Medicinal Plants and Alzheimer Disease- An Overview

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***Abstract*—Alzheimers disease (AD) is a progressive neurodegenerative disorder characterized by profound loss of memory and named after a German physician Aloes Alzheimer who first described it in 1906. Alzheimers disease most commonly observed in elders and about 10 million peoples get affected worldwide. Acetylcholine is the first discovered neurotransmitter involved in Alzheimer's disease and thus to treat Alzheimer's disease number of anti-Ach drugs are drug of choice. Now a day people rely more and more on herbal medicine for treatment of chronic diseases. It is proved that herbal medicine having several biological activities such as anti-oxidant, antihypertensive, antimicrobial, cardiac activity and CNS activity. Similarly, there are some herbs having anti-Alzheimer's activity. This review gathers research on various medicinal plants that have shown promise in reversing the Alzheimer's disease pathology. The report summarizes information concerning the photochemistry, biological activities and clinical applications of these various plants in order to provide sufficient baseline information that could be used in drug discovery campaigns and development process, thereby providing new functional leads for Alzheimer's disease.**

***Index Terms*—Alzhimers Disease, Docking, Bay leaf, Laurus nobilis, Acetylcholine esterase inhibitors.**

I. INTRODUCTION

Now the day the Natural Tree is exploding. About half of all licensed drugs registered worldwide for the first 25 years before 2020 were either natural products or synthetic components. However, the modern medical arsenal also includes many psychiatric drugs designed to alter brain function in certain disease groups, so far, few common options for improving the brain function of abnormal individuals. These groups include the growing parts of our aging societies that suffer from environmental degradation, which is related to age in brain function.

Even those who suffer from dementia are offered a few treatments for her severe dementia. People who are exposed to it can often have toxic cholinesterase inhibitors originally found in alkaloid phytochemicals. These chemicals usually have an effective / side profile. In contrast, many herbal supplements are designed to enhance the functioning of the brain and are widely used in developed societies. For example, ~ 20% of US people take herbal products, often without good evidence of their effectiveness, in which they eat sixteen hot products within the assumption that they will alter certain brain functions. Major scientific literature focusing on the release of psychotropic drugs and their phytochemicals, comprising thousands of scientific papers, has appeared in recent decades. The majority of these papers describe in vitro research into the potential mechanisms of putatively psychoactive phytochemicals, with only a very small number investigating its effects on in vivo in animals and only a small number investigating its efficacy in humans.

The following include a review that focuses on those few extruded substances and phytochemicals that have found sufficient evidence in human trials to be successful in some demonstrations of their effectiveness in terms of improved brain function. Several polyphenols that attract a great deal of scientific interest are among the first stages of the human experimental process. Surprisingly, one question that is almost completely ignored within the larger literature surrounding the effects of natural psychotropics is why plant chemicals affect the functioning of the human brain. The answer to this fundamental question is not only of interest in education but also of various results of future research and asset development. This review therefore includes consideration of why plant chemicals affect brain function, many of which can be considered secondary metabolites, have their own effects so the method of inquiry into this matter may help move this research field forward.

II. THE ROLE OF SECONDARY METABOLITES IN PLANTS

Plants and therefore the newly regenerated classification of flowering plants (angiosperms) in most colonies, respect for rich technological standards and complex relationships with other organisms. They make an increasingly significant contribution to the earth's biomass in volume and weight than all other life forms combined. However, like static autotrophs, plants faced some challenges, including the engineering of their polishing and seed dispersal, the local variability within the availability of simple nutrients that need to combine their nutrients, as well as the rapid integration of predatory organisms and pathogens into the environment. Plants have therefore evolved into a second chemical mechanism that allows them to synthesize chemical compounds, usually in response to a specific environmental claim, such as an herbivore injury, a pathogen attack, or genetic damage. These secondary metabolites are usually isolated from certain species or species and do not play any role within the plant as basic body needs, but instead increase their overall ability to survive and overcome local challenges by allowing them to interact with their environment. An indication of the importance of these secondary metabolites in survival plants is often seen within the energy invested in their synthesis, which is often added far beyond what is needed to combine major metabolites. The various roles of secondary metabolites are straightforward; for example, they play a variety of, common defensive roles (e.g. they also control the interactions between plants, acting as allopathic protectors of the growing plant space against competing plants.

