

Anti Ageing Herbs-A Review

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ABSTRACT: The largest part of human body is skin, which is also the outermost organ; it acts as a first line of defence of our body. After a certain period of time, there is a gradual loss of skin elasticity and collagen fibres that we call ageing. There are various signs of aging and one of them is skin wrinkling. Collagen and Elastin are primary structural components of our skin and are purposively active in minimizing the breakdown of collagen to prevent aging and wrinkle formation. Though there are many problems that arise with ageing, various herbs are available that could be employed for their therapeutic properties for reduction or prevention of skin damage due to ageing. The objective of this review article is to enlist herbs that are influential in reducing factors responsible for ageing. [1]

KEYWORDS: Ageing, Anti-ageing, Collagen, Herbs, Skin Care

I. Introduction:

Ageing is a common process of human beings in which there is inability in maintenance of homeostasis and risk of dying increases. After the age of 20, the symptoms starts appearing as the collagen content per unit area starts decreasing, there is 1% decrease in collagen content per unit area of the skin every year[1].The study of skin problems of ageing can be divided in terms of microscopic, biochemical and molecular changes[2].

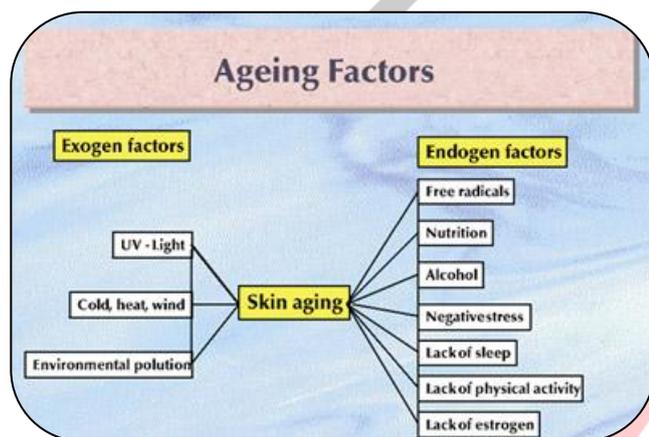


Fig .1: Factors causing Skin ageing [3]

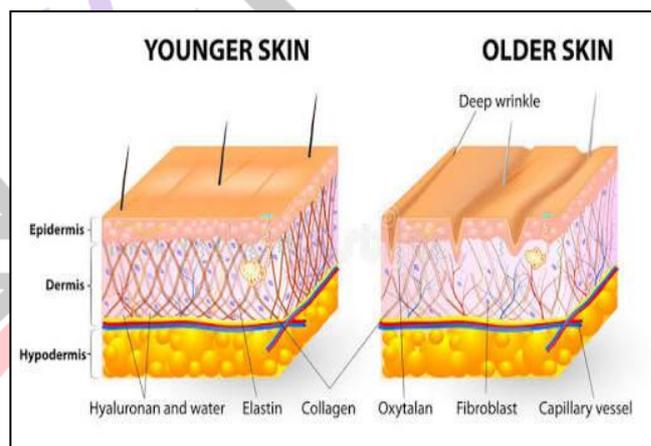


Fig. 2: Collagen changes during ageing [5]

During ageing there is imbalance between collagen production and degradation, its production decreases whereas level of collagen degrading enzymes increases. Skin wrinkling is one of the important features of ageing of human skin, but the exact mechanism of wrinkles formation is still unknown. However, it has been observed that chronic exposure to sun and smoking causes enhancement in the expressions of matrix metalloproteinase, an enzyme which in turn causes repetitive breakdown of collagen fibres and responsible for structural defect in dermis and wrinkles development. Skin elasticity is one of the major factors in skin's health; low tensile strength of skin, excessive stress, improper hormone balance and mutation also leads to skin tension and wrinkling. Dryness of epidermal layer causes skin wrinkling so proper hydration should be maintained to decrease wrinkles. Tobacco smoking causes premature skin ageing, the smoke extract of tobacco disturbs the production of collagen fibres and hence skin elasticity [1].

II. Ageing by Oxidation: A free radical is any chemical species (atom, ion or molecule) that contains an unpaired or odd number of electrons and by far the most common source of free radicals in biological systems is oxygen. Molecular oxygen (O₂) is, of course, fundamental to cellular metabolism and energy production. However, the breakdown of oxygen also produces highly reactive agents that have the potential to cause significant damage to biological tissues. There are a number of ways in which free radicals can be formed, but their most abundant source are the mitochondria (which uses some 90% of the O₂ used by the human body) where oxygen is reduced in sequential steps to produce water [3].

