



Investigation of natural available dietary antiaging phytochemicals

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Abstract

Ageing is a typical biological process which is influenced by various intrinsic and extrinsic factors. Intention of this review paper is to investigate the most important dietary phytochemicals against ageing. We discuss mechanisms of the selected phytochemicals that have yielded promising data. Lastly the paper comprises the anti-ageing through the reported natural extracts.

Keywords: Ageing, Phytochemicals, Anti-ageing, Extracts

Introduction

Ageing is a process of developing and maintaining the functional ability that enables wellbeing in older age. Ageing is due to interactions between intrinsic capacity and environmental characteristics where intrinsic capacity includes the mental and physical capacities of a person. Environmental characteristics are related to home, community and society as a whole [1]. Ageing is a complex process classified as replicative senescence (e.g., telomere damage) and stress-induced senescence (e.g., oxidative stress). It manifests as DNA damage, cell cycle arrest, altered secretion-related factors, metabolic abnormalities, and morphological changes. Ageing involves complex molecular mechanisms, which is the reason for continuous research in this area. [2] The six commonly used Theories of aging include the free radical theory, the genetic theory, the apoptosis theory, the immune theory, the telomere theory, and the Mitochondrial theory. There are twelve common features of aging:

Genomic instability, telomere attrition, epigenetic alterations, loss of Proteostasis, disabled macro autophagy, deregulated nutrient-sensing, Mitochondrial dysfunction, Cellular senescence, Stem cell exhaustion, Altered intercellular communication, Chronic inflammation.

Carrot glycoprotein

Mi-jin lee *et al.*, compared -Carrot glycoprotein (CP) with the fish scale collagen peptide (SCP), flavonoid which is one of the ingredients of anti-oxidant action. CG depends on concentration of SCP. CP eliminate ROS, protect cell membrane. UV reduces the collagen due to involvement of matrix metalloprotein (MMP) in photoaging. When MMP increases collagen breakdown takes place by extracellular matrix protein. Carrot has a control effect of proliferation of cancer cell [3].

Cranberry concentrate

Jingjing *et al.*, proved that Cranberry fruit contain epicatechin, reduce hepatic and brain thiobarbituric acid reactive substance, decreased brain and plasma monoamine oxidase activities, increases hepatic superoxide dismutase. Low calorie high - fiber contain flavanols, Anthocyanin, tannins (ellagitannins & proanthocyanidins), phenolic acid

derivates. Cranberries were used for prevention of urinary tract infection, potential benefit for periodontal disease and inhibit tumors [4].

Morus alba leaf extract

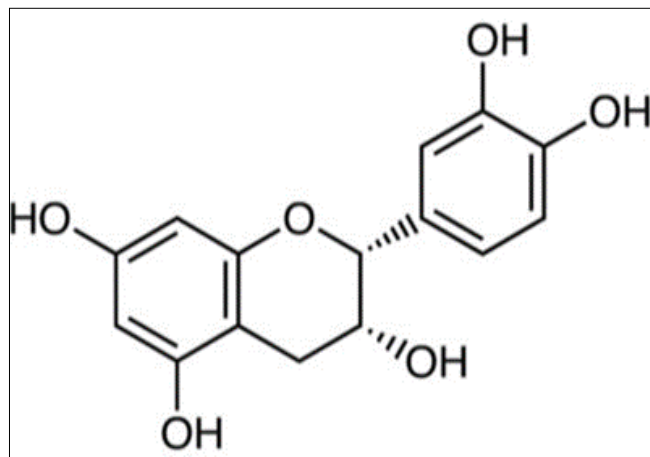
Wantida chaiyana *et al.*, Compared *Morus alba* leaf extract with 95% ethanol using a pulsed electric field and conventional maceration method, Anti (tyrosinase and hyaluronidase) activity was investigated by Vitro spectrophotometry. Rich in I- Deoxynojirimycin, alter cell surface glycosylation, protein turnover skin aging [5].

Eclipta alba

Audrey le cabec *et al.*, described that false daisy raw extract was fractionated using liquid extraction and centrifugal partition chromatography. It showed strong collagenase, cyclooxygenase-2, xanthine oxidase inhibition. Most active fraction contain coumestans [DML] and Wedelolactone [WL] were identified as carrier of anti-collagenase, anti-cyclooxygenase-2 and xanthine oxidase activity. E.alba is medium sized plant with small white flower. Secondary metabolites present in E.alba are saponins, sterols, flavonoids, terpenoids, phenolic acid, thiophenes, polyacetylene and coumestans. Wedelolactone were reported to decrease ROS and inhibit enzyme involved in skin aging. Xanthine oxidase inhibition is an enzymatic assay based on oxidation of xanthine to uric acid producing superoxide radical [6].

Lychee fruit

Mouming Zhao *et al.*, investigated a set of polyphenolic compound with strong antioxidant activity which was present in pericarp of harvested lychee fruit. Major components proanthocyanidin [B4], proanthocyanidin [B2], epicatechin extracted by nuclear magnetic resonance and mass spectrometry. It exhibits good antioxidant capability. Hydroxyl radical and superoxide anion scavenging activities of B2 are high. Epicatechin had the highest DPPH scavenging activity. Recently major anthocyanin of lychee fruit pericarp was cyanidin-3-rutinoside. Pigments in post-harvest fruit exhibited strong antioxidant activity [7].



