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FORMULATION AND EVALUATION OF ANTI-ACNE FACE WASH USING CINNAMON AND NEEM EXTRACTS

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ABSTRACT

Acne vulgaris is a common yet significant skin problem. One often deals it with medications probably antibiotics and sometime following healthy life styles such as take diet low in fat and avoiding oily, junk foods. But recently it was proven in various research studies regarding the potential side effects associated with long term use of antibiotics for acne treatment. The aim of this study was to formulate and evaluate herbal face wash using Cinnamon, Neem and Aloe Vera with carbopol 934 as the gelling agent. The herbs used have anti-microbial, anti-oxidant and anti-inflammatory activity. Prepared formulation was subjected to various evaluation tests which includes physical evaluation (color, odor, washability and irritancy), formability, viscosity, pH and antimicrobial activity. The physical evaluations were determined manually and the anti-bacterial activities of extracts were tested against acne causing bacteria *Staphylococcus aureus*. The combination of cinnamon, neem and aloe vera based facewash has suitable antimicrobial activity against acne causing bacteria.

KEYWORDS: Anti acne, herbal face wash, antibacterial activity, cinnamon, neem, aloe vera.

INTRODUCTION

Most teenagers and young adults experience severe acne, which is one of the most frequent and chronic skin problems. Acne is caused by many different factors, including androgen-mediated stimulation of sebaceous gland activity, follicular hyper keratinization, hormonal imbalances, inflammation, and external bacterial infection. In comparison to current chemical

entities, herbal products are more acceptable because to the assumption that they are safe, possess various medicinal properties, and have no or few negative effects. The most exposed and important area of our body to pathogens was our skin. As a result, formulations with antibacterial, antioxidant, anti-inflammatory, and other qualities are required for protection and prevention of skin diseases. Acne is caused by the microorganisms Propionibacterium acnes and Staphylococcus epidermidis, which can be found on the skin. Antibiotic resistance develops over time as a result of long-term use.[1] To resolve this concern, herbal alternative therapeutic options have been developed. Herbs commonly used for acne treatments includes Cinnamon and neem possess anti-inflammatory properties and can be used to treat acne, scars, and wrinkles.[3-6] Aloe-vera is a hydrating ingredient that also has a smoothing effect on the skin. Honey can be used as a thickening agent, humectant and nutrient. A face wash is a gentle cleanser that keeps skin clean, germ-free, smooth, and fresh while also moisturizing the horny layer without irritating the skin.[4] The aim of face wash is to provide cleansing, anti-wrinkle, anti-acne, moisturizing, and skin fairness properties.

MATERIALS AND METHODS

Collection of Herbs and Chemicals

Herbs

All the herbs were collected from plant nurseries from the region of Perinthalmanna and dried in sunlight.

Chemicals

Carbopol 974-P (Yarrow chem products Mumbai)- Gelling agent, Triethanolamine (Research- lab fine chem industries Mumbai)- Neutralizer, Propylene glycol (Research- lab fine chem industries Mumbai)- Moisturizer, Citric acid (Nice chemicals Pvt. Ltd Kochi)- Preservative, Sodium lauryl sulphate (Isochem laboratories, Kochi)- Surface active agents, Honey (Dabur)- Humectant, Ethanol- solubilizer of laboratory grade were used in the study.

Preparation of Herbal Extracts[7-10]

Ethanolic Extract of bark of *Cinnamomum verum* (cinnamon), leaves of *Azadirachta indica* (neem) and whole plant of *Aloe berbadandis* (Aloe Vera) was prepared by soxhlet Extraction Method using water condensor.

Formulation of Face wash[11]

Weighed quantity of citric acid, honey, sodium lauryl sulphate and propylene glycol are dissolved in distilled water taken in a beaker. The extracts of neem, cinnamon and aloe vera are mixed with ethanol (95%) taken in another beaker. The ethanol mixture is poured to the aqueous preparation with constant stirring in a homogeniser. Carbopol 940 of varying concentrations are added to above preparation until desired consistency is achieved. pH of preparation was adjusted by adding required amount of triethanolamine to it.

Table 1: Different formulations of face wash gel.

