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Research Article

Formulation and Evaluation of Anti-Acne Face Wash Gel using Guava Seed Extract

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ABSTRACT

During the puberty, imbalance of internal constituents and hormonal balance may cause many skin problems. Acne is found as most common skin problem. Face and neck are the major affected area. Preventive approaches involve removal of oil from the face. Proper cleaning and washing require for this purpose. Various researches have been proved utility of herbal based formulations for cleaning purpose which also removes excess oil; considering this fact present work was intended to prepare a face wash gel using *Psidium guajava* seed extract with antioxidant and antibacterial properties. Prepared gel was evaluated for various quality control parameters like; spreadability, pH, consistency and grittiness, etc. The results of quality control parameters were found to be satisfactory.

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INTRODUCTION

The herbal healing has been mentioned from the ancient era, from Vedas, and even from ancient religious work. Probably it is the oldest medical care system in the world. The herbal healing deals with use of herbs, herbs extracts or natural products for the betterment of health condition. Nowadays in westerns countries medical practitioners and mostly prescribing medicines containing plant extract. Developed countries also appreciating this traditional and ancients form of medicine. As a result, Indian herbal drugs are in demand and witnessing rapid growth in global market. Wide growth and demand for herbal cures, herbal skin care products and even herbal cosmetics were observed in recent years¹. Although, herbal products are more acceptable with belief that they are safe posses many therapeutic properties and having no or less side effects as comparing to modern chemical entities. Skin being the most exposed and major part of our body to the pathogens. Hence require protection and prevention from skin diseases by utilization of formulations having antibacterial, antioxidant and anti inflammatory and such other properties. During the puberty imbalance of internal constituents and hormonal balance may cause many skin problems. Acne is found as most common skin problem which is generally characterized b presence of inflammatory lesions, comedon, seborrhea etc. acne may cause long lasing, physical and detrimental

psychosocial effect associated with depression and anxiety without disease severity. Although these effects usually improved by treatment. Acne develop in presence of commensally bacteria *Propionibactum acne*, *Staphylococcus epidermadis* and *Malassezia furfur* in the follicles. Long term uses of antibiotics for the treatment develop resistance to the drugs. To overcome this problem, herbal alternative solution for the treatment has been studied.

Psidium guajava Linn, a well known traditional medicinal plant used in various indigenous system of medicine, also known as Guava belonging to family Myrtaceae. It is represented by approximately 130-150 species² and widely distributed throughout the world³. All parts of the plants being used as medicine, the parts like fruits, leaves, bark and root have been used to treat diarrhea and used as stomachache, respiratory and gastrointestinal disorders as antispasmodic, anti- inflamatory, as cough sedative, in obesity, to control diabetes mellitus. Seeds possess antimicrobial⁴, anti inflammatory⁵, anti allergic⁶, and anti carcinogenic activity⁷. Guava is yellow in color and owing to its abundance and reasonable price it is eaten by all sector by the society .The main guava fruit product are beverages, juices, and canned slices. The important constituents of guava are vitamins⁸, tannins, phenolic compounds, essential oils sesquiterpene alcohol and triterpenoids. The seed are the waste product of the industry and are not yet use for the

any beneficial purpose. Guava seed have been reported to contain 14% oil, 15% protein and 13% starch⁹. It also contains flavonoids. Among these phytochemicals phenolic compounds are the most common in nature¹⁰.

MATERIAL AND METHOD

Collection of Plant Materials: The fruits of *Psidium guajava* were collected from college campus of Kamla Nehru College of Pharmacy, Butibori, Nagpur Maharashtra. Plant material was identified and authenticated in the department of Botany, RTM Nagpur University Nagpur, Maharashtra. The collected materials were cleaned and flesh was removed for further processes of separation of seeds and extraction.

Preparation of the Extract: Seeds were taken (100g) and subjected to alcoholic extraction (Soxhlet Extraction) then, rate was allowed to evaporate excess of solvent under rotary vacuum evaporator until clear liquid (Oil) is obtained. Then the oil extract was then re-dissolved in ethanol at 1 mg/ml ratio and used for formulating the Face wash gel.

Preparation of Gel Base: A little quantity of water along with preservatives was added to the previously prepared solution of propylene glycol and sodium lauryl sulphate, then carbopol was added slowly and stirred well until a gel like dispersion was obtained, Various gel formulations were prepared on the basis of quantity of ingredient of HPMC and Carbapol 940,¹¹ to this the stock solution of seed extract was added, and then triethanolamine was added finally and left for overnight¹².

Evaluation of prepared gel: The physical properties such as color, appearance and consistency were determined visually. Viscosity was measured using the Brook Field Viscometer (Ottendorf, Germany)¹³ and pH of 1% aqueous solution of the formulation was measured by using a calibrated digital pH meter at constant temperature. Spreadability is the property of gel to spread uniformly and smoothly in maximum area of affected part. The bioavailability efficiency of a gel formulation also depends on its spreading value. The spreadability is expressed in terms of time in seconds taken by two slides slip off from the gel, placed in between the slides, under certain load. The spreadability is good if the slipping time is less. Two sets of glass slides of standard dimensions were taken. The herbal gel formulation was placed over one of the slides. The other slide was placed on the top of the gel, such that the gel was sandwiched between the two slides in an area occupied by a distance of 6 cm along the slide. A 30gm weight was tied to the upper slide carefully. The time taken for the upper slide to travel the distance of 6cm and separated away from the lower slide under the influence of the weight was noted. The experiment was repeated three times both formulated gels and marketed gel and the mean time taken for calculation.