Epicatechin

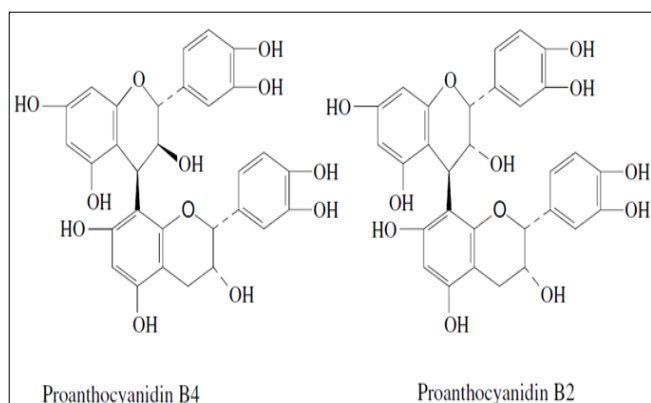


Fig 1

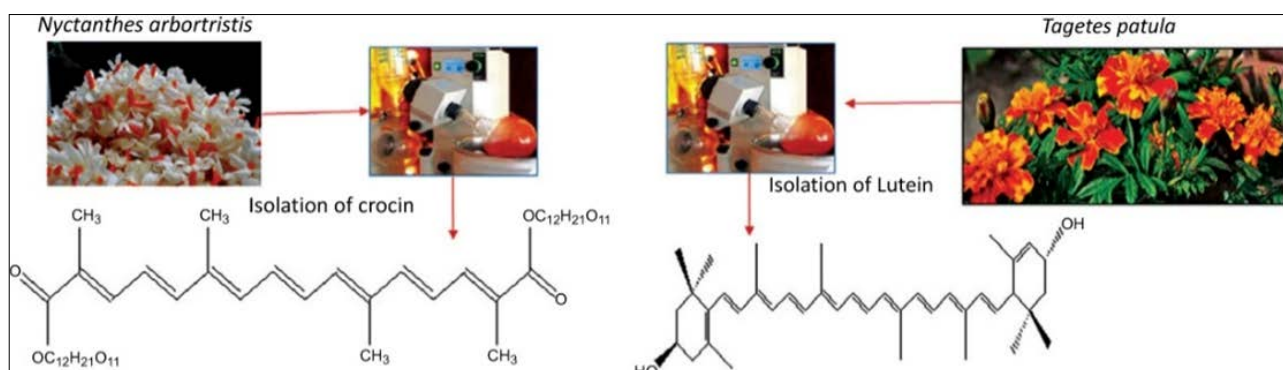


Fig 2

Cinnamon bark

Tiara Fahmawati *et al* proved that Cinnamon bark is known for high polyphenol content, making it a potent source of antioxidant. Nano powder of cinnamon bark shows total phenolic content and more antioxidant activity. Cinnamon serves as antioxidant, antidiabetic, anticancer and anti-inflammatory bark of cinnamon tree contain most of active chemical composed such as cinnamic acid, tannins, coumarins, phenolics, flavonoids and cinnaldehyde. It has great antioxidant potential. Bark as more potential. High water content leading to oxidative and microbiological damage. Cinnamon bark nano powder has higher TPC value and more robust antioxidant [10].

Raspberry Fruit

Xin Huang *et al.*, showed that Raspberry have remarkable antioxidative property. Black raspberry has high content of

Molineria latifolia

Syamsu Nur *et al.*, developed ethanol extract of *M. latifolia* roots by a chromatography column using a solvent based on a gradient. It acts as anti-oxidant, anti-tyrosinase and anti-elastase activities. Exposure to UV radiation from sunlight damage to tissue induce an increase in ROS and activate mitogen-activated protein kinase. The isolation resulted that obtained six secondary metabolism such as 2, 6, dimethoxy benzoic acid, curculigocide, curcapital, syringic acid, 2 hydroxy 4-methoxybenzyl 2, 3-dihydroxy 5methoxybenzoate, luteolin. Curcapital, 2-hydroxy 4-methoxybenzyl 2, 3-dihydroxy-5methoxybenzoate, Luteolin inhibited DPPH radical, tyrosinase, elastase, phenolic derivatives. The two main function of *Molineria latifolia* plant are destruction of fat tissue, lipids and DNA Activation of MAPK [Mitogen activated protein kinase] [8]

Crocin and lutein

Archana A Naik *et al.*, showed that Tubular calyx of nyctanthes arbour tristis contain crocin. It is an substituent for saffron. Lutein from flowers of tagetes patula is an powerful antioxidant.

Crocin is separated by flash chromatographic technique. Lutein is separated by column chromatography. Crocin and Lutein act as anti-collagenase and anti-elastase which is extracted from clostridium histolyticum and porcine. Collagenase breaks down collagen in damaged tissue and helps healthy tissue to grow. Elastase are proteinase enzyme that can reduce elastin by dividing specific peptide bond. Ant collagenase which prevents dermal matrix degradation [9].

