REVIEW ON EFFECT OF NATURAL MEMORY ENHANCING DRUGS ON DEMENTIA

K.Yalla Reddy, S. Mohana Lakshmi, A. Saravana Kumar

Sree Vidyankethan College of Pharmacy, Tirupati, Andhra Pradesh, India-517102.

ABSTRACT

Dementia is a syndrome usually occur Alzheimer’s disease (AD) and vascular dementia (VD) due to disease in brain. It associate’s the impairment of memory, thinking, learning disability, orientation and judgement. These changes effects on cognition functions to decline earlier function of learning and memory. Since, the drugs and natural remedies have been prescribed to enhance the memory and protects the memory functioning in dementia people. Which are today popular all over the world due to their proven effective qualities. The drugs acting on the brain are called as nootropic drugs. The natural memory enhancing drugs controlled the activity of acetylcholinesterase (AChE). AChE modulates acetylcholine (ACh) to proper levels by degradation accordingly excessive AChE activity produce to constant Ach deficiency leads to memory and cognitive impairments. These natural agents inhibit’s the excessive AChE activity and protects the people suffering with dementia. This review focuses on natural herbal drugs as memory enhancing agents on curing the dementia.

KEYWORDS: Memory, Enhancers, Dementia, Herbs, AChE activity.

INTRODUCTION

Dementia is syndrome or set of symptoms and signs occur at the same time is due to a disease in the brain. It is progressive impairment of memory, thinking, orientation, learning capacity, language and judgments. Changes in cognition occurs deterioration in the person’s emotional control, social behaviors or motivation and other cognitive changes often include apraxia, agnosia, aphasia, depression, anxiety, agitation, restlessness, apathy and suspicion. Mainly dementia occurs in Alzheimer’s disease (AD), Cerebrovascular disease, Lewy body weight disease (LBD), Frontotemporal dementia (FTD), parkinsons disease. The changes in behaviour associated with the level or stage of severity of the dementia is a Clinical Dementia Rating Scale (CDRS) developed by Berg and published in 1988. Dementia occurs three stages characterized by severe memory loss, disorientation time and place and inability to make judgements.

Dementia occur due to the cerebral ischemia, energy failure, calcium over load, glutamate mediated excitotoxicity, oxidative stress and structural and functional changes (Juan Wang et al., 2009). The herbs that promote intelligence and memory enhancing are called Medhya. These memories enhancing agents action related to mind and mind resides in brain and nervous system and inhibition the memory loss. Now drugs and natural remedies have been prescribed to enhances memories and prevent from memory deficits in the brain for curing the dementia. The herbal drugs acting on the brain are called Nootropic herbs (Nootropic is derived from Greek and means acting on the mind) and their isolated constituents refered as smart drugs. Memory enhancer herbs enhance the memory and increase the blood circulation in the brain. The drugs acting on cholinergic dysfunction mainly neurotransmitter (ACh) related to memory and learning. It will degraded by acetylcholinestrase (AChE) and this inhibited by the natural enhancing drugs.

Several treatments like drug therapy, mental exercises, nutrition mainly drug therapy shows major role in the treatment of dementia. Current neuroprotective treatment options cover all of the molecular targets of...
dementia cascades. Protective effects of cholinergic agents especially AChE inhibitors (Juan wang et al., 2009) on multiple mechanisms energy failure, glutamate mediated excitotoxicity, intracellular death pathway, oxidative stress, calcium overload.

The following list of the most effective herbs used in memory enhancement activity on dementia are evaluated by the researchers.