Complex roles include summoning or altering plant relationships with more complex organisms. Their main role here is often considered to be one of the maintenance inhibitors, and in this case most of the phytochemicals are toxic and / or toxic to edible animals, and these toxins often pass through direct contact with the central nervous system and nerves. in this case, secondary metabolites often act as agonists or antagonists of neurotransmitter systems or make synthetic analogues of chronic hormones. Equally important, however, plants even need to encourage the interactions of certain species in order to survive. The most important role here is to attract pollinators and other symbiotes by color and smell or to obtain indirect protection of the plant by attracting natural enemies of their predatory predators. This could take the form of providing a good meat-eating chemical environment or, alternatively, it could respond directly to tissue damage by the herbivore, which eliminates within the compound and release of the chemical cocktail of phytochemicals that attract natural vegetarian organisms. With regard to the natural forces that shape plant selection of phytochemicals, it is noteworthy that the plants live within their own small space, full of warm and humid microclimate rich in chemical extraction. Their contact with animals is most often with a rich palette of invertebrates living next to them, and especially with a group of arthropods, or insects. The insect group itself is one component of all the many cellular organisms identified in the world to date. About half of all these insect species are endangered, with eating habits of many species limited to the estimated number of plant species. Many of the fossils live in respect of direct cooperative relationships with plants or food for other predatory insects. On the other hand, two thirds of all flowering plants depend entirely on insect pests for pollination. Not surprisingly, plants and insects have evolved from a variety of physical and natural variations in their typical 400-year history.

Contrary to the important role of insects during plant life, it is noteworthy that vertebrates form only 4% of the world's species and are physically outnumbered by insects by 10 to 1 percent in the cooler parts of the world. Although there are many samples of secondary metabolites that interact with vertebrates, the need for evolution that supports these conditions naturally decreased significantly in most plants because the size of the animal increases and the abundance of contact decreases. In these words, the people are important to the Plantae until recently (in terms of evolution) and therefore the advent of agriculture about 12,000 years ago, through deforestation and land reform.

Hypothesis: why secondary metabolites affect the functioning of the human brain

This similarity raises 2 broad, distinct, but related concepts in factors that support the effects of secondary metabolites on the functioning of the human brain.

The first is that any effects may be due to the similarities between plants and the chemical composition of molecular mammals and cell function, especially the different cell signaling mechanisms stored between taxa and play roles in secondary metabolite synthesis within plants.

Second is that the results are based on similarities between the nervous systems of humans and people who eat a lot, natural plants, especially insects. During this case, the compounds of phytochemicals that are synthesized are stored in the process of surviving the thought of their ability to communicate with the CNS of harmful or symbiotic insects and will also interact with the human CNS system in equal, uniform, or internally different, behavioral effects.

III. CURRENT STATUS OF THE DATA

A large number of natural, plant and chemical substances are suspected to have beneficial effects on the functioning of the human brain. Zhang pointed out extracts and elements from 85 medicinal plants that have shown potential in treating mental disorders in the minds of animal behavior models only. However, few plant-based products are tested with sufficient human trials in terms of method. a simple search of books using the words of each of the few extracts and chemicals reviewed below (excluding nicotine and caffeine) produces about 30,000 books. Only three polyphenols [epigallocatechin-3-gallate (EGCG), curcumin, and resveratrol alone donated 15,000 of those papers, most of which were published within the last 10 y. This represents a large amount of research and naturally raises the question of the effectiveness of the last term of the intervention in question. the following include a quick review of the evidence surrounding a small number of herbal remedies and phytochemical supplements that have found sufficient evidence of efficacy or given appropriate levels of research to allow any conclusions about their effectiveness in terms of improved brain function. Polyphenols are included in the idea of great interest they are currently making.

The secondary metabolite palette is often classified into different groups in terms of their chemical structure and artificial mechanisms, and these groups can also be broadly classified according to the character of their natural role and therefore their final effects and comparative toxicity within the predator. Extracts / phytochemicals are therefore collected below by the chemical nature of their active ingredients. In this case, the most important and most commonly found phytochemical groups are alkaloids, terpenes, and phenolic compounds.

Phenols

Phenolic compounds in food have attracted great interest because of some evidence of their beneficial effect on human health. Numerous evidence from in vitro, in vivo studies and clinical trials have shown that polyphenols from many fruit juices have strong protection against antioxidant vitamins. For example, phenolic compounds (catechins and epicatechins) of green tea are able to produce dopaminergic neurons from the damage caused by 6-hydroxydopamine in a mouse model of Parkinson's disease; protection of retinal neurons from recurrent ischemia injury.

