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Ayurvedic medicinal plants acting on central nervous system

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Abstract

The drugs which act on nervous system are termed as nootropic drugs which help in boosting the cognitive and intellectual ability. The Ayurvedic medicinal plants which help for improving cognitive function owing to their no adverse effects and provides a list of herbs known for nootropic activity as well as their multi-dimensional utility in various conditions. The classification of medicinal plants, as per the dominant pharmacological or therapeutic activity on mental functions have been enlisted. *Viz*; the CNS active medicinal plants, which have emerged are *Rauwolfia serpentina* are *Mucuna pruriens* for Parkinson's disease, *Withania somnifera*, as anxiolytic, *Centella asiatica* and *Bacopa monniera* for learning and memory disorders, *Acorus calamus* as anxiolytic and, *Ocimum sanctum* as an antistress agent etc drugs. The interface of molecular psychiatry and the active principles of some of these plants will be a major field for new developments in neuro-pharmacology. The neuro-pharmacology drugs affects the function in the nervous system and the neural mechanisms through which they influence the behaviour of the person. The neuro-pharmacology has two branches *viz*; behavioural neuropharmacology and molecular neuropharmacology. The behavioral neuro-pharmacology deals with the study of drugs affects human behavour including study of the drug dependence and addiction i.e action on human brain. Whereas the molecular neuropharmacology is the study of neurons and the neurochemical pathway and the interactions. Since both are concerned with the interactions of neurotransmitters, neuropeptides, neurohormones, neuromodulators, co-transporters, ion channels and receptor protiens in the central and peripheral nervous systems. Studying these interactions the researchers developed drugs to treat many different neuro neurological disorders including pain, nero-degenerative diseases such as Parkinson's diseases, Alzheimer's diseases, psychological disorders, addiction and many others. The Present article is a review to update knowledge on selected Ayurvedic medicinal plants their pharmacological properties, major chemical constituents, therapeutic actions, pre clinical studies, safety and possible mode of action of the selected herbs from Ayurvedic pharmacopoeia.

Aims and Objectives: The aim of the present work is to highlighted the concept of medicinal herbs and their impact on nervous system through different animal experiments.

The objective is to elaborate the concept of medicinal herbs acting on human nervous system based on the different *Ayurvedic* texts along with research updates with the help of modern digital data.

Material and Methods: The concepts, assessment and literary survey was done on the basis of *Ayurvedic* texts books and digital data.

Keywords: Ayurvedic medicinal plants, *Medhya Rasayana*, nootropic, neuropharmacology, cognitive functions etc.

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Introduction

According to *Ayurveda* both *Vata* and *Kapha Doshas* must be harmonized in order to increase *Medha* or intellect. Memory is improved when *Vata* and *Kapha* are together. *Pitta Dosha* is important for increasing sharpness and IQ. To accomplish this objective by balancing the *Tridosha*, *Ayurveda* refers to both single medications and a class of pharmaceuticals are named as "*Medhya Rasayanas*" in the *Charaka Samhita*. While describing Health Definition, WHO Considered Physical, mental and social acceptance of health, and physical health is directly related to mental health, poor health with poor mental state is responsible for poor intellectual. *Medha* refers to intelligence and retention, while *Rasayana* refers to a medicinal treatment or preparation that, when followed on a regular basis, improves nutrition, health, memory, intellect, immunity, and hence lifespan. *Medhya* is made up of the three mental faculties, ie *Dhee*, *Dhriti*, and *Smriti*, which are all interconnected in order to boost general intelligence in healthy persons. In neurological and psychiatric illnesses, memory loss, cognitive deficiencies, poor mental function, and other intelligence related symptoms are common. *Dhriti*, which has control over the functions of *Manas* (Mind) is reduced by *Rajasika Ahara*. Other causes include an inability to control one's thoughts, excessive pondering, continuous thinking, a lack of confidence, failure to attain set goals etc. The nootropic medications boost the oxygen supply to the brain and help to perform betterment of mental functions.

These drugs promote the intellect, retention power and memory, moreover Rasayana drugs work on hypothalamus pituitary adrenal axis and normalize the secretion of neurotransmitters such as dopamine, serotonin, acetyl choline and thus can improve the mental functions.

Results

Table 1: Activities/Uses of Ayurvedic medicinal plants

Sl. No	Ayurvedic medicinal plants	activities/uses
1.	*Rauwolfia sepentina*	Anti Hypertention, Insanity
2.	*Mucuna pruriens*	Concious restoring, Anti parkinson
3.	*Withania somnifera*	Anti convulsant, Nerve tonic, Anxilytic
4.	*Centella asiatica*	Antihypnotics, Memory enchancer
5.	*Bacopa monniera*	Memory booster
6.	*Acorus calamus*	Anti psychotics
7.	*Ocimum sanctum*	Antipsychotics, Antipyretic
8.	*Celastrus paniculatus*	Mood enhancer, Concious restoring
9.	*Convolvulus pluricaulis*	Memory enhancer, Sleep disturbance
10.	*Azadirachta indica*	Analgesic, Antipyretic, Anti stress
11.	*Emblica officinalis*	Antiepileptic
12.	*Sida cordifolia*	Nerve tonic, Analgesic
13.	*Butea frondosa*	Stimulants
14.	*Eclipta alba*	Antioxidant, Rejuvenative
15.	*Wedelia calandulaceae*	Anti cancerous

