

Brain nutrition and its role in managing mental disorders

Lakshmi Mundkur, Wednesday, October 5, 2022, 08:00 Hrs [IST]

The brain is one of the most complex but critical organs of the body that controls physical and mental activities and even life itself. Brain health influences the quality of living of an individual and indeed impacts the families and communities too. Lifestyle has a profound impact on our brain health. Lifestyles including unhealthy nutrition, alcohol and tobacco addiction, low physical activity, stress, etc. lead to cognitive decline and different neurodegenerative diseases. Some of the common signs of cognitive decline include confusion, poor motor coordination, loss of short-term or long-term memory, identity confusion and impaired judgment. Under the umbrella of neurodegenerative diseases, a spectrum of disorders such as Alzheimer's, Parkinson's, Amyotrophic Lateral Sclerosis (ALS) exists that can be serious and life-threatening. It is estimated that the number of individuals with cognitive decline worldwide is more than 50 million currently, with this number expected to reach around 75 million by 2030 and about 140 million by 2050. Similarly, neurodegenerative diseases account for a large and increasing health burden worldwide. In 2017, the worldwide burden of neurological disorders accounted for 280 million.

This article examines the risk factors for cognitive decline and neurological disorders as well as the usage of the herbal plant, *Oroxylum indicum* to abate the progression of neurodegenerative diseases and to enhance episodic memory and cognitive function.

Risk factors for cognitive decline and neurological disorders

Neuronal degeneration is not caused by any one diseased condition, nor it is limited to a specific age group, but it is believed to be the result of cumulative incidence of several risk factors such as age, family history, brain injury, exposure to toxins, physical inactivity, poor nutrition, changes in brain signaling networks, etc. affecting multiple areas of brain. Age is a major risk factor for neurological disorders. With aging, reactive oxygen species (ROS) production increases steadily and causes adverse modifications to cell components leading to a noxious condition called oxidative stress. The brain is particularly vulnerable to oxidative stress and damage, because of its high oxygen consumption, low antioxidant defence and lipid-rich content. Oxidative stress induces mitochondrial dysfunction, that adversely affects the calcium buffering and ATP (adenosine triphosphate) production of neurons leading to characteristic loss of function. A decreased level of brain-derived neurotrophic factor (BDNF), a protein that protects neurons from degeneration and brain injury, has also been reported in several neurodegenerative diseases. Similarly, abnormal build-up of proteins such as amyloid- β peptide and tau in and around the neurons also disrupts the communication between neurons and progresses to brain damage.

Brain supplements

Brain supplements, also known as "nootropics", help to improve memory, increase learning capacity, creativity, and motivation, in healthy individuals and provide an overall improvement in cognitive performance and brain power. The impact of Covid-19 pandemic has been significant and far-reaching. Global consumers are living in a state of uncertainty with a growing increase in anxiety and depression levels. Hence, brain supplements that help to reduce anxiety, and increase memory are in demand. The rise in R&D activities in herbal constituents and an increase in the number of key players manufacturing brain health supplement products, have boosted the growth of the global brain health supplements market. The global brain health supplements market generated about \$7.5 billion in 2021, and is expected to reach about \$20 billion by 2030,

growing at a CAGR of 8% from 2022 to 2030. A surge in the prevalence of brain diseases and the geriatric population has opened new opportunities for market players.

The exploration of traditional medicines unravels the benefits of several plants that are pharmacologically potent as brain boosters. *Oroxylum indicum*, commonly known as the Indian trumpet tree, is a plant with ancient testimony for its diverse medicinal applications.

Nature's goodness: *Oroxylum indicum*

Oroxylum indicum, also called 'Shyonaka' in Ayurveda, belongs to the family of Bignoniaceae and is a well-known food and herbal medicine in many Asian countries. The tree is native to the Indian sub-continent, in the Himalayan foothills, and extends into Southern China, Indo-China and the Indo-Malayan ecozone, covering the Southeast and South Asian countries. Almost every part of the plant has been extensively applied traditionally and is beneficial in pain and inflammatory conditions, joint disorders, respiratory issues, anorexia, ear diseases, etc. It is widely indicated in 'Vata vyadhi', hence can be applied in various degenerative conditions. It is used in many famous Ayurvedic preparations like Chyawanprash, Dashmula, Amratarista, Dhanwantara Ghrita, etc. *Oroxylum indicum* is a source of several medicinally important compounds such as Oroxylin A, Baicalin, Chrysin, Baicalein, Ursolic acid etc.

***Oroxylum indicum* for better mental health**

The plant extract obtained from the dried bark of the Indian trumpet tree (*Oroxylum indicum*) is found beneficial for neuronal health. The extract of *O. indicum* helps people have a better mental performance by enhancing memory and supporting neuronal functioning. It is also suggested as an effective supportive therapy to abate the progression of neurodegenerative diseases. *O. indicum* contains bioactive molecules like flavonoids, alkaloids, glycosides, and tannins. Some important phytochemicals include Baicalein, chrysin and oroxylin. All three ingredients have been studied for their pharmacological activities and are found to confer neuroprotection by improving cognition, decreasing oxidative stress, and enhancing mitochondrial function in the brain.

Cognitive application of *oroxylum indicum* extract

Oroxylum indicum extract has been evaluated as a powerful nootropic in experimental studies. It decreased the reactive oxygen generation, lipid peroxidation and nitrite content in the brain and cortex. The extract is also suggested as an effective supportive therapy to abate the progression of neurodegenerative diseases including Alzheimer's disease, Parkinson's disease and amyotrophic lateral sclerosis. Further, the plant extract was found effective against chemotherapy induced neuronal damage and epilepsy in preclinical models. Supplementation of *O. indicum* extract dose dependently reduced seizures induced by kainic acid in rat models by improving locomotion, muscle rigidity, salivation, teeth grinding, clonus and repetitive head/leg movement.

Neurotrophins are proteins that play an important role in the development of the nervous system, by influencing cell survival, differentiation, and cell death. Moreover, the expression of brain-derived neurotrophic factor (BDNF), was increased in neuronal cells by *O. indicum* extract.

Clinical trial with *oroxylum indicum* extract

In a 12 weeks randomized, double-blind, placebo-controlled trial, 82 older adults with self-reported memory complaints were supplemented with *Oroxylum indicum* extract twice daily for 12 weeks. The treatment resulted in significant improvements in episodic memory and several computer-based cognitive tasks compared to the placebo. There were greater improvements in immediate word recall and numeric working memory, and a faster rate of learning on the location learning task in participants supplemented with the *Oroxylum indicum* extract compared to the placebo. The results suggest that *Oroxylum indicum* extract supplementation helps to support healthy cognitive function and improves memory, concentration, focus and

recall in healthy people. Moreover, no serious adverse effects were reported in the human clinical study, establishing the safety of this plant extract for human use.

*In this competitive world, consumers are looking for an edge to stay sharp and remain calm and peaceful. When the neurons in the brain are healthy there is a better ability to focus, and the cognitive stress is lower. The standardized extract of *Oroxylum indicum* may be considered as an overall brain nutrient which can enhance the activity of neuronal cells, and reduce oxidative stress, which is the basis of several neurodegenerative conditions. It could be a wonder ingredient in this segment as it has shown an overall benefit in several aspects of brain health.*

(Author is vice president of Biological R&D, Sami-Sabinsa Group Ltd)