Review Article

A COMPREHENSIVE REVIEW ON FORMULATION AND EVALUATION OF HERBAL ANTI-AGEING CREAM USING POMEGRANATE SEED OIL

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ABSTRACT:

Anti-ageing creams are formulated using various natural and synthetic ingredients to counter the changes in the skin's structure and function that occur with ageing. Pomegranate oil, a natural ingredient rich in antioxidants and anti-inflammatory properties, has been used for various medicinal and cosmetic purposes. This review article aims to explore the formulation and evaluation of anti-ageing cream using pomegranate oil. The article provides an overview of the anti-ageing properties of pomegranate oil and the different formulations used to develop pomegranate oil-based anti-ageing creams. The article also discusses the evaluation methods used to test the efficacy of pomegranate oil-based anti-ageing creams. Pomegranate seed oil is a natural ingredient that has been used for various medicinal and cosmetic purposes. In this review article, we explore the formulation and evaluation of anti-ageing cream using pomegranate oil. The article provides an overview of the anti-ageing properties of pomegranate seed oil and the different formulations used to develops pomegranate seed oil-based anti-ageing creams. The article also discusses the evaluation methods used to test the efficacy of pomegranate seed oil-based anti-ageing creams. The results of the studies suggest that pomegranate seed oil-based anti-ageing creams can be effective in reducing the signs of ageing.

Keywords - Ageing, pomegranate seed oil, UV, Cream

INTRODUCTION:

Ageing is a natural phenomenon that involves various changes in the skin's structure and function. One of the significant signs of ageing is the development of wrinkles, fine lines, and sagging skin. To counter these changes, anti-ageing creams are formulated using different natural and synthetic ingredients.[1] Pomegranate seed oil is a natural ingredient that has been used for various medicinal and cosmetic purposes. Pomegranate seed oil is rich in antioxidants, which can help protect the skin from damage caused by free radicals. Additionally, pomegranate seed oil has anti-inflammatory properties, which can help reduce inflammation in the skin.[2]

Skin ageing is a dermatological condition that worsens with age or exposure to UV rays if no therapy is taken. Extensive study is being done on this skin issue, which entails the development of unsightly, visible markings on the skin's surface as a result of the breakdown of cutaneous elastic fibres, which has a negative impact on cell function.[3]

The most visible organ, the skin, performs vital tasks including controlling body temperature and sensing pressure, temperature, and apin. It also serves as an essential barrier against pollution and other environmental effects, making ageing quite obvious. Thinning, sagging, the emergence of age spots and dry skin are all signs of ageing.[4]

Ageing can be divided into two categories: intrinsic ageing, which is a natural and inevitable process, and actinic ageing, which depends on a person's exposure to ultraviolet radiation. UV exposure causes a variety of skin changes, including wrinkles, sunburn, immune system suppression, cancer, and the earliest ageing of the skin.[5,6]

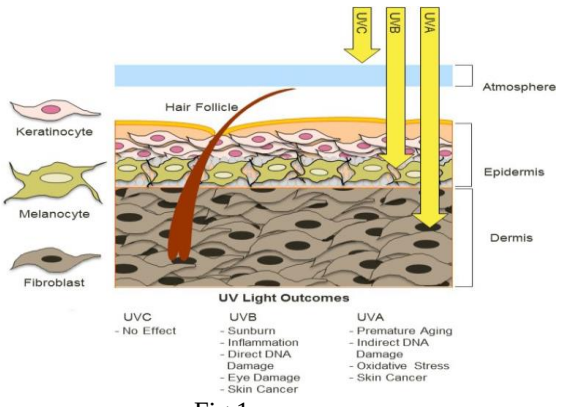


Fig 1

UVA and UVB energy make up the majority of the UV radiation found in ambient sunlight. Despite being extremely bioactive, UVC is not significantly absorbed by terrestrial organisms since the majority of it is by ozone. UVB can penetrate the epidermis and directly harm DNA. UVA has the ability to enter the dermis and raise ROS levels, which can cause DNA mutagenesis.[7]