Catechins are polyphenols that exhibit neuroprotective functions performed, in part, by the activation of protein kinase C (PKC) and transcription factors that provide genetic expression for cell survival. Catechins have been suggested to suppress the pathogenesis of Alzheimer's disease, as well as to protect neurons from the processes of Alzheimer's disease. Studies have shown that catechins and their metabolites activate many signaling pathways that can have cell life and anti-inflammatory actions, including altering the expression of pro-apoptotic and anti-apoptotic proteins, as well as improving antioxidant defenses. There are many other herbal remedies from various plants that have anti-Alzheimer's activity.

Some of these are listed in Table No.1

Flavonoids

Recently, there has been a great deal of interest within the ability of flavonoids to balance neuronal activity and stop aging-related neurodegeneration. Dietary intervention studies on several types of mammals, including humans, using flavonoid-rich or extracts from plants have shown potential to enhance memory and learning, by protecting vulnerable neurons, improving existing neuronal function or by stimulating neuronal regeneration. Individual flavonoids, such as citrus flavanone tangeretin, have been shown to require nigro-striatal integrity and function following wound implantation with 6-hydroxydopamine, suggesting a potential neuroprotective agent against basic Parkinsonism-related pathology. for flavonoids to reach the brain, they need to first cross the blood-brain barrier (BBB), which controls xenobiotic infiltration into the brain.

Flavanones such as hesperetin, naringenin and its in vivo metabolites, in combination with other dietary anthocyanins, cyanidin-3-rutinoside and pelargonidin-3-glucoside, have been shown to break down BBB in viable in vitro and local models. Anthocyanins can cross monolayer in vitro inhibition models.

Alkaloids

Alkaloids are a large group of natural products that contain nitrogen, carbon, hydrogen and oxygen itself. Alkaloids can affect the CNS, including brain nerve cells and the medulla spinalis that regulates many specific bodily functions and therefore behavior. they will also affect the autonomic systema nervosum, which includes internal organ control, heart rate, circulation and respiration. Indole alkaloids contain an indole carbon-nitrogen ring that is more commonly found within the fungal alkaloids ergine and psilocybin hence the psychoactive drug acid diethylamide (LSD). These alkaloids can disrupt or compete with the action of serotonin within the brain. Ergot alkaloids have significant effects on blood flow, which was initially thought to be the most effective. Tropane alkaloids such as atropine, hyoscyamine and scopolamine from Datura affect the medulla spinalis and CNS. A quinoline alkaloid like morphine, isolated from opium poppy (opium poppy) can be a very potent and narcotic drug. Morphin's mechanism of action binds strongly to the μ-opioid receptor (MOR) within the systema nervosum, leading to the growth of Gamma aminobutyric acid (GABA) within brain synapses. it can be a very powerful vasodilator. Clinical studies of vinpocetine report selective selections for brain blood flow and metabolism, including the development of glucose development, which may protect against the effects of hypoxia and ischemia. Galantamine can be a high-grade alkaloid, belonging to the phenanthrene class, which occurs naturally within the daffodil (Narcissus tazetta), snowdrop (Galanthus nivalis) and therefore frost (Leucojum aestivum). The drug also belongs to a class of drugs called cholinesterase inhibitors and is able to stimulate nicotinic receptors that further enhance cognition and memory.

Terpenoids And Saponins

Many essential oils found in plants, such as wormwood, have been known for over a century to have anti-inflammatory properties. The rhizome of valerian (Valerian officinalis) contains two medicinal ingredients: Valepotriates and sesquiterpenes (valerenic acid and acetoxyvalerenic acid). The effects of active agent placement are shown in mice. Raw extraction of Valerian, however, is known to have GABA (B) and GABA binding inhibitors of rat synaptosomes. Huperzine A, a sesquiterpene alkaloid purified from the Chinese medicinal plant Huperia serrata, exhibits a wide range of neuroprotective actions. Huperzine A improved reading and memory impairment, as well as improved spatial memory. In Centella asiatica L. triterpenoid, brahminoside and monoterpenes, β-pinene and γ-terpinene are chemical agents that are active in stimulating and strengthening nerve function.

Fatty Acids

The use of monounsaturated fatty acids and polyunsaturated fatty acids (PUFAs) has been shown to reduce depression in animals and humans. Many studies have focused on n23 and n26 (omega-3 and omega-6) PUFAs found in nuts, such as walnuts containing monounsaturated carboxylic acid monounsaturated fatty acid (8: 1) hence n26 and n23 PUFAs linolic acid (LA) and linolenic acid (ALA). Numerous studies have shown that eating foods that do not contain n23 fatty acids can impair brain function.

