



# Formulation And Evolution Of Pomegranate (*Punica Granatum*) For Making Peels Powder

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**Abstract:** A study was conducted to prepare pomegranate peel extract (PPE) powder and evaluation of its effect on functional properties and storage stability of curd. The extraction was carried out with ethanol and water and the extracted samples were analyzed for anti-oxidant activity and total phenolic content (TPC). Ethanol based extract had significantly ( $p < 0.05$ ) higher anti-oxidant activity and TPC as compared to aqueous extract. Hence, ethanol based extract was selected for powder preparation. It was mixed with drying aids viz. whey protein concentrate 70 (WPC-70) and skimmed milk powder (SMP) to avoid stickiness during drying. The WPC-70 based PPE powder showed higher anti-oxidant activity and TPC than SMP based PPE. Both PPE powders were incorporated into curd at different concentrations (0.5, 1 & 1.5%). Anti-oxidant activity and TPC of curd increased with increase in PPE concentration, however, sensorial attributes decreased at higher PPE concentration. Curd with 1% PPE powder showed considerable anti-oxidant activity and acceptable sensory attributes. During storage, PPE added curd shown resistance to increase in microbial count, change in acidity and whey syneresis. The shelf of the PPE added curd was increased compared to control sample at 5 °C.

**INTRODUCTION :** The pomegranate (*Punica granatum* L.) is one of the oldest edible fruits and is widely grown in many tropical and subtropical countries. Pomegranate (*Punica granatum* L.) is an important fruit plant of tropical and subtropical regions. It is extensively cultivated in Iran, Spain, Egypt, Russia, France, Argentina, China, Japan, USA and in India.

References to the medicinal uses of pomegranate are found in many ancient cultures and religions. Pomegranate is mentioned thrice in ayat of the Holley Quran and by the Islam prophet, "Mohammad", as one of the fruits that will be found in paradise. The bark, leaves, flowers, fruit and seeds of this plant have been used to prevent and treat many infectious diseases. Pomegranate is proved to have high antioxidant activity and good potency for cancer prevention. The edible part of the fruit contains considerable amounts of acids, sugars, vitamins, polysaccharides, polyphenols and important minerals. Great interest has recently been focused on the addition of polyphenols to foods and biological systems, due to their well-known abilities to scavenge free radicals, ie antioxidant power. The generation of free radicals plays an important role in the progression of numerous pathological disturbances. Such as atherosclerosis and brain dis-function.

Several studies have reported the reduced-risk efficacy of various extracts or pure compounds from the different parts of pomegranate plant against the growth of microbial pathogens. Pomegranate (*Punica granatum*) Punicaceae has been known to considerable pharmacological properties with antimicrobial, antiviral, anticancer, potent antioxidant and antimutagenic effects and been used in the markets in the preparation of tinctures, juice, cosmetics and therapeutic formulae. Keeping in view the medicinal importance the present study was aimed for its Proximate Composition, Minerals Content. Antibacterial and antifungal Activity

Evaluation of Pomegranate (*Punica granatum* L.) Peels Powder.

Pomegranate (*Punica granatum* L.) plants are among the first cultivated plants by humanity; however, its consumption had been limited most commonly as a result of the hassle of extracting the juicy arils. Due to the increasing number of scientific studies about its health benefits, production and consumption of pomegranate fruits have been increasing since the beginning of the 21st century. Pomegranate fruits are consumed as both fresh and processed mainly in the forms of juice, oil, wine, and jams. Both the fruits and its peel are known to have high levels of numerous phytochemicals, including phenolic acids, flavonoids, and tannins. -is diverse characteristic of phytochemicals is thought to be responsible for its high antioxidant potential and health benefits. During processing, a considerable amount of by-products are developed from peels and is known to have high contents of hydrolysable tannins (HTs). Recently, by-products of pomegranates, especially pomegranate peel extract (PPE), have been increasing attention due to its scientifically confirmed therapeutic properties such as antioxidant, antimicrobial, anticancer, antiulcer, and anti-inflammatory activities. Numerous scientific studies have suggested that PPE exhibits excellent antimicrobial activity against several foodborne pathogens and improves the postharvest storability of food products is paper will describe and discuss the recent advancements about the biochemical composition, antimicrobial potential, and food preservation characteristics of PPEs.

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## 2. Biochemical Composition of Pomegranate Peel

1. Phenolic acids concentration significantly varies

among varieties and is highly depending upon the geographical location, climatic conditions, and cultivation practices. One of the main parameters defining the concentration of the phenolic acids was noted as the peel colour where the varieties with dark red colour reported to have higher phenolic acids concentration than the light-coloured varieties. Additional to phenolic acids, PPEs are an excellent source of flavonoids. Flavonoid content and composition are also known to vary significantly among varieties and growing conditions; however, it was also noted that the fruit developmental stage influence the flavonoid content and composition.