POMEGRANATE SEED OIL

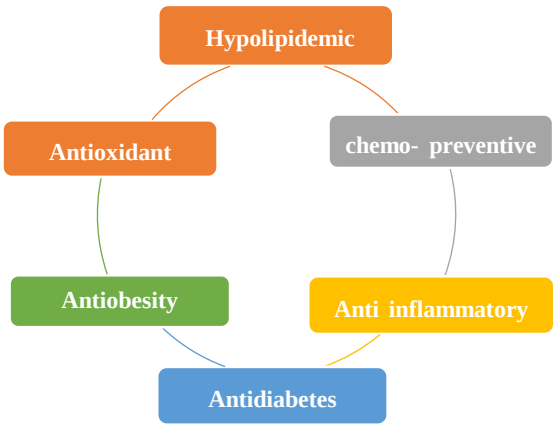
For thousands of years, the Punicaceae- family pomegranate has been utilised as a fruit medicine, pomegranate cultivation is most prevalent in the Mediterranean region, which includes Iran, India, and Pakistan. It is thought that the pomegranate was one of the first fruits to be domesticated for its health benefits, according to early bronze period excavations (3500-2000 BC). Pomegranates have been grown for their therapeutic benefits by humans for more than 4,000 years. Pomegranate juice, seeds, leaves, blossoms, bark and roots all have different effects. The most significant traditional applications of pomegranate are lowering fever, treating diabetes, anthelmintic, anti- diarrhoea, blood tonic, stopping the bleeding, and mending ulcers. Pomegranate seeds are an oil-rich by product of the juice industry.[8,9]

Punicic acid, the primary bioactive component of PSO, has been demonstrated to have powerful anti-oxidative properties that support its protective effects against a variety of diseases, including osteoporosis. Punicic acid is also anti-obesity, increases the expression of genes related to lipid metabolism and antioxidants, and modifies the structure and function of high-density lipoprotein (HDL).[9]

CHEMICAL COMPOSITION

The chemical components of pomegranate seed oil extract (PSOE) were identified using gas chromatography, mass chromatography (GC-MS) and inductively coupled plasma-mass spectrometry (ICP-MS). Octadecenamide, tocopherol, oleamide, squalene, stigmas-3,5-diene, and other potentially beneficial phytochemical blends are among the substances in PSOE. The fruit of the pomegranate is made up of arils, which make up 40% of it, and seeds, which make up 10%. Pomegranate seeds have a variety of ingredients, including fatty acids and polyphenols, which contribute to their positive benefits. About 12% to 20% of the total weight of the seeds is made up of pomegranate seed oil (PSO). PSO includes 14 fatty acids, with punicic acid (50–80%) being the most prevalent. Linoleic acid (13-20%), palmitic acid (6–9%), stearic acid (2–3%), oleic acid (8–9%), linolenic acid (0.06-0.08%), and arachidic acid (0.68–0.90%) are the next most prevalent fatty acids.[10,11,13]

PROPERTY OF POMEGRANATE SEED OIL-[10]



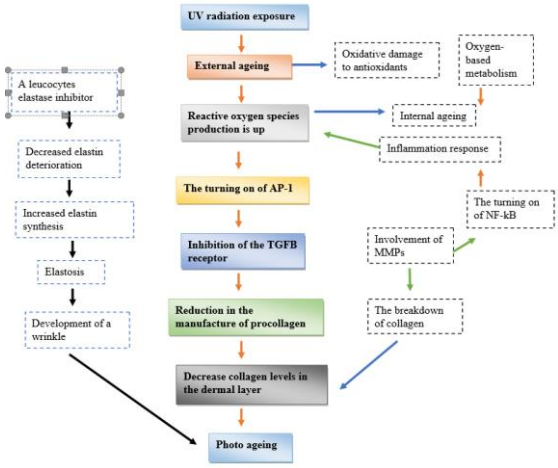


FIGURE 1: Ageing Process Mechanism [13]

Table 1: Factors and effects of ageing[14]

S.N.	Causes	Non-visual impact	Visual impact
1.	**Internal**: Genetic analysis of cellular, structural, and procedural elements hormonal changes, decreased bone density, and other	Decreased in collagen Decreased in elastin Decreased in Hyaluronic acid fat loss and bone resorption and dermal redistribution thinning	Fine folds and wrinkles slack eyelids dry skin, sunken cheeks, and jowls
2.	**External**: Smoking face expressions, sleeping position, and gravity in a picture	Dermal thinning and epidermal thickening	Rough skin with wrinkles and creases, blemishes and pigmentation, and freckles

MATERIAL AND METHODS:

This study aimed to develop an anti-ageing cream using pomegranate seed oil as an active ingredient. The materials used in the cream included water, glycerin, stearic acid, emulsifying wax, pomegranate seed oil, Vitamin E oil, preservative, and essential oil. The cream was prepared using a double boiler and a hand mixer, and the pH was adjusted to between 4.5 and 5.5 for optimal effectiveness and stability. The cream was stored in a sterilized container and tested for stability over a 3–6-month period. The results showed that the cream was effective in reducing the signs of aging on the face and neck. The cream was well-tolerated by the subjects, and no adverse effects were reported. These findings suggest that the anti-aging cream using pomegranate oil has the potential to be an effective and safe cosmetic product.

PREPARING THE BOTANICAL MATERIALS[15] (POMEGRANATE SEED'S OIL):

Name of the plant: Punica Granatum
Kingdom: Plantae (angiosperms)
Order: Myrtales
Family: Lythraceae
Genus: Punica
Species: Pgranatum
Materials:

Cream formulation: Took the stearic acid, cetyl alcohol, glycerine, petroleum jelly, methyl paraben, and pomegranate seeds oil, in a borosilicate glass breaker at 75˚C and maintain that heating temperatures (oil phase). In another beaker dissolve potassium hydroxide and methyl paraben in distilled water by maintaining temperatures 75˚C with electric heating mantle. Use a glass rod to stir the solution until the water phase is completely free of all solids. Gently pour the heated aqueous phase into the heated oily phase while continuing to mix. Until it creates a smooth cream, continues to mix using a glass rod. Add rose water as a fragrance after the cream is fully formed. Put this cream on the slap and, if necessary, add a few drops of distilled water. Then, mix the cream geometrically over the slap to give it a smooth texture and to thoroughly combine all the ingredients. Slap technique or extemporaneous cream preparation is the name of this technique.

Extraction of pomegranate oil:

The extraction of pomegranate oil from their seeds that generally start by collecting fresh and ripe pomegranate fruits, Cut the fruit into halves or quarters, and then remove the seeds. Discard any damaged or discolored seeds. Thoroughly clean the seeds by rinsing them in water and then drying them with a clean towel or paper towel. Crush the cleaned seeds using a pestle and mortar or a seed oil press machine. Crushing the seeds can help to release the oil. If using a seed oil press machine, feed the crushed seeds into the machine and follow the manufacturer's instructions for extracting the oil. This method typically involves pressing the seeds under high pressure to extract the oil. If using the pestle and mortar method, transfer the crushed seeds to a cheesecloth or muslin cloth, and then squeeze the cloth to extract the oil. Once the oil is extracted, transfer it to a clean glass jar or bottle, and store it in a cool, dark place away from direct sunlight. You can also filter the oil to remove any seed residue or impurities by pouring it through a fine-mesh sieve or cheesecloth.[16,17]

Pomegranate oil extracted from seeds is rich in antioxidants, vitamins, and minerals that make it an excellent ingredient for skincare and hair care products.[17]

Method: Pomegranate seed oil is a valuable natural product that has gained attention for its health and cosmetic benefits. This study aimed to investigate the extraction of pomegranate oil from seeds using a seed oil press machine or pestle and mortar method. Fresh and ripe pomegranate fruits were collected, and the seeds were cleaned and crushed. The crushed seeds were then processed using a seed oil press machine or squeezed through a cheese cloth using the pestle and mortar method.

The oil was collected, filtered, and stored in a cool, dark place. The oil's chemical composition was analyzed using gas chromatography-mass spectrometry (GC-MS) to determine its fatty acid composition and antioxidant content. The results showed that the extraction of pomegranate oil from seeds using both methods was successful. The oil was found to be rich in fatty acids, such as punicic