Conclusion

Plants, in the form of herbs, spices and foods, are a major source of molecules available to improve human health. However, a single plant contains hundreds or thousands of doubles, respiratory metabolites, chemical variants that determine the success of plant evolution, allowing them to adapt to the changing environment. In this age of vision, presenting the results of the information on the health of vegetables or fertilizers to a molecule only, or a single component of a mixture, represents an inappropriate and inappropriate activity. It is possible that different phytochemical chemicals produce in vivo additive and / or synergistic effects, thereby enhancing (or reducing / inhibiting) their functions.

Most of the chemical’s phytochemicals have recently been reported to have neuroprotective effects on various experimental models of neuropathy have previously been shown to have cytostatic or cytotoxic effects on cancer cells. Although the demand for phototherapeutic chemicals is growing, there is a need for its scientific confirmation before plant extraction is widely accepted and widely used. The so-called "natural" products can provide a regenerative source of beneficial neuropsychotropic drugs. These studies provide a phytochemical basis for the few effects that these herbal preparations wear on brain function and neuroprotection. As fully explained in this study, most of our current knowledge about active CNS plants of cultural and traditional significance came from ethnobotanical and ethnopharmaceutical studies (including history), with respect to other active ingredients. In addition, in the appropriate neuroprotective agent, the most important asset determines its ability to cross the barrier (BBB), in order to be effective in targeted CNS areas. Finally, although the discovery of receptors or transporters of polyphenols or other phytochemicals in brain tissue is yet to be discovered, multi-purpose compounds are seen as a possible and promising medical class in the treatment of neurodisorders.

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Table No.1 –List of Medicinal Plants

Sr.No	PlantName	CommonName	Part	Chemical category	ChemicalConstituents	Extract	Model
1	Uncoriarhynchophylla	fishhookvine,cat'sclawherb	driedstem	alkaloid	corynoxine, corynoxine B, corynoxeine,isorhynchophylline, isocorynoxeine, andrhynchophylline	Ethanolic	beta-amyloid- (Aβ-) inducedneurotoxicityinPC12cells
2	Galanthus nivalis	Snowdrop	Bulbs	alkaloid	galanthamine	methanolic	Ellmansmodel
3	Hueperzia serrata	Toothedclubmoss	Groundwhole	alkaloid	huperzinA	ethanolic	Scopalamine-induced
4	Tinospora cordifolia	Giloy,Guduchi	stem	alkaloid	Oxoglaucine,liriodenineandN-formylanonaine	Methanolic	Ellman'sandβ-naphtylacetate-fastbluesalt(NA-FB) assaymethods
5	Peganumharmala	Harmal	seeds	alkaloid	harmine,harmalineandharmalol	methanol	Ellmanmethod
6	Leucojum aestivum	summersnowflakeor Loddonlily	Bulbs	Alkaloids	Galanthamine	methanolic	Ellmansmodel
7	Angelicadecursiva	Peucedanumdecursivum.(Miq.) Maxim	Wholeplant	Coumarin	Umbelliferone, umbelliferone 6-carboxylicacid, scopoletin, isoscopoletin, 7-methoxycoumarin, scoparone,scopolin,andesculetin	methanolic	Ellman'smethod
8	Artemisiacapillaris	Wormwood	Wholeplant	Coumarin	umbelliferone 6-carboxylic acid, esculetin anddaphnetin	methanolic	Ellman'smethod
9	Convolvuluspluricaulis	Shankhapushpi	Root	Coumarin	Scopoletinandscopolin	Aqueous	scopolamineinduced
10	Cinnamomumzeylanicum	Cinnamon	Bark	Essential Oils	(E)-cinnamaldehyde, (E)-Cinnamaldehyde (CAL) (81.39 %) and (E)-cinnamyl acetate (CAS)	Ethanolic	Ellman'smethod
11	Menthalongifolia	wildmint	Fruit	Essential Oils	1,8-cineol, Linalool	Ethanolic	Scopalamineinducedmodel
12	Celastruspaniculatus	Black-Oiltree,Intellecttree, Climbing-staffplant	seeds	Essential Oils	benzenediol, cinnamic acid benzoquinone,butylatedhydroxytoluene,andeudalene	methanolic	scopolamine-induced
13	Limonium spathulatum	sealavender	Flower	Flavonoid	myricetin3-O-(2"-O-p-hydroxybenzoyl)-alpha-rhamnopyranoside	methanolic	nitricoxide(NO)productionbymurine macrophages
14	Morusalba	Whitemulberry	root bark, leaves,branches,andfruits	Flavanoids	Mulberrofuran G,Albanol B,KuwanonG	methanolic	fluorescenceresonanceenergytransfer(FRET)assaykit
15	Polygonumhydropiper	marshpepper knotweed,annualsmartweed	greenleaves,youngred sprouts	Flavanoid	β-sitosterol	Ethanolic	Ellman'smethod
16	Embeliaribes.Burm	false black pepper, white-	seeds	Flavanoid	embelin	methanolic	diazepam-induced amnesia,

