“REVIEW OF COSMETIC EFFECTS OF NATURAL BIO FUNCTIONAL INGREDIENT AGAINST SKIN AGING”

A PROJECT WORK SUBMITTED TO

NIRMA UNIVERSITY

In partial fulfillment of the requirements for the degree of

Bachelor of Pharmacy

BY

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Semester VIII

UNDER THE GUIDANCE OF

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May 2023

CERTIFICATE

*This is to certify that the Project Work entitles "**REVIEW OF COSMETIC EFFECTS OF NATURAL BIO FUNCTIONAL INGREDIENT AGAINST SKIN AGING**" is the Bonafide review work carried out by **AASHWI MEHTA (19BPH002), AYUSHI PATEL (19BPH016), KHUSHI MEHTA (19BPH066), KOSHANGI SATVARA (19BPH067), MAHARSHI PATEL (19BPH071)**, B. Pharm semester VIII under my guidance and supervision in the Institute of Pharmacy, Nirma University, Ahmedabad under our guidance and supervision during the academic year 2022-23. This work is up to my satisfaction.*

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CERTIFICATE OF SIMILARITY OF WORK

This is to undertake that the B.Pharm. Project work (BP812PW) entitled ***"REVIEW OF COSMETIC EFFECTS OF NATURAL BIO FUNCTIONAL INGREDIENT AGAINST SKIN AGING"*** *Submitted by,* ***AASHWI MEHTA (19BPH002), AYUSHI PATEL (19BPH016), KHUSHI MEHTA (19BPH066), KOSHANGI SATVARA (19BPH067), MAHARSHI PATEL (19BPH071*** *B.Pharm. Semester VIII is a bonafide review/research work carried out by us at the Institute of Pharmacy, Nirma University under the guidance of* ***"Dr. Bhagwati Saxena"****. We are aware about the rules and regulations of Plagiarism policy of Nirma University, Ahmedabad. According to that, the review/research work carried out by us is not reported anywhere as per best of our Knowledge.*

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ABSTRACT

The review study sheds some light on how natural bio-functional substances affect skin aging from a cosmetic standpoint. The skin comprises three layers that act as a barrier to help protect against pathogens, playing a vital function in the immune system as a result. It also helps in thermoregulation, excretion, and absorption. The primary mechanism which contributes to skin aging is oxidative stress which is because of the generation of reactive free radical species. Another mechanism is inflammation which can be due to various pollutants, UV radiation, and other factors. Skin aging is of two types, intrinsic and extrinsic aging. The bioactive ingredients in this article are aloe vera, avocado, cucumber, green tea, walnut, and amla. Each of these acts according to different mechanisms due to the various specific constituents present in them. The review also contains information about the biological source, family, chemical constituents, chemical structure along with the marketed products available for these biofunctional ingredients.

1. INTRODUCTION: -

1.1 Skin introduction: -

The skin acts as a barrier between the body and the outside world and is the biggest organ in the human body. There are three layers that make up the skin: the epidermis, dermis, and hypodermis (subcutaneous tissue), each with a special structure and purpose(Matthew Hoffman, 2021).

1.2 Skin layers:

1.2.1 Epidermis:

The skin's uppermost layer is in charge of shielding the body from dangers like UV radiation, germs, and moisture loss. It is made up of numerous layers of cells, the topmost of which is the stratum corneum, which is made up of continuously shedding and replacing dead skin cells(*Epidermis*, n.d.). The epidermal layer of the skin serves several important functions, including:

- ***Protection:*** The epidermis acts as a barrier between the body and the environment, protecting the body from physical, chemical, and biological damage.
- ***Regulation:*** epidermis regulates the amount of water that is lost from the body and helps to maintain a balance between moisture and dryness.
- ***Sensation:*** The epidermis contains sensory receptors that enable the skin to detect touch, pressure, heat, cold, and pain.
- ***Absorption:*** Certain substances, such as medications and chemicals, can be absorbed through the epidermis and enter the bloodstream.
- ***Vitamin D Synthesis:*** The epidermis contains cells that can synthesize vitamin D when exposed to sunlight(de Szalay & Wertz, 2023; *Epidermis*, n.d.).

1.2.2 Dermis: Under the epidermis, there is a second layer of skin called this. It is in charge of giving the skin structural support and is made up of blood vessels, nerves, hair follicles, and sweat glands. Moreover, it has fibres of collagen and elastin, which

give the skin its suppleness and toughness.Several crucial tasks are carried out by the dermal layer of the skin, including:

- ***Support and Structure:*** The dermal layer provides support and structure to the skin. It contains collagen and elastin, which give the skin its strength, elasticity, and flexibility.
- ***Blood Supply:*** The dermal layer is highly vascularized and contains many blood vessels, which provide the skin with nutrients and oxygen.
- ***Temperature Regulation:*** Blood flow to the skin's surface is regulated by the dermal layer, which also aids in managing body temperature. The blood vessels in the dermal layer widen when the body is overheated, increasing blood flow to the skin's surface and allowing more heat to be released. In order to conserve heat, the blood vessels close down when the body gets too cold.
- ***Sensory Function:*** The dermal layer contains sensory receptors, such as touch receptors, which allow the skin to sense and respond to various stimuli.
- ***Hair Follicles and Glands:*** The dermal layer contains hair follicles and glands, such as sweat glands and sebaceous glands, which produce sweat and oil to help maintain the skin's hydration and protect against bacterial infections(Brown TM, 2023).

1.2.3 Subcutaneous Tissue:

It lies beneath the dermis and is the skin's lowest layer. It functions as a shock absorber, offering insulation and energy storage, and is composed of fat and fibrous tissue. It aids in controlling body temperature as well. The hypodermis, sometimes referred to as subcutaneous tissue, has a number of crucial jobs to do in the body, including(*Hypodermis (Subcutaneous Tissue)*, n.d.):

- ***Insulation:*** The hypodermis contains adipose (fat) tissue, which provides insulation and helps regulate body temperature.
- ***Energy Storage:*** The hypodermis serves as a storage site for excess energy in the form of fat.
- ***Shock Absorption:*** The hypodermis cushions and protects internal organs from trauma and injury.

- ***Blood Supply:*** The hypodermis contains many blood vessels that supply nutrients and oxygen to the skin and underlying tissues.
- ***Nerve Function:*** The hypodermis contains sensory nerves that provide feedback on pressure, temperature, and pain(Brandi Jones, n.d.).

1.3 Clinical significance

The skin, which are segments that are divided based on afferent nerves which nourish them and are numbered based on the level of the spinal vertebra from which they come, are one of the many features of the skin that have clinical significance. There are five lumbar, seven cervical, twelve thoracic, and five sacral vertebrae. A dermatomal distribution is involved in the pain perception and eruptive rashes of some disorders, such as shingles, which are brought on by varicella-zoster infection. Dermatomes are helpful in determining the severity of vertebral damage to the spine. The cells of the epidermis, in addition to the dermatomes, are susceptible to neoplastic alterations that result in different cancer forms. Desmosomes and hemidesmosomes are prevalent in the epidermis, and various autoimmune and immunological ailments target them(Kaiser JT, 2022).

1.4 Functions:-

- ***Protection:*** By serving as a physical, chemical, and biological barrier between the body's internal organs and the outside world, the skin shields the body from pathogens, UV radiation, pollution, and other physical, chemical, and biological dangers.
- ***Sensation:*** The skin is home to many of sensory receptors which register pressure, temperature, pain. The receptors let us comprehend surroundings which react to stimuli.
- ***Thermoregulations:*** Through the production of sweat to cool the body down and the constriction of blood vessels to hold onto heat, the skin aids in the control of body temperature.
- ***Immunity:*** By creating immune cells and antimicrobial peptides that aid in the body's defence against infections, the skin plays a significant part in the immune system.

- ***Vitamin D synthesis:*** When exposed to UV rays, the skin can produce vitamin D, which is necessary for immune system and bone health maintenance.
- ***Excretion:*** The skin can excrete sweat and sebum, which can help remove waste products from the body.
- ***Absorption:*** Skin can absorb certain substances, such as medications and topical treatments, into the body ("Skin Microbiome," n.d.).

2.SKIN AGING MECHANISM:

Skin ageing can be done by various factors, including genetics, lifestyle, and environmental factors. The ageing process affects all skin layers which are, epidermis the outer most layer, dermis the middle one , and subcutaneous tissue the lowest one(Raschke & Elsner, 2010).

The **epidermis,** that is skin's outermost layer it gives protection to the body from certain extrinsic factors such as harmful Pathogens, UV radiations, and Pollutants. As we age, the turnover of skin cells reduces, leading to a buildup of dead skin cells and a thinner epidermis. This can result in a dull, dry, and rough skin texture.

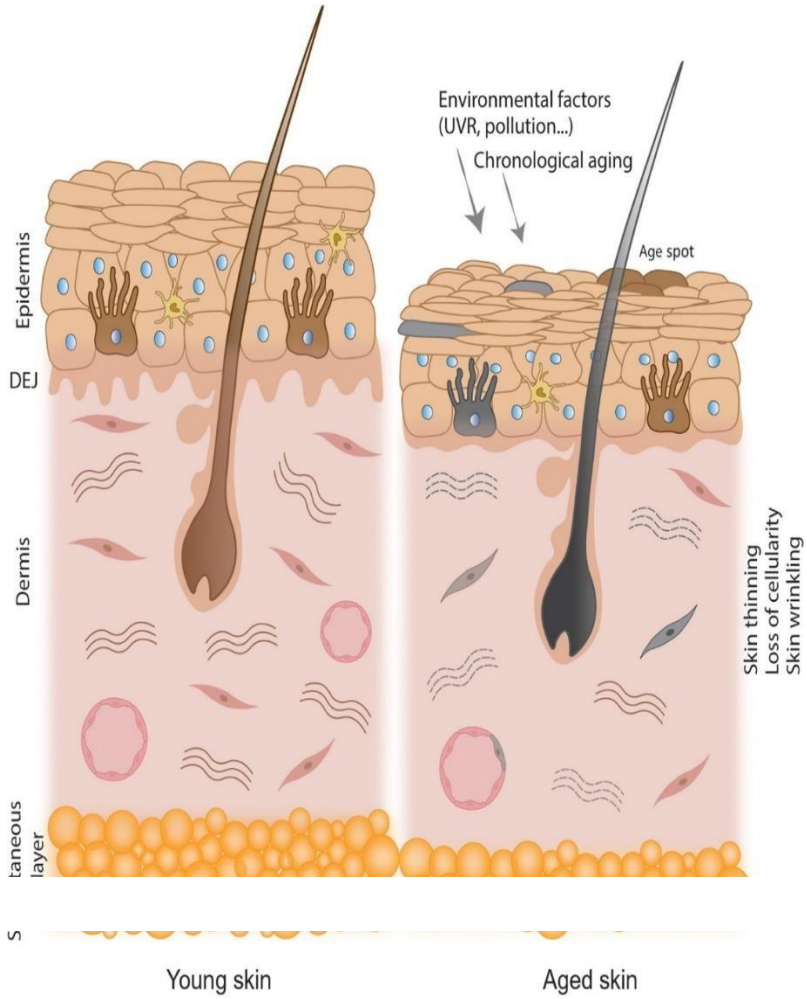
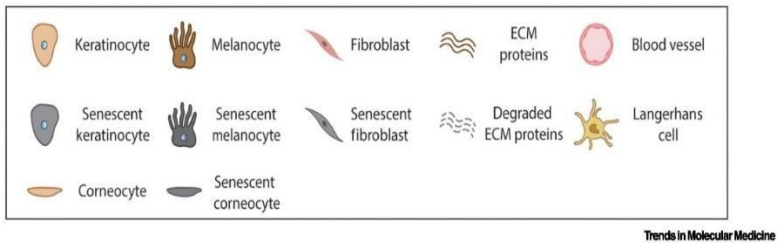


Figure 1Different layers of skin and its aging process



The skin layer under epidermis called as **dermis**, and it consists of collagen, elastin, many of proteins which helps with the elasticity and strength of the skin. With maturity of skin, the composition of these proteins reduces, resulting in thinner, less elastic skin. This can cause wrinkles, sagging skin, and a loss of firmness.