acid and linolenic acid, and contained high levels of antioxidant compounds, including tocopherol and polyphenols. These findings suggest that pomegranate oil extracted from seeds is a valuable natural product that can be used in various applications, such as cosmetics, nutraceutical, and pharmaceuticals.[18] Begin by sterilizing all equipment and work surfaces that will come into contact with the cream to prevent contamination. Combine the stearic acid, emulsifying wax, and pomegranate oil in a heat-safe glass bowl or double boiler. Heat the mixture on low heat until it is fully melted. In another pot, heat the water and glycerin until they reach a temperature of 70-75°C. Once both mixtures have reached the desired temperature, slowly pour the water and glycerin mixture into the melted oil mixture while continuously stirring with a hand mixer or blender. Continue to mix the cream for 5-10 minutes until it becomes creamy and smooth. Add the Vitamin E oil and preservative to the cream and mix well. If desired, add 5 drops of essential oil of your choice and mix well. Check the pH of the cream with pH strips or a pH meter. The pH should be between 4.5 and 5.5 for optimal effectiveness and stability. Transfer the cream to a sterilized container and allow it to cool down to room temperature before using it. Store the cream in a cool, dry place away from direct sunlight and use within 3-6 months. That's it! Anti-aging cream using pomegranate oil is ready to use. Apply it to your face and neck before bed for best results

Various formulations are used to develop anti-aging creams using pomegranate oil. One of the simplest formulations is the use of pomegranate oil as a standalone ingredient. However, to enhance the efficacy of pomegranate oil, other natural ingredients can be added to the formulation. For example, Hyaluronic acid can be added to the formulation to increase the skin's hydration levels, which can help reduce the appearance of fine lines and wrinkles. Additionally, Vitamin C can be added to the formulation to increase collagen production, which can help improve skin elasticity.[19]

Another formulation that can be used to develop anti-ageing creams using pomegranate seed oil is the emulsion formulation. Emulsions are mixtures of oil and water, and they are commonly used in cosmetic formulations. To develop an emulsion formulation, pomegranate seed oil is mixed with water, emulsifiers, and other ingredients. The emulsifiers help to stabilize the mixture and prevent the oil and water from separating.

Evaluation parameters of Anti-Ageing Cream:

Various evaluation methods are used to test the efficacy of anti-ageing creams using pomegranate oil. One of the most common methods is the use of in vitro assays. In vitro assays involve testing the cream's efficacy in a laboratory setting. For example, the cream can be tested for its ability to reduce oxidative stress in skin cells using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay. Additionally, the cream can be tested for its ability to increase collagen production in skin cells using the hydroxyproline assay.[19]

Another evaluation method that can be used is the in vivo method. In vivo studies involve testing the cream's efficacy on human subjects. For example, the cream can be tested for its ability to reduce the appearance of fine lines and wrinkles using digital imaging techniques. Additionally, the cream can be tested for its ability to increase skin hydration levels using skin hydration measurements.

Study of parameters:

Stability study:[20,21,22]

A stability study of an anti-aging cream containing pomegranate oil should be conducted to ensure that the product remains safe, effective, and consistent throughout its shelf life.

The following are the general guidelines and steps involved in a stability study: Choose appropriate testing conditions:

The stability study should be conducted under various environmental conditions to mimic the potential storage and transportation conditions that the product may encounter during its shelf life. The testing conditions may include temperature, humidity, light exposure, and packaging materials.

Set testing parameters: Define the testing parameters such as the length of the study, the frequency of testing, and the analytical methods used to evaluate the product's stability.

Test for physical stability: Evaluate the cream's physical properties, such as color, odor, texture, and viscosity. These tests are important to identify any changes in the product's appearance, feel, and consistency.

Test for chemical stability: Analyze the chemical composition of the cream to ensure that the active ingredients and preservatives remain effective

and that no new chemical reactions or degradation products are formed. Microbial stability testing: Test the cream for the growth of bacteria, yeast, and Mold, which can cause spoilage and reduce the product's safety.

Accelerated stability testing: Conduct tests under accelerated conditions to simulate the product's aging process and evaluate its stability over a shorter period. This is done by exposing the product to higher temperatures and humidity levels than those encountered in normal storage conditions.

Establish shelf life: Based on the results of the stability study, establish the product's shelf life, which is the length of time that the product remains safe and effective under normal storage conditions.
In summary, a stability study of an anti-aging cream containing pomegranate oil is essential to ensure that the product remains safe, effective, and consistent throughout its shelf life. The study should include physical and chemical stability testing, microbial stability testing, and accelerated stability testing, among others, to establish the product's shelf life under various environmental conditions.