Discussion

Ayurveda herbal drugs have major revolution in clinical neuro-pharmacology and psychopharmacology was heralded during the 1950s, when effective drugs were discovered for psychosis, depression and anxiety [1, 2]. Natural products have played a significant role in the management of neuro-psychiatric disorders. Sen and Bose published the first report of the use of *Rauwolfia serpentina* in the treatment of insanity [3]. This plant has major breakthrough for understanding hypertension, depression and Parkinson's disease. *Ayurveda* has described CNS - activity under different categories. For example, *Vata Prakopa* and *Vata Samshamana* are unique activities, which need to be understood in modern neuro-pharmacological terms. The medicinal plants which have been identified to have such specific *Ayurvedic* description of activity need to be investigated by not only the existing but also new experimental models [4] these were followed by extractions, phyto- chemistry and pharmacology. If significant activities were found, animal toxicology preceded the clinical trials of the active principles. Clinical experience precedes clinical trials and the latter is followed up by pharmacology and toxicology and phase 1 studies; phytochemical standardization is carried out of the whole extract by finger-printing (HPLC or HPTLC) [5] methods. Classification of CNS activity *viz*; Analgesics sedatives, Depressants Amnesics, Anaesthetics, Mood-elevators, Intelligence-enhancers, Rejuvenating, Neurohormonizers, Narcotics Antihypnotics, Stimulants, Memory-enhancer, Consciousness restoring, Antipsychotics, Antiepiliptics, Intoxicants, Anti ageing, Mind-soothing, rate sleeping time, are common models used in traditional pharmacology laboratories. Many medicinal plants from India have been shown to have activity by the traditional methods of psycho neuro pharmacology [3]. It may be desirable to create new animal models or *in vitro* models

based on the clinical activity of a medicinal plant. The most promising medicinal plants with CNS activity are the following: *Celastrus paniculatus*, *Withania somnifera, Centella asiatica, Bacopa monniere, Convolvulus pluricaulis* [13] *Mucuna pruriens* [4], *Acorus calamus, Azadirachta indica* [5, 6], *Emblica officinale*, *Sida cordifolia*, *Butea frondosa*, *Eclipta alba* and *Wedelia calendulacea*. *Bacopa monniere* has been studied quite extensively by several scientists and by the Central Drug Research Institute. Dhawan has reviewed the progress of the work of *Bacopa monniere* as enhancing learning and memory etc. *Centella asiatica* has been investigated in mentally retarded children [17], normal children [18], anxiety neurosis etc. Experimental and phytochemical work on *asiaticosides* has also been carried out. It is desirable that molecular psycho pharmacological studies are conducted on the active principles of *Centella asiatica*. *Withania somnifera* affects *pentobarbitone* sleeping time and seizure latency [20]. Antistress effects have been studied by several groups in India and outside, in different animal models [21]. Singh *et al* [21] had shown therapeutic effect in anxiety neurosis [22]. Anti-convulsant activity has been demonstrated by Kulkarni *et al* [23]. They have studied a formulation tablet Mentat containing *Withania somnifera* in diazepam withdrawal and opiate tolerance. Currently the plant singly or in combinations is utilized in many formulations. Substantial basic pharmacology has been carried out [24]. But it is desirable to evaluate the neuro endocrine and molecular level effects of *Withanolides* and their derivatives. *Withania somnifera* and ginseng have been compared for their anti-stress activity in mice swimming endurance test. A significant increase in swimming time was observed [25]. *Celastrus paniculatus* has been used in *Ayurveda* for many centuries. Recently the work on the activity profile of the plant was reviewed [10]. Antistress, antipyretic, anti fatigue and analgesic activity have been demonstrated in the oil or the alcoholic extract. *Mucuna pruriens* was shown to be effective in Parkinson's disease by Vaidya *et al* [14]. Bioavailability of L-dopa from the seed powder of the plant has been studied too. Clinical studies for other indications are desirable, especially the aphrodisiac and effects on sperm motility and count [26]. The anti cancerous activity of *Wedelia calandulaceae* was effectively found in lung cancer [27].

Conclusion

The above mentioned drugs are aid to improve brain circulation, change neurotransmitter concentrations, reduce brain inflammation, activate the production of new brain cells, and protect the brain from free radical damage and helps to accomplish enhancing intellectual capacity objective by balancing the *Tridosha*. At the level of *Rasa* these herbs work by stimulating and increasing the function of Agni, as well as promoting *Rasa* circulation by opening and cleansing the micro channel for improved mental performance. Data of herbs available so far support procognitive activity. Mostly the above said herbs act on the basis of antioxidant, adaptogenic or essential trace elements present in them. These drugs promote the intellect, retention power and memory, moreover these drugs work on hypothalamus pituitary adrenal axis and normalize the secretion of neurotransmitters such as dopamine, serotonin, acetyl choline and thus can improve the mental functions.

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