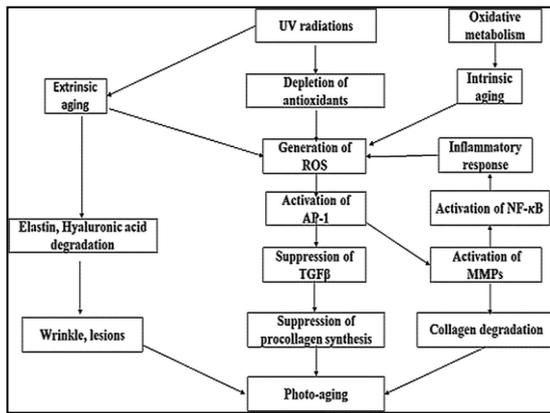


Fig.3: Overview of Skin Ageing [6]



Fig. 4: Structure of Collagen [7]

Free radical activity has also been shown to oxidise and cross-link proteins including enzymes and connective tissue. In particular, the amino acid residues of proteins are highly susceptible to oxidative attack and it has been shown that there is a progressive (almost exponential) increase in this form of damage in the cells and tissues of the body as a function of age. Oxidised protein in an old animal may represent 30–50% of the total cellular protein and this is likely to be a major reason why the catalytic activity of many enzymes decreases with age. Another type of molecule that is highly susceptible to free radical attack is DNA. The reaction of an oxygen radical with DNA can knock out a base, or cause a strand breakage, with the potential to produce a harmful or even lethal event. Moreover, the amount of damage inflicted by free radicals appears to be considerable as shown by estimates of ≈ 10000 oxidative hits to DNA in an average human cell each day [3].

III. Combating Ageing with Naturals:

Ageing is a natural process that develops with various intrinsic and extrinsic factors involved [1]. Thus, the recent advancement in the field of pharmacy and cosmetics have played an influential role in providing therapeutic effects for skin and preventing factors contributing to the ageing process. Various medicines, ointments, creams, etc either from chemicals or herbs alone or in combination of both have been designed.

However, the exaggerated use of chemical agents may tend to cause some side effects, therefore the use of naturals as much as possible are empathized upon.

The Pharmacognosy reveals various phytochemicals and compounds having skin protecting and regenerating properties. For e.g. Phenolic compounds, Flavonoids, and Proanthocyanidins from plants are responsible for anti-oxidative activities of herbal products and explained by their chemical structure and ability to donate free electrons and hydrogen. The extracts of the tropical Cabbage palm fern (*Polypodium leucotomos*) and Yerba mate (*Ilex paraguaiensis*) have strong photo protective properties.

Great number of plant extracts can diminish UVB-induced photo damage by decreasing activity of enzymes involved in tissue degradation (i.e., *Ixora parviflora*), or by increasing of synthesis tissue constituents (i.e., *Labisia pumila*). Numerous plants and plants extracts can attenuate degradation of skin matrix. *A. lappa*, *A. catechu*, *D. villosa*, *C. xanthorrhiza* are examples of plants that can inhibit Hyaluronidase, Elastase, Colagenase, and MMP.

Some plants have the ability to promote synthesis of collagen, that is, *Camellia (Camellia japonica)*, *Kasip Fatimah (Labisia pumila)*

Some plants *Cassia (Cassia fistula)*, *Hops (Humulus lupulus)* can improve skin firmness and elasticity, mainly due to phytoestrogens and saponosides. Plant extracts are often considered safe, because of the simple fact that they come from nature.

Plants like *Camellia (Camellia japonica)*, *Date palm (Phoneix dactylifera)* have skin hydrating and skin smoothing properties. These are also responsible for improving skin elasticity, along with decreasing skin dryness and itchiness.

Over the past decade, a great number of plant extracts have been studied and explored for their therapeutic properties. In our opinion, there is a constant need for more evaluation and more clinical studies in vivo with the emphasis on the ingredient concentration of the herbal products, their formulation, safety, and the duration of the anti-ageing effect [8].

