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FORMULATION AND EVALUATION OF MULTI HERBAL FACE WASH GEL

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ABSTRACT

Background: In the present scenario, natural remedies are more acceptable when compared to the synthetic remedies because of their safety with fewer side effects. The present research work has been undertaken with the aim to formulate and evaluate of multi herbal face wash gel.

Materials and methods: Herbal face wash containing Tulasi (*Ocimum sanctum* Linn. belonging to the family Lamiaceae), Tamalapaku (Piper betel L. belonging to the family Piperaceae), Aloevera (*Aloe barbadensis* Mill. belonging to the family Asphodelaceae), Green tea (*Camellia sinensis* (L) Kuntze, belonging to the family Theaceae), Lemon (*Citrus limon* L. belonging to the family Rutaceae) and Turmeric (*Curcuma longa* L. belonging to the family Zingiberaceae).

Results: It has been reported in literature that these plants have good antimicrobial, anti-inflammatory, anti-bacterial, anti-fungal, anti-acne, anti-ageing, dirt absorbent and anti-oxidant activities. Various formulations were prepared i.e. F1 to F4 using herbal extract in different concentrations and evaluated for certain parameters like colour, consistency, viscosity, spreadability, extrudability, washability, foam ability, grittiness, skin irritancy, pH and stability conditions.

Conclusion: Results showed that F4 formulation was found to be optimum for all evaluation parameters.

Keywords: Piperaceae, *Camellia sinensis*, Extrudability, Asphodelaceae, Zingiberaceae, Skin irritancy

INTRODUCTION

The natural drug enterprise in India is likely the oldest scientific care machine in the world. The historical herbal healing methods of Ayurveda and Unani deal with the use of herbs and natural merchandise to tackle health conditions. While herbal medicines seem to be new to western healers and medical practitioners, the reality is that most of the medicines prescribed today still contain plant extracts **[1]**. Herbal medication, also called botanical treatment or phytomedicine, refers to the use of any plant's seeds, berries, roots, leaves, bark, or flowers for medicinal purpose. Herbal drug treatment is in general used to furnish first-line and common health provider. Medicinal plants and herbal medicines account for a huge percentage of the pharmaceutical market **[2]**. Herbal extracts are applied mainly to the cosmetic formulations due to several associated properties such as antioxidant properties. The main objective of cosmetic treatment is to improve the overall appearance of the face and other parts of the body in order to minimize skin defects to a considerable extent **[3]**. In human being, skin is the most susceptible part for entering of various pathogens, microorganisms and spreading of diseases **[4]**. The skin is the largest organ of the body, accounting for about 15% of total adult body weight. It performs a variety of vital functions including defence against external, physical, chemical and biological attackers, as well as the prevention of excess body water loss and the task of thermoregulation. The skin is continuous, with mucous membranes lining the surface of the body. To keep skin healthy, clear, glossy, a balanced nutrition is required. Among various changes, dryness, roughness and pimples are most common. The pathogenesis of this is bacterial over growth and inflammation. To overcome this problem the herbal face wash gel has been formulated **[5]**.

MATERIALS AND METHODS [6-14]

Collection of materials:

Ocimum sanctum, Aloe vera was collected from our medicinal garden in our college i.e. Chalapathi Institute of Pharmaceutical Sciences. *Piper betel*, *Camellia sinensis, Curcuma longa, Citrus limon* was collected from the local market of Guntur. Carbopol 940, Methyl paraben, Propylene glycol 400 was obtained from Molychem, Sodium lauryl sulphate was obtained from Thermo Electronus India Pvt. Ltd., Triethanolamine and Activated charcoal was obtained from Thermo Fisher Scientific India Pvt. Ltd. All the plants used for the experimental work were authenticated in Acharya Nagarjuna University.

