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FORMULATION AND EVALUATION OF HERBAL AFTERSHAVE GEL

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Abstract

Aftershave gels are cosmetic products that may often contain alcohol which is an antiseptic agent to prevent infection of cuts, as well as to act as an astringent to reduce skin irritation. However, alcohol-based aftershave gels may be prone to cause burns or irritations. The main aim of the present study is to formulate and evaluate aftershave gel with reduced alcohol content using *Hemigraphis colorata* extract. The *Hemigraphis colorata* plant possesses wound healing and anti-inflammatory actions. Ethanol was used as solvent for the extraction in our present study. The gel formulation F1 was made according to the conventional formula having 50% alcohol content. The second formulation F0 was the one that contains three fourth of the alcohol of the above formulation The final gel F2 was the one with three-fourths of the quantity of alcohol mentioned in the conventional formula and having *Hemigraphis colorata* extract in the concentration 50mg/ml. Gels were evaluated for pH, viscosity, and anti-bacterial properties. From the studies conducted it was concluded that the formulation used *Hemigraphis colorata* extracts showed better antimicrobial activity than the conventional "alcohol-only" formulation. So, from the study it can be concluded that plant would be a promising candidate to be used in an aftershave preparation, provided it exhibits astringent activity also.

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Introduction

After-shave gel is meant to both hydrate and refresh the skin after shaving is complete. Aftershave preparations are one of the accessories that can be used to augment and complement shaving preparations. Aftershave is an essential component of a man's everyday routine. The deficiencies of the common shaving preparations have resulted in variety of beneficial preparations as shave accessories. An aftershave should hydrate, nourish, and soothe the skin, as well as encourage cell regeneration and aid in the maintenance of clean, healthy skin [1].

Among various aftershave preparations, aftershave gel is most popular. To prevent infection of cuts, it contains an antiseptic such as denatured alcohol, stearate /citrate, or witch hazel, as well as an astringent to decrease skin irritation. Including moisturizers in aftershave improves skin smoothness after shaving. To increase scent, some aftershaves use fragrance or essential oil. The typical alcohol found in cosmetics is Ethanol which are widely used in all kinds of products which are generally exposed to the human skin. It is added into cosmetics due to its antimicrobial action and its activity as topical penetration enhancer. Alcohols are primarily used because of its solvent properties but it also possesses several concentration-dependent pharmacological actions, including cooling, cleansing, and antiseptic properties. The alcohol content in aftershave and perfume mostly ranges from 65 to 85 percent by volume.

Traditional plant extracts or natural remedies with wound healing and anti-inflammatory characteristics are ideal candidates for wounds with elevated inflammatory responses. Herbal ingredients having beneficial properties like antimicrobial, wound healing, astringent etc. will be a good choice in aftershave and help to reduce alcohol content. *Hemigraphis colorata* is a well-accepted herb for its antimicrobial, astringent and excellent wound healing properties [2].

Hemigraphis colorata (Blume) is the red flame ivy/purple waffle plant and is a tropical perennial herb in the Acanthaceae family that is primarily used as a decorative plant. *Hemigraphis colorata* is an ethno-medicinal plant that contains

a high concentration of bioactive chemicals, making it a potential medication source with antibacterial, anti-diabetic, wound-healing, and antioxidant properties [3]. As the plant has wound healing as well as antimicrobial property this can be used as a good option as an ingredient in the aftershave gel preparations.

Fig 1: *Hemigraphis colorata* plant

Materials and Methods

Table no: 1 List of chemicals

Sl.no	Reagent	Use
1	Menthol	Cooling agent
2	Ethanol	Astringent
3	Activated Charcoal	Adsorbent
4	Citric acid	pH adjustifier
5	Carbopol 934	Gelling agent
6	Triethanolamine	pH adjustifier, Thickens the formula
7	Nutrient agar	For bacterial growth
8	0.5 Mc Farland	To adjust the turbidity
9	0.9% Saline solution	Bacterial dilution

Collection of Hemigraphis colorata leaves and processing and extraction using Soxhlet Apparatus.