## 3. The Extract Process of Pomegranate Peel

1. Extraction method is reported to have a strong influence on the biochemical composition of PPEs. Conventional techniques generally need high amounts of solvents and results with low extraction yields. Moreover, the use of high temperature is reported to result in degradation in the extracts. Recently, high-pressure extraction is observed and noted as a practical methodology, which results with no detrimental effects on bioactive compounds. Additionally, to be a green technology, the high-pressure extraction is faster and has a high yield.

## 4. Antimicrobial Activity of Pomegranate Peel

1. Pomegranate has a broad spectrum of antimicrobial effects, which has an apparent inhibitory effect against Gram-negative, Gram-positive bacteria (Table 1), fungi, and mould (Table 2). However, different extracts from different parts of pomegranate have various antimicrobial activities. -e study of many scholars showed that the antimicrobial activity of PPE was more potent than other parts, and the antimicrobial activity of PPE was related to the total flavonoids and tannins content. PPE is well known for its antimicrobial activity against bacterial and fungal pathogens [29, 37, 38]. However, the number of studies which investigated the effects of PPE against plant pathogenic bacteria and fungi is limited.

## 5. Biochemical Changes and Food Preservation of Pomegranate Peel

2. PPE is a valuable by-product for the food preservation industry. As discussed previously, PPE is a rich source of bioactive compounds,

including tannins consisting of ellagic acid and gallic acid [42, 50, and 51]. Most of the bioactive compounds, which are abundant in the PPE, were previously tested as natural additives for improving the preservation quality of food [52]. PPE was yet tested alone or in combination with edible films and coatings for food preservation. Renewable, bio-based, environment friendly active packaging systems, which are usually composed of biopolymers such as proteins, lipids, and polysaccharides [53], have been extensively.

## REVIEW OF LITERATURE

1. Garg AK et al (2021) in this work they report that Plants have provided humans with many of their essential needs, including life-saving pharmaceutical agents. However, medicinal plants are threatened as a result of human impact and uncontrolled wild collection, it is therefore recommended that deliberate efforts towards domestication and cultivation are essential for continuous supply of these plant species. Presently many countries face large increases in the number of people suffering from diseases like diabetes, diarrhoea, cancer, rheumatism, inflammation, jaundice, hepatic obstruction, pain, cold, cough, etc. remedies from medicinal plants are used with success to treat the disease. In India, Uttarakhand has diversity of aromatic and medicinal plants. These plants may be used as a huge amount of raw material for pharmaceutical industries for manufacturing the medicines. In addition to the requirement for conservation of medicinal plants it has also become essential to protect and patent the traditional knowledge.
2. Regina Sharmila das et al (2019) in this study they report, phytofabricated selenium nanoparticles (PF-SeNPs) were prepared from aqueous fruit extract of *Emblica officinalis* in a facile, green, economic, tactic and eco-friendly way. The aqueous fruit extract of *E. officinalis* was found to be rich with various secondary metabolites including phenolics ( $59.18 \pm 2.91$  mg gallic acid equivalents/g), flavonoids ( $38.50 \pm 2.84$  mg catechin equivalents/g), and tannins ( $44.28 \pm 2.91$  mg gallic acid equivalents/g), flavonoids ( $38.50 \pm 2.84$  mg catechin equivalents/g), and tannins ( $44.28 \pm 3.09$  mg tannic acid equivalents/g) and determined that highly appropriate for the biosynthesis of nanoparticles.

## AIM AND OBJECTIVE

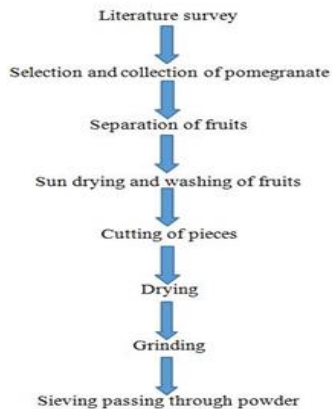
1. **Aim:** - Preparation of Pomegranate (*Punica granatum*) for making Peels Powder

