

Formulation and Evaluation of Polyherbal Antiacne Face Wash by Using Pomegranate Peel Powder

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Abstract: Pomegranate is widely recognized for its potent anti-inflammatory, antioxidant, anti-obesity, and anticancer activities. Because of these therapeutic benefits, it has gained significant importance as a nutraceutical and functional food since ancient times. The fruit mainly consists of three parts: peel, seeds, and juice, each containing valuable medicinal properties. Various research studies have focused on identifying the bioactive compounds present in pomegranate and evaluating their role in promoting health benefits and developing future therapeutic applications.

The pharmacological activities of pomegranate are mainly attributed to compounds such as ellagic acid, ellagitannins (including punicalagins), puniceic acid, fatty acids, flavonoids, anthocyanidins, anthocyanins, estrogenic flavonols, and flavones. These constituents are considered highly beneficial for therapeutic purposes. Studies have shown that the combined or synergistic effect of these phytochemicals is more effective than the action of individual compounds alone.

Several investigations have reported promising outcomes of pomegranate in the management of obesity, insulin resistance, intestinal inflammation, and certain types of cancer. Moderate intake of pomegranate is generally considered safe and does not produce harmful effects. However, further research is still necessary to evaluate its long-term safety and possible interactions with medications that may influence the bioavailability of its active constituents. This review mainly focuses on summarizing the health benefits and mechanisms of action of pomegranate extracts in chronic inflammatory disorders..

Keywords: Pomegranate, Aloe vera, Tinospora, Evaluation

I. INTRODUCTION

Skin is the largest organ of our human body which serve as a protective against the environmental factor such as microorganism, ultra-violet radiation & chemical exposure. It plays a vital role in maintaining homeostasis and regulating body temperature. Due to constant exposure to pollution, dust, and harsh climatic conditions, the skin is prone to various disorders such as acne, dryness, irritation, and premature aging. Therefore, maintaining proper skin hygiene is essential for overall health and well-being.

In recent years, there has been a growing interest in herbal cosmetics due to their safety, efficacy, and minimal side effects. Herbal formulations utilize plant-based ingredients that are rich in bioactive compounds such as flavonoids, alkaloids, tannins, and phenolic compounds. These constituents exhibit various beneficial properties including antimicrobial, antioxidant, anti-inflammatory, and skin-nourishing effects. As a result, herbal cosmetics are gaining popularity as safer alternatives to synthetic products.

Cosmetics are products that are widely used all over the world for maintaining and enhancing the appearance of the skin, hair, and other body parts such as the face, eyes, lips, hands, and nails. These products include creams, lotions, powders, face packs, shampoos, conditioners, hair oils, moisturizers, and many other personal care preparations.



Healthy, smooth, and glowing skin along with strong and shiny hair play an important role in improving a person's overall appearance and confidence. Herbal products are considered safer and more skin-friendly compared to synthetic cosmetic products because they usually produce fewer side effects. Due to increasing awareness about natural and eco-friendly products, the demand for herbal cosmetics is rapidly increasing in the personal care industry.

Herbal Facewash :

Herbal face wash is one of the commonly used herbal cosmetic preparations designed to cleanse the skin, remove dirt, excess oil, and impurities, while also providing nourishment and protection to the skin. The incorporation of herbal ingredients with medicinal and therapeutic properties makes herbal face wash more beneficial for maintaining healthy and attractive skin. Therefore, the development and evaluation of herbal face wash has become an important area of research in the field of cosmetic and pharmaceutical sciences.

Ideal characteristic of herbal face wash :

- ☐ Should be close to natural skin pH (about 5.5 to 7).
- ☐ It should be produce sufficient foam for easy application.
- ☐ It should be easily removable with water without leaving any sticky residue.
- ☐ It should not cause any allergic reaction ,burning sensation ,skin sensitivity.
- ☐ It should be cost effective and simple to prepare.
- ☐ It should provide long term benefits without causing skin damage.

