



# Formulation And Evaluation Of Herbal Cough Syrup By Pomegranate Peel

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## Abstract:

The utilization of herbal remedies for respiratory ailments has gained significant attention due to their perceived efficacy and minimal adverse effects. This study aimed to formulate and evaluate an herbal cough syrup utilizing pomegranate peel extract, known for its rich phytochemical composition and potential therapeutic properties. Pomegranate peel extract was obtained through solvent extraction, and its phytoconstituents were characterized using standard analytical techniques. The cough syrup formulation was developed using a combination of pomegranate peel extract, honey, glycerin, and appropriate excipients to enhance stability and palatability. Various physicochemical parameters, including viscosity, pH, density, and organoleptic properties, were evaluated to ensure the formulation's quality and consistency. The formulated herbal cough syrup underwent *in vitro* and *in vivo* evaluation to assess its efficacy in alleviating cough symptoms. *In vitro* studies included antimicrobial activity against common respiratory pathogens, while *in vivo* evaluation involved assessing its cough-suppressing effects using an animal model. Preliminary results indicate that the formulated herbal cough syrup exhibited desirable physicochemical properties and demonstrated significant antimicrobial activity against respiratory pathogens. Moreover, the *in vivo* study revealed promising cough-suppressing effects compared to standard cough syrups. In conclusion, the formulation of an herbal cough syrup utilizing pomegranate peel extract presents a potential natural remedy for cough management. Further studies are warranted to elucidate its mechanism of action, optimize formulation parameters, and evaluate long-term safety and efficacy in clinical settings.

**Keywords:** Herbal cough syrup, Pomegranate peel extract, Formulation, Evaluation, Phytochemicals, Respiratory ailments, antimicrobial activity, Cough suppression, Natural remedy, Clinical study,

## INTRODUCTION

Pomegranate is one of the oldest fruits and originated from Iran north to the Himalayas in India and cultivated throughout the Mediterranean region in Asia, Africa and Europe. Early fall is the best time pomegranates in October and November in the north hemisphere, but they are usually available early winter. The peel of this fruit makes up 26 to 30 % of the total weight of the fruit and they cover the internal membrane. Pomegranate peel extract is a rich in phenols, flavanoids and tannins, which is why it has found and important place to provide by pomegranate juice related preparation related to the food industry. Pomegranate is also rich source of many essential substances, vitamin B complexes such as pantothenic

acid (vitamin B5), folates, pyridoxine and vitamin K and minerals such as calcium, copper, potassium and manganese. The astringent effect is due to the skin (pericarp).

Despite the large number of polyphenolic compounds and beneficial biological effects of pomegranate peel (PP), unfortunately is often treated as waste and throw away. Phenolic compounds such as anthocyanins, ellagic acid glycosides, free ellagic acidification, ellagitannins, punicalagin, punicalin and gallotannins are found deep in pomegranate peel. They also contain many antioxidants, antivirals, anti-cancer and heart disease. It attracts attention because of its obviousness wound healing properties and immunomodulatory effect.

## HERBAL TREATMENT FOR COUGH

The most popular antitussive is a medicinal plant treatment. Herbal preparations play an important role in improving the health sector. Herbal medicines used for mild to severe health disorders include asthma, tuberculosis, cough, pneumonia, kidney diseases, cancer, diabetes, allergies, lung cancer and viral infections. In recent years, researchers are focusing mainly on herbal medicines with less or no side effects during and after treatment.

WHO estimates 80% of the population even use herbal medicines in a primary health care standard. Medicinal plants have always been used. E.g. with traditional primary providers and especially Asian countries. The main use of herbal medicines is prescribed chronic health promotions and therapy, differently conditions that are life threatening. Most of the synthetic drug treatments used cause a lot of side effects such as vomiting, nausea, sedation, allergies, respiratory infections, change in appetite, irritability, drowsiness, addiction, and overload can damage organs or parts of an organ.