## 2. Objectives:-

3. • To develop and promote pomegranate cultivation to pomegranate growers in all aspects.
4. • To supply all the required help, products, advice, pesticides, growth hormones and other material related for growing pomegranates.
5. • To help to undertake research on cost effective cultivation of quality pomegranates through research institutes.
6. • To help to cultivate new varieties of pomegranates from India and abroad for research on improvement of pomegranate quality production.
7. • To help to bring new methods and technologies in cultivation of pomegranates & also develop new methods and technologies for quality production of pomegranates.
8. • To help to introduce new and tried methods of pruning, pest prevention & control, fertilizers (Organic & Inorganic) by experimenting & research, by establishing laboratory at a convenient location.
9. • To help to establish nursery for research on development of pomegranates.
10. • To supply seedling and known variety of pomegranates from government or private nurseries.
- 11.
12. □ To bring about improvement & development of pomegranate crops by making available funds & finances through recognized economical sources or other sources like banks, government financing Institutions etc.
13. • To arrange for effective marketing and transportation of pomegranate by making such arrangements with transporters, air cargos and others.



## PLAN OF WORK



## PLANT PROFILE

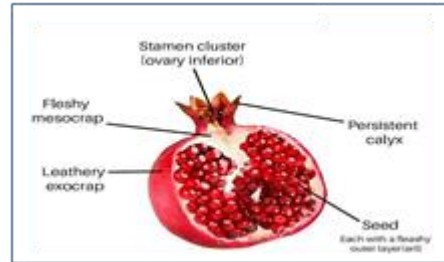
### Synonym

Hindi: Anar Sanskrit : Dadimah,  
 English : Pomegranate,  
 Marathi: Dalimba,  
 Gujarati : Dalimba,  
 Bengali : Dadim,  
 Tamil : Madalai,  
 Telugu: Danimma,  
 Malayalam : Talimatatum,  
 Pharsi: Anar tursa,  
 Arabi : Roman Hamiz,  
 German: Granatapfels.



### Botanical Classification

Botanical name- *Punica granatum*  
 Kingdom: Plantae (Angiosperms)  
 Order: Myrtales  
 Family: Lythraceae Genus: *Punica*  
 Species: *P. granatum*



## MATERIALS AND METHODS

### Production of pomegranate peel powder:

Separation of peel Pomegranate fruits harvested at optimum maturity and with good color were brought to Department of Post-Harvest technology, Aditya College Beed. Fruits after thorough washing in tap water cut into four parts by clean stainless steel knife and then peel and seeds were separated manually without damaging. The peel obtained was used for further usage.

Pre-treatment After separation of peel and other waste parts, the peel was cut into pieces by using stainless steel knife and then pretreated with 2% salt solution for 10 minutes, drained off salt water then washed again with tap water and drained off water peels were spread on stainless steel tray and dried under ceiling fan to remove surface water. These peels were taken

Process of dehydration to get the pomegranate peel powder after pretreatment, fresh pomegranate peel was placed in a tray drier at 65 °C for 10 hr. to obtain dried peel. The dried pomegranate peel was crushed by food grinder in to powder form to completely pass through 0.5 mm size sieve. Pomegranate peel powder was packed in HDPE for further Physicochemical analysis and for fortification in various food products preparation.

PARAMETERS	Fresh Peel Powder
Colour	Dark brown colour
Odour	Characteristic with tannin odour
Appearance	Dark brown coloured fine powder

Mineral (mg/100g)	Pomegranate Peel Powder
Calcium (Ca)	342
Magnesium (Mg)	-
Potassium (K)	148.64
Sodium (Na)	64.63
Phosphorous (P)	118.30
Iron (Fe)	6.35
Zinc (Zn)	0.93
Magnesium (Mn)	0.78
Copper (Cu)	0.64

### Therapeutically Uses of Pomegranate Peels Powder

- 1) Sore Throats
- 2) Coughs
- 3) Urinary infections
- 4) Digestive disorders
- 5) Skin disorders
- 6) Tapeworms
- 7) Skin cancer
- 8) Diabetes
- 9) Healthy diet
- 10) Hearth disease / Heart Attack

### HEALTH BENEFITS OF POMEGRANATE PEELS POWDER

1) May Fight Acne, Pimples and Rashes Pomegranate peel is said to possess antibacterial, antiviral, and anti-inflammatory properties

(I) It can effectively fight skin problems like acne, pimples, and rashes. The peel is rich in antioxidants and helps in keeping bacteria and other infections at bay.

(II) Anecdotal evidence suggests that pomegranate peels can also help in removing dead skin cells from your face when it is used in the form of a face pack or facial scrub. However, more studies are required to understand this benefit of pomegranate peel.

2) May Fight against Skin Cancer Amazing new research has revealed that pomegranate extracts contain a preventive agent that fights against the onset of skin cancer. The anti-inflammatory and anti-cancer properties of pomegranate peel are purported to be effective in the prevention and treatment of skin cancer. Pomegranate peel prevents the cancer cell proliferation process, thereby reducing the risk of skin cancer. However, very few research studies are available in this regard, and more long term research is required to understand this benefit of pomegranate peel in humans.