The **subcutaneous tissue** consists of the fat beneath skin it maintains cushioning as well as insulation for the body. The loss of significant volume and support occurs as a result of this layer's thinning with ageing. It results in hollowing of cheeks, thinning of the lips, and the appearance of jowls.

Several mechanisms contribute to skin ageing. One of the main mechanisms is oxidative stress, which is mainly due to the imbalance into the Reactive Oxygen Species (ROS) secretion and body's ability to neutralize it. Reactive oxygen species can damage cell organelles, as Ribosomes, proteins, nucleic acids, and can result in dysfunction and death of a cell (Forrester et al., 2018).

Another mechanism is inflammation, which UV radiation, pollutants, and other environmental factors can cause. Collagen and elastin breakdown can lead to chronic inflammation and the activation of enzymes that degrade these proteins.

Other factors that contribute to skin ageing include hormonal changes, such as a decrease in estrogen levels, which can lead to a loss of collagen and a decrease in skin thickness, and glycation, which occurs when sugar molecules bind to proteins, the combination results into creation of (AGEs) Advanced glycation end products and it can cross-link proteins, causing them to become stiff and less elastic(Kare et al., 2019).

Skin ageing is a complex process that involves multiple mechanisms, including oxidative stress, inflammation, hormonal changes, and glycation. These mechanisms contribute to a variety of changes in the skin, including a thinning epidermis, a loss of collagen and elastin, and a decrease in subcutaneous fat. Understanding the mechanisms of skin ageing can help develop effective strategies for preventing and treating the signs of ageing.

2.1 Different methods of skin aging:

2.1.1 Intrinsic aging: It is the natural process of aging which occurs over time. Also called chronological aging Intrinsic ageing is influenced by genetics and is a gradual process that affects skin layers. As the age increases the turnover of skin cells decreases, leading to thinner epidermis, a decrease in production of collagen, elastin, and other proteins in the dermis. This can result in a loss of elasticity and firmness and the appearance of wrinkles and fine lines (Khalid et al., 2022).

2.1.2. Extrinsic aging: In this the skin aging is due to many of the external factors like pollution, smoking, UV radiation, and poor nutrition. Extrinsic aging can accelerate aging and damage the skin, leading to premature aging. Extrinsic ageing affects the epidermis primarily as it is the outermost layer of the skin, but also underlying dermis. Extrinsic ageing can cause hyperpigmentation, the formation of age spots, uneven skin tone, and wrinkles. Radiation caused by the UV is the most significant reason for extrinsic aging and causes photo aging, a type of premature aging caused by sun exposure(Tsatsou et al., 2012).

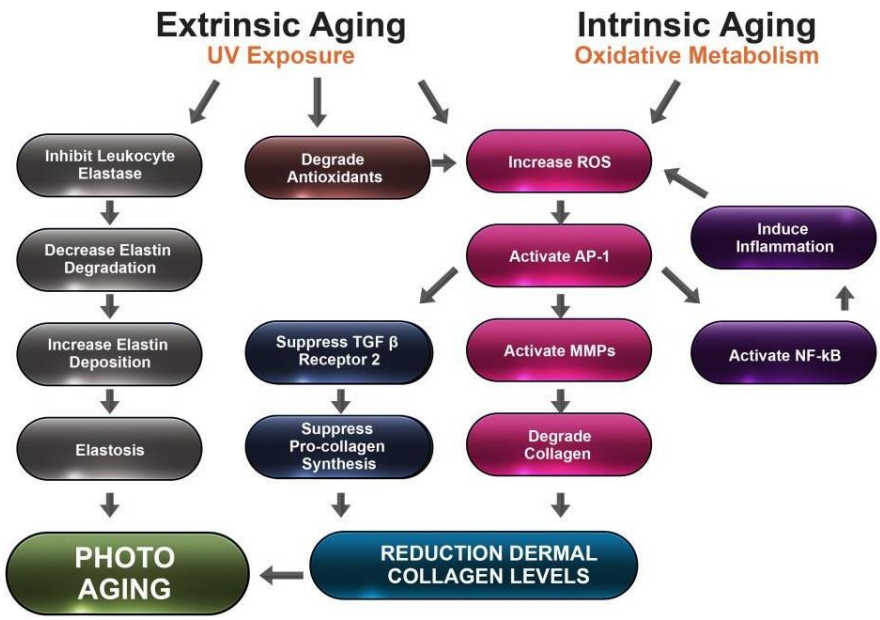


Figure 2 Mechanism of Intrinsic and Extrinsic Skin Aging

Cosmeceuticals are cosmetic products that have therapeutic benefits against. Many of the cosmeceutic products now contain natural bioactive ingredients to slow the process of skin aging. For proper functioning of human body balanced diet is necessary

All biological processes occurring in skin depend heavily on the daily dietary intake of key nutrients. Certain dietary botanicals may serve as supplements for the care of mature skin. These include polyphenols like apigenin, it is found in many plants and vegetables. Another one is quercetin; it is a a flavonol which is commonly found in Apple and onions peel. Curcumin, a substance collected from turmeric. Genistein, the flavonoid found in soybeans, proanthocyanidins, a substance found in grape seeds. Resveratrol found in peanuts, berries. Vitamins and minerals with antioxidant effects are additional essential components of an anti-aging diet (Michalak et al., 2021).

ROS is responsible for activation of MAPK pathway which results in increasing MMP production. MMP deteriorates the collagen. To prevent aging by ROS antioxidants plays a major role. Antioxidents like vitamin E and C etc. Antioxidants acts as reducing agents it neutralises the formed ROS in the body.

There are many plants which have good sources of antioxidant properties, like Amla, Aloe vera. A research done on a mouse model found for green tea was that the epigallocatechin gallate (EGCG), which is a catechin, it reduces maturing of skin by the epidermal growth factor receptor (EGFR) pathway resulted in better skin texture and structure than the control condition mouse (Zhang & Duan, 2018).

3. NATURAL BIOFUNCTIONAL INGREDIENTS

3.1 Aloe vera: - Aloe vera is studied due to its potential anti-aging effects when applied to skin. Contains a varied bioactive compound, it includes minerals, amino acids, Vitamins and polysaccharides, which has antioxidant, anti-inflammatory, and moisturizing effects on the skin.

Aloe vera also contains compounds called lignins, which have been shown to penetrate deeply in skin and enhance the delivery of active ingredients. This means that aloe vera may be able to help other anti-aging ingredients penetrate the skin more effectively, increasing their overall effectiveness (Surjushe et al., 2008).

3.2 Avocado: - Avocado is a nutrient-dense fruit it is rich in healthy vitamins, fat, and antioxidants, making a great addition to a healthy diet and skincare routine. The healthy fats in avocado, including omega-3 fatty acids, can help in skin hydration and moisturization.

Avocados have good amount of vitamin E, an antioxidant which reduces oxidative stress and harmful effects of free radicals in skin. Additionally, vitamin E improves skin texture and decreases scars or any other blemishes. Avocado contains vitamin C; it helps in generation of collagen which keeps the skin elasticity. Eating avocado or using avocado-based products may help improve skin elasticity, decrease the wrinkles of the skin (Annamarya Scaccia, 2017).

3.3 Amla: - Amla, also known as Indian gooseberry, a fruit rich for antioxidants, including, polyphenols, it protects skin from oxidative stress.

Amla is good in anti-inflammatory properties that reduce skin inflammation. Research has suggested that consuming amla or applying amla-based products topically improves.

3.4 Walnut: - Walnuts are a very good source of omega-3 fatty acids, it shows good anti-inflammatory properties. Also a good source of Folates, vitamin E, phosphorus which can help in keeping the skin in healthy and young condition.

Research has suggested that consuming walnuts may improve skin health by increasing

skin elasticity. The polyphenols and other compounds found in walnuts may also help protect against UV skin damage and help prevent breakdown of collagen(Lobo et al., 2010).

3.5 Cucumber: - Cucumbers are a popular ingredient in skin care products due to their high-water content, which can help hydrate and soothe the skin. Cucumbers also contain antioxidants, like vitamin C and flavonoids, these constituents protect the skin from oxidative damage.

Cucumbers contain silica, a mineral that is essential for healthy connective tissue, including collagen. As we age, our natural collagen developement decreases, contributing to the visible signs of aging. Applying cucumber slices or cucumber juice to the skin
may help reduce inflammation and puffiness, which can make the skin look more youthful and refreshed. Cucumber-based products improves skin texture (*Cucumber Extract: Unlocking Nature's Secret to Radiant Skin,* 2023).

3.6 Green tea: - It has many of the positive health benefits including potential anti-aging effects on the skin. The antioxidants present in green tea, particularly polyphenols such as catechins and flavonoids, protect skin of harmful free radicals that causes cellular damage and accelerate aging.

The polyphenols in green tea may helps in reducing inflammation and irritation, which can contribute to skin aging. Additionally, epigallocatechin-3-gallate (EGCG) found in tea, which depicts anti-inflammatory and anti-carcinogenic results and prevents the breakdown of collagen (Chacko et al., 2010a).

4. ALOEVERA

4.1 Introduction

The perennial aloe vera, which belongs to the Liliaceae family, has thick, rosette-shaped leaves joined at the stem (Minjares-Fuentes & Femenia, 2019). Aloe species have been used extensively in skincare, prosthetic treatments, and cosmetics for centuries(Cock, 2015; Nalimu et al., 2021). There are between 360 and 500 different species of aloes in the world, but only a few of them are used as medicines, and only five of them can be consumed. Aloe barbadense Miller, Aloe arborescence Miller, Aloe ferox Miller, Aloe vera var. chinesis, and Aloe Saponaria are the most frequently used aloes in medicine, cosmetics, and health care(Gong & Lu, 2015; Sánchez et al., 2020).

FIgure 4a Aloe Vera

In Traditional Chinese Medicine (TCM), this plant has been used in the treatment of skin conditions like burns, wounds, and anti- inflammatory agents etc. Among its medicinal properties are the anticancer properties, antioxidant properties, antidiabetic effects, and antihyperlipidemic effects of aloe vera. More than 430 species of Aloe are found in the genus, including A. vera and A. ferox. It has been acknowledged that these species have therapeutic properties such as antiproliferative, antiviral, anti-ageing, moisturizing, antibacterial, immunomodulatory, antidiabetic, anti-inflammatory, laxative, wound healing, and skin protection(Cock, 2015; Minjares-Fuentes & Femenia, 2019; Nalimu et al., 2021).

More than 75 different substances have been found in aloe vera, including vitamins (such as vitamins A, C, E, and B12), Anthraquinones, saccharides, minerals, enzymes, saponins, lignins, salicylic acids, and amino acids are just few of the many potentially

beneficial components found in aloe vera(Gong & Lu, 2015; Haniadka et al., 2013).The structures of the compounds are included.