## MATERIAL AND METHOD

Following herbal parts are used in the formulation of herbal cough syrup

- POMEGRANATE
- FENNEL
- CLOVE
- TURMERIC
- TULSI
- HONEY

## POMEGRANATE

**Synonym-** Anar, Dalimb.

**Biological source:** *Punica granatum*

**Family:** Lythraceae

**Chemical Constituents-**

- Polyphenols: Pomegranates are rich in polyphenols, including ellagic acid and punicalagins.
- Flavonoids: Quercetin and anthocyanins contribute to the antioxidant properties.
- Punicic Acid: A polyunsaturated fatty acid found in pomegranate seed oil.

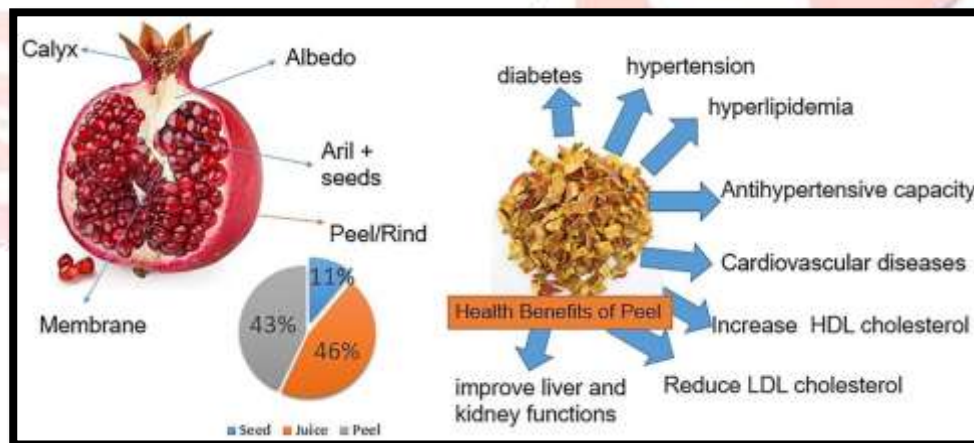
- Vitamins and Minerals: Contains vitamin C, vitamin K, potassium, and other nutrients.

## USES

- Culinary Use: Pomegranates are consumed fresh, juiced, or as an ingredient in salads, sauces, and desserts.
- Medicinal Use: Traditional medicine uses pomegranate for its potential anti-inflammatory and antioxidant properties.
- Beverages: Pomegranate juice is popular for its health benefits and refreshing taste.
- Cosmetic Products: Pomegranate extracts are used in skincare.

## THERAPEUTIC USES OF POMEGRANATE PEEL

1. Pomegranate peel extract has been greatly valued in the traditional system of medicine for relieving colds and coughs.
2. Potent antibacterial property of pomegranate peels is well-known to treat mouth ulcers, tooth and gum diseases.
3. It can be used in the prevention and treatment of several types of cancer, cardiovascular disease, osteoarthritis, rheumatoid arthritis, and other diseases.
4. It improves wound healing and is beneficial to the reproductive system.
5. It is use to cure all skin problems like rashes, oily skin and clogged.



## FENNEL

**Synonyms:** - Large Fennel, Sweet Fennel, Fennel fruit, Saunf (Hindi); Fructus Foeniculi.

**Biological source:** -Fennel is the dried, ripe fruits of *Foeniculum vulgare Mill.*

(Family: Apiaceae).

**Geographical source:** Fennel is indigenous to Mediterranean region of Asia and Europe. It is widely cultivated in Russia, India, Japan, southern Europe, China and Egypt.

**Chemical constituents:** -

Fennel contains volatile oil (2-6.5%) and fixed oil (12%). The main constituent of the volatile oil is phenolic ether, anethole (50-60%) and the ketone, fenchone (18-20 %) which give the fruit its distinct odour and taste; the other constituents of volatile oil are anisic aldehyde, anisic acid, apinene, dipentene and phellandrene.

Uses: -

Fennel is used as stimulant, aromatic, stomachic, carminative, and expectorant. Anethole is used in mouth and dental preparations. Fennel is used in diseases of the chest and spleen.



