostly Less education,
- High blood pressure,

Fig. 1: ***Polygala tenuifolia***

Fig. 2: ***Lycii fructus***

Fig. 3: ***Centella asiatica***

- Obesity,
- Hearing loss,
- Depression,
- Diabetes,
- Physical inactivity,
- Smoking, and

- Social isolation is the major nine potential risk factor of dementia which is associated with 35% of population attributable fraction [11,15].

Risk factors associated in

- Early life (education),
- Midlife (hypertension, obesity, hearing loss, TBI, and alcohol misuse) and
- Late-life (smoking, depression, physical inactivity, social isolation, diabetes, and air pollution) [12-15].

HOW TO PREVENT THE DEMENTIA?

To treat this type of disorder, we need to be careful about their activities there are some preventive methods in which a patient can be cured and they are:

- Cognitive Training in people with Dementia: The cognitive abilities include fluency and improvement in the body and these changes will not show direct evidence to suggest that cognitive training is better than cognitive stimulation therapy [15].
- Exercise and Physical Activity: Dementia and Physical Activity RCT [16], rated moderate to high aerobic intensity and strength training did not delay mental retardation in humans and moderate-to-severe dementia firmness [15].
- Hospitalization: Hospitalization for people with dementia is associated with adverse, unintended consequences, including stress, declining performance and understanding, and high economic costs [15,17-19].
- Prevent Abuse, and reduce dementia: Abuse may go unnoticed if families or professional staff feel that there are no better management options and are therefore not properly recognized and reported [15,20].
- Family Support: For dementia patients, families have difficulties handling them because when dementia progressively increases the mental illness also increases that made it difficult for them to make complex decisions in daily life, so, at that time families are major support for them to take the decisions [15].
- Prevent Post-Stroke dementia: Stroke and dementia are related to each other which increase the risk and stroke increases the chances of dementia in which principally 90% of stroke and 35% of dementia have been estimated to be preventable [15].

CONCLUSION

None

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AUTHORS CONTRIBUTION

All authors made substantial contributions to the conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

CONFLICT OF INTEREST

There are no conflicts of interest.

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