



“FORMULATION AND EVALUATION OF POLYHERBAL ANTIACNE FACE WASH GEL”

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Abstract:

Acne is a long-lasting inflammatory condition of the pilosebaceous unit that is brought on by excessive sebum production by the sebaceous glands and aberrant desquamation of hair follicles at the start of adolescence. Follicular distention is a result of follicle obstruction and is frequently accompanied by the growth of the microorganisms *Propionibacterium acnes* and *Staphylococcus epidermidis*. The purpose of this study was to create and test a polyherbal face wash gel with extracts of *Psidium ghuajava* L. (Guava), *Curcuma longa* (Haldi), and distillate of *Aloe berbadandis* (Aloe Vera.), distillate using HPMC. The goal of this study was to develop an acne treatment using only herbal ingredients as a powerful and secure substitute for dangerous antibiotics. Three plants have been identified as having effective anti-microbial, anti-oxidant, and anti-inflammatory properties for this purpose. The prepared formulation was assessed for a number of factors, including colour, consistency, consistency, pH, viscosity, and stability studies, and the results were positive. The turbidimetric method was used to examine the *in vitro* antimicrobial activity for the various formulations (F1, F2, F3, F4, F5, F6) against *Propionibacterium acnes* and *Staphylococcus epidermidis*, a cause of *acne vulgaris*. Hence, it was determined that the herbal anti-acne gel's formulation of natural active ingredients can be utilised to treat skin acne.

KEYWORDS: *Psidium ghuajava* L., *Aloe berbadandis*, *Curcuma longa*, Polyherbal formulations, Anti-acne action, *Acne vulgaris*.

INTRODUCTION:

The world's oldest healthcare system is likely India's natural medication industry. The use of plants for healing dates back so far in Indian history that the Vedas, an ancient sacred text, make reference to an early type of herbal medicine. The traditional herbal medicine practises of Ayurveda and Unani involve the use of herbs and other natural ingredients to treat medical ailments. The demand for herbal remedies, skin care products including herbs, and even herbal cosmetics has significantly increased on a global scale in recent years.^[1]

The largest portion of the body that reflects one's health is the skin on the face. It is made up of substances including amino acids, lipids, and carbohydrates, among others. It focuses on the creation and description of a

herbal cosmetic face wash preparation. Women began dressing themselves because they were so concerned with increasing their personal attractiveness in the ancient world. [2]

Acne:

The Greek term acme, which means "point" or "spot," is where the word "acne," which means "the highest point," originates. In 1835, it was spelled incorrectly, with a 'n' rather than an 'm'.

Acne, or Acne vulgaris as it is known medically, is a skin condition that affects the oil glands at the base of hair follicles. The sebaceous (oil) glands become active throughout puberty and are triggered by male hormones released by both male and female adrenal glands. These factors provide a potential target treatment. *P. acnes*, *S. epidermidis* and *S. aureus* are the target sites of antiacne drugs [3]

Dead skin cells cause dull, uneven skin that is prone to breakages. Face wash helps remove the layer of dead skin from the face and protects skin from harm when used frequently. By eliminating pollutants, it also promotes the formation of new skin. in maintaining a youthful appearance. [4]

Certain medications burn the skin in that location over time, leaving scarring. Acne can also be brought on by oral contraceptives, injectable contraceptives, intrauterine devices (IUD), and steroids used by bodybuilders and sportsmen. Acne cannot be completely healed, but it can be controlled with the right care. [5]

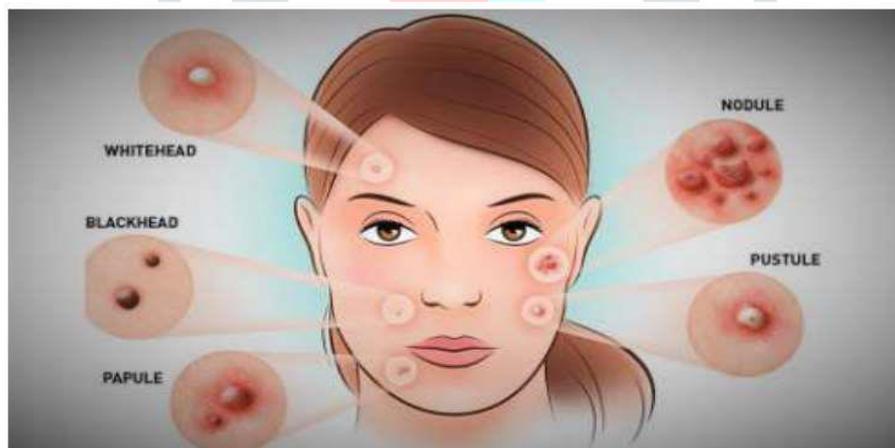


Figure 1 types of acne

MATERIALS AND METHODS:

MATERIALS:

In the present study actives were of plant origin from a specified part of the plant. All the chemicals were of analytical grade.

