International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Natural Anti-Aging Skin Care: Role and Potential

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Abstract

The first and most noticeable indication of the ageing process, which becomes more pronounced as one ages, is the decline of skin morphology and physiology.The essential functions of the skin, including homodynamic regulation of body temperature, fluid balance, loss of electrolytes and proteins, and vitamin D generation, are all impacted by this degradation. elimination of waste, immunological monitoring, sensory perception, and defence of other organs from harmful environmental elements. Consumers are now aware that regular cosmetics contain toxic chemicals and other dangerous substances. Because more people are demanding healthier options, the natural beauty business is growing because to cutting-edge technology and high-performance ingredients. Thus, this review's objectives are to provide some important insights into how inherent and extrinsic factors affect excessive or premature skin ageing. In this we'll know about natural agents like Green Tea, Licorice, Rosemary Jojoba Leaves ,Ashwagandha , shatavari as anti-ageing from various plant sources such root, leaves, seeds , flowers and so on which can be explored as anti-ageing skincare. Which basically beneficial in skincare.

Keywords: Skin, Anti- Ageing, Natural Agents, Role of Agents

1. INTRODUCTION:-

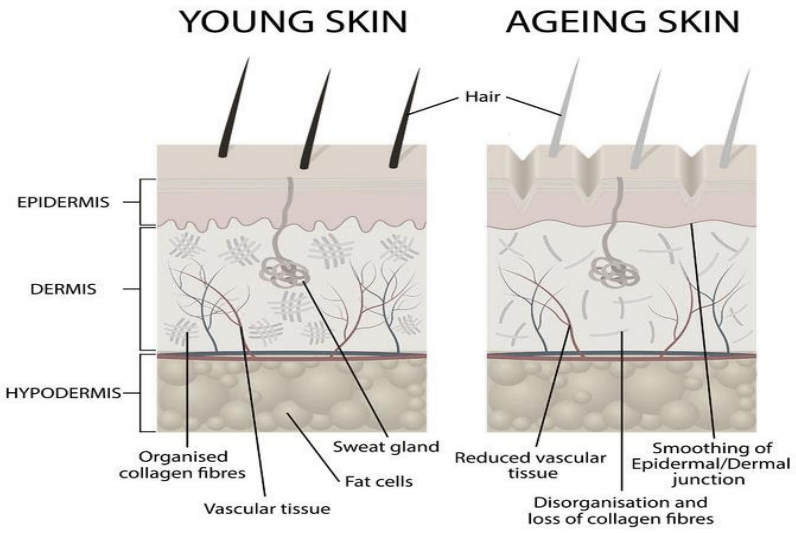

Fig .1.1

Aging is defined as a cumulative loss of physiological function that can result in geriatric syndromes or age-related diseases such as musculoskeletal disorders, many cancer types, cardiovascular and obstructive

lung diseases, neurological diseases, and skin disorders. The idea that age-related illnesses, geriatric syndromes, and the aging process all share similar molecular and cellular pathways has gained attention in recent years. The collective effects of geriatric syndromes, age-related disorders, and physiological aging place a significant financial and emotional strain on patients and their families. Among the many signs of aging, one that is associated with changes in the appearance of the skin, aesthetic manifestations, and the emergence of multiple skin illnesses is skin aging.

