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## Pomegranate Peel Extract as a Potential Anti-Aging Agent in Cosmetic Serum Formulation

Aishwarya Deshmukh, Dr. Deepti Pandey, Dr. Sonal Dhabekar

Department of Cosmetic Technology, Lady amritabai daga college,

Seminary hills, Nagpur, Maharashtra, India

**Corresponding Author**

**Aishwarya Deshmukh**

### Abstract

Skin aging can happen because of genetics or things like pollution, sunlight, and oxidative stress. People are more interested in cosmetics that use natural ingredients these days because they are safer and better for the environment. Punica granatum, or pomegranate peels, are often thrown away, but they have important phytochemicals like punicalagin, ellagic acid, gallic acid, and flavonoids. These substances are very good at fighting free radicals, inflammation, and aging. This review discusses the integration of pomegranate peel extract into serum formulation to achieve anti-aging properties. It involves getting pomegranate peels out of the fruit and testing their phytochemicals, as well as making and testing serum.

**Keywords-** Pomegranate peel, Punica granatum, Anti-aging serum, Natural ingredients, Herbal cosmetic

### Introduction

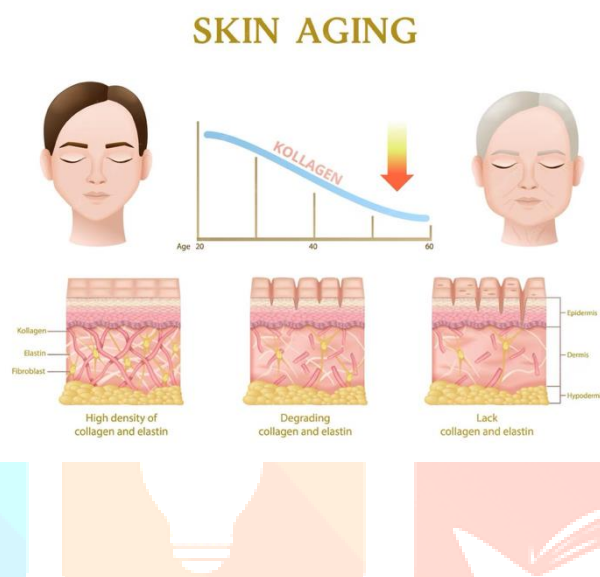
Skin, besides being the largest organ of the body, also act as protection against environmental damage. The ultraviolet radiation, pollution and lifestyle habits leads to the production of free radicals, that causes oxidative stress, which results in wrinkles, dryness of skin, loss of elasticity and uneven skin tone.

In recent times, the demand for plant-based cosmetic products has increased because of their safety, effectiveness and lesser side effects as compared to synthetic products. Pomegranate peels are one of them, which contain both medicinal and cosmetic benefits. While the consumption of pomegranate fruit is highly widespread, its peels are mostly thrown away and are found to have high content of polyphenols, flavonoids, tannins, phenolic acids, along with punicalagin which is the principal bioactive component. Serums refer to cosmetics that are lightweight and easily absorbable and are rich sources of active ingredients that are directly absorbed by the skin. The inclusion of extracts of pomegranate peels in serums can help develop anti-aging cosmetics that are both natural and effective.

This study is carried out to give a comprehensive idea regarding phytochemical components, their extraction process, inclusion in the formulation of serums and their pros and cons along with developing the product from waste materials.