Cosmetic science is a real science and it is multidisciplinary field since it includes basic knowledge and a wide range of information from a number of different fields. Additionally some non science areas as are also and integral part of cosmetic science. Cosmetic are (1) articles intended to be rubbed, poured, sprinkled, or sprayed on introduced into, or otherwise applied to the human body or any part therefor for cleansing, beautifying, promoting attractiveness, or altering the appearance.

The number of patients looking for alternative and herbal treatments is increasing rapidly. Herbal medicines are the result of therapeutic experiences from generations of doctors in traditional medicines systems over many years .These medicines are now in high demand in developing countries for primary health care. This need is not just because they are affordable; they are also more culturally acceptable, compatible with the human body, and have fewer side effects.

In the present study, a polyherbal anti-acne face wash gel was formulated using natural herbal extracts with the help of suitable gelling agents such as Hydroxy Propyl Methyl Cellulose (HPMC) and Carbopol. Different concentrations of herbal extracts were incorporated into the formulation to evaluate their effectiveness. The prepared formulations were further tested for their anti-acne activity and antimicrobial effect against acne-causing microorganisms. This herbal face wash formulation may provide a safe and effective alternative to conventional anti-acne treatments.

Face wash formulations are widely used for maintaining healthy and attractive skin. They help in cleansing the skin by removing dirt, excess oil, dead cells, and impurities from the surface of the skin. In addition to cleansing, modern face washes also provide several beneficial effects such as anti-acne activity, moisturising effect, anti-wrinkle properties, and improvement in skin complexion.

Skin lightening or skin brightening agents present in face wash formulations mainly work by reducing the production of melanin, the pigment responsible for skin colour. These agents act by inhibiting the formation and metabolism of melanin in melanocyte cells, thereby helping to reduce pigmentation and uneven skin tone. Various natural and synthetic ingredients such as propanediol, Evodia rutaecarpa fruit extract, arbutin, jiko acid, vitamin C, and its derivatives are commonly used in skin-whitening cosmetic preparations because they show lower toxicity and are considered safer for skin application.

Nowadays, herbal face wash formulations are gaining popularity due to their natural origin, safety, and fewer side effects compared to chemical-based cosmetic products. Herbal ingredients not only improve skin appearance but also help in maintaining overall skin health.



Types of Skin :

Human skin is classified into different types based on the amount of oil production, moisture content, and sensitivity of skin. Understanding skin type is important for selecting suitable cosmetic and skin care product, especially face wash formulation.

Normal Skin Dry Skin Oily Skin

Sensitive Skin Acne-Prone Skin

Skin care Preparation for face^{vii}.

1. Face pack and masks
2. Cleansing creams and lotion
3. Rouges
4. Face washes .
5. Compact powder Types of herbal face wash :

In general, a face wash is suitable for all skin types; however, there are now a variety of products on the market that are formulated to suit various skin types. For instance, an oily skin face wash is designed for people with oily skin conditions; it does not contain oils and instead leaves a thin film of oil on the skin. There are numerous varieties of face washes on the market, including ones for oily, dry, and regular skin^{viii}.

Features of herbal face wash :

1. Removing the dead cells.
 2. Rejuvenating the skin cells elevate stress.
 3. Removes oil, dirt and impurities.
 4. Reduces microbial flora of skin.
 5. Leave skin fresh and breathing
- 1.4 Main ingredient used in formulation for herbal face wash is :
- i. Pomegranate peel powder
 - ii. Tinospora powder
 - iii. Lemmongrass extract
 - iv. Beetroot juice

Advantages :

1. Natural & eco-friendly in nature.
2. Generally safer & less toxic.
3. Rich in anti-oxidant & bioactive compound.
4. Suitable for herbal cosmetic formulation.

Disadvantages :

1. Difficult to maintaining uniform colour & odour.
2. Stability problem during storage.
3. Possibility of microbial contamination.
4. Shorter shelf life compared to synthetic ingredient.