Methods:**Collection of Plant Materials:**

The *Psidium guajava* linn leaves and the turmeric and aloe vera extracts were procured from local markets in Latur, Maharashtra and Sunpure Extracts Pvt. Ltd., Mumbai, respectively. The materials were cleaned, and the flesh was removed to prepare them for the subsequent extraction and seed separation procedures.

Preparation of herbal Extracts:

By employing rose water as a solvent, the maceration method can be used to make herbal extracts (1:5).

Psidium guajava (guava) leaves were ground into minute bits using a grinder after being dried in a hot air oven at 450 °C. Weighing the desired amounts of herbal medicine, each herb was then macerated in a conical flask. After three days, the contents were removed using a straightforward filtration procedure, and the filtrates were collected in separate vessels. The extract was filtered twice using plain filter paper and a funnel.

Electronic water baths were used for the evaporation process. Up to the necessary concentration of the extract was attained, filtrates were allowed to evaporate in an evaporating pan.

Evaluation of Face Wash Gel:

Physical characteristics of face wash gel formulations are evaluated visually based on physical characteristics like colour, smell, and appearance/clearness. A digital pH metre of the gel's formulation was used to check the gel's pH measurement. For the purpose of identifying any pH alterations over time, measurements were made at 1, 30, 60, 60, and 90 days after preparation. Using a Backfield viscometer, the viscosity of the prepared herbal face wash gel was measured (model RVTDV II). Using spindle no. 6, the reading was taken at 100 revolutions per minute.

Sr no.	Herb name	Parts used	Use
1.	Guava leaves	Leaves	Antibacterial, anti-inflammatory
2.	Turmeric	Rhizomes	Antiseptic, antibacterial
3.	Aloe vera	Whole plant	Soothing, moisturizer

Table 1 herb plant

By observing the physical characteristics and uniformity of the formulation of a herbal hair gel, the created face wash gels were evaluated. The spread-ability of the material was assessed using a wooden block and a pulley mechanism. By using this technique, spread-ability was evaluated based on the gels' tendency to slide and drag. On this ground slide, more gel (approximately 1 g) was being studied. The gel was then placed in a sandwich between this glass slide and another glass slide with a hook and a fixed ground slide dimension. During five minutes, a weight of one kilogramme was placed on the slide's top to force out air and create a homogenous gel film between the slides. The following formula was used to determine spread ability:

$$S = M \times L / T$$

S is for spreadability, M is for weight in the pan (attached to the higher slide), L is for length moved by the glass slide, and T is for the amount of time (in seconds) needed to completely separate the slides from one another. By applying to skin and washing it off with water, washability was also evaluated. By mixing a tiny amount of face wash gel with water in a test tube and shaking it, the foamability of the gel is evaluated.

Formulation of face wash gel method:

A small amount of water and preservatives are added to the produced propylene glycol and SLS solution. Once the gelling ingredient was added, it was well mixed together while being added gradually. Add herbal extracts to the stock solution in this case. Triethanolamine is then added. And Triethanolamine was added drop by drop to the mixture to alter the pH as needed (5.5-5.6). Preservatives methyl and propyl paraben were added.

Ingredients	F1	F2	F3	F4	F5	F6
Guava leaves extract	1%	1.5%	2.0%	1%	1.5%	2%
HPMC	1%	1%	1%	1.5%	1.5%	1.5%
Curcuma longa extract	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
Aloe vera extract	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Methyl paraben	0.5 mg					
Propyl paraben	0.1 mg					
Propylene glycol	5 ml					
Sodium lauryl sulphate	50mg	50mg	50mg	50mg	50mg	50mg
Triethanol amine	q.s + pH 6.5-7					
Fragrance	q. s					
Water	Up to 100 ml	Up to 100 ml	Up to 100 ml	Up to 100 ml	Up to 100 ml	Up to 100 ml

Table 2 formulation table

Determination of antimicrobial activity of poly herbal anti-acne face wash gels against acne causing microorganisms:

Antimicrobial activity was screened using a turbidimetric technique. On a Petri plate, a sterile nutrient agar medium was produced and aseptically applied. A volunteer with noticeable acne had their face cleansed with distilled water and then allowed to air dry. After that, a cotton swab was moistened in 5 cc of distilled water and applied to the ruptured pimple until its full surface touched the acne. This mixture was evenly applied to the previously ready surface. This was cultured for 24 hours at 37°C to obtain a healthy microbial culture.

