

Formulation and Evaluation of Pomegranate Peel Mouth Paint

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ABSTRACT

This study aims to develop an oral mouth paint using pomegranate peel extract and evaluate its effectiveness in promoting oral health and treating oral diseases such as ulcers and gingivitis. "Pomegranate peel mouth paint" refers to a medicine or herb containing pomegranate peel used to treat oral problems. Pomegranate peel is used as medicine in many cultures, especially due to its anti-inflammatory and antioxidant properties. In terms of oral health, it may be beneficial in treating diseases such as cancer, gingivitis, and other oral diseases. The investigation's conclusion suggested that the traditional plant mixture of peel and aloe vera used to make mouth paint might be another way to manage mouth paint finances. It also had less of an optional impact than synthetic specifying, and it could have a huge future growth potential in terms of dental evaluation in conventional cures.

Keywords: Mouth paint, oral diseases, pomegranate, *Punica granatum*, antifungal activity.

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Received on 10 July, 2024, Accepted 20 July, 2024

Please cite this article as: Todkari Sakshi et. al. Formulation and Evaluation of Pomegranate Peel Mouth Paint
International Journal of Pharmacy and Herbal Technology 2024.

INTRODUCTION

Mouth paints are sucked and held in the mouth and throat, these are medicated dosage forms with flavours.¹ Mouth paints are used to treat inflammation in the throat and mouth, including tonsillitis, pharyngitis, laryngitis, and stomatitis.²⁻³ The patient is advised not to drink water right away after the formulation is applied to their throat using a brush.⁴⁻⁵ The goal of the current study is used to target the buccal mucosa.⁶

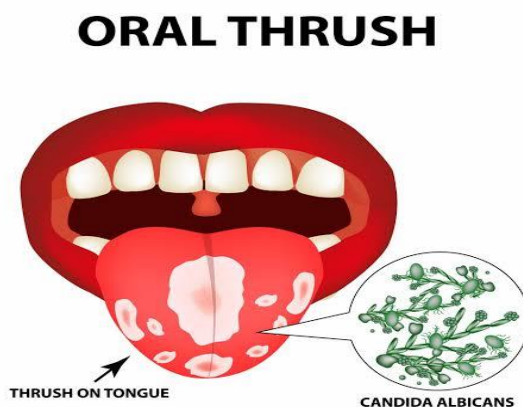


Figure No. 1: Oral Thrush or Candidiasis

Candida albicans is a fungus that causes yeast infections in the mouth, which can lead to oral thrush or candidiasis. These fungi are found in the oral cavity of a diverse range of individuals; alterations in the oral cavity's environment can cause fungal infections; hyposalivation, the use of immunosuppressants, and radiation therapy for ailments can also cause fungal infections⁷⁻¹⁰. Conventional formulations like mouth paints, gels, torches, creams, rinses, and suspensions are used to administer the medication locally into the oral cavity for an extended length of time.¹¹⁻¹²



Figure No. 2: Pomegranate (*Punica granatum*)

One Phyto plant with exceptional medicinal value is the pomegranate (*Punica granatum*), which is frequently used as a remedy for ailments.

Tremendous phytoconstituents are present in various parts of this plant, but the peel has the highest concentration of these compounds¹³. Punica granatum has been identified in recent research as a powerful Phyto plant extract with inherent medicinal qualities that include anti-inflammatory, anticarcinogenic, antiviral, antifungal, and antioxidant capabilities¹⁴⁻¹⁵. Punica granatum has been used extensively in the field of oral diseases recently due to its inherent properties, which include the ability to alleviate many of the symptoms associated with oral mucosal disease.¹⁶

Materials and Methodology

Ingredients

Sr. No	Ingredients	Category
1	Pomegranate peel powder	Antibacterial, antifungal
2	Propylene glycol	Emollient
3	Sodium citrate	Sequestrant, buffering agent
4	Glycerol	Moisturizer
5	Ethyl cellulose	Polymer
6	Saccharine	Sweetener
7	Triethanolamine	Neutralizer, thickener
8	Aloe vera gel	Anti inflammatory
9	Water	Solvent

Table No. 1: Ingredients and its category

Collection

Pomegranate peel powder was gathered from the local market. All other chemicals and solvents such as propylene glycol, sodium citrate, glycerol, ethyl cellulose, saccharine, triethanolamine, aloe vera gel are obtained from our college laboratory i.e. from Fabtech College of Pharmacy, Sangola.¹⁷

Procedure

Ethyl cellulose Polymer + sodium citrate + glycerol, Mixed and kept for 24 hrs. for hydration

Pomegranate peel powder boiled in water for 30 minutes, after cooling it is filtered by using Whatman filter paper, and the extract is obtained.¹⁸

Above extract mixed with hydrated base + propylene glycol

Add glycerol to make up volume, stir for 40 minutes at 50 rpm to get homogenous dispersion, to obtain gel consistency triethanolamine and aloe vera gel is added drop wise.