INGREDIENTS	F1	F2	F3	F4
Cinnamon extract	0.05g	0.05g	0.05g	0.05g
Neem extract	0.165g	0.165g	0.165g	0.165g
Aloe vera	5ml	5ml	5ml	5ml
Honey	2.5ml	2.5ml	2.5ml	2.5ml
Carbopol	0.5g	1g	1.5g	2g
Triethanolamine	q.s	q.s	q.s	q.s
Citric Acid	0.5g	0.5g	0.5g	0.5g
Sodium lauryl sulphate	0.25g	0.25g	0.25g	0.25g
Propylene glycol	7.5ml	7.5ml	7.5ml	7.5ml
Ethanol	20ml	20ml	20ml	20ml
Distilled water	q.s 50ml	q.s 50ml	q.s 50ml	q.s 50ml

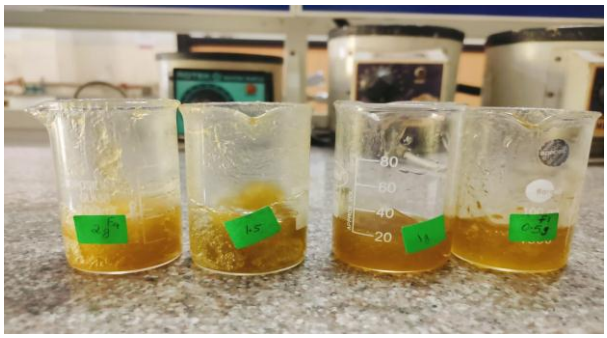

Fig 1: Different formulations of face wash gel.

Characterization and Evaluation

Various parameters were tested on the prepared face wash gel.

1. Physical evaluation[12,13]

- Colour- The colour of face wash was examined visually.
- Odour: The odour of facewash was evaluated by smelling it.
- Consistency: Its consistency was checked manually.

2. Washability[14]

The formulation was applied on skin and then ease and extent of washing with water was checked manually.

3. pH[14]

1% Solution of our sample was measured by using a digital pH meter at constant temperature.

4. Foaming ability[14]

Small amount of gel was taken in a beaker containing water. Initial volume was noted; beaker was shaken for ten times and noted the final volume.

5. Viscosity[15]

The viscosity of facewash is determined using brookefield viscometer. A 100ML gel was put into a container and then placed in a brookefield viscometer with spindle number 64. Thin spindle was lowered onto the gel to the specified limit. Set speed to 0.6 rpm and used viscosity value shown on the tool.

6. Spreadability[14,16]

Two sets of glass slides were taken, herbal gel was placed on one of the slides other slide was placed on top of the gel. Such that gel was sandwiched between the two slides. 100g weight was placed on upper slide so hat gel between two slides pressed uniformly to form a thin layer, weight was removed. 20g weight was tied to upper slide carefully time taken for upper slide to travel a distance of 6cm separated away from the lower slide under influence of weight. Repeated three times on average was taken and spreadability was calculated using the equation.

$S = (m \times L) \div T$

m= weight tied to upper slide

L= length of the slide

T= time in seconds

7. Extrudability

Gel formulation was filled in a standard capped collapsible aluminium tube and sealed by crimpeding to end. The tubes were placed between two slides and were clamped. 500g weight was placed over the slides and the cap was removed. The length of the formulation that came out in 10seconds was recorded.

8. Homogeneity

Homogeneity was tested by visual inspection after allowing them to set in a container. They were evaluated for their appearance and presence of aggregates.

9. Antimicrobial test for plant extracts[17]

The test organism used in the study were procured from KIMS AL SHIFA HOSPITAL, Perinthalmanna. Staphylococcus aureus was used for the study. Nutrient agar medium was used for bacterial growth and anti-bacterial assay. The 24 h cultured fresh bacterial inoculum were uniformly spread using streaking method on a sterile nutrient agar plate. Alcoholic extract of cinnamon and neem (50µl each) were added separately in to well 1 and 2 respectively. The combination of alcoholic plant extracts of cinnamon and neem (50µl) were added in to agar well 3 under aseptic conditions. For negative control, an equal volume of ethanol (50 µl) was added in to well 4. All the plates were incubated for 24-36 h at 37^0C. The experiment performed in triplicate and results were recorded as the average zone of inhibition.