Results and discussion:

Trial and error were used to construct the mixture until a gel with the desired characteristics was produced. Guava leaves, curcumin, and aloe vera are used as the main ingredients since they each individually have all the necessary qualities for a face wash composition, such as antioxidant and antibacterial capabilities. The different additional ingredients, such as Carbopol 940, which acts as a gelling agent, Methyl Paraben and Propyl Paraben, which act as preservatives, Triethanolamine, which acts as a neutralizer, Propylene Glycol, which acts as a humectant, and Sodium Lauryl Sulphate, which acts as a foaming agent. Finally, distilled water was used to modify the formulation's volume. The formulation was also assessed for a number of quality factors, and the findings showed that it met all of the desired quality criteria.

Sr. No.	parameters	Observations		
		Guava leaves	curcumin	Aloe vera
1	Appearance	Greenish powder	Orange yellowish powder	White to brown powder
2	Odour	Characteristic	Characteristic	Characteristic
3	Texture	Smooth	Smooth	Smooth
4	pH of 1% solution	4.77	7.4	4.5
5	LOD	6.09%	0.96	1.34
6	Total Ash value (% w/w)	6.39% w/w	6.2% w/w	3.4%
7	Acid insoluble Ash value (% w/w)	5.36% w/w	0.6% w/w	0.4% w/w
8	Water soluble Extractive (% w/w)	20.2% w/w	14% w/w	13% w/w

Table 3 preformulation table

Calibration curve:

1. Guava leaves:

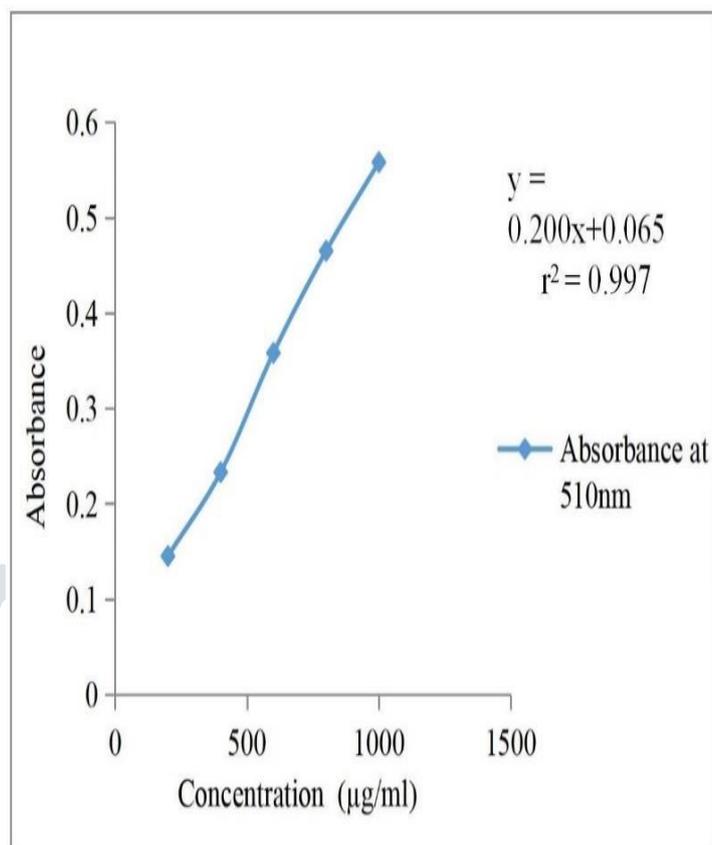


Figure 2 calibration curve of guava extract

Sr.no	Concentration (ug/ml)	Absorbance (λ_{max} observed at 510 nm)
1	80	0.325±0.0013
2	100	0.419±0.0045
3	120	0.498±0.0062
4	140	0.606±0.0054
5	160	0.705±0.0082

Table 4 Absorbance of Guava leaves extract

2. Curcumin:

Sr.no	Concentration (ug/ml)	Absorbance (λmax observed at 425 nm)
1	2	0.2636±0.0011
2	4	0.4724±0.0023
3	6	0.6641±0.002
4	8	0.8742±0.0035
5	10	1.0671±0.0014