GSH and anthocyanin. The content of ASA is high in green raspberry. Raspberry leaf is higher than fruit containing phenolic content. It is rich in vitamins, polyphenols and flavonoids antioxidant activity. There are four category [yellow, purple, black, red] raspberry. Black and purple have high content of anthocyanin. Colour depends on phenolic and anthocyanin. Ascorbic acid [ASA] maintains a state of reductive repair of metal ions and maintains an activity of antioxidant enzyme effective in H_2O_2 scavenging and has strongest redox state in mature fruit. Glutathione [GSH] acts as antioxidant forming ASA-GSH system. Increased circulating activity of ASA-GSH reduces oxidating damage. Flavonoids has antioxidant capacity. Superoxide [SOD], Catalase [CAT], and Peroxidase [POD] plays an important role in antioxidant enzyme system. Ripening superoxide dismutase reductase [AKR], Superoxide dismutase enzyme [SOD] and Glutathione

transferase [GT] increases. Catalase and ascorbate peroxidase decreases. ASA, GSH and anthocyanin are main sources of antioxidant activity of raspberry [11].

Cucumber polysaccharide

Songhua Chen *et al.*, found that Cucumber polysaccharide was extracted with hot water and modified by carboxymethylation and sulfation. Antioxidant activity was determined by hydroxyl radical scavenging ability and ion reducing ability. Cucumber polysaccharide had strong hydroxyl radical scavenging ability and reducing ability and it had antioxidant activity. While carboxymethylation and sulfation decreases the antioxidant activity. Free radical

scavenging and reducing ability are important to detect antioxidant activity of polysaccharide [12].

Avocado

Maria Camila Garcia-Vallejo *et al.*, analysed that Flavonoids and catechin are most abundant compound found in avocado seed and peel extract. Antioxidant have been recognized as most important fraction of residual biomass. Avocado contain unsaturated fatty acid, vitamins, fiber and protein. The phenolic content of avocado residues is higher than pulp. The residue is available to recover phenolic compound. Avocado seeds and peels have a high content of extractable bioactive compounds such as tannins, flavonoids and phenolic acids [13].

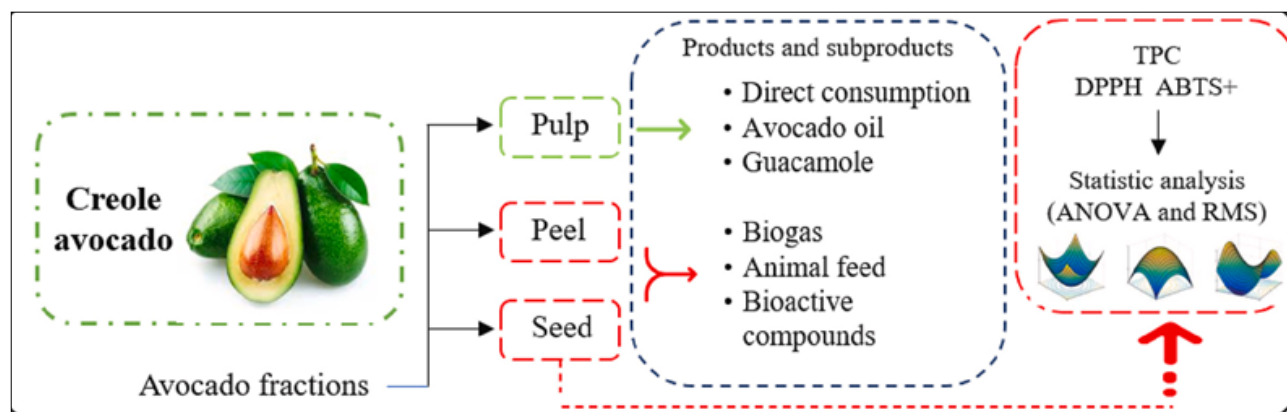


Fig 3

Rose hip tincture

Małgorzata Tabaszewska *et al.*, explained that there are 8 types of tincture produced with different raw materials. It shows total phenol content, polyphenolic, flavanols, anthocyanin, ascorbic acid, dehydroascorbic acid, antioxidant activity against ABTS radical and ferric reducing antioxidant power. Seeds removed from rose hips affected higher antioxidant activity in tincture. It is known as dog rose. It is a shrub with hooked thorns on floppy stems and single or double serrated leaves which are divided into five or seven leaflets. Wild rose hip are rich in polyphenolic compound including flavonoids, anthocyanin, procyanidins, catechin, quercetin, phenolic acid such as gallic and ellagic acid, kaempferol, apigenin, resveratrol. Rose hip exhibit antioxidant and anti-inflammatory and are helpful in osteoarthritis and arthralgia. Tincture is a sweetened alcoholic drink produced by flavouring with herbs, fruits, root, Flower [14].

Warburgia salutaris bark

Mohamed A.O. Abdelfattah *et al.*, mentioned that, *WARBURGIA* (Family- canellaceae) traditionally *W. salutaris* are used as anti-inflammatory, anti-malarial, anti-microbial and wound Healing. The antioxidant potential of extract was evaluated *in vitro* using DPPH and FRAP assays. *W. salutaris* bark extract exhibited antioxidant activity, strong binding affinity and inhibitory potential towards collagenase, elastase, tyrosinase, hyaluronidase enzymes which are involved in cellular anti-aging process. In brief the major identified compounds in the extract were docked into binding sites of five enzymes involved in antiaging process namely heat shock protein 90, tyrosinase,

collagenase, elastase, hyaluronidase using molecular operating environment (MOE) software [15].

