



# FORMULATION AND EVALUATION OF HERBAL COUGH SYRUP BY USING POMEGRANATE PEELS

<sup>1</sup>POOJA PISAL\*, <sup>2</sup>PRANALI A. ZENDE, <sup>3</sup>PRANOTI S. JADHAV, <sup>4</sup>POOJA PETKAR

<sup>1</sup>Assistant professor, <sup>2</sup>Student, <sup>3</sup>Student, <sup>4</sup>Assistant professor

## Abstract :

The most common problem suffered by individuals everywhere over many centuries is cough. Coughing is the protective mechanism of the body. Coughs are classified further accordingly which are depending upon factors such as signs and symptoms, duration, type, character, etc. The most commonly used, prepared and popular dosage form to cure cough and cold is syrup. Syrup is a very popular dosage form of cough and cold medications, which eases patient compliance. By adding the decoction of herbal drugs with a base of honey is helpful to the formulation thick and preserve the formulation. The quality of the final herbal cough syrup was evaluated with parameters such as physical appearance colour, odour, taste, pH, and viscosity. It was found that antitussive activity produced by the herbal formulation in the minimum dose was much better than the standard drug.

**Keywords :** Herbal treatment, Cough, Antimicrobial activity, Honey base.

## I. INTRODUCTION -

Health and nutrition are the most important factors in the human resources development of the country. Pomegranate (*Punica granatum*) is one of the oldest fruits and originates from Iran north to the Himalayas in India and is cultivated throughout the Mediterranean region in Asia, Africa and Europe. Early fall is the best time for pomegranates in October and November in the northern hemisphere, but they are usually available in early winter. Pomegranate is also a good source of many essential substances Vitamin B complexes such as pantothenic acid (vitamin B-5), folates, pyridoxine and vitamin K and minerals such as calcium, copper, potassium and manganese[1].

The peels of this fruit make up 26-30% of the total weight of the fruits and they cover the internal membranes. 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, it is often treated as waste and thrown away. Phenolic compounds such as anthocyanins, ellagic acid glycosides, free ellagic acidification, ellagitannins, punicalagin, punicalin and gallotannins are found deep in the PP. Pomegranate Peel Extract (PPE) is rich in phenols, flavonoids and tannins, which is why it has found an important place in providing by-product pomegranate juice-related preparations to the food industry[2]. They also contain many antioxidants, antivirals, anti-cancer and anti-tumor properties and these antioxidants are equally high, able to protect low-density lipoproteins LDL cholesterol against oxidation and reduces the risk of cancer and heart

disease. It attracts attention because of its obvious wound healing properties and immunomodulatory effects[1].

