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Neurodegenerative and depressive disorders - Lead from Herbals

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ABSTRACT

Neurodegenerative disorders are the condition characterized by destruction in neuronal cells, abruption of neuronal activity and distinct involvement of the functional movement. It includes disorders such as Alzheimer's disease, Parkinson's disease, Schizophrenia, Epilepsy, Depression and Anxiety which pose a sizable global health problem, accompanying substantial burden of disorder, suicides, physical co morbidities, high fiscal expenses and poor quality of life. There is a recent upsurge in global interest towards the area of traditional therapies and phytomedicines are widely admired by researcher's owing to their natural source and fewer side effects. Herbal medicines provides several nootropic herbs having multidimensional bioactivities in various neurodegenerative and depressive disorders. Scattered information is available pertaining to traditional herbal remedial options for various mental disorders. Studies on the lead molecules from herbals for neurodegenerative and depressive disorders would be a better option and it opens up for future investigation and standardization on herbal nootropic herbs. With these considerations, the present topic has been aimed to discuss the significance of herbals in the treatment of neurodegenerative and depressive disorders.

Keywords: Lead molecules, Neurodegenerative disorders, Nootropic herbs, Phytomedicines.

INTRODUCTION

Natural products are the best source for the discovery of new drugs. About 80% drug molecules are natural products or derived from natural compounds. The natural products or naturally derived drugs may be used in treatment of many major diseases such as cancer, cardiovascular diseases and neurodegenerative diseases. Natural products played a significant role in the management of neurodegenerative disorders with numerous discovery of drugs for psychosis, depression, anxiety, Parkinson's disease (PD), Alzheimer's disease (AD), etc. In drug discovery a lead compound is a chemical compound that has pharmacological or biological activity that is likely to be therapeutically useful. It is the chemical structure that serves as a starting point for chemical modifications in order to improve potency, selectivity or pharmacokinetic parameters. There are many natural products which are used as lead point for the development of new drugs for the treatment of neurodegenerative and depressive disorders and some important medicinal plants reported are *Withania somnifera*, *Bacopa monnieri*, *Centella asiatica*, *Mucuna pruriens*, *Abrus*

precatorius, Acorus calamus, Adhatoda vasica, Mentha spicata, Piper nigrum, Emblica officinalis etc.

Neurodegenerative disorders

It is a term for a range of conditions which primarily affect the neurons in the human brain. Neurons are the building blocks of the nervous system which includes the brain and spinal cord. Neurons normally do not reproduce or replace themselves, so when they become damaged or die they cannot be replaced by the body. Neurodegenerative diseases are incurable and debilitating conditions that results in progressive degeneration or death of nerve cells. This causes problems with movement (called ataxias) or mental functioning (called dementias). Some examples of neurodegenerative drugs from plant sources are given in Table no 1.

Table-1: List of neurodegenerative drugs from Plant sources

Plant name	Active compounds	Disorder
Adhatoda vasica	Vasicine, vasicol, vasicinol, arachidic, linoleic,and oleic acids	AD, PD
Ginkgo biloba	Amentoflavone	PD
Centella asiatica	Asiaticoside	Schizophrenia
Panax ginseng	Ginsenoside	PD
Rauwolfia serpentina	Reserpine	Schizophrenia
Withania somnifera	Withaferine, sitoindoside, physagualinD, viscosalactone	Schizophrenia