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

Where, S=Spreadability, M= Mass in gm (30gm), L=Length of the glass (6cm), T= Time in sec.

The washability was determined using formulation already applied on skin and then ease and extent of washing with water were checked manually. Washability was determined by applying gel on hands and exposed to running water. Foamability also determined by taking Small amount of gel in a beaker containing water. Initial volume was noted, beaker was shaken for 10 times and the final volume was noted. Grittiness of the gel was checked for the presence of any gritty particles by applying it on the skin. The stability of the gels was tested using freeze thaw cycling method. The gels were subjected to a temperature of 4°C for 7 days, 25°C

for 7 days and then at 40°C for 7 days¹⁵. The gels were exposed to the ambient room temperature.

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

Turbidimetric method was used for the screening of antimicrobial activity. A sterile nutrient agar medium was prepared and spread on a Petri plate aseptically. The skin on the face of a volunteer with distinctive acnes was washed with distilled water and let to dry. Then a cotton swab was rubbed on the ruptured pimple till its entire surface touched the acne and it was soaked in 5 ml of distilled water. This solution was evenly poured on to the previously prepared medium. This was incubated for 24 hr at 37°C to get a good culture of microorganism

Six sterile cotton balls of 1 cm diameter were soaked in prepared formulations standard drug and distilled water for 5 min. Nutrient broth (50 ml) was prepared and sterilized; 5 ml was kept aside and was used as reference standard in one cell of the UV spectrophotometer. The remaining broth was inoculated with the organism cultured in the Petri plate. This inoculated broth (5 ml was poured into six sterile test tubes and the cotton balls were suspended in each of the test tube and marked accordingly. They were incubated for 24 h at 37°C in an incubator. Then they were taken out and checked for the absorbance at 600 nm.

RESULTS AND DISCUSSIONS

The different gel formulation of *Psidium guajava* seed oil was prepared using various ingredients as mentioned in **Table 1**. The formulation was prepared trial & error basis until a gel was obtained with characteristic feature. The *Psidium guajava* utilized as chief ingredient since individually it possess all essential of properties of face wash formulation like; antioxidant and antimicrobial properties. The various other ingredients used for specific purpose like; Carbopol 940 as gelling agent, Methyl Paraben & Propyl Paraben as preservatives, Triethanolamine as neutralizer, Propylene Glycol as Humectant and Sodium Lauryl Sulphate as Foaming agent. Finally volume of formulation was adjusted with distilled water. The formulation was also evaluated with various quality parameters and results of quality parameters revealed that formulation possess all desire quality parameters as mentioned in **Table 2**. Formulation showed pH with range of skin application, it also showed characteristic consistency of gel, viscosity was found to be 5549cp. Finally homogenous, spreadable and washable formulation was obtained without any grittiness. Stability studies were performed and the results were tabulated in **Table 3**. The results showed that the gels stood stable at all temperatures with a little change. The efficacy of the anti-acne gels from herbal extracts is shown in **Table 4**. The anti-acne gels could inhibit the growth of the microorganisms that inhabit acnes and all the formulations exhibited comparatively less efficacy to standard drug.

Table 1: Composition of gel formulaions (% w/w)

S. N.	Ingredient	Quantity
1	Drug extract	4
2	Carbapol	1.5
3	Methyl paraben	0.1
4	Propile paraben	1
5	Triethanolamine	2
6	Propylene Glycol	2.5
7	Sodium lauryl Sulphate	2.5
8	Water	QS

Table 2: Quality parameters of Gel formulation

S. N.	Parameters	Observations
1	Colour	Transparent
2	Odour	None
3	Consistency	Consistent
4	pH	5.9
5	Viscosity (cp)	5549cp
6	Spreadability (gm.cm/sec)	1.8
7	Washability	Washable
8	Foamability	Passed
9	Grittiness	Nil

Table 3: stability studies of the formulation

Formulation	pH			Viscosity		
	40c	250c	400c	40c	250c	400c
Gel	5.9	5.9	5.8	5549	5578	5506

Table 4: Anti-acne efficacy of formulations

Formulation	Absorbance
Gel formulation	0.1438
Standard	0.1271
Control	0.759

CONCLUSION

This study aimed at developing herbal gels for anti acne treatment using seed extracts of *Psidium guajava* in Carbopol gel system. Desired formulation of the gel was prepared and evaluated for their physicochemical properties, like color, odour, pH, spreadability, viscosity, foamability and microbial assay. The microbial assay of all the formulations demonstrated better inhibitory activity against acne causing micro organisms probably *Propionibacterium acnes*, *Staphylococcus epidermidis*, and *Malassezia furfur* and stood competitive to the standard marketed formulation. It was concluded that the present research might hopefully bring advancement in the treatment of acnes using herbs as well as in developing herbal formulations for safe and effective management of diseases. Study also concluded that prepared herbal gel possess all essential features of gel formulation for topical application.

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CONFLICT OF INTEREST

The authors report no conflict of interest.

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