**ILEX PARAGUARIENSIS (AQUIFOLIACEAE)**

*Ilex Paraguariensis Yebra* mate tea (mate) leaves (Aquifoliaceae). It is an ingredient in the food and dietary supplement industries (Heck and De Mejia, 2007), *Ilex Paraguariensis* having memory enhancement properties to treat dementia. It inducing social recognition ability on facilitation of adenosine receptors. The scientific literature has reported that mate tea is hypocholesteremic, hepatoprotective (Filip and Ferraro, 2003) and stimulant of central nervous system (Mazzaferra, 1997). These mate tea leaves contain two active principles are polyphenols (chlorogenic acid) and xanthines (caffeine, theophylline, and theobromine) other flavanoids (quercetin, kaemferol) and vitamins C, B<sub>1</sub> and B<sub>12</sub> (Pomilio et al., 2002). The ilex leaves are reported memory enhancing activity on dementia on different models are spontaneous locomotor activity, social recognition task and inhibitory avoidance task methods (Rui Prediger et al., 2002). The use of mate tea for improvement of cognition modulates short and long term learning and memory in animals on antagonistic action on adenosine receptors.

**COMMIPHORA WHIGHITTI (BURSERACEAE)**

*Commiphora whighetli* (Burseraceae) plant resin contain major constituent of guggulipid is goguisterone. The guggulipid shows potential cognitive enhancer for improvement memory in scopolamine induced memory deficits (Gunjan saxena et al., 2007). The gum resin exudates of commiphora whighetli tree used in ayurvedic medicine for more than 2000 years to treat a variety of ailments like obesity, lipid disorders, rheumatoid arthritis (Dev, 1987). Experimental studies with extracts and fractions of guggul demonstrated anti-inflammatory activity (Gujral et al., 1960). Experimental studies have shown that cholesterol-fed wild type rabbits develop brain pathology similar to Alzheimer’s disease, which is supported by human studies, showing that statin therapy reduces the risk of Alzheimer’s disease (Raja et al., 2004). However commiphora whighetli shows maximum effects on memory functions and potential for dementia disorder. The commiphora whighetli acting on impairment in learning and memory and decreased choline acetyl transferase levels in hippocampus (Lannert and Hoyer, 1998). The effect of guggulipid on learning and memory function on different models passive avoidance and mornis water maze was studied. (Gunjan saxena et al., 2007).

**GLYCYRRHIZA GLABRA (FABACEAE)**

The roots and rhizomes of *Glycyrrhiza Glabra* (Fabaceae) is an efficient brain tonic it increases the circulation into the CNS system and balance the sugar levels in the blood (permender rathee et al., 2008) significant action an memory enhancing activity as dementia disorder (Dinesh Dhiingra et al., 2004) Liquorice shows significantly improved learning and memory on scopolamine induced dementia. The main constituent of *Glycyrrhiza Glabra* is glycyrrhizin. The roots have anti ulcer, expectorant, diuretic, laxative, sedative, antipyretic (Lata et al., 1999), anti microbial and anxiolytic activities (Ambawade et al., 1998). Oxygen free radicals and other products of oxidative metabolism have been shown to neurotoxic (Sayre et al., 1997). The protective effect of liquorice extract may be attributed to its antioxidant property by virtue of which susceptible brain cells get exposed to less oxidative stress resulting in reduced brain damage and improved neuronal function there by enhancing the memory (Dinesh Dhiingra et al., 2004).

**HUPERZIA SQURURUS (LYCOPODIACEAE)**

*Huperzia Squirrelus* is a fern family (Lycopodiaceae) reported in Argentinean popular medicine as a memory enhancing agent Huperzia squirrelus mainly contain two major constituents hyperzine A and B are lycopodium alkaloids among the compounds with known activity an memory and learning (Zhu and Tang, 1988). It is used mainly as an aphrodisiac. *Huperzia Squirrelus* mainly acting an intra hippocampal administration an memory retention using step down test. (Vallejo et al., 2007). Many studies have demonstrated the participation of the hippocampus in learning and memory processes. (Bliss and Colin Gridge, 1993).