Table 1: List of plants used in the study

S. No	Ingredients	Skin Benefits/Uses
1	*Ocimum sanctum*	Efficient in skin rashes, insect bites and itching.
2	*Piper betel*	The ethanolic extract of this plant prevents plant fungal pathogens. This plant has shown fungicidal activity
3	*Aloe vera*	Moisturizing agent, delivers soothing property to the skin
4	*Camellia sinensis*	Polyphenols present in green tea helps in anti-ageing and makes the skin looks younger and better
5	*Curcuma longa*	Antibacterial, antifungal, also adds glow to the skin
6	*Citrus limon*	To lighten skin and reduce blemish marks on the skin. It is also quite effective for treating pimples

Table 2: List of chemicals

S. No	Chemicals	Supplied by	Uses
1	Carbopol 940	Molychem	Gelling agent
2	Methyl paraben	Molychem	Preservative
3	Propylene glycol 400	Molychem	Solubilizer
4	Triethanolamine	Thermo Fisher Scientific India Pvt.Ltd.	Neutralizer
5	Sodium lauryl sulphate	Thermo Electronus India Pvt.Ltd.	Surfactant
6	Activated charcoal	Thermo Fisher Scientific India Pvt.Ltd.	Adsorbing agent

Methods for Preparation of herbal extracts:

Extraction of Ocimum sanctum:

Fresh leaves of tulasi were collected and were shade dried .The dried powder of tulasi was placed in the thimble of Soxhlet apparatus. 500 ml of distilled water was used as a solvent. The extraction was continued until the clear solvent was contained in the thimble. The extract has been extracted using a rotary evaporator. Then the extract was dried in a digital water bath until a dark green residue was collected **[6]**.

Extraction of Piper betel:

Fresh betel leaves were collected and were shade dried. Dried powder was extracted by using Soxhlet equipment with 150 mL deionized water as a solvent. Ratio 1:15 of the dried powder and solvents were selected for this Soxhlet extraction process. The extraction process was run for 24 hours and temperature was set at 150ºC. Extract was dried in oven for 3 days at40ºC until the solvent is evaporated. The dried extract was weighed **[7]**.

Figure 1: Leaves *of Ocimum sanctum*

Figure 2: Leaves of *Piper betel*

Extraction of Curcuma longa:

Fresh turmeric rhizomes were collected and dried in hot air oven at 45˚C. Dried turmeric is first grinded in a mixer grinder and then subjected to separation through a vibrating sieving machine 44 mesh size. 2g of sample was taken and mixed with 30 ml of ethanol and then filtered. The concentration of the filtrate was measured using spectrophotometer at 425nm **[8]**.

Figure 3: ***Curcuma longa***

Extraction of Citrus limon:

Fresh fruits of *Citrus limon* were collected. Five lemon fruits were peeled and the juice was collected using a plastic juice extractor. The extracted fruit juice was subjected to double filtration with Whatmann Number One filter paper and 0.45µm membrane filter (Sigma) respectively. The filtrate was measured into a weighed sterile petri dish and evaporated to a paste at room temperature. Subsequently, the residual weight was calculated and reported as the yield (w/v) of the fruit juice extract **[9]**.

Figure 4: ***Citrus limon***

Extraction of *Camellia sinensis*:

Fresh leaves of green tea were procured and dried. Green tea solutions were prepared using distilled water at 25˚ C. Aqueous extracts were prepared by soaking dry green tea leaves in 25 mL water at 25˚ C for 20 min. The green tea supernatant was collected after centrifugation (1250 rpm) **[10]**.

Figure 5: Leaves of ***Camellia sinensis (green tea)***

Extraction of Aloevera:

The fresh leaves were collected and washed with fresh water. The outer skin and exudates of the leaves were removed manually with the help of knife to form fillet. 60ml pulp volume as centrifuged in cooling type centrifuge for separation of crude gel and fiber. Charcoal was mixed with crude gel for purification. The vaccum filtration method was used to obtain pure gel from crude gel **[11]**.

Figure 6: *Aloe vera* plant

Table 3: Composition of herbal extracts

S. No	Ingredients	Quantity
1	*Ocimum sanctum*	0.5ml
2	*Piper betel*	0.5ml
3	*Curcuma longa*	2g
4	*Camellia sinensis*	2g
5	*Aloe vera*	2g
6	*Citrus limon*	1ml
7	Activated charcoal	2g

Preparation of herbal face wash gel:

Step 1: Preparation of gel base containing herbal extract:

- ✓ 1g of Carbopol 940 was dispersed in 50 ml of distilled water with continuous stirring and kept the beaker aside to swell the Carbopol 940 to form a gel.
- ✓ To 5ml of distilled water, required quantity of Methyl paraben was dissolved by heating on water bath and then the solution was cooled, Propylene glycol and Sodium lauryl sulfate was added into it.
- ✓ Further required quantities of herbal extracts were homogenized and this herbal mixture was then added into Carbopol 940 gel base with continuous stirring. Tri-ethanolamine was added drop wise to the formulation for the adjustment of required skin pH and to obtain the gel of required consistency.