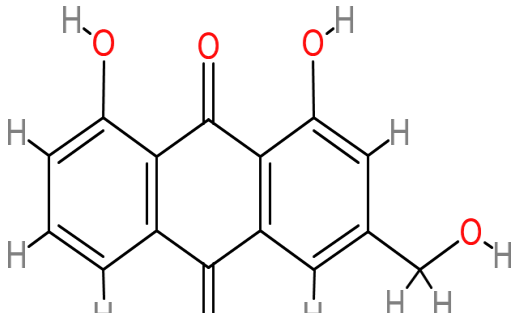


Figure 3 Aloe emodin

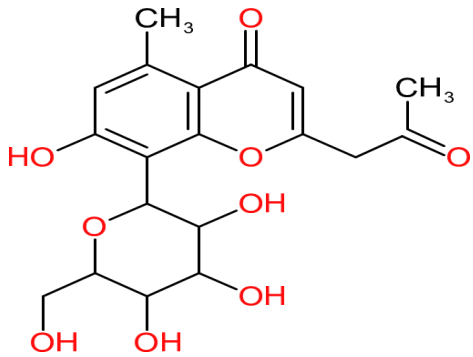


Figure 4 Aloesin

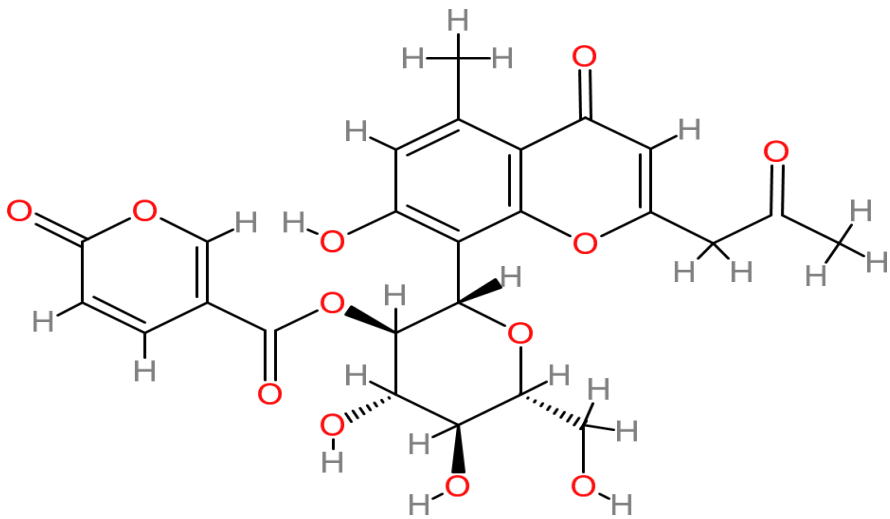


Figure 5 c 2'-O-p-Coumaroylaloesin

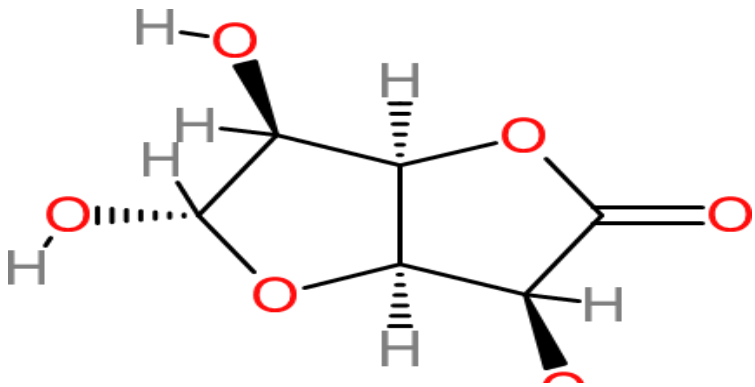


Figure 6 Vitamin B2 (riboflavin)

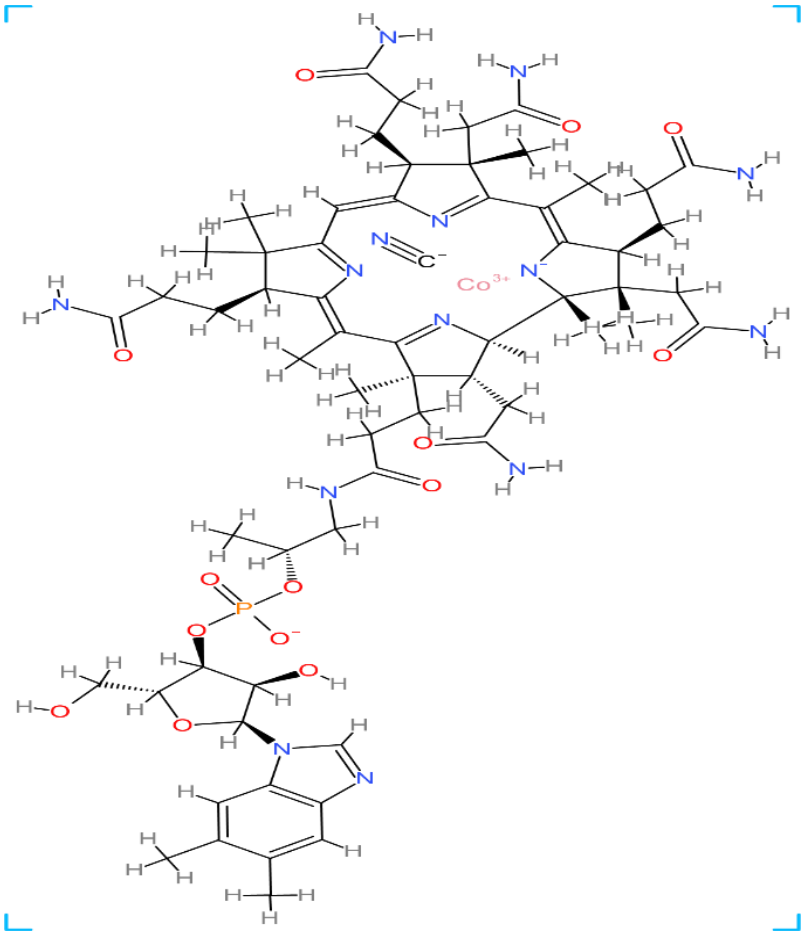


Figure 7 Vitamin B12

4.2 Constituents

CLASS	COMPOUNDS
Vitamins	Vitamins A, Vitamins B1 (Thiamine), Vitamins B2 (Riboflavin), B6(Pyridoxine), b-carotene, C, choline, E, Folic Acid, α-tocopherol
Anthrones, Anthrsquinones	Aloin, aloetic acid, anthranol, aloin A, aloin B, and ester of cinnamic acid, emodin, isobarbaloin.
Saccharides	Acemannan, alprogen and C-glucosyl chromone, polysaccharides such as glucomannans,monosaccharides such as

	mannose-6-phosphate.
Enzymes	Amylase, catalase, carboxypeptidase, cyclooxygenase, phosphoenolpyruvate carboxylase, superoxide dismutase,lipase, oxidase, and peroxidases are examples of enzymes.
Minerals	zinc, copper, selenium, and calcium

Table 1

4.3 Effect against skin aging

The beneficial moisturizing properties of Aloe vera is responsible for its ability to provide anti-aging properties. By improving the skin's hydration and exfoliating capabilities, which aid in removing dead skin cells that generate elastin and collagen, it ultimately reverses the effects of ageing by making the skin smoother and more flexible.(Moghaddasi & Kumar Verma, 2011).

Aloe has an anti-aging effect because it stimulates the fibroblast for the production of collagen and elastin fibers, enhancing skin elasticity and minimizing wrinkles, increasing the skin elasticity and minimizing wrinkles. Skin becomes softer as a result of the binding of the flaky surface cells, which invokes a harmonious effect. Amino acids help to soften the tough skin cells while zinc (Zn) serves as an astringent to tight the pores. Manganese and selenium, which are found in aloe juice, are the trace elements that make up enzymes like superoxide dismutase and glutathione peroxidase. These enzymes are well known for having strong anti-aging benefits. The ideal capacity for holding and elasticity of epithelial tissues is achieved due to proline, which is an amino acid that is not necessary for the body. As a result of consuming the vitamins and minerals found naturally in Aloe, the blood becomes properly saturated, leading to moisturized, more elastic and smoother skin through more efficient detoxification. The skin experiences significant anti-aging benefits as it is protected against the harmful impact of free radicals.(Tewari & Tiwari, 2018).

4.4 Marketed Products

BRAND NAME: - ROREC
PRODUCT NAME:- Aloe Vera foaming face cleanser
INGREDIENTS:- Potassium Hydroxide, Peg-32, Myristic Acid, Water, Glycerin, Stearic Acid, Stearate, Aloe Barbadensis Leaf Extract, Peg-75, Laureth-2, Sodium Laureth Sulfate, Disodium Edta, Sodium Benzoate scent (parfum), Blue 1 (Ci 42090), Yellow 5 (Ci 19140), and caramel
USE:- Skin brightening, spot removal

BRAND NAME: - THURSDAY PLANTATIONS
PRODUCT NAME:- Aloe Vera Gel (30g)
INGREDIENTS:- Aloe vera inner leaf juice fresh 974 mg, Hydroxybenzoates, Diazolidinylurea, Potassium sorbate
USE:- helps in the healing of sunburns and restores moisture to the skin after sun exposure

BRAND NAME: - Fleurance nature
PRODUCT NAME:- Moisturising cream
INGREDIENTS:- Aloe vera, shea butter, glycerin and ingredients from Organic Agriculture
USE:- 24H moisturizing, long-lasting hydration (a) of both the skin of the face and the body

5. AVOCADO

5.1 Introduction

The avocado, or Persea americana, as it is commonly known, has gained widespread popularity. It is often marketed as a "Superfood," due to its distinctive nutritional profile, phytochemical content and health benefits (Mohammed et al., 2020). which make this fruit a popular food item.An avocado tree (Lauraceae) is an evergreen tree that is a member of the Lauraceae family and whose origins are believed to have been around 1000 years ago in Mexico, Venezuela, Colombia, Guatemala, Ecuador, and Peru, and is commonly known as an avocado tree(Rozan et al., 2021). This fruit's pulp is made up of roughly 7% skin, 60% oil, and 2% seeds.(Flores et al., 2019b).

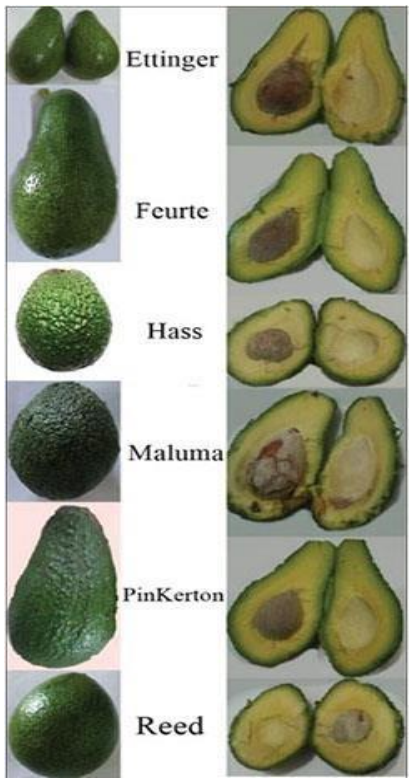


Figure 5a Avocado

Depending on the location, P. americana can grow to a height of 9-20 meters. There are various geographical distributions of avocado trees. Some avocado varieties lose their leaves just before flowering, but some varieties are evergreen. An upright and asymmetrical canopy can be found in trees that range from upright and asymmetric to low, dense, and symmetrical. There are numerous leaf shapes, including elliptic, lanceolate and oval ones and a leaf length of 7-41 cm(Yasir et al., 2010). Flowers range

in size from 1 to 1.3 cm in diameter and are yellowish green in colour. Inflorescences with many flowers are carried in a pseudo terminal position. Depending on the variety, ripe fruit can be
green, black, red, or purple in colour (Vinha et al., 2013; Yasir et al., 2010).

A variety of medicinal effects can be obtained from it, including lowering blood pressure, lowering blood sugar, and acting as an antiviral agent and are also used to treat ulcers and cardiovascular disease(Vinha et al., 2013). Avocado is also said to have analgesic and anti-inflammatory properties and its Additionally, the pulp is utilized in a number of dermatological compositions, including emulsions for the treatment of dry skin, UV shields, and antioxidants. opposing ageing (Flores et al., 2019b; Vinha et al.,2013;Yasiretal.,2010). In their 2010 study of avocado oil, Chia and Dykes were able to show that three different avocados—the "Hass," "Fuerte," and "Shepard" varieties—have antibacterial properties in both their peels and seeds(Rozan et al., 2021; Yasir et al., 2010).

These classes of compounds can be divided into alkanols, terpenoid glycosides, flavonoids, and coumarins. The highly functional alkanols of avocados have so far demonstrated a wide range of biological properties(Yasir et al., 2010).