**LEPIDIUM MEYENII (BRASSICACEAE)**

*Lepidium Meyenii* (Brassicaceae), known as Maca. Maca showed to beneficial improves an memory and learning. It shows memory enhancing property on memory impairment is dementia patients. (Julio Rubio et al., 2007) *Lipidium Meyenii* acting on cholinergic dysfunction mainly neurotransmitter (ACh) related to memory and learning. It will degraded by AChE and this inhibited by this memory enhancing agent. (Wang et al., 2006). Bleck Maca an male mice with memory impairment induced by scopolamine using water morris maze (Morris, 1984) and step-down avoidance test.

**PANAX GINSENG (ARALIACEAE)**

Panax Ginseng (Araliaceae) saponins having memory enhancing action the learning impairment induced by scopolamine. Panax Ginseng contain seponins
protopanaxdiol, protopantriol and oleanolic acid saponins improves the scopolamine induced learning disability and spatial working (Sung-Ha Jin et al., 1998), gingseng root has been used as an East Asian medical herb for treatment of various diseases (Hu, 1977). Ginseng root improves learning ability in animals (Park et al., 1994). A component of ginseng saponin, improves the cyproheptadine-induced recognition deficits in rats (Me and Yu, 1993).

GINKGO BILoba (GINKGOACEAE)
Ginkgo Biloba (Ginkgoaceae) is also known as maiden hair tree, kew tree, ginkyo, yinhsing. The herb shows memory enhancing action by increase the supply of oxygen, and helps the body to eliminate free radicals there by improving memory (Permender Rathee et al., 2008). These constituents include terpenoids bilobolide, ginkgolides, flavanoids, quercetin, isorhamneting, steroids (sitosterol and stigmasterol) and organic acids (ascorbic, benzoic, shikimic and vanillic acid. Ginkgo biloba shows prevention action an corticosterone produce neuronal atrophy and cell death in the hippocampus (Anna Walesiuk et al., 2007). The Hippocampus corticosterone impairs GABA-mediated inhibitory neurotransmission and causes neurodegeneration, these can be prevention by Ginkgo Biloba. (Welzman et al., 1997). Ginkgo Biloba also used is antioxidant, free radicals converging antiplatelet (Smith et al., 1996) and neuroprotective effects and enhances long term potentiation. Benifical actions of the plant against ischemia injury, hypoxia, cerebrovascular and cardiovascular diseases, cognitive deficits and dementia (Kanowski et al., 1996).

EMBLICA OFFICINALIS (EUPHORBIACEAE)
Emblica Officinalis (Euphorbiaceae) posses memory enhancing action on improvement in memory in scopolamine and diazepam induced memory deficits. Emblica Officinalis inhibits the AChE activity. Amla contains major active constituents of vit-C, phyllumblin, Due to vit-C the amla posses the beneficial effects such as, memory improving property, cholesterol lowering property and anti cholinesterase activity. (Mani Vasudevan and Milinol Perle, 2007).

SESAMUM INDICUM (PEDALIACAE)
Sesamum Indicum in annual herb family (Pedaliaceae). It shows significant memory enhancing property to treat dementia. A method of preparing a synergistic herbal formulation of Sesamum Indicum as a brain tonic, cognition, recalling of thoughts and as an antioxidant capable of treating amnesia and having property for improving memory (Pushpangadan et al., 2004), Sesamum Indicum contains major active constituents protein, carbohydrates, vitamins, (Thiamine, Niacin), riboflavin, nicotinic acid, pantothenic acid and ascorbic acid. Sesame oil is rich in oleic and linolic acids. Main two constituents, sesamin and sesamolin, sesamum oil having the antioxidiant activity, sesamum seeds are considered emollient, diuretic, lactogogue and nourishing tonic, emmenogogue and cough. Powdered seeds are used in amenorrhoea and dysmenorrhoea (Kirtikar & Basu et al., 1992).

Sesemine and Sesemelinit show little antioxidant activity (wealth of India, 1994). Sesamum Indicum acting on hypoxia induces a reduction of memory and judgment that is associated with a decrease in acetylcholine synthesis (Gibson and Duffy, 1981).