## Skin aging mechanism

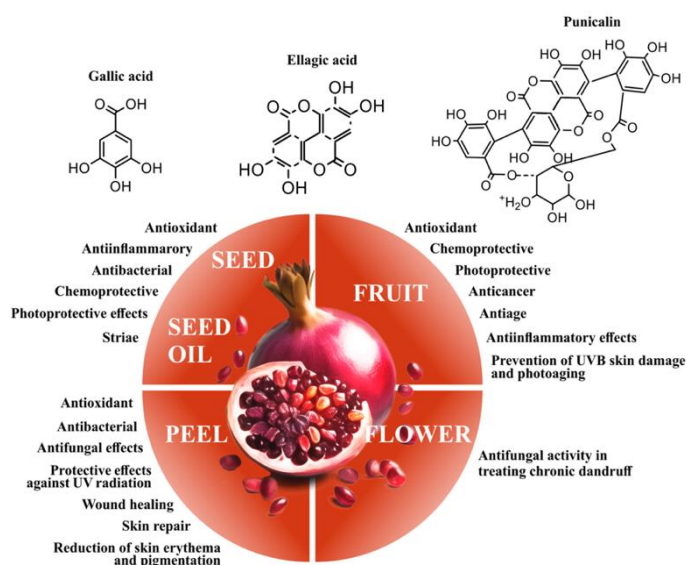
Aging of the skin is a complex phenomenon that is caused by several internal and external factors and ultimately leads to the alteration of its physical appearance and function. The intrinsic causes are associated with the genetic background of a person and are referred to as chronological or genetically programmed aging. As time passes, the cells' capacity for division decreases while collagen levels decline resulting in skin's inability to restore itself at the same rate as before. At the same time, there are extrinsic factors contributing to the aging process. Aging due to external factors is related to the impact of environmental stimuli such as ultraviolet light, exposure to air pollutants, and even lifestyle-related activities such as smoking. Possibly, constant stimulation is the factor that intensifies the process of aging by accelerating the existing genetically programmed deterioration.



## Pomegranate peel

The Pomegranate peel (*Punica granatum* L.) is small trees belonging to the family Lythraceae (previously named Punicaceae) native to the Middle East but now grown all over the Mediterranean area, China, India, South Africa, North and South America. The Pomegranate peels form 26-30% of their total weight.

It has been found out that the Pomegranate peels are an excellent source of various phytochemicals such as phenolic acids (gallic acid, caffeic acid, ferulic acid, cinnamic acid, p-coumaric acid, ellagic acid, vanillic acid), flavonoids (catechin, epicatechin, quercetin, rutin, punicalin). These phytochemicals are more present in the peel of the Pomegranate fruit than in other fruit parts, hence exhibiting high antioxidative activity. Other phytochemicals include alkaloids, saponins, carbohydrates, Quinones, terpenoids, cardiac glycosides, coumarins, steroids and many more...



## Extraction Methods

The peel of pomegranate fruit contains many bioactive compounds such as polyphenols, flavonoids and tannins. Various extraction techniques can be used to extract these compounds, but their efficiency highly depends on the technique used.

Maceration refers to one of the most popular extraction techniques. In maceration, the bioactive compound is extracted by soaking the plant in an organic solvent at room temperature. Once the solvent reaches the interior of the cell, it then extracts the bioactive compound. Maceration is preferred due to the simplicity of the technique and low cost. For maceration, you do not need an expensive laboratory equipment. All you need is to have a simple laboratory equipment.

Solvent Extraction is another extraction technique, also known as chemical extraction or leaching. This involves the dissolution of the constituents of a solid into a liquid solvent. It is one of the most widely used methods which include methods such as liquid-liquid extraction, liquid-solid extraction and supercritical fluid extraction. Solvent extraction is efficient for purification and concentration of a certain component for complex mixtures.

## Phytochemical analysis

Constituents	Test	Procedure	Observation
Phenolic Compounds	Ferric chloride test	Add ferric chloride to the extract	Blue-black/green color
Flavonoids	Shinoda test	Add magnesium turnings along with conc. HCL to the extract	Pink/red/orange color
Tannins	Gelatin test	Add 1% gelatin solution	White precipitate
Alkaloids	Dragendorff's test	Add Dragendorff's reagent to the extract	Reddish-brown precipitate
Glycosides	Keller-Killani test	Add glacial acetic acid, ferric chloride and sulfuric acid to the extract	Reddish-brown ring at the interface
Terpenoids	Salkowski test	Add conc. Sulfuric acid to the extract	Reddish brown interface
Saponins	Froth test	Shake the extract with water vigorously	Persistent froth
Carbohydrates	Molisch test	Add Molisch reagent and conc. Sulfuric acid to the extract	Violet ring formation
Proteins	Biuret test	Add sodium hydroxide and copper sulfate to the extract.	Violet coloration