Aloe barbadensis miller

Hyeonwoo Lee *et al.*, said that Exposure of human skin to UV radiation increases the synthesis of various matrix metalloproteinases which are implicated in photo Aging and destruction of extracellular matrix due to the loss of collagen. Oxidative stress due to the exposure of UV radiation substantially increases the level of reactive oxygen species (ROS). Among many aloe species, a gel of *ALOE BARBADENSIS MILLER* commonly called as aloe vera obtained by peeling the skin off the leaves and has been most widely used as food supplement and cosmetic ingredient due to its various biological effects. Used for the treatment of burns, anti-inflammatory and antibacterial properties.

Quercetin, an antioxidant flavonoid that exist in the outer layers of Aloe leaves was found to have cytoprotective effect on the mitochondrial pathways by inhibiting the oxidative stress [16].

Moringa oleifera leaves

Yongbing Xu *et al.*, proposed that *Moringa oleifera* (*M.oleifera*) widely used in tropical and subtropical regions has been reported to process good and teasing benefits on the skin care. It contains the components including flavonoids, phenolicacids, glucosinolates, nitrile Glycosides these leads to its numerous pharmacological activities like antioxidant, anti- inflammatory and antibacterial activities. *M.oleifera* leaf extracts displayed anti aging activity by improving oxidative stress resistance and nutrients sensing pathways [17].

Oregano polyphenols

Erick P. Gutiérrez-Grijalva *et al.*, mentioned that, the oregano species are used in ancient folk medicine. Its medicinal properties includes antioxidant and anti-inflammatory. The Oregano species Includes *Hedeoma patens* (HP), *Lippia Graveolens* (LG) and *Lippia Palmeri* (LP). HP, LG, LP polyphenols exhibit potential use as

hypoglycemic, hypolipidemic and anti-oxidant agents. Oregano is also used to treat Respiratory and digestive disorders, headaches, rheumatism, inflammation related ailments. Polyphenols - A heterogeneous group of phytochemicals that are synthesized in plants as product of secondary metabolism^[18].

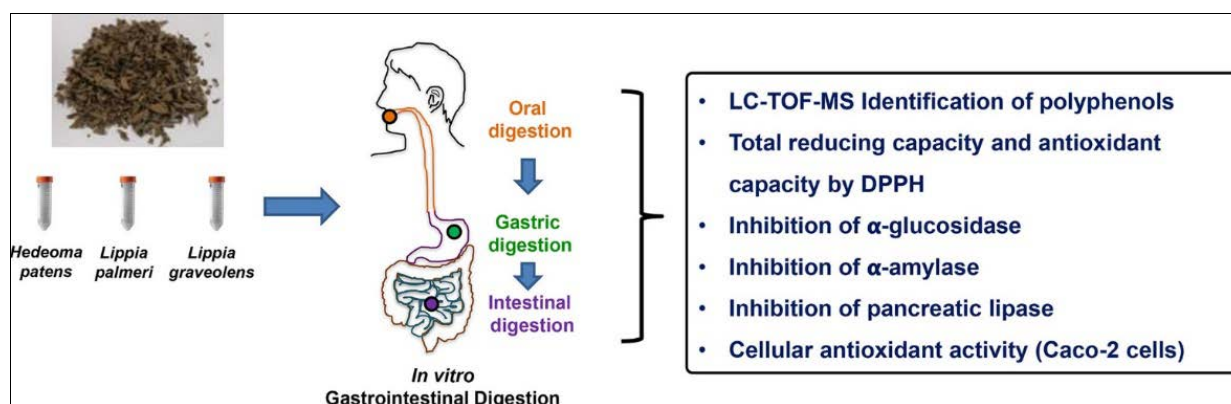


Fig 4

Isatis indigotica

Jin Hyeok Kim *et al.*, specified that Wrinkles a major symptom of skin aging is caused by multiple factors where some includes, reactive oxygen Species, oxidative stress and pro inflammatory mediators in the skin cause Matrix Metalloproteinases (MMPs), causing accumulation of degraded matrix components. These lead to loss of skin elasticity, moisture- wrinkle formation. An Antiwrinkle agent must display Anti-oxidant and anti- inflammatory activity. The major component of the extract was identified as 3, 4, 5-trimethoxycinnamic acid. Molecular docking was conducted to predict the binding mechanism of 3, 4, 5-trimethoxycinnamic with matrix metalloproteinase-1 and -3, and their binding energies were -5.20 and -4.89 kcal/mol. I. indigotic a leaf extract inhibits wrinkle formation, and could be a potential anti-wrinkle agent^[19].

Gingiber officinale roscoe

Suzana Makpol *et al.*, reported that, increased oxidative stress levels the production of antioxidant agent causing oxidative damage to biological molecules, Including DNA, protein, carbohydrates which affect the normal cell signalling, cell growth, differentiation and apoptosis and leads to the disease pathogenesis. Since the oxidative stress and inflammation contribute to diseases, Ginger is one of the potential herbs that can be used to reduce the level of oxidative stress. Ginger consists of two major active components. Gingerol and shogaol are essential for preventing the oxidative stress and inflammation. Due to its bioactive components Ginger has shown various type of therapeutic effects including the antibacterial, anti-cancer, Anti diabetic, gastro protective, anti-oxidant and neuroprotective activities. The properties of gingerol and shogaol on heart structure can also be seen through inhibition of leukotriene and prostaglandin biosynthesis by suppressing 5 - lipo oxygenase synthetase^[20].