Fresh leaves of *Hemigraphis colorata* were collected and were authenticated. The leaves were washed using distilled water and dried in shade under room temperature. The dried leaves were finely grounded to powder and stored in airtight container till extraction. *Hemigraphis colorata* powder was extracted by hot percolation method using Soxhlet apparatus. About 140 g of *Hemigraphis colorata* powder was placed in a Soxhlet apparatus extractor thimble composed of strong filter paper. Ethanol was used as the solvent to extract the leaf powder at a temperature 70 °C and was left for 72hours [4]. Ethanol was used as solvent for the extraction since polarity of ethanol is higher, most of the secondary metabolites of the leaves dissolves in ethanol that shows extract with high degree of activity. Following 6-10 cycles of extraction, distillation was performed in order to recover the ethanol. The obtained ethanolic extract was evaporated in the electronic water bath at a temperature of 60-70°C.The dried extracts were collected and kept refrigerated at 4°C in an airtight container until they were needed [5].

Table no 2 Working Formula

Sl no	Ingredients	F0	F1	F2
1	Menthol	0.06g	0.06g	0.06g
2	Ethanol	9.1ml	12.1ml	9.1ml
3	H. colorata ethanolic extract	-	-	1g
4	Activated charcoal	-	-	0.2g
5	Citric acid	-	-	q. s
6	Water	12ml	9.9ml	12ml
7	3.5%w/w Carbopol	0.7g	0.7g	0.7g
8	Triethanolamine	q.s	q. s	q. s

Preparation of formulation [6]

For the preparation F0 and F1, menthol was added in alcohol followed by addition of water. Carbopol 934 was added to this solution and agitated vigorously to completely disseminate Carbopol. Triethanolamine was added drop wise by lowering the agitator speed to obtain the gel of required consistency. Finally, perfume was added to the gel and mixed well. In F2 formulation Menthol was dissolved in alcohol and 50mg/ml *Hemigraphis colorata* ethanolic extract (which was previously decolourised using activated charcoal) * was added. Pinch of Citric acid was added to adjust the pH to the above Carbopol solution before addition of triethanolamine.

(*Procedure for decolourisation -Activated charcoal was heated to fumes which was added along with the menthol, alcohol, *Hemigraphis colorata* extract and then again heated and filtered)

Evaluation of gel formulation[7, 2, 8]

The organoleptic characters and Homogeneity were observed by visual examination. Grittiness was evaluated microscopically. The pH of 1% aqueous solution of the formulation was measured by using a calibrated digital pH meter at constant temperature.The viscosity of the gel was determined using a Brookfield viscometer. Spreadability was determined using parallel plate method.

In antimicrobial studies, test organism was prepared and compared with Mc Farland standard [9]. The antibacterial activity of several formulations against *Bacillus subtilis* and *Pseudomonas aeruginosa* was tested using the Agar well diffusion method [7, 4, 10].In a sterile petri dish with an internal diameter of 8mm, 30 ml of culture media was poured. The homogeneous thickness of the medium layer in different plates was carefully monitored. The Agar plates were left to harden. In each of the plates, a sterile 8 mm borer was utilized to cut equidistant wells. Plates were seeded with 50µL of prepared bacterial suspension, which was compared to the 0.5 McFarland standard, and allowed to dry. The wells that were filled with 0.3g of prepared formulations in each of the 6 plates for both the organisms, which were done in triplicate. Marketed aftershave formulation was used as the standard and the organisms as the blank in the remaining plates. Plates were held for 30 minutes to allow for pre-diffusion. The plates were incubated at 37°C for 48 hours. Once they had returned to room temperature the antibacterial activities were evaluated by measuring the diameters of the zones of inhibition (in mm).

Results and Discussion

Plant collection and extraction:

The *Hemigraphis colorata* plant were collected and leaves were dried, powdered and extracted using ethanol. The ethanolic extract content shows extractive yield of 2.25%w/w.

Formulation of aftershave gel

Aftershave gel was formulated with Hemigraphis colorata ethanolic extract using the formula given in Table no 2. The formulation F1, F0, F2 were prepared and evaluated.