## CLOVE

**Synonyms:** - Caryophyllus, Clove buds, Caryophyllum; Caryophylli; Laung (Hindi).

**Biological source:** -Cloves are the dried flower buds of *Eugenia caryophyllata* Thumb (Syn. *Syzygium aromaticum*. (Family: Myrtaceae).

**Geographical source:** - The clove tree is native of Molucca Island. It is cultivated in Zanzibar, Sumatra, South America, West Indies, Brazil, Pemba, Ambon, Madagascar, Mauritius, Tanzania, Sri Lanka and South India.

**Chemical Constituents:** -

Clove contains 14-21% of volatile oil. The other constituents present are the eugenol, acetyl Eugenol, gallotannic acid, and two crystalline principles;  $\alpha$ - and  $\beta$ - caryophyllenes, methyl Furfural, gum, resin, and fiber. Caryophylline is odorless component and appears to be a Phytosterol, whereas eugenol is a colorless liquid. Clove oil has 60-90% eugenol, which is the cause of its anesthetic and antiseptic properties.

**Uses:** Used for upset stomach and as an expectorant clove is used for diarrhea, hernia.



## TURMERIC

**Synonyms:** - Curcuma

**Biological source:** - Turmeric is prepared rhizome of *Curcuma longa* Linn. (Zingiberaceae). It is perennial herb of ginger family, having thick rhizome; native to Southern Asia; extensively cultivated in India, China Indonesia and other tropical countries.

**Chemical Constituents: -**

Turmeric contains 3-7% orange-yellow colored volatile oil which is mainly composed of Turmerone (60%),  $\alpha$ ,  $\beta$ -atlantone and zingiberene (25%) with minor amounts of 1,8 cineole,  $\alpha$ Phellandrene,  $\delta$  sabinene and borneol. Others than above it contains yellow coloring matter Including 0.3-5.4%.

**Uses: -** It is used as an antioxidant in capsules tablets and flavouring tea. It is recommended as a food Supplement to treat liver problems menstrual difficulties hi mare test pain etc.

**TULSI**

**Synonyms: -** Sacred basil, Holy basil

**Biological Source: -** Tulsi consists of fresh and dried leaves of *Ocimum sanctum* Linn. (Syn. *Ocimum tenuiflorum*) Umily Lamiaceae, and contains not less than 0.40 per cent eugenol on dried basis.

**Geographical Source: -**It is herbaceous, multi branched annual plant found throughout India. It is considered as sacred by Hindus. The plant is commonly cultivated in garden and also grown near temples. It is propagated by seeds; Currently Tulsi is cultivated commercially for its volatile oil.

**Chemical constituents: -**

It contains approximately 70 per cent eugenol, carvacrol (3%) and eugenol-methyl-ether (20%). It Also contains caryophyllin. Seeds contain fixed oil with good drying properties.



**Uses: -** The oil is antibacterial and insecticidal. The leaves are used as stimulant, aromatic, anticatarrhal, spasmolytic, and diaphoretic. The juice is used as an antiperiodic. Tulsi has expectorant and anti-inflammatory properties.

## HONEY

**Synonym:** Madhu

**Biological source:** Honey is a sugary substance/secretion deposited in the honey comb by the *hive bee Apis mellifera* and other species of *Apis* belonging to the family *Apidae*.

**Geographical source:** Honey is produced in India and major produce comes from the state of Himachal Pradesh, Other chief countries are Australia, Newzealand, West indies, USA.