fig 1 : bioactive components present in the pomegranate peel[2] -

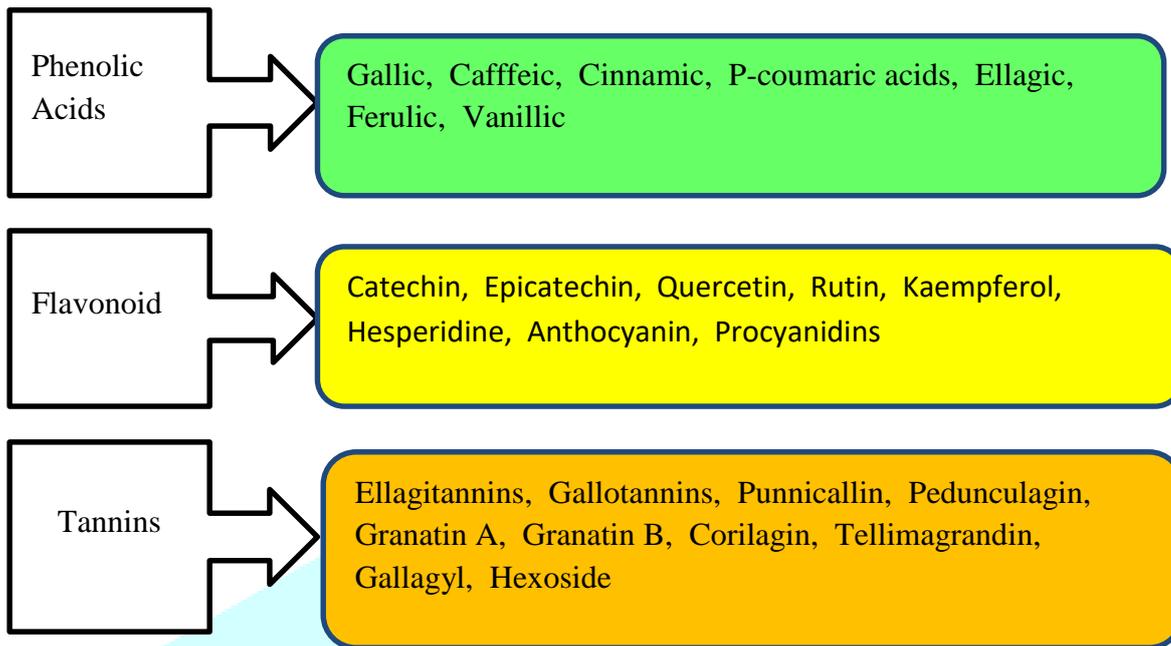


table 1 : classification of cough[3] -

Sr. No.	Types of cough	Properties
1.	Acute cough	Not more than three weeks duration
2.	Chronic cough	More than three weeks
3.	Dry cough	No mucous or secretion
4.	Wet cough	With mucous or secretion
5.	Cough from chest and throat	Productive or non – productive
6.	Paroxysmal	Spasmodic and recurrent
7.	Bovine cough	Soundless cough due to paralysis or larynx
8.	Psychogenic cough	Self – conscious activity of the patient to draw attention

#### 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 remedies used for mild to severe health disorders include asthma, tuberculosis, cough, pneumonia, kidney diseases, cancer, diabetes, allergies, lung cancer and viral infections. WHO estimates 80 per cent of the population even use herbal medicines in primary health care standards. Medicinal plants have always been used, e.g. with traditional primary providers and especially in Asian countries. The main use of herbal medicines is prescribed chronic health promotion and therapy, for 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 organs. In recent years, researchers have done focusing mainly on herbal medicines and herbal medicines with less or no side effects during and after treatment[4].



**Fig 2.**



**Fig 3.**

**Table 2: methods and materials[5] -**

Sr. No.	Material	Uses
1	Pomegranate peel	Antitussive
2	Clove	Expectorant
3	Tulsi	Antitussive
4	Fennel	Flavouring agent
5	Black pepper	Preservative
6	Honey	Base

### **Extraction of pomegranate peels[6] :**

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

- Grind the pomegranate peel into small particles to increase the surface area for extraction.
- Weigh the ground pomegranate peel to accurately determine the amount used in the extraction.
- Place the ground peel into a thimble, which is a small cylindrical container typically made of filter.
- Set up the soxhlet apparatus, consisting of a round bottom flask, a condenser, and a soxhlet extractor. The thimble with the packed peel was placed in the soxhlet extractor.
- 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 a mixture of ethanol and water as a solvent in a ratio 1:1.

- 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.
- The process continues in a cyclical manner, with the solvent cyclic through the extraction thimble until a concentrated extract is obtained.
- Collect the extracted solution in a round bottom flask.
- Remove the solvent from the collected solution using techniques like rotary evaporation to obtain the concentrated extract.
- Store the extract in a proper container.



#### Extraction of Tulsi :

Leaves of *Ocimum sanctum L.* tulsi were collected from different sites and washed with sterile water, 50g of tulsi was placed in the thimble of soxhlet apparatus with 50ml of water and 50 ml of ethanol over 24 hours[7].

#### Extraction Process of Decoction of Fennel, Clove :

Take 5-7 gm of each herbal ingredient. Herbs were mixed using 500ml of water. Attach reflux condenser and material was boiled carefully by using a water bath for 3 hrs. Boil until the total volume becomes one-fourth part of the previous. Then the liquid was cooled and filtered[7].

#### Extraction of Black pepper :

The pepper was dried and ground to a fine powder and approximately 10 g was placed in a soxhlet thimble and then extracted using 100 ml of ethanol for 240 minutes[8].