Step 2: Preparation of formulation:

In this study, four formulations each containing 1g, 2g, 3g and 4g of extract were prepared.

Table 4: Composition of formulations

S. No	Ingredients	F1	F2	F3	F4
1	Herbal extract	1g	2g	3g	4g
2	Carbopol 940	1g	1g	1g	1g
3	Methyl paraben	0.2g	0.2g	0.2g	0.2g
4	Propylene glycol	5ml	5ml	5ml	5ml
5	Sodium lauryl sulfate	2g	2g	2g	2g
6	Triethanolamine	1.2ml	1.2ml	1.2ml	1.2ml

Evaluation parameters:

Physical evaluation:

Physical parameters such as colour, presentation and quality have been visually tested.

Washability:

The product was applied on hand and was observed under running water.

Measurement of pH:

pH of 1% aqueous solution of the formulation was measured by using a

calibrated digital pH meter at constant temperature.

Extrudability:

The gel formulation was filled with standard capped collapsible aluminium tubes and sealed to the end. The weight of tubes was recorded and the tubes were placed between two glass slides and were clamped. 500gmweight was placed over the slides and then the cap was removed. The sum of extruded has been collected and measured. The percent of the extruded gel was measured as

- When it is greater than 90% then extrudability is excellent.
- When it is greater than 80% then extrudability is good.
- When it is 70% then extrudability is fair **[12]**.

Spreadability:

Spreadability denotes the degree to which the gel spreads easily to the skin or the affected portion when applied. The seconds taken by two slides to slip off the gel, put between the slides, under a certain load. Less time taken to separate the two slides, better spreadability. The formulation of the herbal gel 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 bioavailability of the gel formulation also depends on its spread size. The spreadability is expressed in terms of time in occupied by a distance of 6 cm along the slide. The weight of 100gm was placed on the upper slide, so that the gel between the two slides was pressed evenly to a thin layer. The weight was removed and the excess of the gel adhering to the slides was scrapped off. The two slides in position were fixed to stand without slightest disturbance and in such a way that only the upper slide to slip off freely by the force of weight tied to it. The weight of 20gm was carefully attached to the upper slide. The time taken for the upper slide to travel the distance of 6 cm and separated away from the lower slide under the influence of the weight was noted. The experiment was repeated three times on both formulated gels. Spreadability was calculated by using the following formula,

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

Where,

S- Spreadability

M- Weight tied to the upper slide (20gm)

L- Length of the glass (6.5cm)

T- Time in sec [13].

Irritancy test:

The gel was applied on left hand dorsal side surface of 1sq.cm and observed in equal intervals upto 24hrs for irritancy, redness and edema.

Foam ability:

A small amount of gel has been taken in a beaker containing water. Initial volume was noted, beaker was shaken for 10 times and the final volume was noted.

Grittiness:

The formulations were checked for the presence of any gritty particles by applying it on the skin.

Viscosity:

The viscosity of face wash gel was determined by using digital Brookfield viscometer. 50ml of herbal face wash is taken into 100ml of beaker and the tip of viscometer was dipped into the beaker containing face wash formulation and its viscosity was measured **[14]**.

Stability studies:

Stability studies were carried out for the optimized formulation F4 according to International Conference on Harmonization (ICH) guidelines. Short term accelerated stability studies were carried out for the period of 3 months for the formulation [F4]. The samples was stored at different temperature conditions i.e., refrigeration temperature (4-8˚C), room temperature (25±2˚C) and oven maintained at (45˚C±2˚C). Samples was withdrawn on weekly time interval and analyzed for visual appearance, viscosity, extrudability, spreadability, foam ability, grittiness and pH. Sample was withdrawn at 1,3,6,9 and 12 weeks and evaluated for various parameters.