RESULTS AND DISCUSSION

1. Physical evaluation

Colour: It was found to be yellowish brown

Odour: It had a characteristic smell

Consistency: It had a gel like consistency

2. Washability:

Facewash was found to be washable with water.

3. pH

pH of all formulation were in proper range except F1.Therefore it was rejected from further study.

Table 2: pH of different formulations.

FORMULATION	pH
F1	7.4
F2	6.5
F3	6.3
F4	6.2

4. Foaming ability

Facewash was found to have good foaming ability.

Table 3: Foaming ability of different formulations.

Formulations	Volume	
	Initial (cm)	Final (cm)
F1	10	12
F2	10	12
F3	10	12
F4	10	12

5. Viscosity

Viscosity of formulation F2 was in proper range leading in to rejection of other formulations, which had high viscosity due to high concentration of gelling agent. Thus other formulations were rejected from further studies.

Table 4: Viscosity of different formulations.

FORMULATION	VISCOSITY
F2	2013
F3	4041
F4	4987

6. Spreadability

The average spreadability was found to be 6 gcm/s, which lies in the range of 5.2 – 6.2.

Table 5: Spreadability of formulation F2.

FORMULATION	SPREADABILITY (gcm/s)		
	I	II	III
F2	5.6	6.4	6

7. Extrudability

Extrudability of formulation was found to be good.

8. Homogeneity

Homogeneity of formulation was evaluated and it contains no aggregates.

9. Antimicrobial test for plant extracts

Ethanolic extracts of cinnamon and neem were analyzed for antimicrobial activity against test organism Staphylococcus aureus. Combination of plant extracts showed activity against S. aureus and the range of inhibition zone was 22.6 mm. The zone of inhibition of potential plant extracts against test pathogens is shown in Fig. 4. Average inhibition zone of plant extracts against test organism is shown in Table 7.

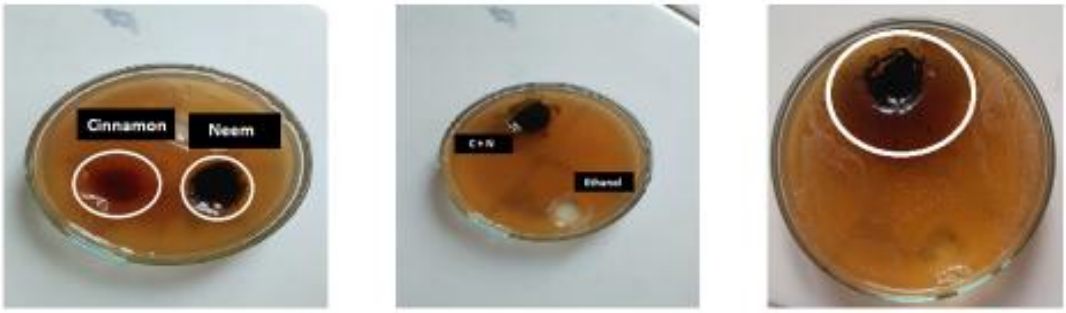

Fig 2: Zone of inhibition of plant extracts.

Table 8: Average inhibition zone of plant extracts against test organism.

Sample	Culture	Zone of inhibition (mm)
Cinnamon extract	S. aureus	21.2
Neem extract	S. aureus	16.4
Cinnamon extract + Neem extract	S. aureus	23.6
Control	S. aureus	-

(-) No zone of inhibition

CONCLUSION

The anti-acne herbal face wash gel was formulated and evaluated. The optimal formula was Cinnamon extract 0.05g, Neem extract 0.165g, Aloe vera 5ml, Honey 2.5ml, Carbopol 1g, Triethanolamine q.s, Citric Acid 0.5g, Sodium lauryl sulphate 0.25g, Propylene glycol 7.5ml, Ethanol 20ml, Distilled water q.s 50ml which have optimum viscosity and spreadability. In antimicrobial activity test shows inhibition of microorganisms.

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