An inability to maintain homeostasis and an increased risk of death are common aspects of the aging process in humans. There is a 1% annual drop in the amount of collagen in the skin per unit area beyond the age of 20, at which point the symptoms begin to show microscopic, biochemical, and molecular alterations can be used to categorize research on age-related skin issues. Age-related imbalances in collagen production and degradation result in decreased collagen production and increased levels of collagen-degrading enzymes. Although wrinkle formation's precise mechanism is still unknown, it is one of the major signs of aging on human skin. Nevertheless, it has been noted that long-term smoking and sun exposure increase the expression of matrix metalloproteinase, an enzyme that repeatedly breaks down collagen fibers and is accountable for dermal structural defects and the development of wrinkles. One of the most important components of healthy skin is elasticity; other variables that contribute to wrinkles and tension in the skin include low tensile strength of the skin, excessive stress, imbalanced hormones, and mutation. Skin wrinkles due to dryness of the epidermal layer; therefore, it's impornt to stay well hydrated to prevent wrinkles. Smoking tobacco accelerates the aging process of the skin because the smoke extract reduces the suppleness of the skin and the creation of collagen fibers .Aging is defined as a cumulative loss of physiological function that can result in geriatric syndromes or age-related diseases such as musculoskeletal disorders, many cancer types, cardiovascular and obstructive lung diseases, neurological diseases, and skin disorders. The idea that age-related illnesses, geriatric syndromes, and the aging process all share similar molecular and cellular pathways has gained attention in recent years. The collective effects of geriatric syndromes, age-related disorders, and physiological aging place a significant financial and emotional strain on patients and their families. Among the many signs of aging, one that is associated with changes in the appearance of the skin, aesthetic manifestations, and the emergence of multiple skin illnesses is skin aging [1, 3]

2. SKIN :

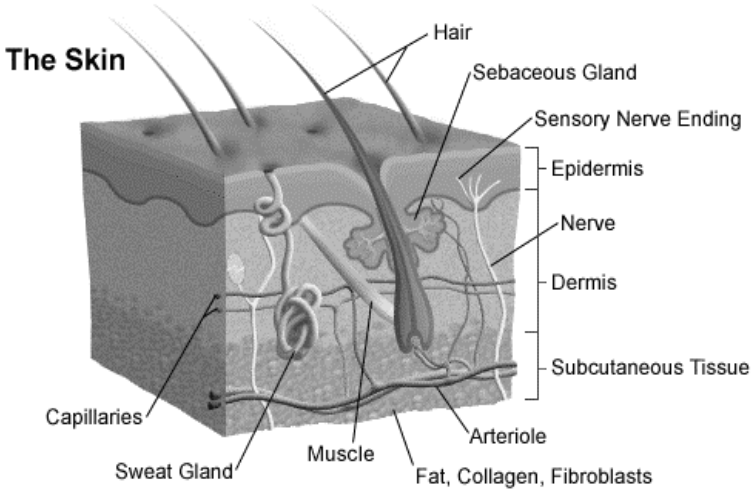

Fig: Skin

The degeneration of skin morphology and physiology with age is one of the first and most obvious signs of aging. It's also common knowledge that the skin acts as a barrier to prevent dangerous substances from the outside world from penetrating the skin. The stratum corneum, which is made up of corneocytes and is encircled by intercellular lipid lamellae and linked by the corneodesmosome. Other elements of the skin barrier include the intercellular lipids, such as cholesterol, ceramides, and free fatty acids, which stop trans epidermal water loss, and the tight junctions that link to the lateral walls of the keratinocytes in the upper stratum granulosum. Therefore, in addition to being essential for the homodynamic regulation of body temperature, fluid balance, loss of proteins and electrolytes, synthesis of vitamin D, waste elimination, immunological surveillance, and sensory perception, the skin also serves as an organ of defense against harmful environmental influences. An individual's skin serves as a social contact with other members of society. A fresh investigation into so-called "anti-aging products" is made possible by the fact that many people are now looking for remedies against the aging process of their skin, given that the skin is the primary component of one's personal identity. The cosmetics anti-aging market is enormous. The cosmetics business and dermatological research are focused on the potential for anti-aging treatments since an individual's physical appearance and feeling of self-identity are inextricably linked. Thus, the two fundamental self-concept motives that determine customers' views toward cosmetics and other personal care goods and services are self-esteem and self-consistency. A complex combination between internal and external elements causes cumulative detrimental changes in skin layers, morphology, physiology, and appearance. Skin aging is a natural, physiological, biochemical, and time-dependent process.