**Chemical constituents: -**

Honey contains glucose (30-40%), fructose (40-50%), small quantities of sucrose, dextrin, formic acid. Also, contain proteins, enzymes, vitamins, coloring matter

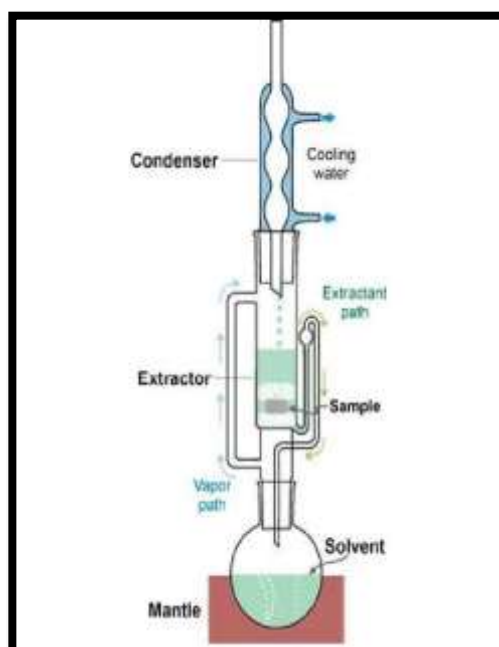
**Uses: -**Honey is used as a demulcent and sweetening agent. It is used as antiseptic It is applied to burns and wounds Used in preparations of creams, lotions, soft drinks, candies also.



## EXTRACTION PROCESS OF POMEGRANATE PEEL BY SOXHLET EXTRACTION METHOD

The Soxhlet extraction method is commonly used to extract compounds from solid materials, such as pomegranate peel. Here's a basic overview of the process

- **Grinding:**  
Grind the pomegranate peel into small particles to increase the surface area for extraction.
- **Weighing:**  
Weigh the ground pomegranate peel to accurately determine the amount used in the extraction.
- **Packing:**  
Place the ground peel into a thimble, which is a small cylindrical container typical made of filter.



**Diagram:** Soxhlet extraction apparatus

- **Assembly:**  
Set up the Soxhlet apparatus, consisting of a round-bottom flask, a condenser, and a Soxhlet extractor. The thimble with the packed peel is placed in the Soxhlet extractor.
- **Solvent:**  
Use a suitable solvent (e.g., ethanol, distilled water) in the round-bottom flask. The solvent will continuously cycle through the extractor, extracting compounds from the pomegranate peel. Add mixture of ethanol and water as solvent in ratio 1:1.
- **Heating:**  
Apply heat to the round-bottom flask for 12 hours, causing the solvent to evaporate and rise into the Soxhlet extractor. The solvent extracts compounds from the pomegranate peel and then drips back into the round-bottom flask.
- **Continuous Extraction:**  
The process continues in a cyclical manner, with the solvent cycling through the extraction thimble until a concentrated extract is obtained.
- **Collection:**  
Collect the extracted solution in the round-bottom flask.
- **Evaporation:**  
Remove the solvent from the collected solution using techniques like rotary evaporation to obtain the concentrated extract.
- **Storage :**  
Store the extract in proper container.

## EVALUATION OF HERBAL SYRUP

The evaluation parameters of herbal syrup are as follows

### 1. Physicochemical parameters

The herbal syrup was evaluated for various Physicochemical parameters such as physical Appearance (colour, odour, taste), pH.

- **Color examination**

Five ml final syrup was taken into watch Glasses and placed against white back ground in white tube light. It was observed for its color by naked eye.

- **Odour examination**

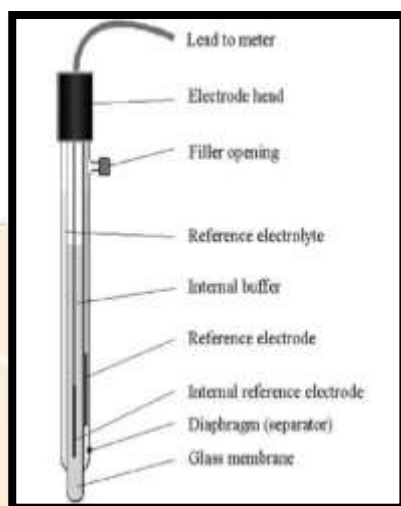
Two ml of final syrup was smelled individually. The time interval among two smelling was kept 2 minutes to nullify the effect of previous Smelling.

- **Taste examination**

A pinch of final syrup was taken and examined for its taste-on-taste buds of the tongue.