Prepared formulation is stored in an airtight container.¹⁹

Formulation

Ingredients	Quantity Taken		
	F1	F2	F3
Pomegranate peel powder	10 gm	9 gm	8 gm
Aloe vera gel	7 ml	8 ml	9 ml
Propylene glycol	20 ml	20 ml	20 ml
Sodium citrate	1.5 gm	1.5 gm	1.5 gm
Glycerol	Q. S	Q. S	Q. S
Ethyl cellulose	1.5 gm	1.5 gm	1.5 gm
Saccharine	1 gm	1 gm	1 gm
Triethanolamine	Q. S	Q. S	Q. S
Water	Q. S	Q. S	Q. S

Table No. 2: Formulation Batches of medicated mouth paint

Experimental Work**Evaluation****Physical Appearance****Colour**

Against white background formulation's colour was evaluated.

Greasiness

Putting paint on the skin makes it easier to get grease.²⁰

Odour

The mouth paint 'scent' was ascertained by dissolving them in water and inhaling the resulting solution.

Consistency

It is tested by applying it to skin.²¹

Transparency

A visual assessment of the prepared gel's 5 ml transparency was conducted in a 10 ml test tube.²²

Smoothness

The products smoothness and whether it was smooth, clumped, homogenous, or harsh were assessed.²³

Relative Density

Relative density calculated using RD bottle, the weight in grams of sample and the dist. H₂O.²⁴

pH

pH paper is used to determine the pH.²⁵

Viscosity determination

A Brookfield viscometer with spindle number 7, at 25⁰C spindle speed 100 rpm, measures viscosities of works that formed.

The dial reading on the viscometer was recorded. to correspond with the result.²⁶

Spreadability

Around 1 g of sample is placed at the center of one of the glass slides. Cover the sample with the second glass slide. Place the standardized weight on the top slide. Allow the weight to sit on the sample for a specific time period, typically 5 minutes. After the time period, remove the weight and the top glass plate carefully. Measure the diameter of the spread area using a ruler or measuring scale.²⁷

Homogeneity

Following the gels placement in the container, each generated gel was examined visually to ensure that it was homogeneous. They were inspected to see if any aggregates were present and how they looked.²⁸

Antifungal activity

Method

Agar cup plate bioassay

Preparation of nutrient agar media

Composition	Quantity (gm)
NaCl	0.5 gm
Pepton	5 gm
Beef extract	3 gm
Dist. Water	1 liter

Table No. 3: Preparation of nutrient agar media

1st sterilize all glassware for 30 min, at 121⁰C in autoclave. Put above listed chemicals in water, boil it for 30 min, cool the mixture. Give the culture media 48 hrs. incubation period at 37⁰C²⁹

Determination of Zone of inhibition

To prepare the agar plate medium, 15 g of nutrient agar powder were added to dist. Water 100 liters. Then it is heated and all ingredients are dissolved. To allow the mixture dissolve to cool but not solidify, it is autoclaved for 15 minutes at 121^o C. after that, the provided microorganism (fungi) was inoculated into the nutrient agar medium and the mixture was poured into plates to solidify. Then, using a borer, make holes in the same medium that are roughly 9 mm in diameter using the agar well diffusion method. Pomegranate peel (*Punica granatum*) extract antifungal solution poured straight into the holes. After incubation, the plates are reported.³⁰