Genetic and physiological alterations dictate intrinsic factors, while extrinsic factors are influenced by environmental stressors such as air pollution, UV radiation, nutrition, alcohol and tobacco misuse, lifestyle, toxins, and others. Body temperature control, fluid balance, protein and electrolyte loss, vitamin D synthesis, waste elimination, sensory perception, immunological response, and skin barrier function are all impacted by physiological skin changes. Aesthetic impacts, which include skin spots, thinning, wrinkles, and loss of suppleness, alter the appearance of the skin and cause psychological, emotional, and mental health issues. Yet since consumers are becoming more and more concerned about their health, they are calling for and supporting the addition of natural bioactive or functional ingredients to cosmetics and other formulations in order to improve their overall state of health. The development of modern skincare products necessitates a thorough understanding of natural product chemistry, skin biology, and ingredient selection. Nevertheless, research on the use of biodegradable materials is steadily increasing, primarily because of growing concerns about the environment and the ecological effects of using synthetic counterpart [2, 3].

3. Causes of Aging:

Ageing is caused by a variety of factors, including accumulation of toxic and non-toxic waste, metabolic damage, cellular senescence, and cellular death. Glycation, mitochondrial damage (damage to somatic mitochondrial DNA), and respiratory chain failure are examples of metabolic damage. Free radicals are produced by mitochondrial malfunction and are largely to blame for aging. A variety of aging traits are accumulated by respiratory chain malfunction. Irreversible cell cycle growth arrest and/or irregular cell formation are known as cellular senescence. Since senescent cells never enter the cell cycle again, they multiply tumor cells. The increased activity of the tumor suppression genes p53 and p19Arf is primarily responsible for the etiology of senescence. Skp2 E3-ubiquitin ligase functions as a protooncogene and promotes cancer, which is another cause of senescence. Inflammation-induced cellular senescence and

mortality, including DNA-related chronic cell death shortening of telomerase, a deteriorating and insufficient antioxidant system, a declining and insufficient DNA repair and autophagy system, faulty cell cycle regulation, malfunctioning proteasomes, lysosomes, and shock proteins. The waste products that build up in body tissue and are a primary cause of ageing are lipofuscin, cortisol, advanced glycation end products, and atherosclerotic and amyloidal plaque.[4]

4. Types of Aging Process:

a) Programmed Aging :- Aging in this sense would be caused by something within the organism's regulatory systems that drives aging and degradation, in a manner akin to the way genes program other life phases, including cell differentiation in the embryo or sexual maturation in adolescence.

b) Wear and Tear Aging : The cumulative impact of several environmental threats, including as radiation, chemical toxins, metal ions, free radicals, hydrolysis, glycation, disulfide-bond cross-linking, etc., results in it rather than any one controlling program. Genes, proteins, cell membranes, enzyme activity, blood vessels, etc. can all be impacted by this kind of harm.[4]

5. MECHANISM OF SKIN AGING :

5.1 Extrinsic skin ageing:

Environmental variables like smoking, exposure to UV light, repetitive facial expressions, gravity, and sleeping positions are to blame for this. Photo ageing, another name for extrinsic aging, is the result of prolonged exposure to UV light. The process of extrinsic skin aging is multifactorial and mostly determined by skin pigmentation and amount of sun exposure. After prolonged exposure to UV radiation, the skin's stratum corneum thickens, the epidermis is harmed, and gradual dysplasia with cellular atypia and anaplasia, collagen breakdown, and elastic fiber deterioration occur.

a) Membrane/ nuclear signalling : Protein tyrosine phosphatase κ activity is suppressed by reactive oxygen species (ROS) produced by UV exposure. This particular enzyme keeps the skin's cell surface receptors in an inactive (hypophosphorylated) state. These receptors include those for keratinocyte growth factor, TNF-α, interleukin (IL)-1, and epidermal growth factor (EGF). Through the stimulation of the stress-associated mitrogen activated protein (MAP) kinases p38 and c-Jun amino terminal kinase (JNK), active receptors drive intracellular signaling. Kinase activation results in decreased expression of procollagen I, III, and TGF-β receptors as well as the transcription of MMPs (matrix metalloproteinase). This ultimately leads to a reduction in the creation of the dermal matrix, which in turn inhibits the synthesis of collagen.