PLANT PROFILE:

1. Pomegranate peel powder (*Punica granatum*)



Fig no1 : Pomegranate peel powder

- ☐ Kingdom : Plantae
- ☐ Class : Mangoliopsida
- ☐ Order : Myrtales
- ☐ Species : *P. granatum*
- ☐ Family : Lythraceae
- ☐ Subclas : Mangoliopsida
- ☐ Genus : *Punica*
- ☐ Division : Magnoliophyta

Main properties in Pomegranate peel :

1. Anti-oxidant property : Helps protect skin from radical damage & reduce premature ageing and wrinkles.
2. Anti-microbial property : Show activity against bacteria & fungi. Helps prevent skin infections and acne.
3. Anti-inflammatory : Reduce redness, irritation and swelling of the skin.
4. Wound healing property : Support regeneration of damage skin tissue.
5. Exfoliating property : Acts as a natural scrub. Remove dirt, impurities and dead cells from skin.
6. Astringent Property : Tightens skin pores due to the presence of tannins.

Phytoconstituents :

a. Tannins :

Mainly hedrolysable tannins.

E.g ; Punicalagin Pinicalin Ellagic tannins Gallotannins

b. Flavanoids :

Posses anti-oxidant and anti-inflammatory activity.

E.g ; Catechin

Quercetin Kaempferol Anthocyanins

c. Phenolic acids :

Helps in Scavenging free radicals and protecting skin cells.

E.g ; Ellagic acids

Gallic acids Caffeic acids Ferulic acids

d. Alkaloids :

Present in small quantities, contribute in biological activity.

e. Glycosides :

Participate un various therapeutic effects.

f. Saponins :



Showing cleansing and antimicrobial activity.

g. Vitamins :

Vitamin C, Vitamin E

Support skin nourishment and repair.

h. Minerals :

E.g ; Potassium

Magnesium Calcium Phosphorus

i. Dietary Fibers :

Improve texture and natural exfoliating action.

LITERATURE REVIEW

1. Shital Sadashiv Shinde, Mr. D. M. Waghmode, and Dr. Santosh Jain (2023) reported the preparation of pomegranate (*Punica granatum*) peel powder.
2. Nitin Yadav, Shashikant Maury et al. (2021) formulated a medicinal plant-based face wash and concluded that herbal face wash preparations are safe, effective, and of good quality for skincare applications.
3. Jadhav Ajinkya, Prakashrao, Mr. C. G. Kute, and Dr. Prachi Uduparkar studied the formulation and evaluation of pomegranate (*Punica granatum*) peel powder for skin care applications.
4. Sudhir Chaudhary (2010) studied the anti-acne activity of certain Indian herbal drugs. The research demonstrated the antibacterial activity of herbal extracts against *Staphylococcus epidermidis* using culture media techniques.
5. Gowda Bhaskar, Shariff Arshia, and Priyadarshini evaluated a topical polyherbal anti-acne gel containing *Garcinia mangostana* and *Aloe vera* (2009). The study revealed that pomegranate peel powder, along with *Aloe vera*, *Tinospora*, and honey, helps improve skin texture and reduces acne formation.
6. Sowmya K. V., Darsika C., Fatima Grace, and S. Shanmuganathan (2015) formulated and evaluated a polyherbal face wash gel. Their study concluded that herbal ingredients are effective in preventing and treating skin diseases without causing harmful side effects and are widely used in cosmetic formulations.

AIM AND OBJECTIVES

Aim

To formulate and evaluate a herbal face wash containing *Tinospora*, pomegranate peel powder, and lemongrass extract for effective skin cleansing and anti-acne activity.

Objectives

1. To provide effective cleansing action to the skin.
2. To reduce pimples and acne from the skin.
3. To provide essential nutrients and nourishment to the face.
4. To improve skin texture and appearance.
5. To remove dirt, sebum, excess oil, and dead skin cells from the skin surface.
6. To evaluate the physicochemical properties and stability of the herbal face wash formulation.