MAGNOLIA OFFICINALIS (MAGNOLIACEAE)
The bark of Magnolia Officinalis (Magnoliaceae) used as a traditional memory enhancing agent in Chinese medicine for the treatment of neurosis, anxiety, stroke, dementia, Magnolia Officinalis inhibit the memory impairment induced by scopolamine through the inhibition of AChE. Magnolia officinalis contained 4-0-methyl honokiol, honokiol and magnolol (Yong Kyung Lee et al., 2009). Magnolol and honokiol shows anti inflammatory, anti bacterial, anti allergic activities, and treatment of neurosis, anxiety, stroke, fever and headache (Song et al., 2005) Honokiol was promote a potassium-induced release of acetylcholine in a rat hippocampus slice (Tsai et al., 1995), magnolol and honokiol exhibited an AChE inhibitory property, in rat spleen microsomes and human polymorpho nuclear leukocytes (Fukuyama et al., 1992). Magnolia Officinalis shows memory enhancing property on memory and learning using water maze and step down avoidance methods (Yong Kyung Lee et al., 2009).

CENTELLA ASIATICA (UMBELLIFERAE)
Centella Asiatica (Umbelliferae) commonly known as Mandoookaparni is widely available Indian herb has been used for centuries in Indian system of medicine. It shows memory enhancing property on treating dementia. Centella Asiatica inhibit the memory impairment induced by scopolamine through the inhibition (Russo et al., 2005) of AChE. Centella Asiatica contain glycosides asiaticosides, cenoic acid fatty oils, linolic, lignoceric, palmitic and stearic acid. Vellarine, pectic acids are present in the leaves and roots, and also contain as ascorbic acid. It posses anti protozoal activity against E. Histolytica, (Indian medicinal plant, 2001) (Wealth of India, 1992) Centella Asiatica herbal formulation as a brain tonic, cognition, recalling of thoughts and as an antioxidant capable of treating amnesia.
and having property for improving memory (Pushpangadam et al., 2004).

**ZINGIBER OFFICINALE (ZINGIBERACEAE)**

Zingiber officinale (Zingiberacea) rhizomes possess potent memory enhancement in scopolamine inducing memory impairment by significantly increased whole brain acetyl cholinesterase inhibition activity. Zingiber officinale significantly improved learning and memory (Hanumanthacar Joshi and Milind Parlie, 2006). Zingiber officinale contains major active constituents are gingerin, gingerol, shogaol and zingerone. Zingiber officinale rhizomes implicated in the treatment of cardiac diseases, piles, colic, asthma, diseases of kapha, vata and pitta (Yoganarsimhan, 2000). It is reported to posses antioxidant (Masuda et al., 2004), anti hypertensive (Ghayur et al., 2005), analgesic, anti-inflammatory (Young et al., 2005). It also reported to posses anti-obesity enhances learning an morrison water maze (Topic et al., 2002) and inhibits the β-amyloid peptide-accumulation, thus useful delaying the onset and progression of neurodegenerative disorders.

**TINOSPORA CORDIFOLIA (MENISPERMACEAE)**

Tinospora Cordifolia (GULVEL) (Menispermaceae) possess memory enhancing property on learning and memory in normal and memory deficits animals. Tinospora Cordifolia mechanism of cognitive enhancement by immunostimulation and increasing the synthesis of acetylcholine, these supplementation of choline enhances the cognitive function (Ashutosh Agarwal et al., 2002). Tinospora Cordifolia also reported to possess anti arthritic, bitter tonic and anti bacterial activity (Bisset Nwai, 1983), diuretic, aphrodisiac activity (Kokate et al., 2004). Tinospora Cordifolia enhanced the cognition in normal and cognition deficits animals in behavioural test Hebb William maze and the passive avoidance task.