- **Determination of pH**

Placed an accurately measured amount 10 ml of the final syrup in a 100 ml volumetric flask and made up the volume up to 100 ml with Distilled water. The solution was sonicated for About 10 minutes. pH was measured.



**Diagram: pH meter**

## 2. Stability testing

Stability testing of the prepared herbal syrup Was performed on keeping the samples at Accelerated temperature conditions. The final Syrup was taken in culture tubes and were kept at accelerated temperature at 4°C, Room Temperature and 47°C respectively. The Samples were tested for all the Physicochemical parameters, turbidity and Homogeneity at the interval of 24 hr, 36hr and 72 hr to observe any change.

## 3. Determination of Density

- Procedure to determine density
- Clean thoroughly the specific gravity bottle with chromic acid or nitric acid.
- Rinse the bottle at least two to three times with distilled water.
- If required, rinse the bottle with an organic solvent like acetone and dry.
- Take the weight of empty dry bottle with capillary tube stopper (w1).
- Fill the bottle with unknown liquid and place the stopper, wipe out excess liquid from Outside the tube using tissue paper.
- Weigh bottle with unknown liquid on analytical balance (w2).
- Calculate weight in grams of unknown liquid (w3).
- Formula for density:
- Density of liquid under test (syrup) = weight of liquid under test /volume of liquid under test = w3/v



#### 4. Determination of specific gravity

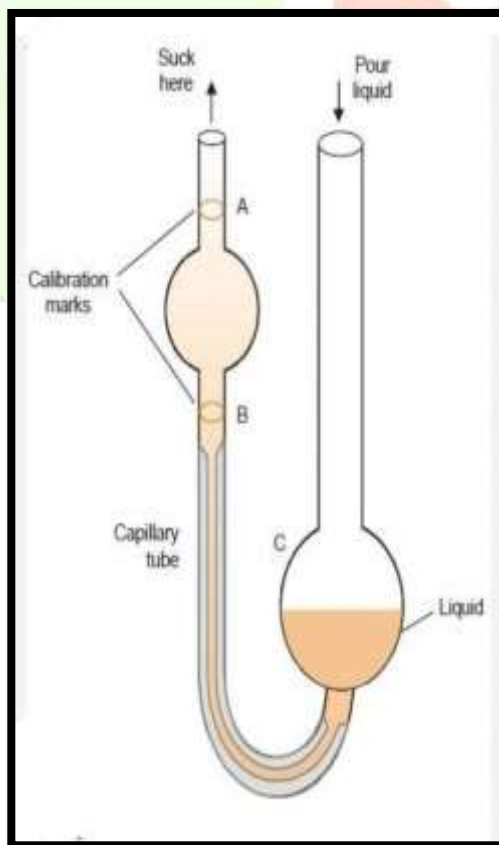
- Clean thoroughly the specific gravity bottle with chromic or nitric acid.
- Rinse the bottle at least two to three times with purified water.
- If required, rinse the bottle an organic solvent like acetone and dry.
- Take weight of empty dry bottle with capillary tube stopper.
- Fill the bottle with distilled water and place stopper; wipe out excess liquid from side tube using tissue paper (w<sub>2</sub>).
- Weigh bottle with stopper and water on analytical balance (w<sub>2</sub>).
- Repeat the procedure for liquid under test by replacing the water after emptying and drying as mentioned in step 4 to 6.
- Weigh bottle with stopper and liquid under test on analytical balance (w<sub>3</sub>).

#### Formula for specific gravity:

Specific gravity of liquid under test (syrup) = weight of liquid under test /weight of water = w<sub>5</sub>/w<sub>4</sub>.

#### 5. Determination of viscosity

- Procedure to determine Viscosity:
- Thoroughly clean the Ostwald viscometer with warm chromic acid and if necessary, used an organic solvent such as acetone.
- Mount viscometer in vertical position on a suitable stand.
- Fill water in dry viscometer up to mark G.
- Count time required, in second for water to flow from mark A to mark B.
- Repeat step 3 at least 3 times to obtain accurate reading. Rinse viscometer with test liquid and then fill it up to mark. find out the time required for liquid to flow to mark B.