MATERIAL AND METHODS :

Material : Table no : 1

Sr.no	Ingrediant	Uses
1.	Pomrgranate peel powder	Antioxidant & acne treatment, anti-microbial
2.	Almond oil	Using a cleanser
3.	Tinospora	Antioxidant
4.	Aloe vera	Eczema, psoriasis



5.	Rose water	Flowering agent
6.	Glycerine	Humectant
7.	Methyl paraben	Antifungal preservative
8.	Shikakai	Foaming agent
9.	Water	Solvent
10.	Acacia, Carbacol, Gelatine	Gelling agent
11.	Green Tea	Anti-oxidant
12.	Beetroot	Natural moisturizer, Anti-inflammation

Methodology ;

Collection and Authentication:

The Pomegranate peels and Tinospora stems were collected from the local area near Shri Ganpati Institute of Pharmaceutical Sciences and Research, Tembhurni. The plant materials were identified and authenticated by the Department of Botany at Walchand College of Arts and Science, Walchand Hirachand Marg, Ashok Chowk, Solapur-06 (MS).

Plant Material Drying and Powdering:

The collected pomegranate peels and Tinospora stems were thoroughly washed with water to remove dirt and impurities. The plant materials were shade dried for about two weeks at room temperature (approximately 25°C). After complete drying, the materials were separately powdered using a mixer grinder to obtain coarse powder. The prepared powders were stored in airtight containers for further use in the formulation of herbal face wash.

PHYTOCHEMICAL TESTS:

Pomegranate peel powder -

A) Alkaloid test ; Table no.2

Sr.no	Test Name	Observation	Inference
1.	Dragandoff Test (Extract + Dragandrogg reagent)	Reddish Brown ppt	+ve
2.	Mayer's Test (Extract + Mayers reagent)	Yellow/ white creamy ppt	-ve
3.	Wagners Test (Extract + Wagners reagent)	Brown / Reddish ppt	+ve

B) Tannin / Phenolic compound test ; Table no.3

Sr.no	Test Name	Observation	Inference
1.	FeCl ₃ (Extract + Ferric Chloride reagent)	Dark Blue/Green colour	+ve

C) Glycoside Test : Table no.4

Sr.no	Test Name	Observation	Inference
1.	Keller killani Test (Extract + glacial acetic acid + FeCl ₃ + H ₂ SO ₄)	Blue colour solution	+ve
2.	Brontaggar's Test (Extract + Chloroform + Shake well and add 10% ammonia)	Pink colour solution	-ve