5.2 Constituents

CLASS	COMPOUND
Carotenoids	xanthophyll carotenoids lutein, β-cryptoxanthin, and zeaxanthin
Phenolics	
Phytosterols	
alkanols	1,2,4-trihydroxynonadecane, 1,2,4-trihydroxyheptadec-16-yne,
derivatives of glycosylated abscisic acid	(1R,3R,5R,8S)-pi-dihydrophaseic acid-D-glucoside, (1S,6R)-8-hydroxy abscisic acid-D-glucoside

persea americana	1'S,6'R)-8'-hydroxyabscisic acid B-D-glc , 4-acetoxy-1,2-dihydroxyheptadec-16-ene, (2S,4S)-1,2,4-trihydroxyheptadec-16-ene, (2S,4S)-2,4-dihdroxyheptadec-16-ynyl acetate, dimethyl sciadinonate, (+)-catechin,(-)-epicatechin, scopoletin.

Table 2

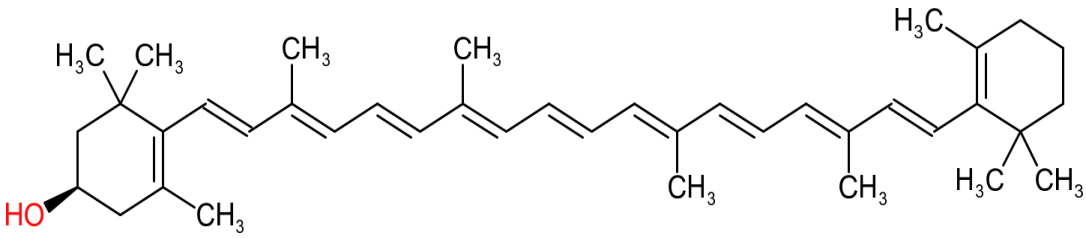


Figure 8 β-cryptoxanthin

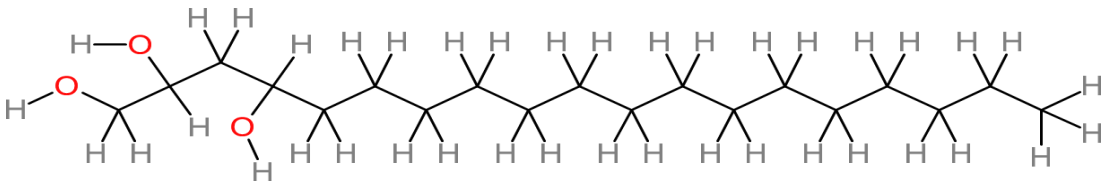


Figure 9 1,2,4-trihydroxynonadecane

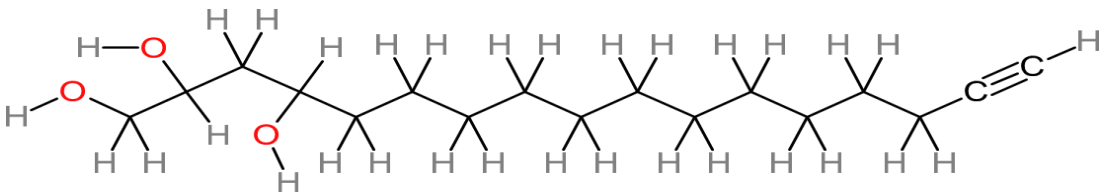


Figure 10 1,2,4-trihydroxyheptadec-16-yne

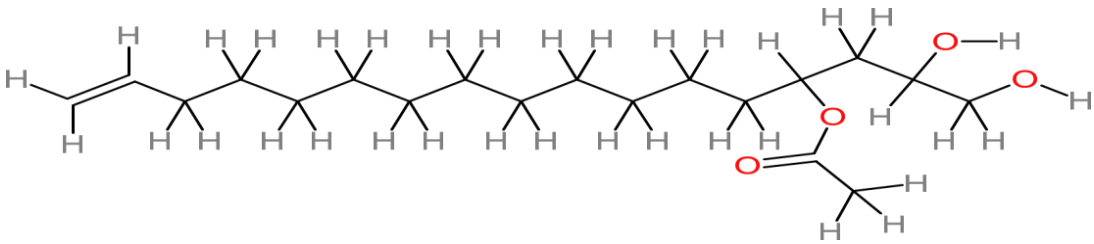


Figure 11 4-acetoxy-1,2-dihydroxyheptadec-16-ene

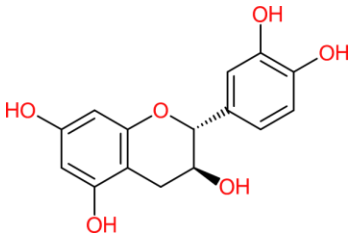


Figure 12 (+)-catechin

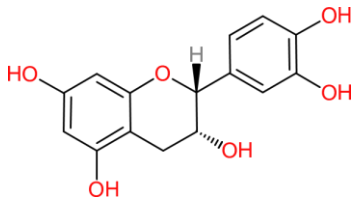


Figure 13 (-)-epicatechin

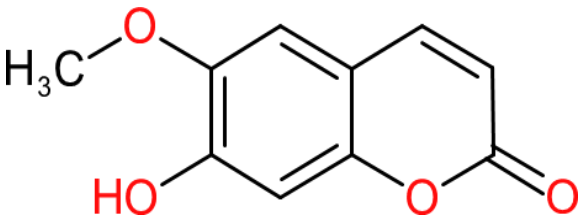


Figure 14 Scopoletin

5.3 Effect against skin aging

Avocado consists of many constituents which can provide anti-aging effects. Avocado oil can be used for dry skin as lecithin, lutein, and zeaxanthin hydrates the skin and provides elasticity by increasing collagen synthesis("EVALUATION OF PULP OIL FROM Persea Americana (Avocado Fruit) in Pharmaceutical Cream Formulation," 2018; Henning et al., 2022; Lin et al., 2017).The carotenoids present in avocado give an antioxidant effect by concentrating on the skin(Henning et al., 2022).

The tocopherols, phytosterols, and polyphenols present in the unsaponifiable portion of avocado soften the skin and gives a toning effect("EVALUATION OF PULP OIL FROM Persea Americana (Avocado Fruit) in Pharmaceutical Cream Formulation," 2018; Lin et al., 2017).This toning effect, along with moisturizing and emollient and antioxidant properties, makes the skin look healthy, young and glowing and thereby helps in preventing aging("EVALUATION OF PULP OIL FROM Persea Americana (Avocado Fruit) in Pharmaceutical Cream Formulation," 2018).

Anti-tyrosinase activity has also been shown by a study conducted by using avocado exocarp and seed extracts in n-hexane. Using molecular oxygen, the enzyme tyrosinase helps in the formation of the melanin pigment. Hyperpigmentation of this pigment can lead to the oxidation of melanocytes – the cells which produce melanin. This reaction can further be accelerated by an increase in the free radical's production, which can contribute to aging(Flores et al., 2019a; M. Hürkul et al., 2021).

5.4 Marketed products

BRAND NAME: - MORE BEAUTY
PRODUCT NAME:- Anti aging cream
INGREDIENTS:-, Isopropyl Myristate, Prunus Amygdalus Dulcis (Sweet Almond) Oil, Dimethicone, Glycerin, Persea Gratissima (Avocado) Oil, Water (Aqua), Caprylic/Capric Triglyceride, Cetearyl Alcohol & PEG 20 Stearate, Cetyl Alcohol, Butyrospermum Parkii (Shea Butter), BHT, Sodium Benzoate, Phenoxyethanol, Imidazolidinyl Urea, Punica Granatum Benzyl Salicylate, Eugenol, Alpha-IsomethylIonone, Hydroxycitronellal, Linalool, Butylphenyl Methylpropional, Simmondsia Chinensis (Jojoba) Seed Oil, Lavandula Angustifolia (Lavender) Oil, Rosmarinus Officinalis (Rosemary) Leaf Extract, Maris Sal (Dead Sea Salt), and Aloe
USE:- moisturizing, hydrating, anti-wrinkle

BRAND NAME: - GOOD VIBES
PRODUCT NAME:- Anti aging face gel
INGREDIENTS:-, AVOCADO GEL
USE:- helps in evening out skin tone and reduces pigmentation

BRAND NAME: - SKINERGY
PRODUCT NAME:- Energizing scrub
INGREDIENTS:-, Avocado and Ginseng.
USE:- Prevents skin damage and combats signs of ageing while minimizing breakouts

6. AMLA

6.1 Introduction

Several illnesses are routinely treated with medicinal plants in developing countries. Emblica officinalis is one of the most well-known medicinal plants used in ayurvedic patent medicines. Phyllanthus emblica, often known as Indian gooseberry or Emblica officinalis, is a plant in the Euphorbeaceae family. (Variya et al., 2016).It has an extensive tradition of use in conventional medicine and is a source of phytochemicals that may be beneficial for health. According to Ayurveda, it is one of the earliest oriental medicines and has the potential to treat a wide range of illnesses. Of course, it is one of the oldest traditonal medicines(Singh et al., n.d.). In Sanskrit, it is known as “Amalaki” or “Dhartiphala”. One of the wonders of nature and a gift from it to humans is amla. Amla is referred to as "Divya" and "Amrit Phala" or “Amrut” in Sanskrit, which means "fruit of heaven" or "nectar fruit" in English(*Indian Gooseberry (Emblica Officinalis): Complete Pharmacognosy Review Indian Gooseberry (Emblica Officinalis): Complete Pharmacognosy Review 1 Kaushik Vilas Kulkarni, 2 Shrishail M Ghurghure*, n.d.). Originally from India, amla is now grown in a variety of tropical and subtropical regions throughout the world, including Southeast Asia, China, Malaysia, Pakistan, Uzbekistan, Sri Lanka, among many others(Ikram et al., n.d.).

The leaves of this plant are similar to pinnate leaves in the sense that they are simple, dull green in colour, and they are without stalks, and Their flowers are a shade of greenish yellow. Their fruit is a light yellow tint and contain three hard shell cocci containing six trigonal shape seeds. Their thin, light-gray bark is very thin. Amla comes in two varieties: wild and cultivated (gramya) (vanya). While cultivated amla is large, smooth, and juicy, wild amla is small(Singh et al., n.d.).

Figure 6a Amla

Ayurveda used amla fruits frequently because they believed that they improved defence against many diseases, including cancer, ulcers, anaemia, heart disease, liver disease, and diabetes. Antioxidant, antitussive, immunomodulatory, analgesic, and gastroprotective, anti-pyretic are additional functions of this substance. Additionally, it is helpful in ophthalmic disorders to improve memory and control cholesterol levels. Additionally useful as an antimicrobial and for neutralising snake venom(Ikram et al., n.d.). The fruit of P. emblica L., one of among the most popular botanicals, has a number of applications in the fields of medicine, food, and cosmetics. This review aims to offer a quick summary of the nutritional make-up, phytochemistry, and potential health advantages of consuming amla's naturally occurring phytochemicals(Gul et al., 2022).More than 80% of the amla fruit's chemical makeup is made up of water. Additionally, it contains minerals, protein, carbohydrates, fibre, and gallic acid, a strong polyphenol. It's extremely crucial for humans to consume vitamin C(Gul et al., 2022; Singh et al., n.d.).The vitamin C content of amla fruit is said to be nearly 20 times that of orange juice(Singh et al., n.d.).

Numerous phytochemical elements, there is evidence that certain compounds, including terpenoids, flavonoids, alkaloids and tannins, have advantageous biological properties.E. Officinalis leaves are the best source of biochemical compounds like malic acid, gallic acid, chebulic acid, chubulinic acid, alkaloids, ellagic acid, phyllantine, phyllantidine and chebulagic acid. While leukodelphinidin, proanthocyanidin, and tannin are abundant in the bark of E. officinalis(Mona Hassan et al., n.d.; Singh et al., n.d.).Included are the compounds' structural details in Figures.