Phyllanthus emblica

Puxvadee Chaikul *et al.*, included that *PHYLLANTHUS EMBLICA* L (amla), a medicinal plant in family Phyllanthaceae. It demonstrates several biological activities

including antioxidant, anti-cancer, anti-diabetic, rejuvenating and promoting health and longevity. Also, it is a rich source of nutrients such as amino acids, vitamin C, carbohydrates, Alkaloids and phenolic acids. Amla Branch was standardised and evaluated the skin aging activities, including Anti- melanogenesis, anti-oxidant and matrix metalloproteinases (MMPs)-2 inhibitory assays *in vitro* and cellular tests. The Antioxidant activity was performed by DPPH scavenging as says. Sinapic and ferukuc acids were major bio active components in extract^[21].

Pink rambutan

Korawinwich Boonpisuttinant Ratakorn Srisuttee *et al.*, reported that, Anti-aging activities for the anti skin aging of ethanolic extracts of pink Rambutan (*nephelium lappaceum* Linn) from leaves, branches, seeds and peels from a ripe fruit. This Extraction yields of all Pink Rambutan (PR) extracted by maceration and Soxhlet extraction. Flavonoids were found as the main Phytochemicals. The investigations of *in vitro* anti-ageing biological activities including the tyrosinase inhibition and the anti-melanogenesis, the collagen biosynthesis, and the stimulation of Sirt1 and Foxo1 mRNA expressions, and the three anti-oxidative activities as well as the cytotoxicity on human dermal fibroblasts, indicate the efficiency and safety of the PR extracts which can be further developed to natural skincare products, radical oxygen species, or ROS, can cause age-related damage at the cell and tissue levels, accelerating chronologic and environmental ageing characterized by wrinkles and a typical pigmentation. Natural antioxidants have the ability to scavenge free radicals, which results in reduced anti-inflammatory effects, the prevention of cancer, diabetes, and brain disorders, the reduction of blood pressure and atherosclerosis, and the slowing of skin aging. Free radical scavenging, inhibition of lipid peroxidation, and metal chelation have been widely investigated as systems to investigate the antioxidant activity of natural products. For DPPH free radical scavenging, the odd electrons in DPPH molecules are reduced by receiving a hydrogen atom from antioxidants to become hydrazine molecules^[22].

Radix astragali

PinGong *et al*, Specified that, Radix Astragali (RA) consists of the dried root of Astragalus membranous Bunge and is one of the most frequently used dietetic Chinese herbs to treat inflammation and neurodegenerative disease among other conditions. Radix Astragali preparata (RAP) is a medicinal form of RA. RA and RAP have been used as anti-aging agent. The main active compounds of RA include flavonoids, triterpene, saponins, polysaccharides, amino acids, and trace elements. These constituents exhibit many bioactivities and functions, including neuro protection against ischemic brain injury, hepatoprotection, gastroprotection, cardiotoxic, immunologic properties,

adjuvant, anti-aging activities, and anti-tumor effects. *In vivo* and *in vitro* studies has been used to confirm the anti-aging effects of RA. Based on experimental studies and clinical practices, summarized the anti-aging effects of *A. mongholicus* Bunge are largely attributed to anti-oxidative-stress, anti-inflammatory, immunoregulatory, The main active compounds of RA include flavonoids, triterpene, saponins, polysaccharides, amino acids, and trace elements. These constituents exhibit many bioactivities and functions, including neuro protection against ischemic brain injury, hepato protection, gastro protection, cardiotoxic, immunologic properties, adjuvant, anti-aging activities, and anti-tumour effects [23].