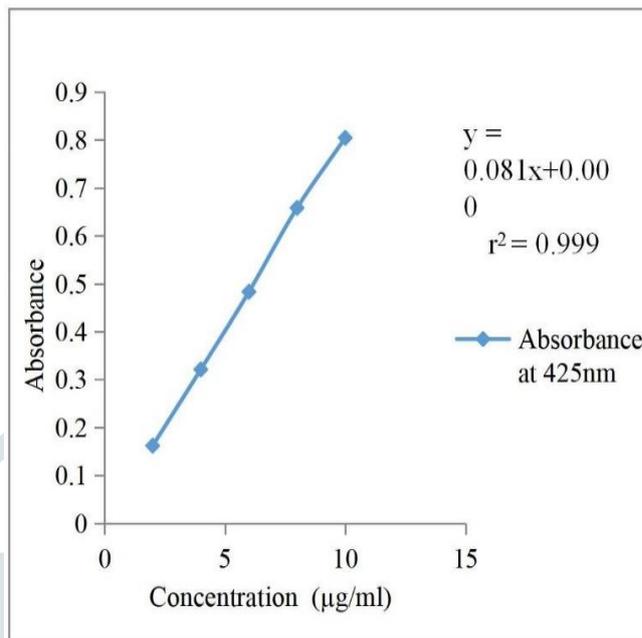


Table 5 Absorbance of curcumin extract

Figure 3 calibration curve of curcumin extract

3. Aloe vera:

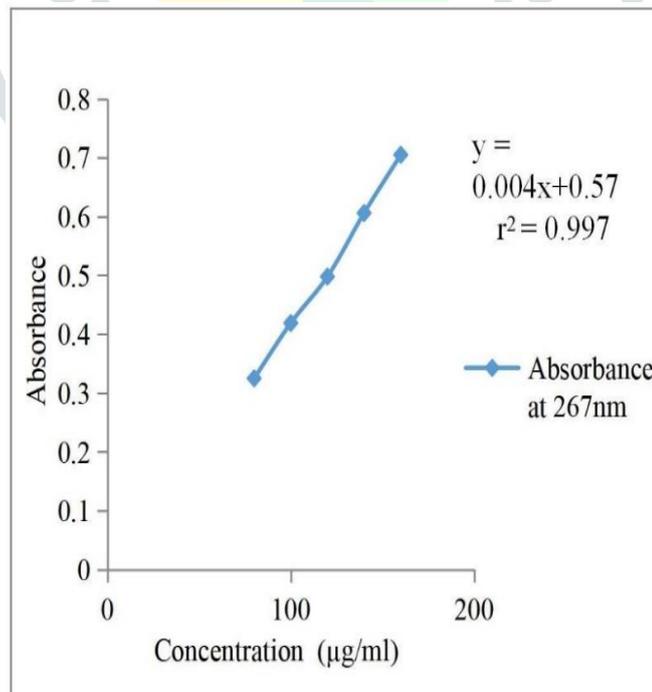


Figure 4 calibration curve of aloe vera extract

Sr.no	Concentration (ug/ml)	Absorbance (λ_{max} observed at 425 nm)
1	80	0.325 ± 0.0013
2	100	0.419±0.0045
3	120	0.498±0.0062
4	140	0.606±0.0054
5	160	0.705±0.0082

Table 6 Absorbance of aloe vera extract

Determination of total antioxidant activity: DPPH Assay:

1-Diphenyl-2-picryl-hydrazyl (DPPH) free radical scavenging activity: The DPPH assay is used to measure the antioxidant capacity of herbal extracts. It absorbs at 517 nm when it is a DPPH radical, but when it is reduced by an antioxidant or another radical species, its absorbance falls. Lower absorbance of the reactant combination means that the mixture is more effective at scavenging free radicals. Three times the experiment was conducted. The following equation was used to determine the ingredient's IC₅₀ value, or the concentration needed to have 50% of the DPPH free radical scavenging activity. Activity to Scavenge DPPH Radicals (%) = $(A_0 - A_1 / A_0) \times 100$. Where A₀ is the DPPH absorbance. A₁ indicates how much of the test solution's DPPH solution is absorbed.