AD – Alzheimer's disease , **PD –** Parkinson's disease

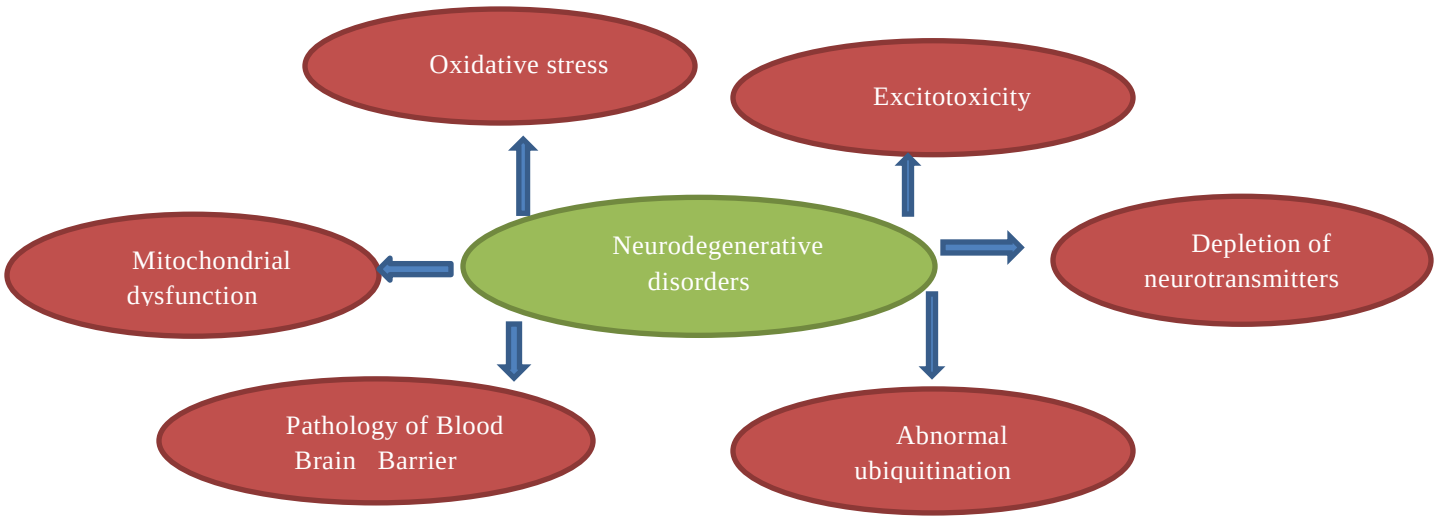

Figure.1 shows the various biological mechanisms contributing to neurodegenerative disorders

Lead compound

A lead compound in drug discovery is a chemical compound that has pharmacological or biological activity likely to be therapeutically useful, but may nevertheless have suboptimal structure that require modification to fit better to the target; lead drug offer the prospect of being followed by back-up compounds. Its chemical structure serves as a starting point for chemical modifications in order to improve potency, selectivity or pharmacokinetic parameters. Now a days the lead drugs are developed from herbals for many disease conditions due to their safety and efficacy. For the treatment of neurodegenerative disorders many natural drugs are available, and from this natural sources new efficient drugs are developed by using the natural products as a lead structure. Some examples of such compounds are listed in the Table 2.

Table-2: List of lead compounds from natural sources

Lead compound	Natural source	Family	Use
Cyclosporine A	*Tolypocladium inflatum*	Ophiocordycipitaceae	Reduction in neuron cell death
Huperzine A	*Huperzia serrate*	Lycopodiaceae	Memory loss, AD
Curcumin	*Curcuma longa*	Zingiberaceae	Dementia, AD
Bryostatin-1	*Bugula neritina*	Bugulidae	Memory enhancing agent, AD
Resveratrol	*Vitis vinifera*	Vitacea	Antioxidant, AD, Amyotrophic lateral sclerosis
Rifampicin	*Amycolatopsis rifamycinia*	Pseudonocardiaceae	AD

CONCLUSION

Plant derived bioactive compounds in addition of directly being developed as drugs also serve as prototype drug molecule known as lead compounds. This may help in better understanding of pharmacological and biochemical mechanisms. The majority of neurodegenerative agents are primarily from plants, animals, marine and microbial sources. The natural molecules are subjected to chemical derivatisation and synthesis of analogues for better efficacy and pharmacokinetic properties. Thus natural products have emerged as promising hope in the drug discovery programme in neurodegenerative disorders. In future, phytochemicals could be used as promising therapeutic agent for neurodegenerative disorders due to their anti-inflammatory as well as anticholinesterase activities. Thus phytochemicals may serve as promising alternatives to current therapies for neurodegenerative disorders.

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