Herbs which have been significant as anti-ageing agents from traditional times have been enlisted in the following table:

Table no.1: Traditional Herbs functioning as Anti-Ageing agents:

Sr.no	Herbs	Activity	Image
1.	Green Tea (<i>Camellia sinensis</i>)	Epigallocatechin gallate & other catechins prevents adverse effects caused by UV radiation [9]	
2.	Licorice (<i>Glycyrrhiza glabra</i>)	Flavonoids of licorice has recovering power to reduce fine lines and wrinkles[8]	
3.	Coffee (<i>Coffea arabica</i>)	Chlorogenic acids, caffeine and melanoidins acts as anti-inflammatory and prevents ageing [10]	
4.	Ginseng (<i>Panax ginseng</i>)	Ginsenosides induces synthesis of type I Collagen(the collagen which the skin is mostly composed of) [11]	
5.	Rosemary (<i>Rosmarinus officinalis</i>)	Caffeic acid, rosmarinic acid, carnosic acid delays ageing activity[12]	
6.	Pomegranate (<i>Punica granatum</i>)	Flavonoids, anthocyanins, catechins, from peels, fruits, seeds shows antioxidant activity, peels being the more in character[13]	
7.	Amla (<i>Emblica officinalis</i>)	Tannins, ellagic acid, gallic acid of the fruit show free radical scavenging activity [14]	
8.	Cinnamon (<i>Cinnamon zeylanicum</i>)	Eugenol, cinnamaldehyde, cinnamyl acetate shows anti-oxidant activity [15]	
9.	Orange (<i>Citrus sinensis</i>)	Flavanone glycosides, flavones and flavonols shows anti-oxidant activity [16]	
10.	Basil (<i>Oscimum basilicum</i>)	Phenolics and flavonoids of basil which possess anti-ageing properties [18]	

IV. Herbs having different curative factors for preventing signs of ageing:

1] Herbs with Skin moisturizing properties:

Moisturizing is the primary and basic function in relation to skin ageing. Various external and internal causes are responsible for the dryness of the skin. Demoisturized skin is prone to various skin problems such as skin itching, rashes, wrinkling; etc. The transepidermal water loss is also a factor leading to dryness of skin. Various herbs possessing moisturizing components help retain skin moisture [8]

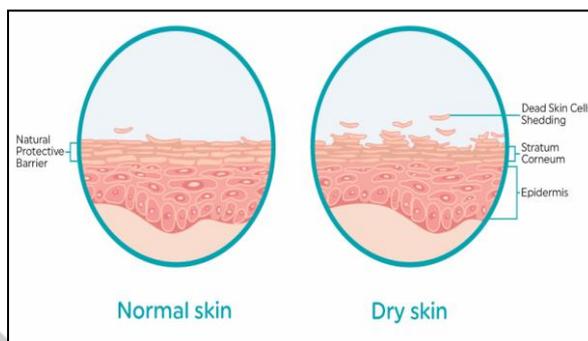


Fig.5: Normal vs. Dry skin [42]

Table no.2: Herbs with skin moisturizing properties:

Sr.no	Herbs	Activity	Image
1.	Camellia (<i>Camellia japonica</i>)	The oil of camellia has good anti-oxidant, skin emollient and moisturizing properties[43]	
2.	Date palm (<i>Phoenix dactylifera</i>)	The presence of phenolic acids, vitamins and ascorbic acid promotes skin collagen synthesis and thus improves the hydration level[44]	
3.	Hemp (<i>Cannabis sativus</i>)	Hemp seed oil is soothing and hence useful in treatment of dry skin and other conditions like eczema and scabies[45]	
4.	Horsetail (<i>Equisetum arvense</i>)	Moisturizing properties against dry skin and a good skin conditioning agent[46]	
5.	Opuntia (<i>Opuntia ficus-indica</i>)	The cladodal extract of opuntia has skin hydrating properties [47]	

2] Herbs acting as Free Radical Scavengers:

The free radicals are reactive chemical species that contain one or more unpaired electrons; they are products of oxidative cell metabolism. The body and especially the skin are routinely exposed to stressful environmental factors such as pollutants and UV-radiation, which produce a large number of aggressive oxidants that damage all the biological skin cell membranes [8]

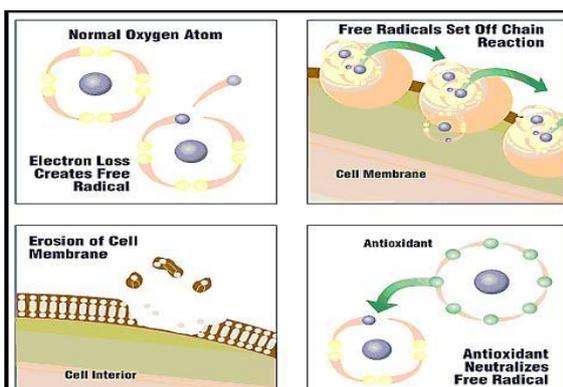


Fig. 6: Free radical Scavenging Mechanism [18]