Sr no.	Concentration (ug/ml)	Absorbance at 517 nm				% inhibition		
		Ascorbic acid	Guava leaves	Curcumin	Aloe vera	Guava leaves	Curcumin	Aloe vera
1	25	0.182	0.195	0.197	0.192	7.18	8.24	5.49
2	50	0.129	0.145	0.142	0.137	10.11	10.77	6.20
3	75	0.088	0.0122	0.0112	0.098	25.33	27.27	11.36
4	100	0.059	0.080	0.085	0.072	42.55	44.67	22.03
5	125	0.024	0.055	0.059	0.038	88.05	145.83	58.33

Table 7 In vitro antioxidant study of drug extracts by DPPH Assay

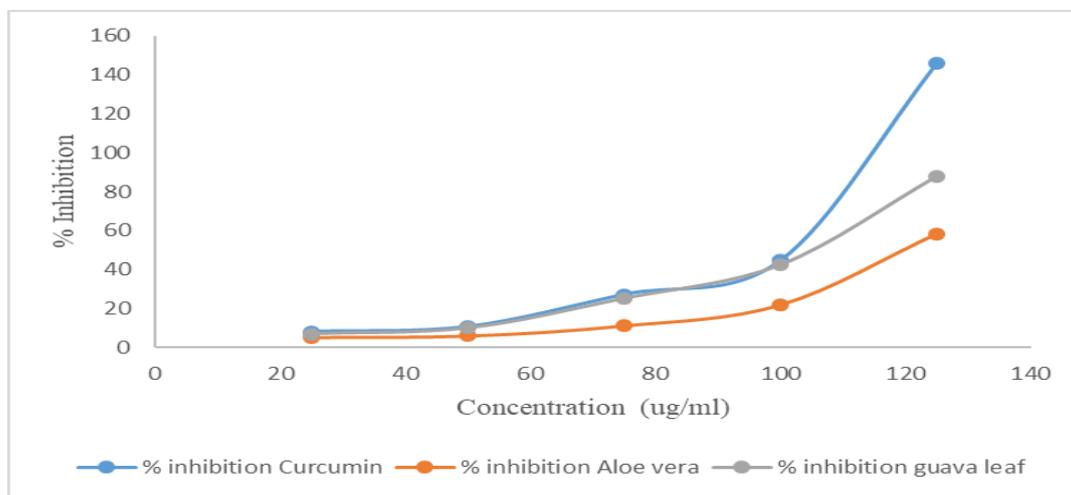


Figure 5 Total antioxidant capacity of drug extracts

Invitro Evaluation Parameters:

The prepared face wash gel is evaluated for various parameters as follows.

Viscosity study of gel:

50 gm of prepared gel was kept in 50 mL suitable beaker and spindle Groove will dipped at specific RPM in Brookfield Viscometer. This was done three times and recorded observation will considered as mean of viscosity.

Spread ability of gel:

An accurately weighed quantity of 1 g of gel was pushed among two slides and the time (in seconds) required by the top slide to cover a distance of 6.5 cm is noted. A shorter interval indicates better spread-ability. Readings attained are mean of three determinations.

Washability:

It was analysed by applying onto skin and washed out with water.

Grittiness:

The product was checked for the presence of any gritty particles by applying it on the skin.

Foamability:

It is checked by taking small amount of gel with water in test tube and after shaking it, how foam is produced in test tube.

Determination of antimicrobial activity of herbal face wash gel:

Using the turbidimetric approach, face wash gels are tested for their antimicrobial efficacy against bacteria that cause acne.

Formulations	Absorbance
Blank	0.759±0.02
F1	0.166±0.05
F2	0.1432±0.01
F3	0.1295±0.04
F4	0.162±0.01
F5	0.146±0.07

F6	0.1285±0.04
Marketed formulation	0.1271±0.03

Table 8 Anti-acne efficacy of formulation against Propionibacterium

Conclusion:

The idea that natural medicines are safer and have fewer negative effects than synthetic ones makes them more acceptable. The demand for herbal formulations is rising on the global market. The goal of this work was to create a polyherbal face wash gel for treating acne using Psidium guajava leaf extract, curcuma longa extract, and aloe vera extract in an HPMC gel system. The desired Face Wash gel formulation was created and its physicochemical characteristics, including colour, scent, pH, spreadability, viscosity, foamability, and microbiological test, were assessed. According to the current experiment, the designed herbal face wash gel is more effective than the commercial face wash gel. All of the formulations' superior inhibitory effectiveness against acne-causing microorganisms was seen in the microbiological assay, and formulation (F6) was competitive with the widely used formulation. It was determined that the current study may, in theory, enhance both the development of herbal formulations for the safe and efficient management of diseases as well as the use of herbs in the treatment of acne. The study also found that the prepared herbal Face Wash Gel has all of the necessary components for topical use.

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