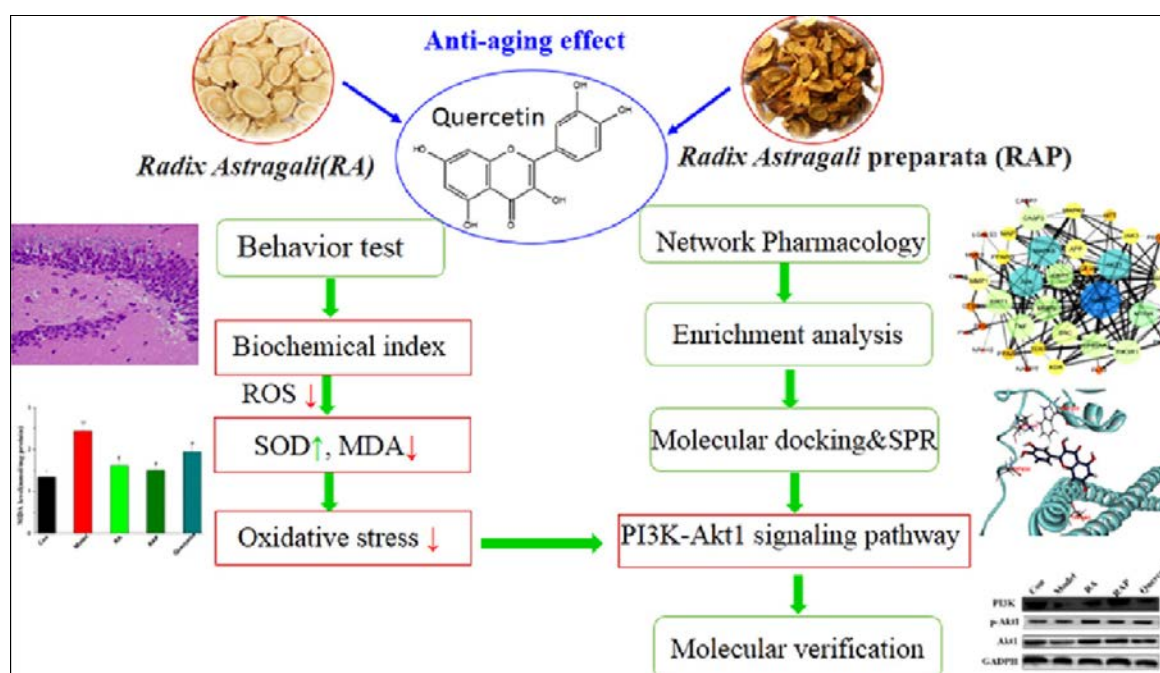


Fig 5

Angelica sinensis

Wenjuan Tuo *et al*, reported that Aging not only leads to a shortened lifespan but also causes various diseases, including intestinal homeostasis imbalances, sleep disorders, and neurodegenerative diseases. Angelicasinensis polysaccharide (ASP) is one of the principal active components of Angelica sinensis (AS) that is widely used in natural medicine and has various pharmacological activities, including antioxidant, anti-inflammatory, and enhancing immunity. ASP has been found to retard the rate of aging by protecting neural stem cells and promoting neurogenesis via enhancing the antioxidant and anti-inflammatory properties functional effects of ASP in dietary supplements on the lifespan of flies and age-related dysfunctions, such as intestinal homeostasis imbalance, sleep disorders, and neurodegenerative diseases. Besides, the underlying mechanism of ASP on alleviating healthy aging has been probed [24].

Green tea

Puxvadee Chaikul *et al*, mentioned that, green tea, a processed tea plant (*Camellia sinensis* (L) Kuntze), possesses health benefits and has been used in traditional medicines and natural products. Usage of green tea in traditional medicines are to prolong life, detoxify, and treat various conditions, including headache, body ache, and

digestive problems. Additionally, green tea has been used for prevention and treatment of cardiovascular diseases and cancer, photoprotection, and body weight control. However, the clinical efficacy of green tea against skin aging have been a subject of controversy. To clarify this without the interference of systemic involvement, the study was aimed to evaluate the anti-skin aging activities of green tea in cell culture using a number of assays, including melanogenesis assay, antioxidant activity, collagen content analysis, and MMP-2 inhibitory assay. The green tea used in this study consisted of a variety of phenolic acids. EGCG, EGC, and ECG, were shown to be the three major phenolics in this extract. The noncytotoxic concentration of green tea, 0.5 % or 0.0875 mg/mL, exhibited the anti-skin aging activities, including the significant suppression of melanin production by inhibition of tyrosinase and TRP-2 activities, the potent antioxidant, and the significant MMP-2 inhibitory activity. These results have revealed that green tea is an anti-aging substance [25].

Jasminum sambac

Sara Ceccacci *et al*, reported that extracts derived from the specie *Jasminum*, belonging to the Oleaceae family, are interesting for their antioxidant properties and their joined use in folk medicine to treat skin diseases. Hydroethanolic extract derived from *Jasminum sambac* cell cultures

(JasHEX) was studied. Since the large majority of secondary metabolites identified in the extract such as chlorogenic acids, lignans and triterpenes possess well-known antioxidant activity, the JasHEX effect on cytosolic ROS was evaluated. Here, an hydroethanolic extract derived from *Jasminum sambac* cell cultures (JasHEX) was studied. Its GNPS-aided mass spectrometry based chemical characterization revealed the presence of phenolic acid derivatives (mainly chlorogenic acids), lignans (secoisolariciresinol, nortrachelogenin and matairesinol) and triterpenes (arjunolic acid, Asiatic acid, maslinic acid, oleanolic acid and ursolic acid). All of these secondary metabolites possess well-known antioxidant properties.

Indeed, chlorogenic acids and lignans. Their phenolic moiety, have free radical scavenging and chain-breaking antioxidant activities: they donate hydrogen atoms to free radicals, giving rise to phenoxyl Radicals stabilized by resonance, and thereby inhibiting the propagation of radical chain reactions and other biological oxidants.

Moreover, they act as secondary antioxidants by binding metal ions (Fe (III) and Cu (II)) able to catalyse oxidative processes. It was able to reduce cytosolic ROS production in H₂O₂ stressed keratinocytes [26].

Basil

Rasul and N. Akhtar Both explained that, Skin aging is a complex process induced by constant exposure to ultraviolet (UV) irradiation and damages human skin. UV generates reactive Oxygen species leading to collagen deficiency and eventually skin wrinkling. Basil contains a number of phenolics and flavonoids which possess antioxidant properties. The extract was formulated and investigated the antiaging potential of a cream containing Basil. Here the base showed insignificant ($p < 0.05$) while formulation showed significant effects on skin moisture. Volume, SELS (skin roughness), SEsc (skin scaliness), SEsm (skin smoothness), SEw (skin wrinkles) parameter showed significant decline while texture parameter of 'Energy' showed significant increase. The results statistically indicated that the active formulation contain extract of Basil exert antiaging effects when applied topically [27].