6.2 Constituents

source	Common name	Reported Pharmacological activity
Fruit	Emblicanin-A, Emblicanin - B,vitamin-C (Ascorbic acid), Chlorogenic acid, Punigluconin, Pedunculagin	Antioxidant
	Glucogallin	Inhibitor of Aldose reductase
	3,6-di-O-galloyl-d-glucose	Neuroprotective, Anti-oxidant
	1,6-di-O-galloyl-β-d-glucose	Anti-atherosclerotic, Anti - microbial
	Chebulagic acid	Anti-inflammatory, Antioxidant, Anti-proliferative, Anti-diabetic,
	Coumaric acid	Antioxidant, Antihyperlipidemic
	Caffeic acid	Antioxidant, Anti-hyperlipidemic, Anti-inflammatory, Anti-cancer
Whole plant	Gallic acid	Anti-cancer, Antioxidant, Anti-inflammatory, Antibacterial, Anti proliferative,Anti-diabetic, Cardio-protective,Neuroprotective,
	Ellagic acid	Anti-diabetic, Antioxidant, Anti-cancer, Anti-proliferative
	Quercetin	Protein kinase inhibitor,Antioxidant
Root	Phyllaemblicin-A, B and C	Anti-bacterial, Protein kinase inhibitor
	Phyllaemblic acid	
Leave	Apigenin-7-O-(6'-butyryl-β-glucopyranoside)	Cytotoxic

	Trihydroxysitosterol	
	5α,6β,7α-acetoxysitosterol	
	1,2,3,4,6-penta-O-galloylglucose	Anti-inflammatory, anti-allergic
	luteolin-4' -O-neohesperidoside	Anti-inflammatory, Anti-diabetic

Table 3

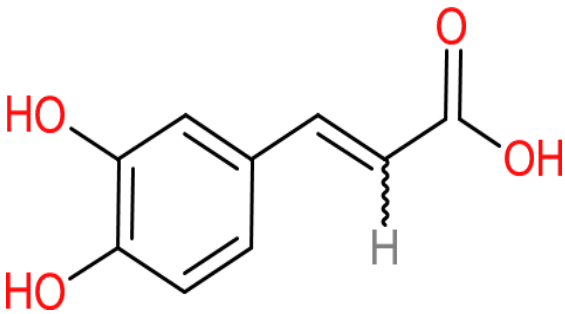


Figure 15 Cholinergic Acid

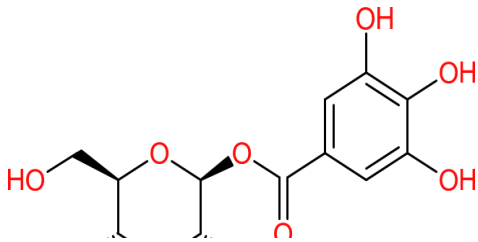


Figure 16 Glucogallin

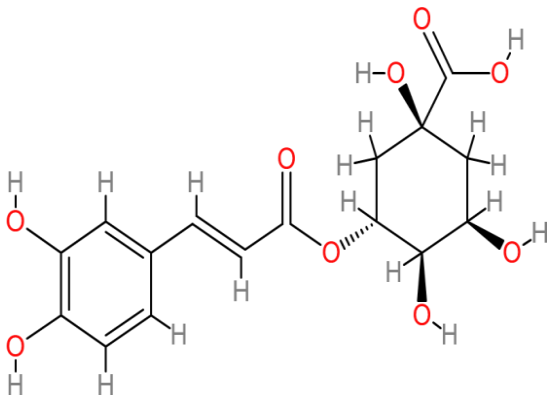


Figure 17 Caffeic acid

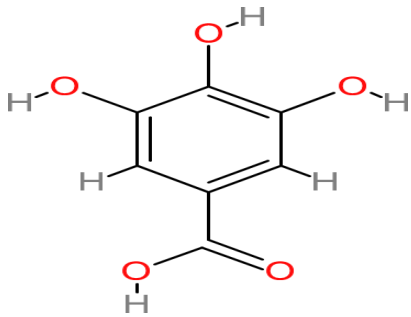


Figure 18 Gallic acid

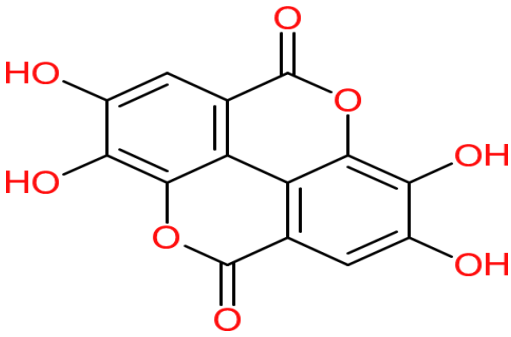


Figure 19 Ellagic Acid

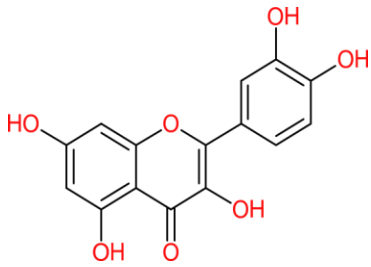


Figure 20 Quarcetin

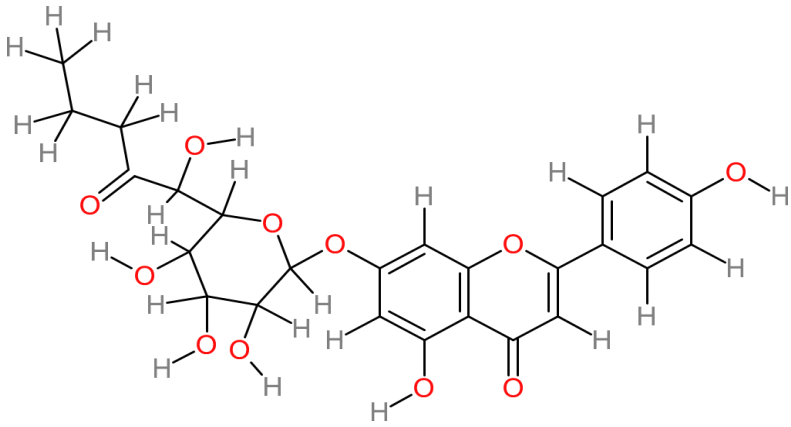


Figure 21 Apigenin-7-O-(6'-butyryl-β- glucopyranoside)

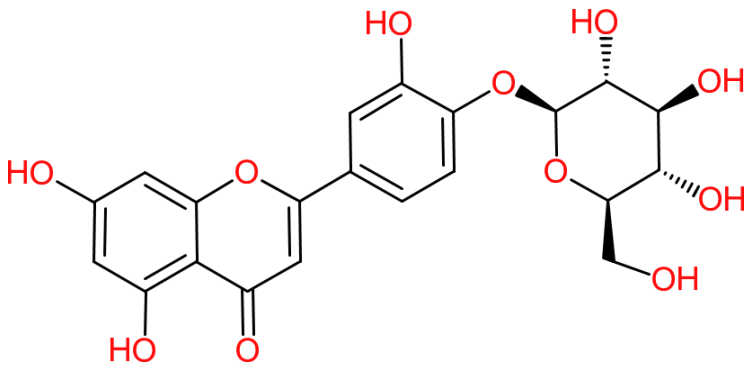


Figure 22 luteolin-4' -O-neohesperidoside

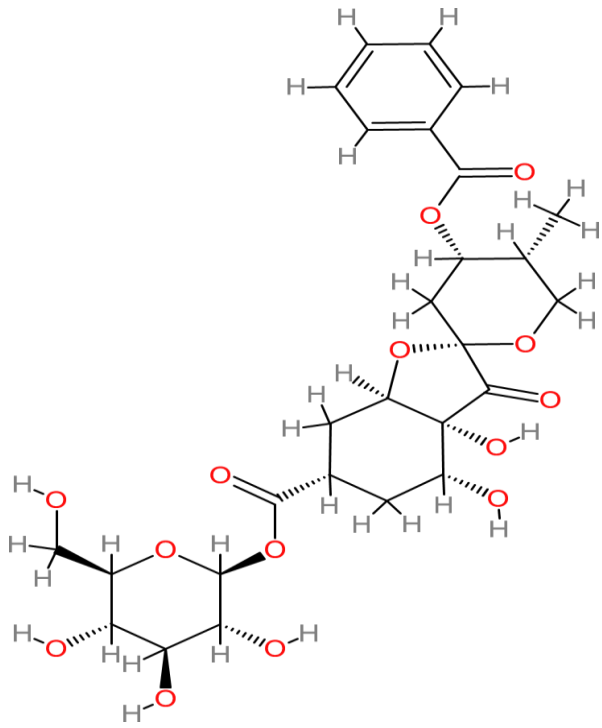


Figure 23 Apigenin-7-O-(6'-butyryl-β- glucopyranoside)

6.3 Effect against skin aging

Emblica officinalis has revitalizing benefits since it includes a component that is essential for delaying the effects of ageing and retaining strength as we age. It strengthens the body's defences and protects the body against infection(Pandey, 2020).

Emblica officinalis is a good antioxidant because it is one of the most effective sources of vitamin C (ascorbic acid) and hydrolysable tannins with low molecular weight such as pedunculagin, punigluconin, emblicanin-A (37%) and emblicanin-B (33%), are claimed to offer protection from oxygen radicals(Debasis Das 1 and Preetha Bhadra2, 2020).

Through a variety of processes, including the quenching ROS and the induction of antioxidant enzymes, *Emblica officinalis* exhibits antioxidative effects. According to research by Reddy et al., E. officinalis fruit extract lowers lipid peroxidation and boosts the activity of an antioxidant enzyme like catalase (CAT), superoxide dismutase (SOD) and glutathione peroxidase (GPx) and also the nonenzymatic antioxidant glutathione (GSH), thereby inhibiting alcohol-induced oxidative damage(Prasad & Srivastava, 2021).

6.4 Marketed Products

BRAND NAME: - ORGANIC VEDAS
PRODUCT NAME:- Anti aging cream (vitamin c)
INGREDIENTS:-,Water, Moringa oleifera seed oil, Propanediol, Glycerin, Coco Caprylate Caprate, Ascorbic Acid, Phyllanthus emblica extract, Moringa oleifera leaf extract, Ocimum sanctum leaf Extract, Glyceryl Stearate, Cetearyl Alcohol, Cetearyl Glucoside, Cassia auriculata extract, Azadirachta indica leaf extract, Xanthan Gum, Tocopherol, Sorbitan Caprylate, Benzoic Acid, Ocimum sanctum oil, Chamaemelum nobile Oil, Pelargonium graveolens Oil.
USE:- Hydrating,Anti-aging

BRAND NAME: - M.S skincare
PRODUCT NAME:- Amla booster oil (cold pressed)
INGREDIENTS:-, Amla oil
USE:- Able to rejuvenate and regenerate the skin's cells.

BRAND NAME: - Wellena Skincare
PRODUCT NAME:- Amla Eye cream
INGREDIENTS:-, Amla, Aloe, Mango seed butter, Shea butter
USE:- Helps the production of collagen, Extremely high in vitamin C, Reduces under-eye puffiness

7. WALNUT

7.1 Introduction

In many communities, walnuts ("Juglans regia L") are a popular component of the Mediterranean diet and are a fantastic source of numerous nutrients (Mo et al., 2022). There are numerous names for walnut ("Juglans regia L.") in different parts of the world. The most popular names are Gardgani in unani, akhrot in hindi, and doon in Kashmiri. The meaningless name walnut comes from old wealhh nutu, which is short for foreign nut (wealhh is akin to the terms Welsh and Vlach)(Rashid Bakshi et al., 2018).Juglans, a nut tree genus in the Juglandaceae family, is the source of the walnut. Two main species of walnut are Black walnut and Persian or English walnut. Juglans regia, also known as English walnut, is a native of Iran (Persia). It is the most significant temperate nut produced in India, mostly in the states of Himachal Pradesh, Jammu and Kashmir, Arunachal Pradesh and Uttar Pradesh. The black walnut, on the other hand, is a native of eastern North America and is scientifically known as Juglans nigra. The most important producer of walnuts in 2017 is China. In the entire world, 51% of the overall production is contributed by it. Turkey and the United States are two additional important producers(Laddha et al., 2020).