Evaluation

Organoleptic characters

The prepared formulations were characterized for physical characteristics such as texture, colour, and odour. Results are shown in the Table no 3

Table no 3 organoleptic characters

Characters	F0	F1	F2
Colour	Colourless	Colourless	Slightly green
Texture	Smooth	Smooth	Smooth
Odour	Attractive	Attractive	Attractive

All the three formulations appeared to be uniformly homogenous and none of the formulations showed grittiness.

pH

The pH values of all prepared formulation ranged from 5-6. Results were shown in Table no 4

Table no 4 pH of various formulations

Batch	pH
F0	5.53±0.05
F1	6.13±0.05
F2	5.5±0.04

Viscosity

The measurement of viscosity of the prepared aftershave gels were found to be in the range of 980-1040 centipoise. Results were shown in the Table no.5

Table no 5 Viscosity of various formulations

Sl no	Formulation code	Spindle no	RPM	Torque applied	Viscosity centipoise (cps)
1	F0	61	5	86.4	1037±1
2	F1	61	5	85.3	975±1
3	F2	61	5	81.8	981±1

Spreadability

The Spreadability of *Hemigraphis colorata* ethanolic extract gel formulation is depicted in Table no.6

Table no 6 Spreadability of various formulations

Sl no	Batch	Quantity (g)	Spreadability* (cm^2)
1	**F0**	**1**	**6.16±0.02**
2	**F1**	**1**	**9.62±0.01**
3	**F2**	**1**	**11.34±0.02**

Antimicrobial activity

The antibacterial studies of the prepared formulations were carried out against a gram-positive bacteria *Bacillus subtilis* and a gram-negative bacteria *Pseudomonas aeruginosa*. The prepared formulations showed zone of inhibition.The zone of inhibition was found to be greater for marketed formulation compared with prepared formulations against the *Bacillus subtilis*.The zone of inhibition of F0<F1<F2<marketed formulation against *Bacillus subtilis* and zone of inhibition of F0< F1<marketed formulation<F2 against *Pseudomonas aeruginosa.* Results were shown in the Table no 7 and Figure 2.

Table no 7 Antimicrobial studies

Sl.no	Formulation	Maximum zone of Inhibition (mm)	
		Bacillus subtilis	***Pseudomonas aeruginosa***
1	F0	5.03±0.05	1.03±0.05
2	F1	8.96±0.1	1.96±0.04
3	F2	20.1±0.1	16±0.1
4	Marketed formulation	25	2

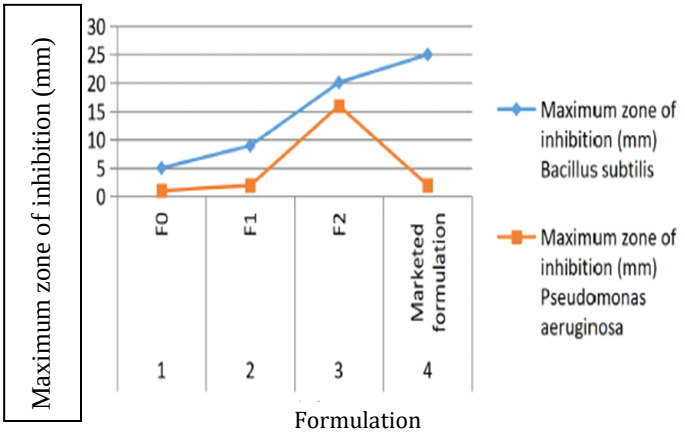

Fig 2 Zone of inhibition against *Bacillus subtilis* and *Pseudomonas aeruginosa*

Summary and Conclusion

After shave gels are a main type of aftershave preparations and alcohol is a major ingredient in many of such gels. Alcohol is used in aftershave gels mainly for three purposes: that it has astringent, antimicrobial and wound healing properties. Ethanol in preparations may cause irritation or burning sensations. Decreasing the alcohol content can affect the antimicrobial action of the formulation. The present formulation used Hemigraphis colorata extracts and as expected, it showed better antimicrobial activity than the conventional "alcohol only" formulation. From the study conducted, it can be concluded that, the plant *Hemigraphis colorata* can be used as a promising candidate in the formulation of aftershave gel with reduced alcohol content.

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Conflict of interest

No Conflict of interest

Ethical approval and Inform Consent

Not Required

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