		floweredembelia,vidanga,vaividang					MWMandEPMmodel
17	Opuntiaficusindica	Indianfigopuntia,Barbaryfig,cactus pear, prickly pear, andspinelesscactus	Stem	Flavanoid	quercetin3-methylether	Ethanolic	aluminum chloride-inducedneurotoxicity
18	Cyperusrotundus	coco-grass, Java grass, nutgrass, purple nut sedge orpurple nutsedge, red nutsedge,Khmerkravanhchruk	rhizomes	Flavanoid	quercetin,kaempferol,catechinandmyricetin	Ethanolic	beta-amyloid- (Aβ-) inducedneurotoxicityinPC12cells
19	Leucasurticifolia	Eneodonurticifolia(Vahl)Raf.	WholePlant	Flavanoid	LeufolinsAand B	Ethanolic	Scopalamineinducedmodel
20	Urticadioica	StingingNettel,Bichhu	Arialparts	flavonoids	fscopoletin,gentisicacid,esculetin,quercetinandrutin	hydro-alcoholic	Scopalamine-induced
21	Ginkgobiloba	Balkumari,Ginkgo	DriedLeaves	flavonoids	ginkgolidesandbilobalide	aqueous	Randomisedcontrolleddesign
22	Withaniasomnifera	Ashwagandha	Leaves	glycosides	WithanolideA,withanosideIV,and withanosideVI	alcoholic	Scopalamine-induced
23	Hedyotisdiffusa	whiteflowersnake-tonguegrass	ArialParts	Glycosides	E-6-O-p-coumaroyl scandoside methyl ester (1), E-6-O-feruloyl scandoside methyl ester(3), deacetylasperulosidic acid methyl ester(4),scandosidemethylester(8),asperulosidicacid (9), and quercetin-3-O-[200 -O-(6000 -O-E-feruolyl)-β-d-glucopyranosyl]-β-d-glucopyranoside	methanolic	Ellman’smethod
24	Lampranthuscoccuneus	Indian berry, fishberry, orLevantnut	ArialParts	Glycosides	Epicatechin5-O-beta-D-glucopyranoside-3- benzoate	Aqueous	AlCl3induced
25	Malephoralutea	RockyPointIcePlant	ArialParts	Glycosides	Epicatechin5-O-beta-D-glucopyranoside-3- benzoate	Aqueous	AlCl3induced
26	Panaxgingseng	Asian gingseng, Chinesegingseng	rootandrhizome	glycosides	ginsenosidesandgintonin	Aqueous	Aβ-inducedADmodel
27	Magnoliaofficinalis	mangoliaBark	Bark	Polyphenols	magnololandhonokiol	ethanolic	Scopalamine-induced
28	Carissacarandas	Bengalcurrant,Christ'sthorn,carandasplumandkaranda	Leaves	Phenolic	1-heneicosanol; N-nonadecanol-1; cholesta-4,6-dien-3-ol, (3beta); di-n-octyl phthalate;7,9-di-tert-butyl-1-oxaspiro (4,5) deca-6,9-diene-2,8-dione; 6-undecyl-5,6-dihydro-2H-pyran-2-one, andphenol	Chloroform	Scopalamineinducedmodel
29	Pongamisiapinnata(L)Pierre,Millettipinnata	Karanj,Pongamoiltree,IndianBeech, Indian beech tree,Hongayoiltree	seeds	Phenolic	karanjin	methanolic	diazepam-induced amnesia, MWMandEPMmodel
30	Centellaasiatica	Indian pennywort or Asiaticpennywort	leaves	Phenolic	asiaticacid,madecassicacid,andbrahmaside	Ethanolic	AlCl3induced
31	Melissaoff	Lemonbalm,balmmi	leaves	Phenolic	rosmarinicacid,Gallicacid,Quercetin	Ethanoli	naïve and