**Table 3 : formulation for 15 ml -**

Sr. no.	Ingredient	Quantity
1	Pomegranate peel	5ml
2	Clove	1.5 ml
3	Tulsi	3 ml
4	Fennel	1.5 ml
5	Black pepper	1 ml
6	Honey	3 ml

**Evaluation parameters :**

## a) Colour examination [9]:

2ml of prepared syrup was taken on watch glass and it was placed under white tube light. Then colour was observed.

## b) Odour examination :

2ml of prepared syrup was taken and smelled by an individual.

## c) Taste examination[9]:

Pinch of final syrup was taken and examined the taste buds of the tongue.

## d) pH examination[9] :

Steps -

- 1) The glass electrode is washed with distilled water and cleaned.
- 2) Place the electrode in the pH 7 buffer solution and set the pH meter to 7 by turning the calibration knob on the meter .
- 3) The electrode was removed, washed with distilled water and cleaned.
- 4) The inserted electrode was in a buffer solution of pH 4. Adjust the value.
- 5) The electrode was then placed in the final syrup and the pH was monitored .

## e) Density examination[9] :

Steps –

- 1) Cleaned the specific gravity bottle.
- 2) The bottle was cleaned at least two times with distilled water.
- 3) Measured the weight of empty dry bottle syrup with stopper (w1).
- 4) The bottle was filled with final syrup and the stopper, wipe out excess syrup from outside the tube.
- 5) Measure the weight in grams of syrup(w2).
- 6) Calculate weight in grams of syrup(w3).
- 7) Formula of density :

$$\text{density of liquid under test (syrup)} = \frac{\text{weight of syrup under test}}{\text{volume of final syrup under test}}$$

## f) Viscosity examination[10] :

Steps-

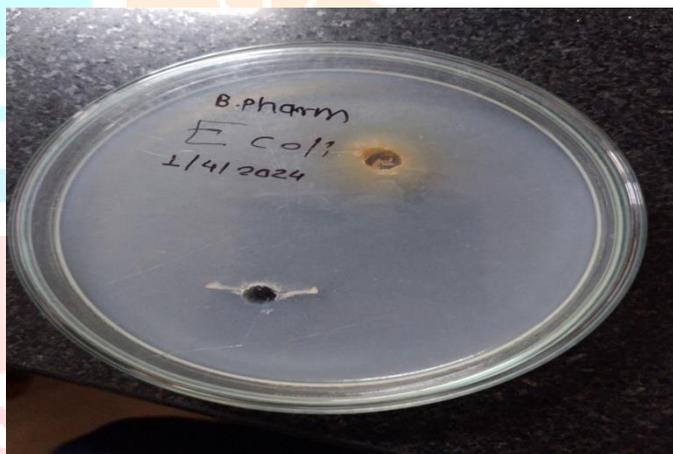
- 1) An organic solvent such as acetone.
- 2) Mount the viscometer in a vertical position on a suitable stand.
- 3) Fill water in a dry viscometer up to mark G.
- 4) Count time required, in seconds for water to flow from mark A to mark B.
- 5) Repeat step 3 at least 3 times to obtain accurate reading.
- 6) Rinse the viscometer with test liquid and then fill it up to mark A, and find out the time required for liquid to flow to mark B.
- 7) Determination of densities of liquid as mentioned in the density determination experiment

Formula:

$$\text{viscosity} = \frac{\text{density of test liquid} \times \text{time required to flow test liquid}}{\text{density of water} \times \text{time required to flow water}} \times \text{viscosity of water}$$

## g) Determination of antimicrobial activity[11] :

The agar plate method was used to examine the antimicrobial activity of the herbal cough syrup. The test compound (50 $\mu$ L) was introduced in the well. The plate was incubated overnight at room temperature. The antimicrobial spectrum of the extract was determined for the bacterial species in terms of zone sizes



around the well.

Fig 4 : MIC against E.Coli

**Result :**

The results obtained in this study suggest that herbal formulations prepared and possess anti-microbial activity, the component of herbal cough formulation was selected due to their reported action that plays preventive and curative role in the prevention of cough. The syrup prepared passes all physical parameters and shows significant anti-microbial activity.