Table no 3: Herbs acting as Free Radical Scavengers:

Sr.no	Herbs	Activity	Image
1.	Grapes (<i>Vitis vinifera</i>)	Astringinin from flavonoids (anthocyanins, catechins) and non-flavonoids (stilbenes)has anti-oxidant properties [19]	
2.	Japanese Star Anise (<i>Illicium anisatum</i>)	Protocatechuic acid marks the free radical scavenging activity of anise [20]	
3.	Oregano (<i>Origanum vulgare</i>)	Vanillic acid shows stronger anti-oxidant activity than vanillin of oregano[21]	
4.	Poplar bud (<i>Populus nigra</i>)	Caffeic and p-coumaric acids being the potent anti-oxidants , the extract also regulates cell renewal, regulation of anti-oxidant defence and inflammatory response [22]	
5.	Yerba mate (<i>Ilex paraguariensis</i>)	The phenolics of the extract has anti-oxidant activity [23]	

3] Herbs for prevention of photo-ageing:

Ageing is accelerated in areas exposed to sunlight, a process known as photo-ageing. It is called photo-ageing because of a combination of short wavelength (UVB) injury to the outer layers of the skin (epidermis) and long wave length(UVA)injury to the middle layers(dermis) Clinical presentation of photo-ageing includes dryness of the skin, irregular pigmentation-freckles, lentigines, hyper pigmentation, wrinkling, and inelasticity. Histologically, there are an increased compaction of stratum corneum, increased thickness of granular cell layer, reduced epidermal thickness, elongation of epidermal rete ridges, and an increased number of hypertrophic dopa-positive melanocytes. Ultraviolet radiation stimulates ROS synthesis, which has been implicated in mutagenesis and photo-ageing [48]

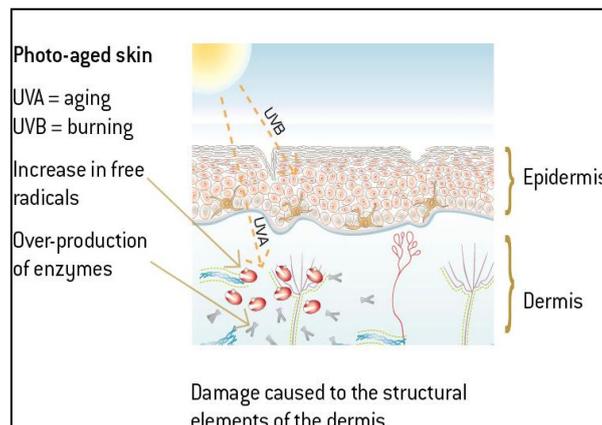


Fig.7: Photoaged skin [30]

Table no.4: Herbs for prevention of Photoageing :

Sr.no	Herbs	Activity	Image
1.	Cabbage palm fern (<i>Polypodium leucomotos</i>)	Phenolic components have dual protective effects on the extracellular matrix via the inhibition of the proteolytic enzymes [31]	
2.	Kasip Fatimah (<i>Labisia plumila</i>)	Collagen synthesis of human fibroblast restores back to normal on application of the extract [32]	
3.	Nevvari (<i>Ixora parviflora</i>)	Polyphenols of Ixora are influential in reducing UVB – induced intracellular reactive oxygen species[33]	
4.	Soybean (<i>Glycine max</i>)	Isoflavones prevents Skin cell apoptosis, erythema, and inflammation reactions [34]	
5.	Milk thistle (<i>Silybum marianum</i>)	Favourably supplements skin protection. Silymarin possesses anti-inflammatory, anti-photo carcinogenic properties [35]	

4] Herbs for Protection of Skin Matrix:

Random tissue injury, for instance, as a result of ultraviolet exposure or the formation of reactive oxygen species, results in the development of a chronic vicious circle that in the course of time leads to increasing matrix damage. Both low-dose and high dose ultraviolet radiations induce several cytokines, among them very prominently Tumour Necrosis Factor- α (cell signalling protein involved in systemic inflammation), through a post-translational mechanism[8]