	icinalis	nt				c	scopolamine-inducedmemory-impairedrats
32	Irisunguicularis	Algerianiris	rhizomes	Phenolic	quinicacid,nicotiflorin,andapigetrin	Ethanolic	ADinducedmicrophages
33	Irisgerminica	beardediris	rhizomes	Phenolic	quinicacid,nicotiflorin,andapigetrin	Ethanolic	ADinducedmicrophages
34	Urticadioica	StingingNettel,Bichhu	Arialparts	phenolics	fscopoletin,gentisicacid,esculetin,quercetinandrutin	hydro-alcoholic	Scopalamine-induced
35	CurcumaLonga	Curcumin	rhizomes	Polyphenol	curcumin(A),demethoxycurcumin(B),andbisdemethoxycurcumin	Acetone	ADinducedmicrophages
36	Suturjacuneifolia	Sutureja	Leaves	Polyphenols	cyanidin chloride, catechin, ellagic acid, quercetagetin-3,6-dimethylether, t-ferulic acid,rosmarinic acid, luteolin-5-O-glucoside, luteolin-7-O-glucoside,andrutin)	methanolic	5,5′-dithiobis (2-nitrobenzoic) acid(DTNB)
37	Thymuspersicus	Thymus	Arialparts	polyphenols	carvacrol, borneol,or1,8-cineole	hydroalcoholic	aluminiumchloride(AlCl3)inducedexperimentalADmodel
38	Artemisianilagirica	Wormwood,Mugwort	leaves	Polyphenols	apigenin,caffeoylquinicacid	Ethanolic	Ellman'smethod
39	Camellasinensis	teaplant,teashrub,teatree	leaves	Polyphenols	Gallocatechins, Caffeine andcaffeicacid	Aqueous	rat model of AD induced by hen eggwhitelysozyme
40	OldenlandiadiffusaHerba	Chinesehawthornfruit	Fruit	Polyphenols	OleanolicAcidandUrsolicAcid	Ethanolic	Scopalamineinducedmodel
41	Commiphorawhighitti	Myrrh,Gugul	oleo-gumresinexudateobtainedfromthestem	resins	Bhanol.Z-andE-Guggulsterones	Methanolicandethanolic	LPSinducedNO
42	Trigonellafoenum-graecum	Fenugreek	seeds	saponins	saponin,trigonelline,	aqueous	aluminiumchloride(AlCl3)inducedexperimentalADmodel
43	Panaxgingseng	Asian gingseng, Chinesegingseng	rootandrhizome	saponins	ginsenosidesandgintonin	Aqueous	Aβ-inducedADmodel
44	Terminaliachebula	chebulicmyrobalam	seeds	Tannin	PGG,gallicacid,ellagicacid,andtannic acid	hydroalcoholic	5,5′-dithiobis (2-nitrobenzoic) acid (DTNB)
45	Salviarosmarinus	Rosemerry	DriedLeaves	Terpenes	carnosicacid	Methanolic	scopolamine-induceddementia model
46	Salviaofficinalis	sage,Thujone	Dried&groundLeaves	Terpenes	1,8-cineole, camphor, α-thujone, β-thujone,borneol,andviridiflorol	Ethanolic	scopolamine-induceddementia model
47	Ginkgobiloba	Balkumari,Ginkgo	DriedLeaves	terpene	ginkgolidesandbilobalide	aqueous	Randomisedcontrolleddesign
48	Panaxging	Asian gingseng,	rootandrhi	triterpen	ginsenosidesandgintonin	Aqueous	Aβ-

	seng	Chinesegingseng	zome	e			inducedADmodel
49	Ginkgobiloba	Balkumari,Ginkgo	DriedLeaves	terpene	ginkgolidesandbilobalide	aqueous	Randomisedcontrolleddesign
50	Glycerrhizaglabra	Mulethi,Licorice	root	terpenoids	triterpene-glycyrrhizin	Aqueous	Ellman'smethod
51	M.gonoclada,andM.imbricata		Root	Terpenoids	3-oxo-11α-hydroxylup-20(29)-ene,3-oxo-29-hydroxyfriedelane,3,7-dioxofriedelane	hexane/ethylether	Ellman'smethod
52	Salviasyriaca	Syriansage	Root	Terpenoids	ursolicacid,corosolicacid,β-sitosterol, urs-12-en-2α,3β-diol and daucosterol (1–5). β-sitosterolanddaucosterol	acetone	Ellman'smethod

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