b) Mitochondrial damage : Cellular organelles called mitochondria use oxygen to drive the synthesis of energy (ATP). The UV influence on the electron transport chain in mitochondria generates a large amount of ROS, which can harm mitochondrial DNA (mtDNA).Thirteen elements of oxidative damage and the electron transport chain are encoded by the mitochondrial DNA could be mostly caused by DNA deletions or rearrangements, most likely as a result of double-strand breaks, which could impair the cell's capacity to produce energy from the mitochondria. It is assumed that the ensuing decline in mitochondrial activity in photo damaged skin causes more ROS to build up and jeopardizes the cell's capacity to produce energy.

c) Protein oxidation : Proteins and photodamaged skin are also susceptible to oxidative damage. Decreased or increased susceptibility to degradation, loss of structural protein function, and activity (i.e., enzymes) can all be consequences of oxidative protein impairment.

5.2 Intrinsic skin ageing :

Natural ageing, commonly referred to as intrinsic skin aging, is primarily observed in areas shielded from the sun. It is also known as chronological ageing since it results from inherited genes or the passage of time. In general, the molecular mechanisms underlying both intrinsic and extrinsic skin aging are comparable. These mechanisms include telomere shortening, mitochondrial DNA alterations, oxidative stress, genetic mutations, and a drop in numerous hormone levels. According to the free radical theory of ageing, ROS are important players in both photo ageing and chronological ageing. They primarily originate from oxidative cell metabolism. Through MAPK (mitrogen activated protein kinase), ROS affect the transcription factor c-Jun.Skin that is intrinsically aged exhibits damaged collagen, a skin to photo aging, and ages similarly to extrinsic ageing. Moreover, hormonal fluctuations can modify intrinsic skin aging. By the mid-20s, the pituitary, adrenal, and gonads begin to gradually decline in their production of sex hormones. During menopause, the hormones progesterone and estrogen begin to decline. Specifically, deficiencies in oestrogens and androgens lead to dryness, wrinkles, loss of elasticity, collagen breakdown, and epidermal atrophy. [5]

Some Natural Herbs as Anti-Aging Agents:

Plant	Biological Source	Chemical Constituents	Uses	Plant image
Green Tea	Leaves and leaf buds of *Camellia sinensis*	Catechin Theaflavin Caffeine Theanine,	Slow Down Agening Hydrates Skin Reduce Acne Control Excess Oil	
Liquorice	Roots of the plant *Glycyrrhiza Glabra*	Glycyrrhizin Liquiritigenin Glabridin Liquiritin	Prevents Sun Damage Brightens Skin Fades Scars Treat Wrinkles	
Coffee	Dried ripe seed of *Coffea Arabica*.	Caffeine Theobromine Theophylline Patuletin	Helps in Smooth Skin	

			Helps in Glowing Skin Treat Acne	
Ginseng	Root of *Panax ginseng*	Ginsenoside Rb1 Dammarane Ginsenoside Rf Protopanaxatriol	Smooth Skin Treat Wrinkles Skin Glowing Moisture Skin	
Rosemary	Flowering tops of leafy twigs of *Rosmarinus officinalis*	Eucalyptol Camphor Camphene Borneol	Slow Down Aging Skin Glowing Reduce Acne Treat Wrinkles	
Pomegranate	Fruit of *Punica granatum*	Cyanidin Myrtillin Punicalin Punicalagin	Skin Hydration Slow Down Aging Increased Collagen Smooth Skin	
Amla	Fruit of *Phyllanthus emblica*	Ascorbic acid Gallic acid Ellagic acid Leutolin	Slow Down Ageing Hydrates Skin Reduce Acne Control Excess Oil	