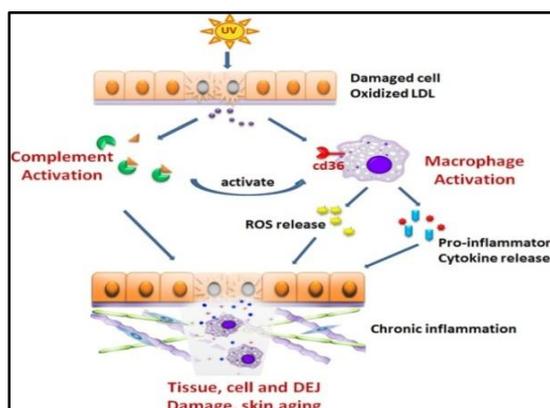


Fig .8: Skin matrix damage [24]

Table no 5: Herbs for Protection of Skin Matrix:

Sr.no	Herbs	Activity	Image
1.	Areca Nut Palm (<i>Areca catechu</i>)	Phenolic compounds of areca provides anti-hyaluronidase and anti-elastase activity [25]	
2.	Astralagus root (<i>Astralagus membranaceus</i>)	The polysaccharides, Asragalosides have potential to prevent tissue injury via anti-oxidant mechanisms[26]	
3.	Burdock (<i>Arctium lappa</i>)	Polyphenolic content of Burdock acts as inhibitory agent for elastase and tyrosinase responsible for causing skin ageing [27]	
4.	Temulwak (<i>Curcuma xanthorrhiza</i>)	Xanthorrhizol suppresses UVB induced MMP-I and increased type I pro-collagen suppression[28]	
5.	Wild yam (<i>Dioscorea villosa</i>)	Leaf extract of the leaves combats skin inflammation [29]	

5] Herbs with elasticity and skin tightening properties:

The dermis layer is responsible for the supply of support and food material to the epidermis. This layer is primarily composed of collagen and elastin fibres. Collagen is a type of protein built as thick and interwoven fibres, facing in different directions and maintaining the strength and allowed to be stretched without tearing. The elastin fibres are what give the skin its elasticity. These fibres are relatively thin, and behave like elastic, allowing the skin to return to its original form. With age these fibres begin to change, and give skin an old wrinkled look [8]

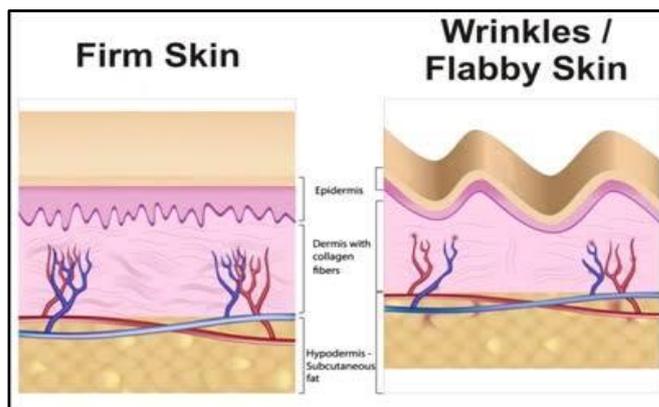


Fig .9: Firm skin vs. loose skin [36]

Table no.6: Herbs with Elasticity and Skin Tightening Properties:

Sr.no	Herbs	Activity	Image
1.	Cassia (<i>Cassia fistula</i>)	Plays a potential role in increasing collagen synthesis and Hyluronidase acid synthesis[37]	
2.	Hops (<i>Humulus lupulus</i>)	Xanthohumol, humulones and lupulones are potent antioxidants . Xanthohumol possesses highest oxygen radical absorbance[38]	
3.	Sausage tree (<i>Kigelia africana</i>)	Luteolin and quercetin;saponins are anti-inflammatory ,reduces depth wrinkles around eyes and promotes elasticity [39]	
4.	Persimmon leaves and seeds (<i>Diospyros kaki</i>)	Tannins and flavonoids possess astringent activity which promotes skin tightening[40]	
5.	Dill leaves (<i>Anethum graveolens</i>)	The dill extract is found to increase skin elasticity, firmness and also reduces wrinkles [41]	

V. CONCLUSION:

Though the wealth from nature is available in abundance, this comprehensive review was restricted to five herbs in each category which play a pivotal role based on their efficacy and their chemical constituents responsible for their therapeutic action on skin. Thus, more herbs with secondary action on ageing could be identified and evaluated for their medicinal and anti-ageing factors, after a deep research in every aspect.

VI. ACKNOWLEDGEMENT:

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