**SALVIA LAVANDULAEFOLIA (LAMINACEAE)**

Salvia Lavandulaefolia (Spanish sage) (Laminaceae) and other salvia special are prominent for their reputed beneficial effects on memory disorders, depression and cerebral ischemia, anti cholinesterase activity (Nicolette Perry et al., 1996) helps the supplementation of ACh. It enhances the memory power Salvia Lavandulaefolia produced significant effects on cognition (Nicolette et al., 2003). Salvia majorly contains essential oils, 1, 8-cineole, linalool, α-and β-pinene, carvacrol, luteolin. Salvia Lavandulaefolia have been reported to be antioxidant (Adam et al., 1998). Anti inflammatory activity can be demonstrated isolated essential constituents (Bingol and Sener, 1995) S. Lavandulaefolia posses oestrogenic activity (Perry et al., 2001) by monoterpenoid geraniol, Salvia Lavandulaefolia inhibit the acetylcholinesterase and improvement of memory in dementia (Nicolette Perry et al., 1996).

**ACORUS CALAMUS (ARACEAE)**

Acorus Calamus (Sweet flag) (Araceae) posses beneficial memory enhancing property on memory impairment, learning performance, behaviour modifying. Acorus Calamus inhibits the acetylcholinesterase (AChE). Acorus Calamus contains majorly α-and β-asarone. The rhizomes of Acorus Calamus are used in loss of memory given in combination with other drugs like Centella Asiatica, Bacopa Monniera and Rauwolfia Serpentine. (Permender Ratheia et al., 2008). Acorus Calamus also shows anti inflammatory anti oxidant, anti spasmodic, cardiovascular hypolipidemic, immuno suppressive, cytoprotective anti diarrheal, anti microbial anthelmintic activities (Pulok Kumar Mukherjee et al., 2007).

**EVOLVULUS ALSINOIDES L (CONVOLVULACEAE)**

Evolvulus Alsinoides L (Convulvulaceae) is used as nootropic or brain tonic in traditional systems of medicines. Evolvulus Alsinoides L potential memory enhancing agent used in treating dementia (Amritpal Singh, 2008), (Alok Nahate et al., 2009). Evolvulus Alsinoides L contains alkaloids betaine, sankhapushpine and evoline, scoopetis, scopolin, umbelliferone, 6-methoxy-7-0-β-glucopyranoside coumarin quaretine-3-o-β-glucopyranside are reported (Gupta et al., 2007). Evolvulus Alsinoides L possess anti bacterial and anthel mintic (Dash et al., 2002) anti ulcer and anti catatonic activity (Parohit et al., 1996), immuno-modulatory activity (Ganju et al., 2003).

**ROSA ALBA (ROSACEAE)**

Rosa Alba (Rosaceae) posses memory enhancing property Rosa alba produces symptomatic improvement in learning and memory Rosa Alba might proven to be a useful memory restorative agent in the treatment of cognitive disorders. Rosa alba reported the effects on cognitive functions learning and memory by using elevated plus-maze and passive-avoidance test. Rosa album inhibits cholinesterase and improves the memory power (Nilofar Naikwade et al., 2009) Rosa Alba also used in leprosy, biliousness burning sensation, appetite, cold, headache, bronchitis, ophthalmia, rheumatism and its perfume is a tonic for the brain and the heart (Zimmerman, 1983).
Conclusion
The review focuses on several natural memory enhancing agents acting on dementia. Dementia is syndrome usually occurs impairment on memory, thinking, orientation and judgement. These memory enhancing agents showed potential acting on cognitive functions by maintaining the Acetyl choline (Ach) level in the brain. In that Centella Asiatica, Tinospora Cordata, Glycyrrhiza Glabra, Rosa Album, Zingiber Officinalis, Ginkgo Bioloba, Panax Ginseng etc., which are today popular all over the world due to their proven effective qualities for treating dementia. Several medicinal plants used in ayurvedic polyherbal formulations for curing the dementia and so many medicinal plants showing the memory enhancing property under several researcher studies in the current trend.

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