Fig no 2 : Photochemical test of pomegranate powder

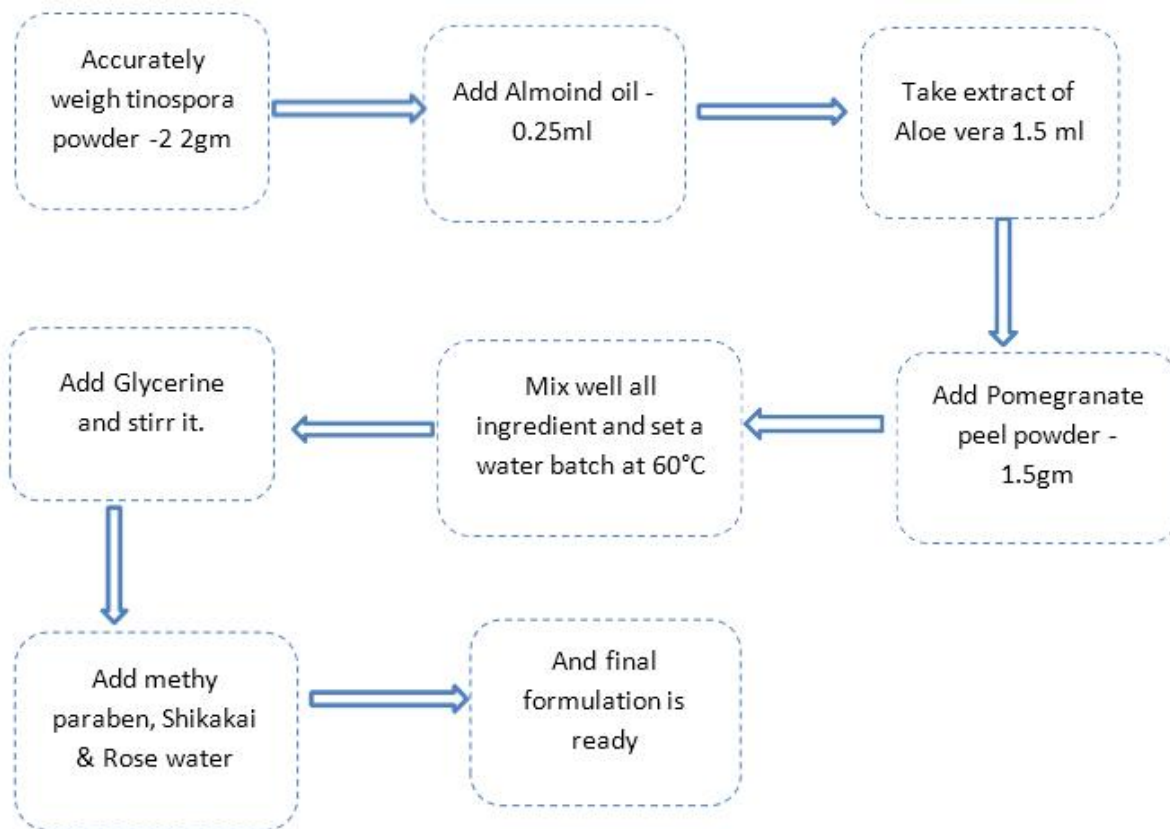
FORMULATION TABLE

Table no : 5

Sr.no	Name of Drug	F1	F2	F3	F4
1.	Pomegranat peel powder	1,5gm	2gm	2gm	2gm
2.	Aloe vera gel	1.5ml	2ml	3ml	3.5ml
3.	Glycerine	6ml	5ml	5.5ml	6ml
4.	Acacia	0.5gm	1gm	1.5gm	1.5gm
5.	Shikakai	1.5gm	1gm	2.5gm	2gm
6.	Methyl paraben	0.02gm	0.01gm	0.03gm	0.02gm
7.	Almoind oil	0.25ml	0.25ml	0.25ml	0.5ml
8.	Tinospora powder	0.5gm	0.5gm	0.5gm	0.75gm
9.	Lemmongrass extract	2ml	2ml	3ml	2ml
10.	Sodium benzoate	0.2gm	0.2gm	0.2gm	0.2gm
11.	Beetroot juice	5ml	3ml	3ml	3ml
12.	Rose water	5ml	5ml	5ml	5ml
13.	Purified water	Upto 30ml	Upto 30ml	Upto 30ml	Upto 30ml



PROCEDURE:



Flow chart no 1 : Procedure



Fig no 3 : Formulation



EVALUATION PARAMETER :

The prepared face wash was evaluated for various parameters as follows :

1. Physical Evaluation :

- a. Washability : Formulation is easily applied on the skin and then easily remove by the water.
- b. Colour : The colour of facewash is faint brown observed.
- c. Ph : pH of formulation is 6.
- d. Odour : Odour of formulation is characteristics / pleasant.
- e. Irritancy test : The wash is applied on left hand dorsal surface of 1 sq.cm and observed in time interval 1 to 2 hrs.
The result was found to be non irritant effect on skin
- f. Consistency : Semisolid in nature.
- g. Foamability : Foaming was observed in this formulation.
- h. Grittiness : No gritty particles observed.
- i. Viscosity : viscosity is measured by the ostwald viscometer or brookfield viscometer.x

RESULT AND DISCUSSION :

The herbal face wash was formulated with a slightly acidic pH to match the normal pH of the skin. The evaluation results are shown in Table No. 2. The prepared formulation was brown in colour, while the marketed face wash was blue in colour. The herbal face wash showed a semisolid consistency and was found to be homogeneous and easy to wash off.