I Cleistocalyx nervosum varpaniala

Cleistocalyx nervosum contain high amount of phenolic compound. The cold methanol extract of old leaves showed the highest total phenolic and flavonoid content. Also gave high free radical scavenging, lipid peroxidation inhibitors and tyrosinase inhibition. Matrix metalloprotein are family of zinc dependant matrix including collagen endopeptidases which can cleave the extracellular matrix including collagen. MMP are activated by overproduction of ROS. MMP1, MMP2, MMP7 and MMP9 are activated by ROS through interaction with thiol group which is converted to sulfinic acid. The fruit are sour and slightly astringent with scent smell. The rich purplish red of fruit is characterised by anthocyanin. The high content of polyphenol and flavonoids have been related to antioxidative anti anticarcinogenic. The total flavonoid content of extract was determined by calorimetric method. The extract was tested for gelatinolytic activity of MMP2 inhibition in comparing with ascorbic acid. Young leaves gave more phenolic content than old leaves [28].

Terminalia chebula gall extract

The plant extract was prepared by four extraction method [hot and cold] aqueous processes and hot and cold methanol process. The cold aqueous process extract of *T. chebula* gall indicate the highest stimulation index on human fibroblast proliferation of 1.441 which was more active than ascorbic acid. Free radical is highly reactive molecule with unpaired electron which can cause damage to cell membrane, lipid, protein and DNA. Damage to DNA result in collagen breakdown. Tyrosinase is a copper containing monoxygenase is a key enzyme that catalyses melanin synthesis in melanocytes. Fibroblast which produces collagen, glycosaminoglycan, reticular and elastic fibres are found in extra-cellular matrix. Proliferation activity of human fibroblast by self-ordained B assay. Gelatinase digest collagen type 1, 2, 3. When MMP2 increases collagen degradation takes place. The Fe²⁺ chelating ability of extract was measured by ferrous iron ferrozine complex method. Aqueous extract gave higher percentage yield than methanol method extract. Plant extract may contain more water soluble than insoluble constituent, [HW > CW], [CM > HM]. Hot process appeared superior process for water soluble components. Cold process contains water insoluble substance. *T. chebula* gall extract contain alkonoids, flavonoids, saponin, tanins and xanthones but no anthoquinones and glycoside. The methanol extract either by hot or cold process of most plant exhibited higher DPPH radical scavenging, chelating and tyrosinase inhibition activities than aqueous extract [29].

Safranal and saffron stigma

Sanju Nanda *et al* the reversible oxidative modification on protein such as cysteine oxidative play important role. Safranal is one such natural agent which is a major volatile component of saffron. Safranal is monoterpene aldehyde possessing a sweet fragrance. Safranal as an anti-inflammatory, antidepressant, anti-convulsant anticancer, antitissue, antigenotoxic agent.

ROS is generated in various metabolic reaction in form of superoxide anion radical [O₂], HYDROXYLRADICAL [OH], hydrogen peroxide [H₂O₂], which are unstable and highly reactive. Function as secondary messenger in signally pathway [transcription regulation, differentiation and cell apoptosis] ROS appeared to play an important role in proapoptotic pathway in cutaneous T- cell lymphoma [CTCL] when treated with indirubin free radical is beneficial it is present in low amount. Phagocytes store free radical. Human bodies have their own antioxidant defence system which is capable of adapting to varying level of oxidant. Antioxidant enzyme are superoxide dismutase, catalase, glutathione peroxidase. Antioxidant compound which act first line of defence against free radical damage. Safranal as great antioxidant potential due to presence of unique carotenoid which is obtained from stigma of flower of saffron. It is bitter in taste used as food additive due to antioxidant property. Parts of saffron as antioxidant are tepal, stigma, style, Stamen. Anti-oxidant capacity was tested by lipid peroxidation, trolax equivalent antioxidant capacity. In Iran saffron are known as red gold. Safranal successfully extracted from cumin seeds. Stigma of flowers has higher free radical scavenging activity and higher ferric reducing power. Due to presence of pyrogallol and gallic acid in stigma. Safranal as cyclic terpenic aldehyde with formula [C₁₀H₁₄O]. Aging is of two types intrinsic and

extrinsic. Photoaging depend upon degree of sun exposure amount of melanin present in skin. ROS producing enzyme are NADPH oxidases, xanthine oxodo- reductase, lipoxygenase, peroxisomal oxidases, cyclooxygenase, cytochrome P450. The photo-sentizer absorb photon leading to their excited singlet state short lived convert it into triplet excited stats. ROS activate MAP.EPK [extracellular signal

regulated kinase], JNK [jun amino terminal kinase]. Saffranal cream has been reported to exhibit significant depigmentation. Aging causes increase in lipid peroxidation, decrease GSH level, activates SOD and catalase. Saffranal produces properties such as elastase, collagenase, Hyaluronidase [30].