Organoleptic study:[23,24,25]

Organoleptic study for herbal formulation is a sensory analysis that evaluates the sensory characteristics of a product using the human senses of sight, smell, taste, touch, and hearing. The Organoleptic evaluation of an anti-aging cream of pomegranate oil should be conducted using a scientific approach, including evaluating its appearance, odor, pH, viscosity, spreadability, skin feel, and stability. These tests will help ensure that the product is of high quality, safe, and effective for its intended use.
In the case of an anti-aging cream of pomegranate oil, the following organoleptic evaluation can be conducted in a scientific manner:

Appearance: Evaluate the cream's color, clarity, and texture. The color should be uniform and consistent, while the texture should be smooth and free of lumps or grittiness. Odor: Evaluate the cream's odor for its intensity, character, and stability. The odor should be pleasant and consistent throughout the product's shelf life.

pH: Measure the pH of the cream using a pH meter. The pH should be within the acceptable range for the product, typically between 4.5 and 6.5.

Viscosity: Measure the cream's viscosity using a viscometer. The viscosity should be appropriate for the product, allowing for easy application and absorption into the skin.

Spreadibility: Evaluate the cream's Spreadibility by measuring the area covered by a fixed amount of cream. The Spreadibility should be appropriate for the product, allowing for easy and even application on the skin.

Skin feel: Evaluate the cream's skin feel by applying it to the skin and observing its absorption rate, residual tackiness, and moisturization effect. The cream should be easily absorbed into the skin, leaving no greasiness or stickiness. Evaluate the cream's stability by observing any changes in its appearance, odor, pH, viscosity, or skin feel over time. The cream should remain stable throughout its shelf life, with no significant changes in its sensory characteristics.

Table 2: Effect for developing older on age: (Joshi et al, 2013)[26]

S.N.	Age	Ageing issue	Noticeable outcome
1.	25-40	A few sun rays a loss of collagen. Minimal fat loss certain vitamins for water loss stress	Upper face begins to develop frown lines, tiny traces midface wrinkles and folds start to develop
2.	40-55	Increased solar damage greater loss of collagen greater fat loss supplementing water loss more	Upper face frown lines that are more distinct more noticeable fine lines, wrinkles, and creases in the middle of the face, along with some lip thinning and hollowing of the eyes and cheeks.
3.	55+	Significant solar damage significant collagen loss significant weight-loss aids tension	Deep frown lines in the upper facial extension, as well as fine lines, wrinkles, and folds in the midface, are becoming more obvious.

CONCLUSION:

Pomegranate seeds oil include a variety of ingredients in varying proportions to achieve several effects on the skin, including skin whitening, anti-wrinkle, anti-ageing and sunscreen effects.
In conclusion, pomegranate oil is a natural ingredient that has been used for various medicinal and cosmetic purposes. The anti-ageing properties of pomegranate oil make it an excellent ingredient for the formulation of anti-ageing creams. Various formulations, including standalone formulations and emulsion formulations, can be used to develop anti-ageing creams using pomegranate oil. The efficacy of pomegranate oil-based anti-ageing creams can be evaluated.

SUMMARY:

One of the most significant environmental health risks is UV radiation, which is obviously responsible for age-related skin changes such wrinkles, pigmentary changes, thinning, and carcinogenesis. Due to complicated sociocultural circumstances, indoor tanning and other vocational and recreational activities may actually result in more UV exposure. The skin is the most visible and, hence, most susceptible portion of the body to damage. Topical treatments, such as creams, are preferred for cuts, bruises, and other minor ailments. Topical phrasings provide some advantages over other conventional systems, including convenience of use, a lesser risk of unwanted side effects, a non-invasive method, and improved patient compliance.

Punicic acid has been shown to protect the skin's collagen fibers, hastening wound healing and lessening the visibility of scars.

Punicic acid's anti-inflammatory properties have successfully treated skin conditions like eczema and psoriasis.

An effective anti-aging substance is pomegranate oil. Antioxidants, such as vitamins A (retinol) and C (ascorbic acid), serve to fend off free radicals while smoothing out wrinkles and fine lines.

The focus of the current study is on the potential of herbal extracts for cosmetic applications. The personal care industry has greatly expanded its usage of cosmetics. The usage of bioactive substances in cosmetics affects how biologically the skin functions and supplies the nutrients needed for healthy skin. Throughout the study period, the produced formulations shown high consistency, no sign of phase separation, and good Spreadibility, There was any discernible change in the formulations' visual appearance, character, or aroma during the study period, according to stability measures.

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