Figure 7a Walnut

Walnuts are the single-seeded, ovoid or rounded fruit of the walnut tree that is used frequently once it has reached full ripeness. After maturing, a reddish to brown wrinkle shell with two or occasionally three segments are typically discovered. The green fruit shell, root, stem bark, and leaves of the Juglans species, among others, are all used in

some way, but the fruit and timber have been used to their fullest potential according to an increasing number of research publications(Bi et al., n.d.; Rashid Bakshi et al., 2018).

Walnuts also have beneficial medical qualities, such as improving memory and treating insomnia, spermatorrhea, and constipation. Furthermore, walnut oil can be used in the production of anti-aging and anti-wrinkle cosmetics that can be used to treat dry skin; the oil can also be used to treat constipation, scabies, and bromhidrosis, among other conditions(Bi et al., n.d.).Review also demonstrates the development of phytochemical and bioactive research juglone and its derivatives, Diarylheptanoids, polyphenols, terpenes and flavones are main compounds found in these plants. Antitumor, antioxidant, and antibacterial activities have been the main focus of these chemical constituents' pharmacological actions. These Juglans species have attracted significant interest due to their anticancer potential as the demand for new cancer treatments increases (Bi et al., n.d.; Laddha et al., 2020; Rashid Bakshi et al., 2018).

A plant has a different chemical composition in different countries depending on various factors like geographic location, temperature, time, and other factors. The essential fatty acids and tocopherols found in walnuts are abundant. The entire walnut tree includes a range of functions phytoconstituents, the majority of which are found in the leaves and fruits(Delaviz et al., 2017; Mo et al., 2022).

7.2 Constituents

Resource	Name	Plant part
Juglans regia	juglanin B	green husk
	juglanin A	green husk
	rhoipteol	green husk
	3-ethoxy juglone	twigs
	α-tetralonylglucoside	pellicle
	juglanoside E	pellicle
	tellimagrandin I	kernel pellicles
	casuarinin	seed
	4-p-coumaroylquinic acid	leaves
	catechin	fruit
	texifolin	fruit

J. nigra	juglone	husk
	5-hydroxy-3-methyl-1,4-naphthoquinone	fruit
	(-)-egiolone	green husk
	α-hydrojuglone-4-glucoside	Bark of the stem
	5-caffeoylquinic acid	seed
	stigmasterol-3-O-glucoside	leaves
Juglans nigra& J. regia	1,4-naphthoquinone	fruit

Table 4

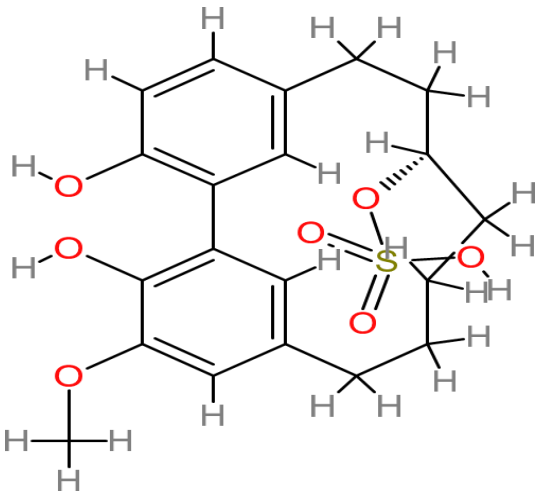


Figure 24 juglanin B (2)

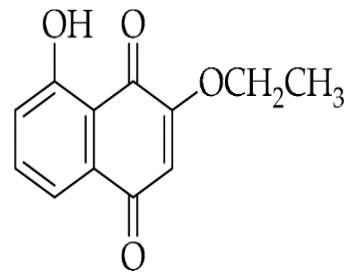


Figure 25 3-ethoxy juglone

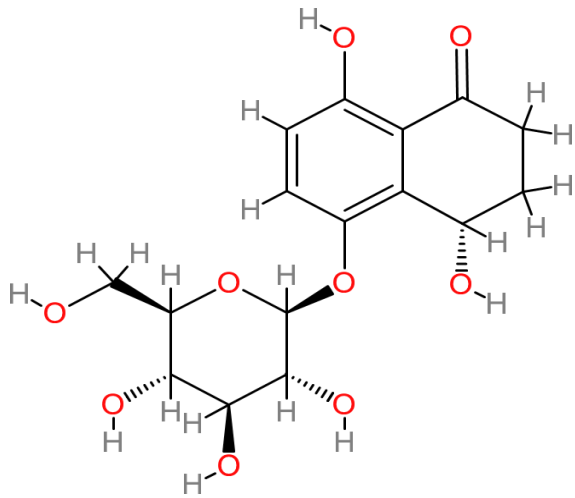


Figure 26 juglanoside E

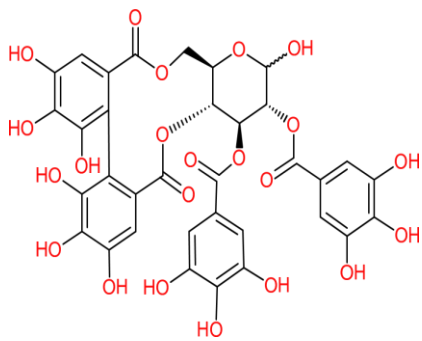


Figure 27 tellimagrandin I

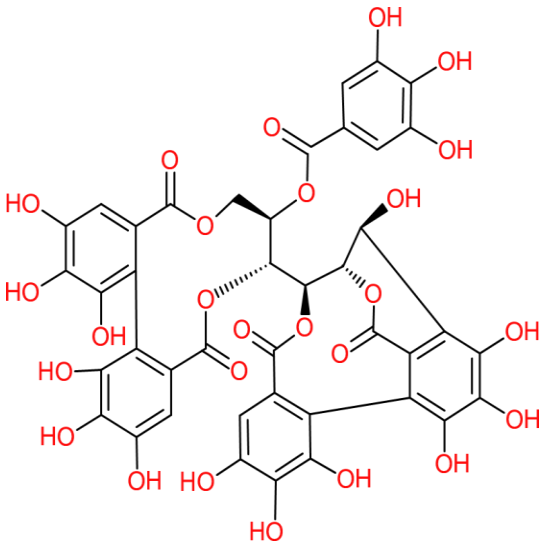


Figure 29 casuarinin

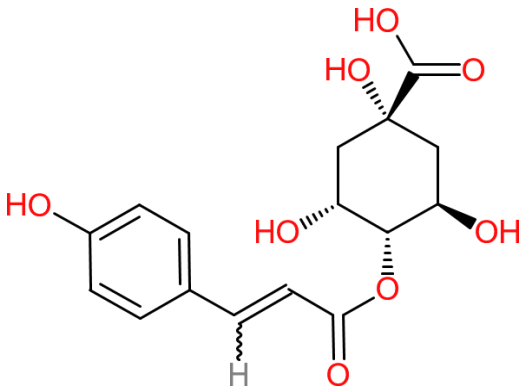


Figure 28 4-p-coumaroylquinic acid

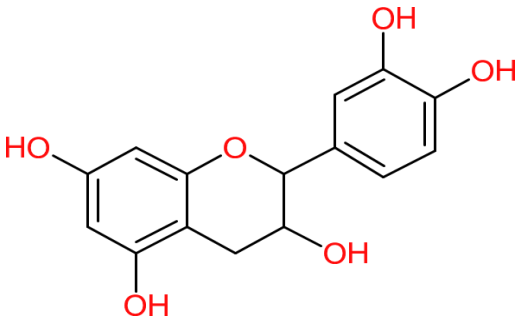


Figure 30 catechin

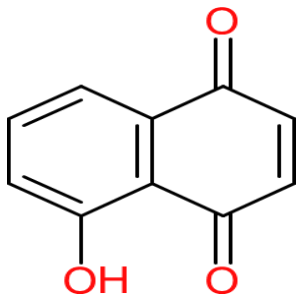


Figure 31 juglone

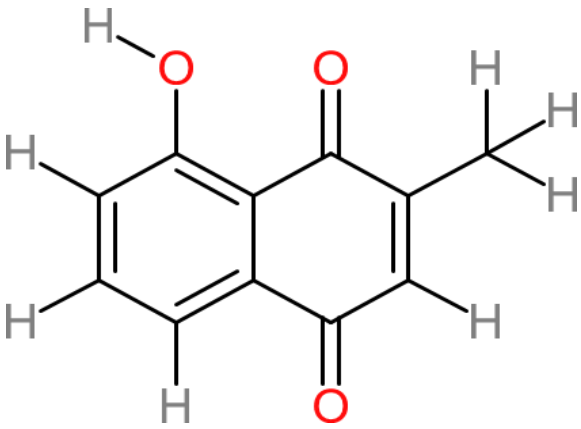


Figure 32 5-hydroxy-3-methyl-1,4-naphthoquinone

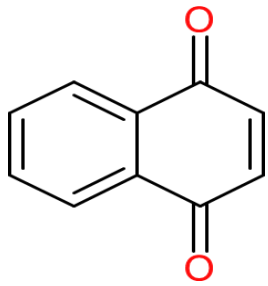


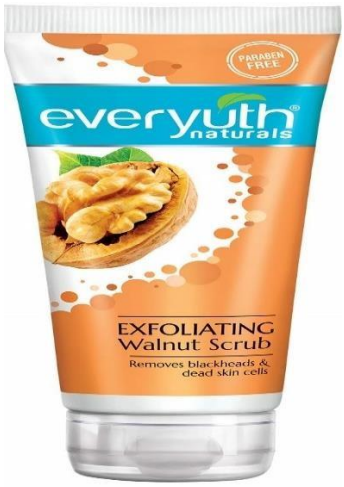
Figure 33 1,4-naphthoquinone

7.3 Effect against skin aging

Walnut consists of many constituents such as saponins, phenolic acids, tannic acid, flavonoids, etc., that play a role in different activities such as antioxidant, antimicrobial, anti-inflammatory, anticancer, etc. Phenolic compounds are chiefly responsible for antioxidant effect. The study conducted reported that the highest content of phenolic compounds and 2,2-diphenyl-1-picrylhydrazyl (DPPH) scavenging activity, was seen in methanolic extract of walnut seed(Ni et al., 2022). Moreover, walnut intake also reduces the ROS and inflammatory cytokine levels(Mateș et al., 2023). Other antioxidants present in walnut are flavonol, tannin, walnut quinone, etc(Ni et al., 2022). It also contains certain acids such as linolenic acid and linoleic that help regulate transepidermal loss of water(Datt Joshi & Singh, 2009). Due to its hydrogen-providing and free radical scavenging properties, walnut oil is used in many cosmetic products as anti-ageing creams(Datt Joshi & Singh, 2009; Ni et al., 2022).

7.4 Marketed products

BRAND NAME: - RROVALO
PRODUCT NAME:- Foaming face wash
INGREDIENTS:- Walnut Extract; Witch Hazel Extract, Salicylic Acid(1%, Encapsulated),Aloe Vera Extract
USE:- decrease sebum production, anti inflammatory



BRAND NAME: - EVERYUTH
PRODUCT NAME:- Exfoliatng walnut Scrub
INGREDIENTS:-Glycerin, Triethanolamine, Triclosan, Carbomer, Methyl Paraben, Laminaria Digitata Extract, Tocopheryl Acetate, Lecithin, Glyceryl Linoleate, Glyceryl Linolenate, Retinyl Palmitate, Sodium Ascorbyl Phosphate, Xanthan Gum, Liquid Paraffin, Walnut Shell Powder, Cetostearyl Alcohol, Cetyl Phenoxyethanol, Disodium EDTA, Butylparaben, Ethylparaben, Isobutylparaben, Propylparaben, Diatomaceous Earth Color, Saffron Yellow Fcf,
USE:- Exfoliates Dead Skin Cells and Impurities

BRAND NAME: - DEVE HERBS
PRODUCT NAME:- Pure walnut oil
INGREDIENTS:- omega 3, vitamin B, walnut oil
USE:- free from radicals, reduce lines and wrinkles

8. CUCUMBER

8.1 Introduction

The plant Cucumis sativus L. is a member of the Cucurbitaceae family, produces fruit that has been a staple of the traditional Mediterranean diet since ancient times. This Mediterranean diet is high in natural antioxidants and reduces the risk of cancer and heart disease (Sotiroudis et al., 2010). Cucumber is a seasonal vegetable crop that is globally grown for commercial use. It is indigenous to India and can be found growing wild from Kumaun to Sikkim in the Himalayas. Other common names for it include cucumber (Eng.), Kheera, and kheer (Hindi)(Saeedi et al., 2020; Sotiroudis et al., 2010).