**Diagram:** Ostwald viscometer

## CONCLUSION

The main purpose behind the syrup formulation was to achieve the better therapeutic effect on the cough problem and was found to be satisfactory. Similarly, the intension behind formulating it in the liquid form was to fulfill pediatric requirements and it absorbs in faster way than solids. Also, it is more flexible in achieving the proper dosage form of medications. It is suggested that the prepared formulation is having very negligible side effects and is physico-chemically stable and possessed characteristics of a standard formulation.

## REFERENCES

1. Ruth Cordoba-Rodriguez, Ph.D. A Regulatory perspective of forced degradation study (assessed in February, 2016)
2. Asha S. Joshi and Archana K. Nadre 2018 Force Degradation study: An overview, IJRAR Page no. 479-482
3. Ashish K. Mullani and Prakash I. Nargatti 2021, Force degradation study a new approach for stress Testing of drug substance and drug products IJPSR, Page no 2683-2691
4. A. Padma, B. Venkateshwara Reddy, G. Aravind Kumar, E. Hema latha, B. Ramesh Naik 2019 review On strategies and analytical perspective of SIAMS, IJPPR, Page no- 408-419
5. ISO/IEC (2007) (1stedn) Guidance on International vocabulary of metrology – Basic and general concepts and Associated terms (VIM). International Organization for Standardization. Geneva.
- 6 N. Md. Akram and Dr. M. Umamahesh, 2017, Development of stability indicating method and study of Validation on pharmaceutical drug substances by RP-HPLC, International Journal of Trend in Research And development vol. 4(1), Page no. 552–553.
- 7 Vikash Sharma, Saurabh Singh, Arushi Dixit and Alka Saxena  
FORMULATION AND EVALUATION OF HERBAL COUGH SYRUP FROM SEEDS EXTRACT OF HEDGE MUSTARD international journal of research in pharmacy and chemistry 2020
- 8 Miss. Telange-Patil P. V, Miss. Gorad S.U., Miss. Mane P.K., Miss. Thavare S.B.  
FORMULATION AND EVALUATION OF HERBAL COUGH SYRUP OF CLOVE BY USING JAGGERY BASE international journal of creative research thoughts December 2022, volume 10, issue 12
- 9 Sayeeda fathima, Yamuna Devi Pazaikalan, 2015, Development of Food products using pomegranate skin, journal of science and Research (JJSR), Page no- 175 o6 1757
- 10 Huma Bader Ul Ain. Tabussam Tufail. Shahid Bashir, Nabia Ijaz. Mozzamal Hussain. Ali Ikram Muhammad Adil Farooq, Shamanil A Sarwan, 2073 Nutritional importance and industrial uses of pomegranate peel A critical review Wiley, page n. 2549-2596
- 11 Ankush Ganpat Patil. Kaivalya Gajanan Mirajkar Pranay Laxman Savekar, Chetana V Bugadikattikar, Somesh S Shintre, 2020, formulation and evaluation of ginger macerated honey base herbal cough syrup, international journal of innovative science and research technology page no, 582-588.
- 12 Rowayshed G. Salama. A. Abul Fadll M. Akila Hamza and chemical evaluation for pomegranate (punica granulation) fruit peed and seeds powders by products Page no 16.
- 13 Jing chen challing Liao. Xisely Ouyang. Prahim Kahramanehaoglu, vudi Oan, and ve 2020 antimicrobial activity of pomegranate peel and its application om food preservation.
- 14 Jyoti Singh, Hamita Preet Kaur, Anjali Verma, pomegranate peel, phytochemistry, pharmacological properties and extraction. Review 19 sept 2023[proximate composition and vitamin and mineral content of pomegranate peel powder] parameter value.
- 15 Yaxian Mo, Jiagi Ma, W entao Gao, leizhang Jiangui Li, Jingaming and Jiachen zang 09 june 2022 volume 09 pomegranate peel as a source of bioactive compounds: a mini review on their physiological function.