A total of 10 g of herbal face wash was prepared and stored in a well-closed container. All evaluation tests were performed successfully, and the formulation showed satisfactory results.

Phytochemical evaluation :

Table no : 6

Sr.no	Test Name	Observation	Inference		
			Tinospora	Lemmongrass	Beetroot
	Alkaloid Test				
1.	Dragandroff Test	Reddish Brown ppt	+ve	+ve	+ve
2.	Mayers Test	Yellow/white creamy ppt	-ve	-ve	-ve
3.	Wagners Test	Brown reddish ppt	+ve	+ve	-ve
	Tannin Test				
4.	Ferric chloride Test	Dark Blue/Green colour	+ve	+ve	+ve
	Glycoside Test				
5.	Killar killani Test	Blue colour solution	+ve	+ve	+ve
6.	Brontagors Test	Pink colour solution	-ve	-ve	-ve

(+=Present - = Absent)

Physical appearance : Table no : 7

Sr.no	Formulations	Colour	Odour	pH	Consistency	Foamability
1	F1	Faint Brown	Pleasant	6.45	Semi-Solid	Good
2	F2	Brown	Pleasant	5.90	Semi-Solid	Good
3	F3	Faint Brown	Pleasant	6.10	Semi-Solid	Good
4	F4	Faint Brown	Pleasant	6.2	Semi-Solid	Good



pH :

The pH of a face wash is an important factor in maintaining healthy skin and protecting the natural skin barrier. A suitable pH helps to reduce skin irritation, dryness, and damage while maintaining the normal balance of the skin surface. Nowadays, face washes with skin-friendly pH are widely preferred because they provide gentle cleansing without affecting skin health. Mildly acidic formulations help to retain skin moisture, improve smoothness, and support the natural protective layer of the skin. In the present study, all prepared face wash formulations were found to be pH balanced, with pH values ranging from 5.5 to 6.5, which is close to the natural pH of human skin.