Fig 6

Ginkgo biloba leaf

Sandra Maria Barbalho *et al.*, specified that Ginkgo biloba L. (Ginkgoaceae), popularly known as a living fossil have been used for 5000 years in traditional Chinese medicine. The leaf extract of G. biloba is composed of flavonoids (24%), terpene trilactones (6%), proanthocyanidins, organic acids, and other constituents. The extract has been reported to protect against chronic cerebral hypoperfusion, improve cognitive function and regulate inflammatory responses, and prevent UVB-induced photo aging. Flavonoids are the main contributors to the anti-inflammatory and antioxidant activity of the extract, whereas terpene trilactones are the main contributors to blood microcirculation and neuroprotective effects. In addition, the extract has been

demonstrated to be effective in preventing apoptosis and to possess antioxidant activity the extraction of G. biloba, owing to high levels of flavonoids and lactones, inhibited ROS and MMP-1 degradation in HDFs. The chemical constituents kaempferol 3-O-β-D-glucopyranoside, isorhamnetin-3-O-glucoside, myricetin, ginkgolide A and bilobalide in the active extraction, showed marked MMP-1 inhibitory activity. Ginkgolide A and bilobalide, which have better collagen promoting activity should be studied further for their anti-aging activity. The results provide evidence supporting the use of the leaf extract and active compounds of G. biloba as the anti-aging medicinal and cosmetic raw materials [31].

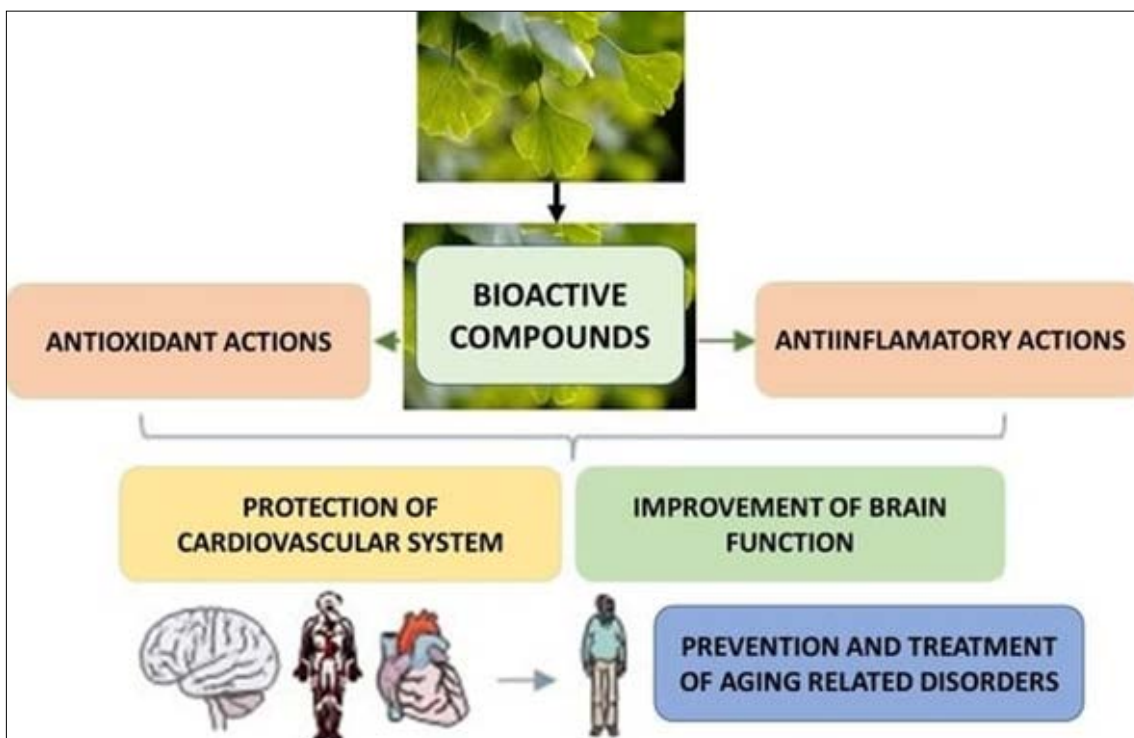


Fig 7

Deer antler

Truc Le-Buu Pham *et al.*, specified that Coconut oil is a potential candidate for natural skin care products with properties such as antibacterial, anti-inflammatory and moisturizing. Virgin Coconut Oil (VCO) consists of 90–95% saturated triglycerides that have a moisturizing effect on the skin. VCO contains high levels of ferulic acid and p-coumaric acid (both phenolic acids) which are associated with antioxidant capacity. Clinical studies shown that coconut oil improves symptoms of skin disorders by moisturizing and soothing the skin. In a study of the anti-inflammatory and skin-protective properties *in vitro* of VCO showed moderate UV resistance in HaCaT cells. VCO exerts its anti-inflammatory activity through suppressing inflammatory markers and protects the skin by strengthening the skin barrier function. Another study showed 100.36% improvement in skin moisture of substances including hydrophilic and lipophilic molecules and at the same time enhance product stability and prevent irritation [32].

Conclusion

Anti-aging medication is a growing field in areas with an aging population, particularly in developed countries. These studies have given many fresh biological perspectives based on the analysis of its activity, giving a reason to treat antiaging. This review article encompasses the essential phytochemicals which are essential for the antiaging process

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