Cinnamon	Bark of *Cinnamomum zeylanicum*	Cinnamaldehyde Cinnamyl Acetate Phellandrene Eugenol	Skin Hydration Slow Down Aging Increased Collagen Smooth Skin	
Orange	Fruit of *Citrus sinensis*	Limonene Octanal Ethyl butanoate Linalool	Smooth Skin Treat Wrinkles Skin Glowing Moisture Skin	
Basil	Foliage of *Ocimum basilicum*	Estragole Eucalyptol Elemene Farnesene	Treat Acne Treat Blackheads Treat Wrinkles Treat Skin Rashes	
Jojoba leaves	Leaves of *Simmondsia chinensis*	Wax esters Sterols, Vitamins Simmondsin	Natural Moisture Does not Clogs Pores Balance Skin Oils	
Lemon	Fruits of *Citrus limon*	Myrcene Oil Geranyl acetate Limonene	Skin Cleansing Anti oxidant	

			Acne Fighting Treat Wrinkles	
Avocado	Fruit of *Persea americana*	Oleic acid beta-Sitosterol Palmitic acid Palmitoleic acid	Hydrates Skin Fight Acne Anti Ageing Straight Skin Barrier	
Aloe	Dried latex of leaves of *Aloe* barbadensis	Aloin Chrysophanol Anthraquinone Chromone	Moisture Skin Treat Dark Circles Treat Puffiness Treat Sunburn	
Turmeric	Rhizome of *Curcuma longa*	Curcumin Curcuminoid Vanillic acid Germacrone	Skin Whitening Treat Acne Healing Wound Reduce Stretch Marks	
Ashwagandha	Root of *Withania somnifera*	Withanolide Withanolide D Withaferin A Withanone	Skin Moistures Produces Skin Oils Treat Blackheads Treat Aging Skin	

Papaya	Fruit of *Carica papaya*	Carpaine Isoquercetin Papain Lycopene	Treat Facial Hair Treat Wrinkles Cleansing Skin Slow Down Aging	
Rose	Flower of *Rosa rubiginosa.*	Rubixanthin Citronellol Farnesol Nerol	Skin Moistures Produces Skin Oils Treat Blackheads Treat Aging Skin	
Sandalwood	Wood and roots of *Santalum album*	α-Santalol Sandalore (-)-α-Santalene Ximenynic acid	Skin Cleansing Anti oxidant Acne Fighting Treat Wrinkles	

Tulsi	Fresh and dried leaves of *Ocimum sanctum*	Oleanolic acid Eugenol Linalool	Treat Acne Treat Blackheads Treat Wrinkles Treat Skin Rashes	
Shatavari	Tuberous roots of *Asparagus racemosus*	Steroidal Saponins, Mucilage Alkaloids	Skin Whitening Treat Acne Healing Wound Reduce Stretch Marks	

a) Green Tea:

Drug Profile
Kingdom-Plantae
Order- Ericales
Family- Theaceae
Genus- Camellia
Species – C.sinesis
Botanical name- *Camellia sinensis*

For many years, green tea has been a popular beverage in around 160 countries. On a dry basis, green tea contains around 30% polyphenols, which include flavanol, flavandiol, flavonoid, and phenol acid.
These polyphenols are widely recognised for their many good biological properties, including their ability to prevent gout, reduce blood pressure inhibit allergies and inhibit tooth decay.
The purpose of this study was to examine the anti-wrinkle, skin-whitening, and anticancer effects of irradiation polyphenols on human skin. The food and cosmetic industries could find the data helpful as they investigate the use of radiation to enhance the colour of green tea extract [6]

b) Licorice:

Drug Profile:
Kingdom -Plantae
Order – Fabales
Family -Fabacea
Genus -Glycyrrhiza
Species -G.glabra
Botanical name- *Glycyrrhiza glabra*
Glycyrrhiza glabra L., commonly known as liquorice or licorice, is a perennial plant belonging to the Fabaceae family (Figure 1) that can be found growing as weeds in wheat fields, cucurbits and kitchen gardens, cotton, potatoes, sugar beet, hay, clover, and sainfoin. Current research suggests that licorice may help with duodenal ulcers, the enlarging congestion of the upper respiratory system, and stomach problems. Gastric disinflation is caused by licorice, or dried licorice root, which stimulates serotonin and prostaglandin release in the stomach.[7]

c) Rosemary:

Drug Profile
Kingdom -Plantae
Order -Lamiales
Family -Lamiaceae
Genus – Salvia
Species – S. rosamarinus