## Formulation of anti-aging serum

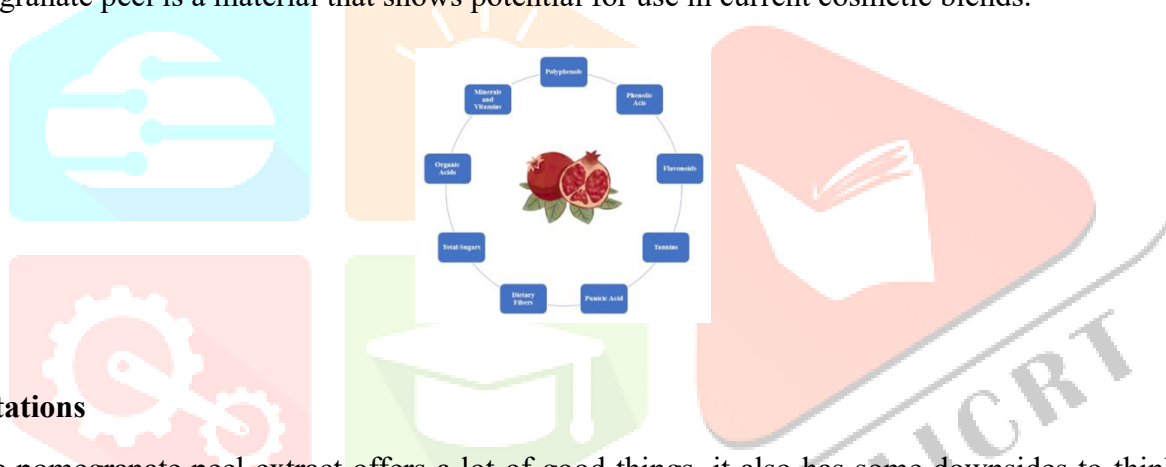
Sr. No.	Ingredients	Quantity 100%
1	Water	83.5
2	Carbopol 940	0.1
3	Triethanolamine	0.3
4	Glycerin	7
5	Pomegranate peel extract	8
6	Vitamin E	1
7	Sodium Benzoate	0.1

## Evaluation of serum

1. Physical evaluation: The serum should be checked visually for its color, odour, texture etc. for an aesthetic appeal
2. Chemical evaluation:
  - pH value: 1ml serum should be dissolved in 50ml distilled water and pH should be checked using pH meter.
  - Stability studies: The serum should be kept under different temperatures like 25, 35 and 45 degrees Celsius to check its stability.
  - Washability: The serum should be applied to the skin and wash it to check if it is easily washable.
  - Patch test: Apply small amounts of serum to the skin on different parts to check for any kind of itching, redness etc.

## Advantages of using pomegranate peels

By using pomegranate peel in cosmetic products, manufacturers gain multiple advantages. It is a material that comes from nature and does not harm the environment because people can recycle it instead of discarding it as waste. On the market this ingredient is inexpensive and accessible in large quantities - it is practical when companies produce goods on a large scale. There are many antioxidants in the peel which protect the skin from signs of aging. For those reasons, shoppers choose products with herbs plus natural components repeatedly because the items are safe and do not cause many unwanted reactions. In the industry extract from pomegranate peel is a material that shows potential for use in current cosmetic blends.



## Limitations

While pomegranate peel extract offers a lot of good things, it also has some downsides to think about. For instance, the helpful natural compounds in it can get less stable if they're exposed to things like light, heat, or even changes in their pH level. This means the product might not work as effectively after a certain amount of time. Another challenge is that there isn't a single, agreed-upon way to extract it or put it into a product, so the quality you get can really vary. And, some people might experience skin irritation. That's why it's really important to make sure the products are made correctly and tested well to deal with these issues.

## Conclusion

Pomegranate peel is a fantastic natural source packed with anti-aging properties. It contains essential phytochemicals like punicalagin, ellagic acid, and flavonoids, which offer anti-inflammatory and antioxidant benefits. These powerful compounds help reduce oxidative stress and enhance the overall skin barrier. By incorporating pomegranate peel extract into face serums, we can harness its full potential for skin health. This not only boosts skin vitality but also contributes to a cleaner, more sustainable, and eco-friendly approach to cosmetic formulations.

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