RESULTS AND DISCUSSION

In the present study, prepared multi herbal face wash gel has shown various pharmacological uses for skin such as anti-bacterial, anti-microbial, anti-fungal, anti-acne, anti-ageing effects and also gives glow to the skin. In this study, totally four formulations were prepared and evaluated. The colour of the prepared gel was found to be yellowish green and the intensity of the colour was increased with the increase in the concentration of extract in the gel. The viscosity, extrudability, spreadability, stability studies and pH of the formulations showed that there is a significant change when the concentration of extract has been increased in the gel. The stability studies were carried out at different temperature conditions i.e., refrigeration temperature (4-8˚C), room temperature (25±2˚C) and oven maintained at (45˚C±2˚C). All the four formulations were easily washable and also have semisolid consistency. There are no side effects and skin irritation. Compared to all four formulations F4 is the best formulation having pH-7 **(Table 5)**.

Storage and Stability Studies of optimized Multi Herbal Face Wash Gel Formulations:

Stability studies were carried out for the optimized formulation F4 according to International Conference on Harmonization (ICH) guidelines. Short term accelerated stability studies were carried out for the period of 3 months for the formulation. The sample was stored at different temperature conditions i.e., refrigeration temperature (4-8˚C), room temperature (25±2˚C) and oven

maintained at (45˚C±2˚C). Samples were withdrawn on weekly time interval and analyzed for visual appearance, viscosity, extrudability, spreadability, foam ability, grittiness and pH. Sample was withdrawn at 1,3,6,9 and 12 weeks and evaluated for various parameters **Table 6**.

Table 5: Physicochemical studies of developed formulations

S. No	Physicochemical parameters	F1	F2	F3	F4
1	Viscosity (cps)	5323.24	3316.48	3091.56	2482.57
2	Extrudability	88.9	90.2	91.6	92.8
3	Spreadability (g.cm/s)	2.6	3.8	4.2	5.8
4	pH	6.8	6.9	7.0	7.0
5	Colour	Yellowish green	Yellowish green	Yellowish green	Yellowish green
6	Consistency	Semisolid	Semisolid	Semisolid	Semisolid
7	Washability	Excellent	Excellent	Excellent	Excellent
8	Foam ability	Good	Good	Good	Good
9	Grittiness	No grittiness	No grittiness	No grittiness	No grittiness
10	Irritancy test	No irritation	No irritation	No irritation	No irritation

Table 6: Stability studies of F4 formulation

Physicochemical parameters	4˚C	25˚C	45˚C
	F4	F4	F4
Viscosity	5112.3	2692.2	2140.1
Extrudability	99.2	91.6	82.3
Spreadability	2.9	5.6	6.9
pH	6.9	7.0	7.1
Colour	Yellowish green	Yellowish green	Yellowish green
Consistency	Semisolid	Semisolid	Semisolid
Washability	Good	Good	Good
Foam ability	Good	Good	Good
Grittiness	No gritty particles	No gritty particles	No gritty particles
Skin Irritation	No Irritation	No Irritation	No Irritation

CONCLUSION

Natural remedies are more suitable in the assurance that they are safer with fewer side effects than the synthetic ones. Herbal formulations have increasing demand in the world market. It is a very good attempt to establish the multi herbal face wash gel containing extracts of *Ocimum sanctum, Piper betel, Camellia sinensis, Aloe vera, Citrus limon, Curcuma longa* with activated charcoal. The plants have been reported in literature having good antimicrobial, anti-inflammatory, anti-bacterial, anti-fungal, anti-acne, anti-ageing, dirt absorbent and anti-oxidant. Four formulations F1, F2, F3, F4 was developed by changing the concentration of herbal extract i.e. 1g, 2g, 3g, 4g and then gel was evaluated for various parameters like colour, consistency, viscosity,

spreadability, extrudability, pH, skin irritancy and stability studies. All the prepared formulations do not show any skin irritation. After evaluation this study showed that all the four formulations gave good results. F4 is the best formulation when compared to all prepared formulations. The results clearly proved that the herbal face wash thus prepared is more effective. So here by concluded that formulated poly herbal face wash gel showed a significant activity.

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