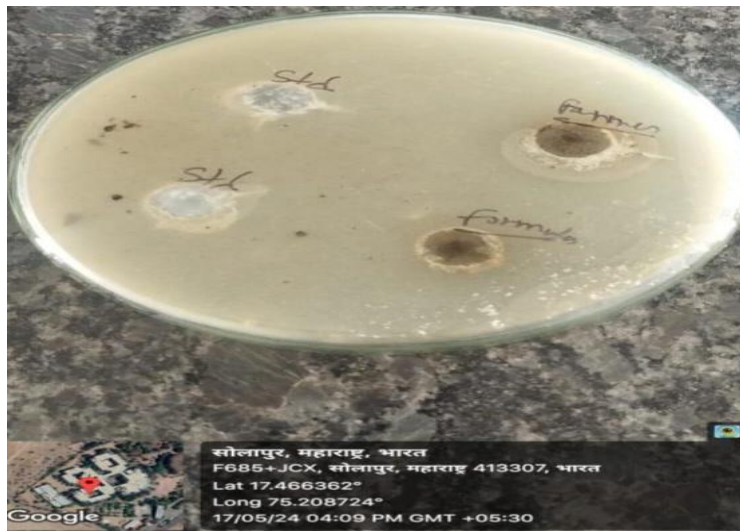


Figure No. 3: Zone of inhibition

RESULTS

Physicochemical properties

Sr. No.	Parameter	Aqueous Pomegranate peel extract	Aloe vera gel	Formulation
1	Colour	Yellowish brown	Greenish yellow	Yellowish brown
2	Odour	Aromatic	Odourless	Aromatic
3	Transparency	Transparent	Transparent	Clear
4	Smoothness	Smooth	Smooth	Silky Smooth
5	Density	1.01 g/ml	1.2 g/ml	1.12 g/ml

Table No.4: Physicochemical properties

Determination of pH

Sr. No.	Formulation	pH
1	F1	7.1
2	F2	7.5
3	F3	6.9

Table No.5: pH readings

The mean pH of the prepared mouth paint was found to be 7.16

Determination of viscosity

Sr. No.	Formulation	Viscosity
1	F1	990CP
2	F2	980 CP
3	F3	985 CP

Table No. 6: Viscosity readings

The viscosity of formulated mouth paint was found to be 985 ± 5 .

Determination of spreadability

Sr. No.	Formulation	Spreadability
1	F1	12.06 ± 0.53
2	F2	11.13 ± 0.51
3	F3	10.76 ± 0.76

Table No.7: Spreadability of prepared mouth paint

The mouth paint's spreadability was determined to be between 10.76 ± 0.76 and 12.06 ± 0.53 gm-cm/sec, indicating that they may spread smoothly and uniformly.

Determination of homogeneity

Sr. No.	Formulation	Homogeneity
1	F1	Very good
2	F2	Good
3	F3	Good

Table No.8: Homogeneity of prepared mouth paint

The mouth paint formulation of homogeneity was found to be Very good.

Antifungal activity

Zone of inhibition presence and diameter around the disks serve as indicators of antifungal action. Results of antifungal activity using candida albicans are displayed below. This aids in selecting a formulation that works better.

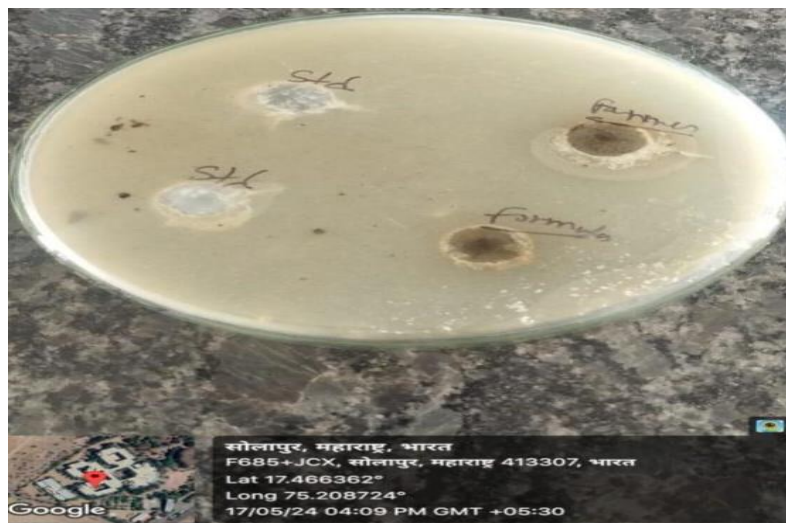


Fig. No. 4: Zone of inhibition

Sample	Zone Inhibition (mm) after 36 hrs.
Standard 1	11 mm
Standard 2	11 mm
F 1	12 mm
F 2	10 mm

Table No. 9: Zone of inhibition (mm)

DISCUSSION

In the present work the herbal mouth paint preparations of pomegranate peel is designed using polymer like Ethyl cellulose for the treatment of oral thrush, fungal infection inflammation in throat. During our physico-chemical evaluation studies the formulation was found to have good spreadability and homogeneity. The rheological behavior of mouth paint was studied. During microbiological investigation against the causative organism was tested, formulation showed good zone inhibition when compared with standard marketed product.

CONCLUSION

The study found that natural medications are more widely accepted and have fewer side effects than synthetic formulations. The pomegranate peel and aloe vera mouth paint combination formulation mentioned above is fully capable of preserving oral hygiene, safeguarding oral health, and exhibiting strong antibacterial activity against infections. Thus, the development of microorganisms within the oral cavity is inhibited. Pomegranate peel and aloe vera gel combined in a mouth paint demonstrated the great potential for future dental research in natural therapies.

CONFLICTS OF INTEREST

Nil.

FUNDING

No financial interest

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