Neurotrophins, Neuronal Diseases, Natural Products and Bioinformatics

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Abstract

Neurological diseases are a subset of disorders that refer to brain problems. People's capacity to walk, speak, learn, and move are all affected by neurological ailments, sometimes known as brain, behavioural, or cognitive disorders. A significant portion of the global population suffers from neurological illnesses which account for a considerable share of the disease burden. Neurological ailments are the most difficult to diagnose, manage, and monitor due to the complexity of neural system.

There are about 600 nervous system diseases, including epilepsy, dementias, Alzheimer's disease, cerebrovascular diseases such as stroke, multiple sclerosis, Parkinson's disease, migraine, neuro infections, brain tumours and traumatic nervous system disorders like brain trauma and autism. It is estimated that 9.9 million European citizens and 35.6 million worldwide suffer from some form of dementia. These figures are expected to double in 2030, and triple in 2050. Neurodegenerative diseases are a heterogeneous group of late-onset disorders caused by the progressive dysfunction and death of neuronal cells, leading to a series of cognitive and movement disorders. Ageing is considered as the important factor in neurodegenerative processes. ND is characterized by the neuronal loss of function, death, and aggregation of misfolded proteins, and the formation of intracellular and extracellular deposits.

In neurodegenerative diseases, the excessive production of reactive oxygen species (ROS) and inflammation play an important role, representing the direct consequences of perturbation in central nervous system (CNS) homeostasis. Brain Derived Neurotrophic factor (BDNF), Nerve Growth Factor (NGF), Neurotrophins 3 and 4 , cerebral dopamine neurotropic factor (CDNF) , Glial cell line –derived neurotropic factor (GDNF) and Mesencephalic astrocyte-derived neurotrophic factor (MANF) bind with the receptor p75NTR and involve in the signalling cascade process leading to neurodegenerative diseases like AD and PD.

Hence attempts have been made for the docking of 33 reported phytochemicals in the literature for controlling AD and PD with the above seven NTs so that the binding with receptor is prevented. The top five phytochemicals binding with each of the seven neurotrophins are presented. Some of these phytochemicals in the top seem to be common for other targets also. The presentation will cover the above details.