Figure 8a Cucumber

"Cucumis, C. sativus L" has the greatest economic value among the 30 species of Cucumis. Among the most important vegetables in the world, cucumber is the fourth most important one (Saeedi et al., 2020).There are a number of creeping vines in the cucumber family that are found throughout the world. There are hispidly hairy leaves on both the tralling and climbing types of this plant.

Leaves are simple alternates, deeply cordate, and three to five lobed on both the surfaces. They have dense denticulate margin with a long hairy margin. A yellow colour is characteristic of the flowers; the presence of clustered male flowers, carrying clinging, connective-colored anthers that are pressed against or raised above the cells, whereas female flowers are existing separately, thick frilly covered in very rounded based hairs(Mukherjee et al., 2013a). This plant has seeds like fish that are compressed, elongated, ellipsoidal, dorsoventrally convex, and have lateral rigidity, which make them distinctive from other plants(Saeedi et al., 2020). Dioscorides suggested using cucumber fruit or seeds to cure skin conditions and painful and difficult urination.They

are frequently used to treat a variety of skin issues, such as sunburn and swelling under the eyes(Sotiroudis et al., 2010). They are thought to have a reviving, healing, cooling, calming, anti-itching and emollient effect on skin that is irritated. The therapeutic potential of the plant's various parts, including the leaf, fruit, and seed, has been investigated.Multiple pharmacological activities have been described for the plant, including antioxidant, antibacterial, anti-wrinkle, anti-diabetic, and lipid-lowering potential. Demonstrated anti-elastase and anti-hyaluronidase activity due to its cosmetic potential(Ezekiel Tagwi Williams et al., 2020; Mukherjee et al., 2013a).The stems, leaves, and roots are commonly used in Chinese folk medicine as an antidiarrheal, detoxification, as remedy for gonorrhea(Ezekiel Tagwi Williams et al., 2020; Mukherjee et al., 2013a).

Determining the phytochemical and mineral composition of locally grown plants is important because the phytochemical and mineral compositions of plants vary not only by species but also by the environmental conditions in which they grow. To identify the phytochemical and mineral composition of cucumber was the goal of this study(Ezekiel Tagwi Williams et al., 2020). The fruit of C. sativus contains phytochemicals such as carbohydrates, steroids, glycosides, and flavonoids(Ezekiel Tagwi Williams et al., 2020; Insanu et al., 2022).

8.2 Constituents

CLASS	COMPOUND
triterpenoid	Cucurbitacin A, Cucurbitacin B, Cucurbitacin C, Cucurbitacin D, Cucurbitacin E, Cucurbitacin F, Cucurbitacin G, Cucurbitacin H, Cucurbitacin I, Cucurbitacin J, Cucurbitacin K, Cucurbitacin L glucoside, Q, dan R

Phenolic compounds	1. C. sativus quercetin 3-L-rhamnoside, apigenin 7-rutinoside, naringenin 7-O-β-D-glucoside, laricresinol 9-O-β-D-glucopyranoside, isorhamnetol 3-O-rutinoside, kaempferol 3-O-sambubioside 2. C. melo gallic acid, luteolin-7-glycoside, oleuropein, pinoresinol, amentoflavone
Vitamin and minerals	1. C. sativus
	Vitamin A, Vitamin B1,Vitamin B2, Vitamin B6, Vitamin C, Mg, Ca,Zn,Mn,K,Cu,Na 2. C. melo β-carotene, vitamin B1vitamin B2, vitamin B9, vitamin C, vitamin D, vitamin E, vitamin K, Fe,Na,Ca,N,P
Essential oils and fatty acids.	1. C. sativus 3-nonenal, E,Z-2,6-nonadienal, pentadecanal,tridecanal,9,17,octadecadienal, E,E-2,4-nonadienal, nonanal, 1-tetradecene, α-humulene 2. C. melo Palmitic acid, linoleic acid, stearic acid, oleic acid, α-spinasterol, stigmasta-7,22,25-trienol

Table 5

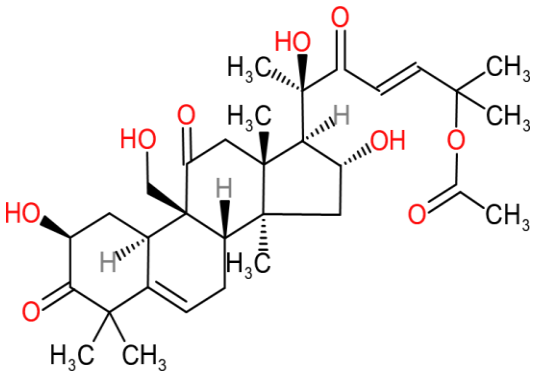


Figure 34 Cucurbitacin A

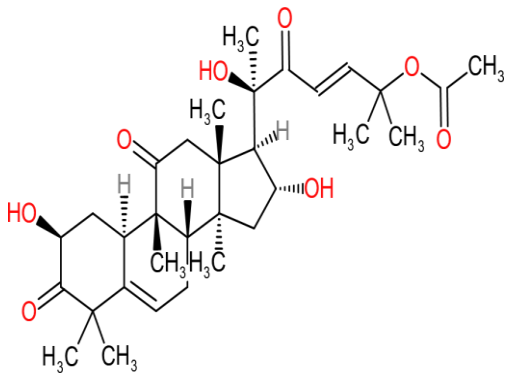


Figure 35 Cucurbitacin B

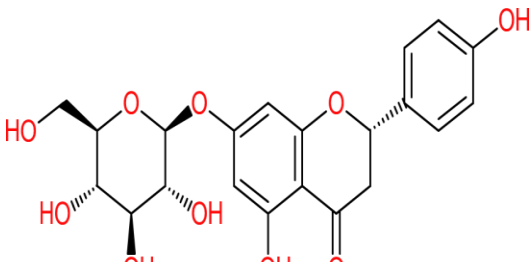


Figure 36 naringenin 7-O-β-D-glucoside

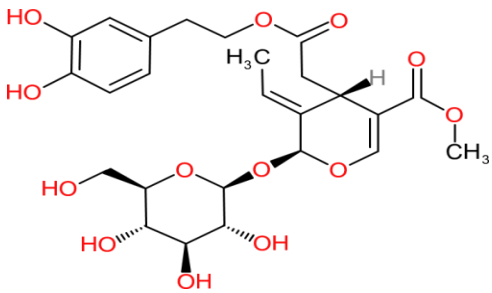


Figure 37 oleuropein 1

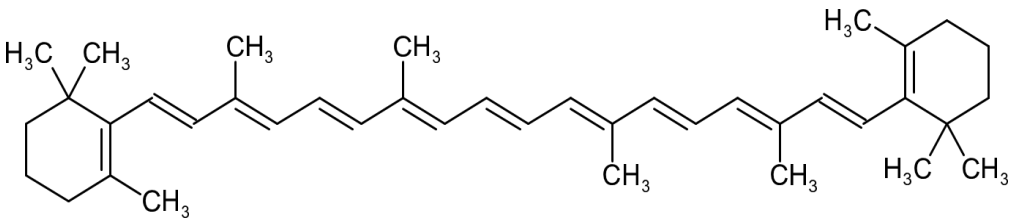


Figure 37 β-carotene

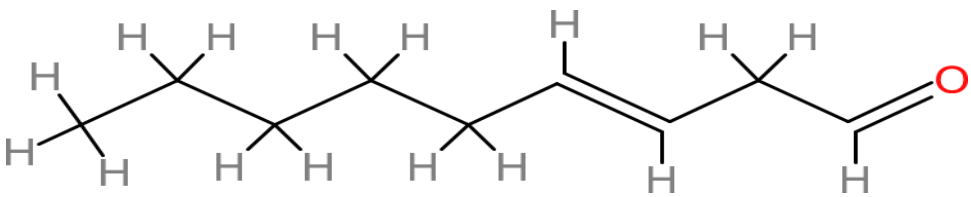


Figure 38 3-nonenal

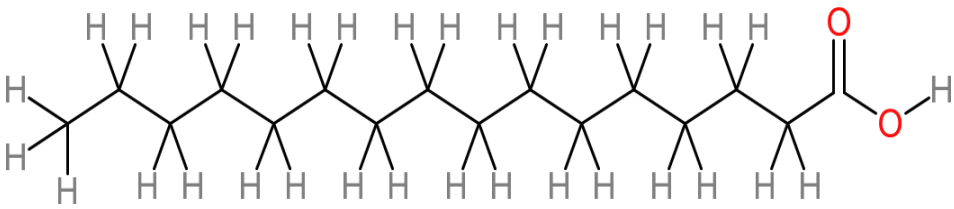


Figure 39 palmitic acid

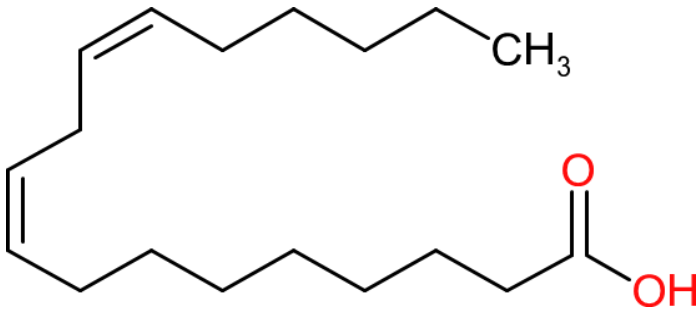


Figure 40 linoleic acid

8.3 Effect against skin aging

The *Cucumis sativum* plant has been connected to a number of pharmacological effects, such as, anti-aging, anti-microbial, antidiabetic, and hypolipidemic potential(Mukherjee et al., 2013b).Several anti-aging advantages of *Cucumis sativus* have been demonstrated, primarily because of its high level antioxidant content. Free radicals are chemicals that can harm cells and speed up ageing. Antioxidants aid in defending the body against them(Uthpala et al., 2020).Vitamin C, beta-carotene, and flavonoids are a few of the antioxidants found in Cucumis sativum, which may aid in reducing oxidative stress on the skin and slow down the ageing process(H. Murad, n.d.).

It contains vit C, which is essential for the production of collagen. It is a protein that provides strength and elasticity to the skin(Telang, 2013). A higher vitamin C consumption can promote the synthesis of more collagen, which keeps the skin looking healthy.(Nelson, 2006).

The 95% water content of cucumber can aid to hydrate the skin and stave off dryness. Fine lines and wrinkles, which are more obvious on dry skin, can be lessened with the help of this. Because of its tiny molecular size and ability to pass through the cell wall, glycolic acid is the most active and effective alpha hydroxyl acid for skin care. Once within the cell, it stimulates the production of new collagen, dermal glycosaminoglycans that expand the cell, and the ground material inside skin to lessen the visibility of wrinkles on the surface of the skin. The appearance of surface pigmentation and photodamage is improved by lactic acid(Chakraborty & Rayalu, 2021).

8.4 Marketed products

BRAND NAME: - COOLA
PRODUCT NAME:- Classic Face SPF 30 Lotion - Cucumber
INGREDIENTS:- Avobenzone, Homosalate, Ethylhexyl Salicylate, Octocrylene, Aloe Barbadensis Leaf Juice, Brassica Campestris Seed Oil, Butylene Glycol, Camellia Sativa Seed Oil, Caprylyl Glycol, Carthamus Tinctorius - Oleosomes, Carthamus -Tinctorius Seed Oil, Dimethicone, Silica, Squalane,
USE:- A mild sunscreen moisturizes and shields the skin from free radical damage, which can hasten the aging process.