**Table 4 : Result of Physicochemical parameters of developed herbal syrup -**

Sr.no.	Parameter	Observation value
1.	Color	Reddish brown
2.	Odour	Sweet aromatic
3.	Taste	Sweet
4.	pH	5.9
5.	Viscosity	0.029 P
6.	Density	0.77 g/cm <sup>3</sup>

**Table 5: The antimicrobial activity and MIC of the prepared extract**

Test bacteria	Zone of inhibition (mm)	
	50µL	Positive
E-coli	3	13

**Conclusion :**

In conclusion, our study showed that *Punica granatum* showed antitussive activity and a satisfactory result was found. *Punica granatum* has no adverse effects comparable to chemical drugs. Hence, it has the potential to be used as a cheap, non-toxic formulation for standard antitussive activity. This is an in-vitro study, the data of which can be useful for further studies on animals and then eventually on human beings. *Punica granatum* has no adverse effects comparable to chemical drugs. Hence, it has the potential to be used as a cheap, non-toxic formulation for standard antitussive activity. This study will help us understand cough and measures to prevent cough. This study helps us understand the effectiveness of herbal cough syrups compared to chemical-based syrups. This is an in-vitro study, the data of which can be useful for further studies on animals and then eventually on human beings.

**Acknowledgement :**

The authors express gratitude to the Principal, Dr. R.S . Chavan, Seth Govind Raghunath Sable College of Pharmacy, Saswad, Department of Chemistry for providing facilities required for the article, also thankful to Ms. Pooja Pisal for providing consistent support and timely guidance.

## Reference

- 1 Sayeeda Fathima, Yamuna Devi Puraikalan, 2015, Developement of food products using pomegranate skin, International Journal of Science and Research (IJSR), Page no- 1756-1757.
- 2 Yaxian Mo, Jiagi Ma, Wentao Gao, leizhang Jianguai 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.
- 3 Ankush Ganpat patil, Kaivalya Gajanan, Mirajkar, Prnav Laxamn Savekar, Chetana V. Bugadikattikar, Somesh S. Shintre, 2020, Formulation and evaluation of ginger macerated honey base herbal cough syrup, Internantional journal of innovative science and research technology page no. 582-588, Classification of cough.
- 4 Pratikeshwar Panda, Arpita Sahu 2023, Formulation and evaluation of cough syrup, Asian Journal of herbal pharmaceutical research and development, page no 28-32 (herbal treatment for cough).
- 5 S.C Kushwaha, M.B.Bira and Pradyuman Kumar, Nov-Dec 2013, Nutritional composition of detanninated and fresh pomegranate peel powder (material and methods) Page no- 38-41.
- 6 Jing chen chuhling Liao, Xiaolu Ouyang, Ibrahim Kahramanoglu, Yudi Gan, and 4 Nov 2020, Antimicrobial activity of pomegranate peel and its application on food preservation (the extract process of pomegranate peel).
- 7 Miss. Priya D. Khode, Rupali R. Singanjude, Urwashi D. Lanjewar, Formulation and Evaluation of herbal Cough Syrup, Journal of Critical Reviews, Vol 06, Issue 03, 2019.
- 8 H. G., Matena, Z.N., Kariuki and B.C., Ongarora OPTIMIZATION OF PIPERINE EXTRACTION FROM BLACK PEPPER (PIPER NIGRUM) USING DIFFERENT SOLVENTS FOR CONTROL OF BEDBUGS.
- 9 Dr. Javesh K. Patil, Dipali R. Mali\*, Komal R. More and Shraddha M. Jain. FORMULATION AND EVALUATION OF HERBAL SYRUP, World Journal of Pharmaceutical Research Volume 8, Issue 6, 1061-1067.
- 10 Krishna Suresh Gupta, Yatin Nitin Gorhekar , Pratiksha Subhash Gharat , Maheshwari Ashok Gawari , Saroj Changdev Firke Formulation and Evaluation of Herbal Syrup , International Journal of Research Publication and Reviews Vol 4, no 6, pp 3300-3304 June 2023
- 11 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, 10(1), 1-10