Botanical name – *Salvia rosamarinus*

Additionally, rosemary has been shown to have anti-aging properties for the skin.5. In human cell lines, the phenolic diterpene carnosic acid from rosemary reduced UV-induced MMP production in a concentration-dependent manner. Also, carnosic acid decreased the production of reactive oxygen species brought on by UV light and the expression of GADD45, a marker for oxidative DNA damage. The anti-inflammatory compounds in rosemary, carnosic acid and carnosol, also controlled the expression of genes linked to inflammation in the skin.Six In particular, the anti-inflammatory markers interleukin-1 beta (IL-1β), tumor necrosis factor-alpha (TNF-α), and cyclooxygenase-2 (COX-2) were all downregulated by both substances. The ability of various rosemary extracts to inhibit the oxidative breakdown of meals containing oil and fat is attributed to the presence of several important phenolic compounds and antioxidant oil. These compounds are used in the food industry and medicine. Carnosic acid (phenolic diterpenes) and carnosol account for around 90% of the antioxidant action.[8,12]

d). Jojoba Leaves:

Drug Profile:

Kingdom – Plantae
Order – Caryophyllales
Family – Simmondsiaceae
Genus – Simmondsia
Species – S. chinensis
Botanical name – *Simmondsia chinensis*

Thus, Simmondsia chinensis (link) Schneider—also known as deer nut, oat nut, wild hazel, and coffee berry—is a promising oil seed crop for the global economic development of arid and semiarid regions. It is commonly known as jojoba [1, 2]. A monogenetic dioecious grey-green shrub, jojoba plants are members of the Simmondsiaceae family. It is indigenous to the deserts of North America, particularly those in the northwest regions of Mexico (Baja California and Sonora) and the southwest states of the United States (California, Arizona, and Utah).[9]

e). Ashwagandha:

Drug Profile:
Kingdom – Plantae
Order - Solanales
Family –Solanaceae
Genus –Withania
Species – W. somnifera
Botanical name – *Withania somnifera*
Since the herb's fresh roots have a horsey scent and because taking herb extracts can help a person gain the strength and vitality of a horse, the name "ashwagandha" literally translates to "smell of horse." It is known as a "royal herb" because of its many restorative benefits for the human body. Antioxidant, adaptogen, anxiplytic, thyroid-modulating, anticancer, antidepressant, cardio-protective, immunomodulating, antifungal, antibacterial, neuro-protective, anti-inflammatory, hematopoietic, and cognitive-enhancing properties have all been investigated about this substance. The ingredients of ashwagandha include sitoindoside, withanolides, and other alkaloids that are essential for medical and pharmacological purposes because they shield cells from oxidative damage and disease. [10]

f). Shatavari:-

Drug Profile:
Kingdom – Plantae
Order -Asparagales
Family -Asparagaceae
Genus – Asparagus
Species -A .racemosus
Botanical name – *Asparagus racemous*
Asparagus racemosus, also known as shatavari or the "Queen of Herbs" in Ayurveda, is the most often used species of asparagus in traditional medicine and is known as a rasayana herb. This plant's medicinal uses have been documented in traditional medical systems like Ayurveda, Unani, and Siddha as well as in Indian and British Pharmacopoeias. It can also be found in several areas of tropical Africa, Indonesia, Australia, and Sri Lanka. This plant resembles a spiny under-shrub, with a short, tuberous stem that produces a large number of succulent, tuberous roots (30–100 cm long and 1-2 cm thick), with an exterior colour of silvery white or ash and an interior colour of white.[11]

Conclusion
The given review article illustrate facts and knowledge about the naturally occurring compounds and shares their modern ayurvedic prospects with respect to their pivotal role in treatment of ageing of skin.

The antioxidant and anti-aging properties of numerous phytochemicals have therefore been demonstrated in a variety of in vitro, in vivo, and even ex vivo models. The pharmacophoric structure of the chemical moieties gives them this activity. More reliable scientific research is yet required to confirm the security and effectiveness of natural therapies in reawakening and detoxifying processes.

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