3) May Protect against Heart Disease (I) Pomegranate peel is rich in antioxidants that are highly capable of protecting LDL cholesterol against oxidation. It is also said to possess vascular protective effects that prevent heart problems. (II) This beneficial because LDL cholesterol oxidation in your body can lead to oxidative

stress, a major contributing factor toward heart disease and other ailments.

4) May Boost Bone Health Pomegranate peels are effective in reducing bone density loss. Studies indicate that consuming concoctions made of pomegranate peels can help boost bone health and prevent the onset of osteoporosis after menopause. A study states that pomegranate peel is rich in tannins, polyphenols, and flavonoids, and the consumption of its extract as a dietary supplement has a beneficial effect on bone health.

5) May Cure Sore Throat And Coughs (I) According to traditional medicinal practices, pomegranate peel helps relieve cough and is used in a powdered form with water as a gargle to help relieve sore throat (II) Multiple studies suggest that the hydro alcoholic extract of pomegranate peel possesses antibacterial properties that may help in treating sore throat and cough



#### Oily Skin/Combination Skin:

Pomegranate oil even works for oily skin and the use of pomegranates have been beneficial for acne prone skin, to combat breakouts, reduce scarring, and soothe minor irritations.

#### Youthful Skin:

Pomegranates promote smooth, firm skin by boosting collagen. And elastin production and soften skin.

#### Dry Skin:

It is a great ingredient for skincare because it penetrates deeply into the skin. It works for most skin types, (which depends on the skin care ingredients pomegranate is combined with). Since pomegranate oil penetrates deeply into the skin, it is effective for treating dry skin. It soothes dry, cracked, and irritated skin. It contains puniceic acid, an omega 5 fatty acid that hydrates and prevents moisture loss.

### Area and Distribution

(I) Pomegranate (*Punica granatum* L.) is one of the commercially important fruit crops of India. It is native to Iran (Persia).

(II) India ranks first with respect to pomegranate area and production in the world.

(III) Pomegranate is cultivated commercially only in Maharashtra. Small scale plantations are also seen in Gujarat, Rajasthan, Karnataka, Tamil Nadu, Andhra Pradesh, Uttar Pradesh, Punjab and Haryana. Maharashtra contribute about 73% of the total area followed by Karnataka and Andhra Pradesh.

(IV) India is exporting pomegranate to UAE, Netherlands, UK, Saudi Arabia, Russia, Bangladesh, Egypt, Nepal and Oman.

### Side Effects of Pomegranate for Skin

"Skin allergy/irritation is possible, but rare," says Mudgil. Unless you know you're allergic, you're likely safe though. And while there are few side effects to pomegranate itself (except the red it dyes your fingers when you eat one).



### Preparation of Method Pomegranate Peel Powder

1. Take a handful of sun-dried pomegranate peels and roast them over a hot tava or a deep-bottomed pan.
2. Allow them to cool and grind it in a grinder or mixer.
3. Make a paste of this powder with lemon juice or rose water and apply it all over your face, especially on your pimples or acne.
4. Let it dry for a while then wash it off thoroughly with lukewarm water.

### RESULTS AND DISCUSSION

The observation of detanninated and fresh pomegranate peel powder is represented in Table 1, which showed that fresh peel powder is darker in colour than detanninated powder and having pleasant odour. Table 2 showed the chemical composition (average value and standard deviation of three replicates) of both fresh and detanninated pomegranate peel powder.

### CONCLUSION

From above comparative results and discussion of fresh and detanninated pomegranate peel powder it can be

concluded that pomegranate peel i.e. Fruit juice industrial waste can be further utilized by tannin extraction and rest other byproduct (i.e. solid peel residue) can be produced as cattle feed supplement loaded with beneficial nutritional component at very low cost. Although fresh peel powder also exhibit higher amount of nutritional component except few components but it was found that its higher tannin content reflects in its odour which makes it unpleasant and bitter due to which cattles may dislike it.

Apart from this in detanninated peel there is two advantages first one is that gain of useful hydrolysable ellagitannin which can be further utilized in different Food, drugs and cosmetics as additives while other one is that gain of nutritious detanninated peel powder with improved odour which also contains a sufficient amount of tannin (i.e. 0.11%) as in residual form. The detanninated and fresh pomegranate peel powder showed almost equal calculated metabolized energy value, which is a supportive remark to recommend and use of detanninated pomegranate peel powder as a novel cattle feed supplement.

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