BRAND NAME: - Botanical Beauty
PRODUCT NAME:- CHILEAN CUCUMBER SEED Carrier OiL
INGREDIENTS:-Cold-pressed carrier oil from cucumber seeds. Fully pure and natural. No animal testing, vegan, paraben-free, and 100% natural. Only apply cucumber seed carrier oil topically. Not to be used internally. With a dropper cap, a glass bottle. 10.3 ml to 0.33 fl ounce .
USE:-Damaged skin conditions like acne, psoriasis, eczema, sunburn, stretch marks, burns, cuts, and scars are treated by carrier oil. It assists in repairing dry, damaged skin. It works well for treating the face and neck and could even slow the onset of wrinkles. Additionally, apply it to trouble spots like the elbows and knees.

BRAND NAME: - MARIO BADESCU
PRODUCT NAME:- Cucumber cleansing lotion
INGREDIENTS:- water (eau), isopropyl alcohol, propylene glycol, cucumis sativus (cucumber) fruit extract, polysorbate 20, parfum (fragrance), sodium chloride, citronellol, coumarin, alpha-isomethyl ionone, ci 19140 (yellow 5), ci 42090 (blue 1)
USE:- Removes excess oil

9. GREEN TEA

9.1 Introduction

Figure 9a Green Tea

The Camellia sinensis (L.) 0. Kuntze plant, leaf, or beverage known as tea is now thought to be a single species. An evergreen plant family called Theaceae includes green tea(Arya et al., 2019; Reto et al., 2007). Sinensis and assamica are recognized as the two main varieties. The obvious distinction
between the main varieties in the field is the size of the leaves. Variant sinensis have tiny leaves (5-12 cm). The leaves of the Var. assamica can grow to be 20 cm long(Graham, 1992).

Green tea is grown without the use of fermentation, and it is processed with the least amount of oxidation possible. Black tea has traditionally been consumed all over the world, but due to its medicinal properties, green tea is becoming more popular. The presence of theanine, polyphenols, and caffeine in tea leaves affects how tea infusions taste. The level of fermentation has a significant impact on the quality and type of tea. Three categories of tea exist: green tea comes first (unfermented), oolong tea comes second (semi-fermented), and black tea comes third (fully fermented)(Kar & Saloni, n.d.). But out of all of these, it has been shown that consuming green tea offers the greatest advantages for human health.(Chacko et al., 2010b).

Extracts from green tea can be the starting point for products like dietary supplements, cosmetics, and various beverages. In the past few years, the health advantages of drinking green tea have been studied, including its potential for cancer and cardiovascular disease prevention, as well as its antioxidative, antibacterial, anti-inflammatory, antiangiogenic, antiviral, anti-arthritic and neuroprotective properties. However, it should be noted that there may be other significant health risks associated

with incorporating green tea into one's diet(Chacko et al., 2010b). Due to the cultural practices and processing parameters of various verities, these verities serve functional roles that vary(Kar & Saloni, n.d.).

Green tea is thought to contain about 4000 bioactive compounds, according to phytochemical studies. Chemicals known as bioactive compounds are those that are naturally present in plants as secondary metabolites(Arya et al., 2019). The composition of tea has been demonstrated to vary with climate and season, horticultural practises, and variation and the position of the leaf on the harvested leaf, that is, its age at the time of harvest(Graham, 1992). Aside from polyphenols, caffeine, amino acids, and other nitrogenous compounds, green tea also contains vitamins, inorganic elements, carbohydrates, and lipids. There are several components of the infusion, namely polyphenols, caffeine, theanine, and vitamins(Kar & Saloni, n.d.).

9.2 Constituents

CLASS	COMPOUND
Polyphenol (36%)	6 kinds of catechin: (-)-EGCG, e (-)-EGC, (-)-ECg, (-)-EC, (+)-GC and (+)-C
Amino acids and other nitrogenous compounds	Aspartic acid and arginine, theanine or 5-N-ethylglutamine, glutamic acid, glycine, serine, tyrosine, valine, leucine, threonine, tryptophan and lysine
Alkaloids (3-4%)	methylxanthines, tryptophan, caffeine, theobromine, and theophylline
Vitamins	Vitamin C (ascorbic acid)
Minerals (6-8%)	Magnesium, calcium, chromium, copper, zinc, iron, molybdenum, manganese, selenium, sodium, phosphorus, strontium, nickel, potassium, fluorine, and aluminium
trace amounts	lipids (linoleic and a-linolenic acids), sterols (stigmasterol), xanthic bases (caffeine, theophylline), pigments (chlorophyll, carotenoids)

Carbohydrates	cellulosic fibre, glucose, fructose, starch, pectins, sucrose
volatile compounds (>0.1%)	aldehydes, alcohols, esters, lactones, hydrocarbons

Table 6

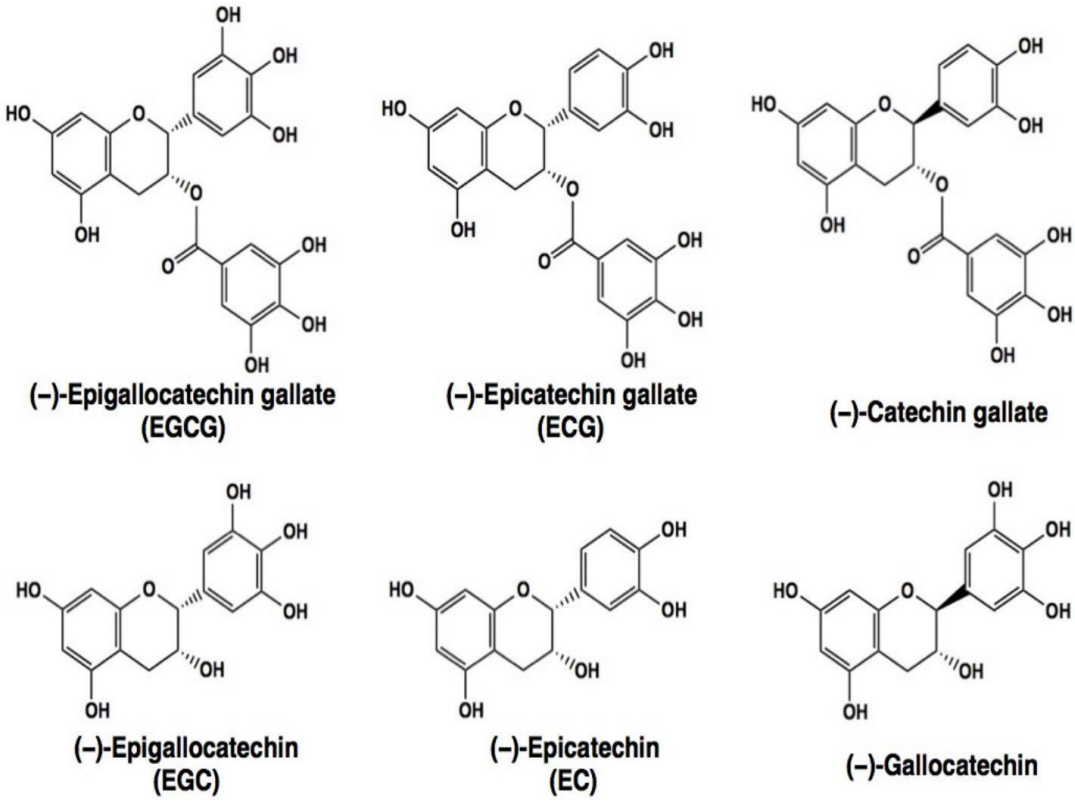


Figure 41

9.3Effect against skin aging

The skin is protected by green tea polyphenols from the ultraviolet (UV) irradiation-induced acceleration of skin ageing through the avoidance of immunosuppression as well as anti-melanogenic, antiwrinkle, antioxidant, and anti-inflammatory properties. Deep wrinkles and tissue elasticity loss are caused by the destruction of fibrillar collagen and elastic fibres brought on by UV irradiation. Accelerated photoaging is also a result of free radicals created by UV light(Roh et al., 2017). Polyphenols include catechins, i.e., epicatechin (EC), epicatechin gallate (ECG), epigallocatechin (EGC), and epigallocatechin gallate (EGCG). These all known as green tea polyphenols (GTPP). EGCG is most abundantly found among these polyphenols and is extensively studied for its effect on the skin(Bedrood et al., 2018).

As mentioned earlier, free radicals or excessive production of reactive oxygen species can damage lipids, proteins, DNA, leading to skin-related diseases. This can be controlled with the help of GTPPs, which chelate metal ions and lessen cellular damage from free radicals. In addition, a study concluded that when compared to control groups, GTPP can also enhance fibroblast cell shape and absolute cell numbers(OyetakinWhite et al., 2012).EGCG was also found to decrease the expression of collagenase in human epidermal fibroblasts in culture(Hsu, 2005).

Thus, GTPPs protect the skin from oxidative stress due to UVB radiation and DNA damage, thereby preventing premature ageing(OyetakinWhite et al., 2012).

9.4 Marketed products

BRAND NAME: - BELEZALIB (AirroYE)
PRODUCT NAME:- Green Tea Cleansing Mask Stick,
INGREDIENTS:- NATURAL INGREDIENTS :OIL, VITAMIN E, GLYCERIN
USE:- Effectively clean up dirt skin and impurities, Remove excess oil from pores to balance water

BRAND NAME: - INNISFREE
PRODUCT NAME:- Green tea seed serum
INGREDIENTS:- the following ingredients: ethanol, glycerin, betaine, propanediol, biosaccharide gum-1, and green tea extract (74.9%) Citrus aurantium bergamia extract, grapefruit extract, orange extract, tangerine extract, prickly pear extract, orchid extract, tangerine peel extract, green tea seed oil (208mg), Acrylates/C10-30 Alkyl Acrylate Crosspolymer, Hydroxyethyl Acrylate/Sodium Acryloyldimethyl Taurate Copolymer, Ethylhexylglycerin, Cocoa Extract, Dextrin, Potassium Hydroxide, Disodium EDTA, Bis-PEG-18 Methyl Ether Dimethyl Silane, PEG-60 Hydrogenated Castor Oil, Fragrance
USE:- Features Dual Moisture-Rising Technology to create a strong protective barrier that seals in moisture for lasting hydration

BRAND NAME: - INNISFREE
PRODUCT NAME:- Green tea seed cream
INGREDIENTS:- Water (aqua), Propanediol (propanediol), Glycerin (glycerin), Methyl Trimethicone (stearyl dimethicone), Butylene Glycol Tetraethylhexanoate (butylene glycol tetraethylhexanoate), Camellia Sinensis Seed Oil (camellia sinensis seed oil), Polymethylsilsesqui
USE:- is a day and night moisturiser that keeps your skin barrier in tip-top shape and floods skin with long-lasting hydration, quenching desert-like thirst

10. CONCLUSION

With more number of people aiming to look good and young with smooth and even skin, the use of anti-ageing products is increasing. This has led to the increase in use of aloevera, green tea and cucumber for the same and they have become a household name.In addition to having other skin benefits like moisturising and anti-inflammatory effects, aloe vera contains a variety of bioactive compounds, including minerals, amino acids, vitamins, polysaccharides, which have an anti-aging effect by stimulating the production of collagen and elastin fibres in the fibroblast.

Research has indicated that using amla-based products topically or ingesting amla may enhance the texture, look, and suppleness of skin through a number of mechanisms, as well as lessen the indications of sun damage.

Walnut protein and avocado are also slowly gaining momentum. Further research into the various constituents present in avocado seed rich in vitamins, antioxidants and polyphenols can give more insight into its effect as anti-ageing product.

These anti-aging substances have received a lot of interest recently because of their potential to increase lifespan and improve health. Anti-aging bio functional substances come in a wide variety of forms, each with special features and modes of action. It is critical to keep studying these substances to find out which ones are best for treating various aging-related diseases and to identify any possible drug interactions or contraindications. Finally, the demand for efficient anti-aging treatments will increase as the population ages and age-related diseases become more common. For improving quality of life for aging individuals and lowering the impact of age-related illnesses on society, ongoing research in this area is crucial.

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