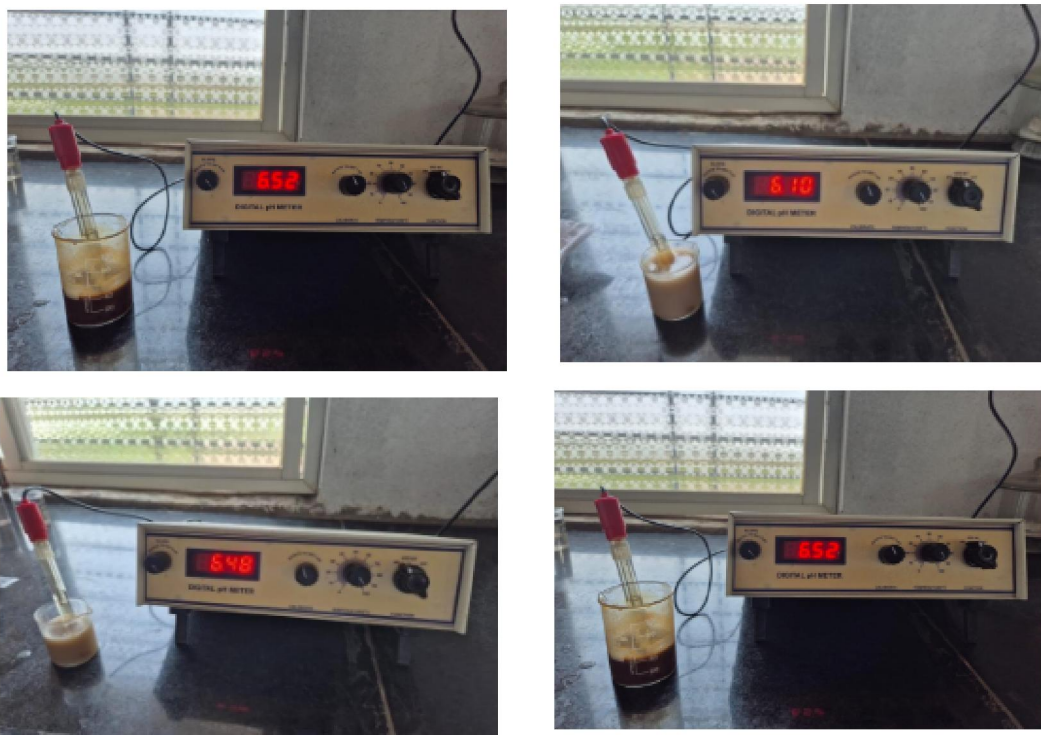


Fig no 4 : Result of pH test

Viscosity :

The viscosity of the formulated herbal face wash was determined using a Brookfield Viscometer with Spindle No. 3 (RV-C model). According to the literature, an ideal herbal face wash should possess moderate viscosity to ensure easy application and good spreadability on the skin. The formulation should exhibit pseudoplastic (shear-thinning) behavior, which allows the face wash to spread smoothly during rubbing while maintaining suitable consistency in the container. Proper viscosity also helps in improving product stability, ease of handling, and consumer acceptability.





Fig no 5 : Result of viscosity test

Microscopy of herb powder :

The microscopic feature of pomegranate peel powder showed the characteristics such as, brownish coloured powder with rough texture, epidermal cell, fiberes wire present, calcium oxalate crystal were observed in prism form.

The tinospora powder containing following microscopic features fiberes were long thick walles and lignified, coek cell were rectangular and compactly ar





Fig no 6 : Result of Irritancy , wash-ability, spread-ability, Foam-ability test
Anti- microbial Activity : (In vitro Antiacne activity Propionobacterium acne ATCC No-11827)



Fig no 7 : Antiacne test (Batch 3)

Table no : 8

Sr.no	Sample	Concentration	Zone of inhibition (mm) P.acne
1.	Control		-
2.	Standard marketed crean	1mg/ml	28
3.	Sample PN (0555)	5mg/ml	08
		10mg/ml	15



Conclusion of anti acne result

The antibacterial activity study against *Propionibacterium acnes* (P. acnes) demonstrated that Sample-PN (0555) exhibited noticeable antibacterial activity in a concentration-dependent manner. The standard marketed cream showed a strong zone of inhibition of 28 mm, confirming effective antibacterial action against the test organism. Sample-PN (0555) produced zones of inhibition of 08 mm and 15 mm at concentrations of 5 mg/mL and 10 mg/mL, respectively. The increase in the zone of inhibition with higher concentration indicates enhanced antibacterial effectiveness of the formulation. Overall, the results suggest that Sample-PN (0555) possesses promising antibacterial activity against P. acnes and may be useful for the development of anti-acne topical formulations.

The herbal face wash formulations exhibited:

- ☐ Good cleansing ability and easy removal of dirt and excess oil
- ☐ Smooth texture and pleasant appearance
- ☐ Good spreadability and easy application on skin
- ☐ Appropriate foaming ability and foam stability
- ☐ Suitable pH compatible with skin physiology
- ☐ Good consistency and viscosity for convenient use
- ☐ Non-irritant and skin-friendly nature

Overall, the developed herbal face wash formulation showed satisfactory physicochemical properties and was found to be suitable for effective skin cleansing and care.

II. CONCLUSION

People have been using medicinal plants for skincare since ancient times, and this knowledge has become an important part of traditional culture and practices. Nowadays, there is a growing demand for herbal cosmetic products because they are considered safer and more natural. Herbal ingredients such as vitamins, antioxidants, natural oils, almond oil, tinospora, aloe vera, and pomegranate contain many beneficial bioactive compounds that help in maintaining healthy skin. In today's lifestyle, many individuals are looking for treatments for skin problems that provide both care and healing without causing side effects. Herbal ingredients have made it possible to prepare cosmetic products that are gentle and safe for the skin. Herbal face washes and herbal creams are widely used as an effective and natural way to improve and maintain the appearance and health of facial skin.

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