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RESEARCH ARTICLE

FORMULATION DEVELOPMENT OF POLY HERBAL GEL FOR EFFECTIVE MANAGEMENT OF ACNE

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ABSTRACT

Herbal remedies are more acceptable in the view that they are safe with fewer side effects than the synthetic ones. The present work deals with the development and evaluation of poly-herbal anti-acne formulation (gel) containing aqueous extract of *Gloriosa superb* flower and aqueous extract from bark of *Litsea glutinosa*. Aqueous extracts of *Gloriosa superba* and *Litsea glutinosa* were formulated in an aqueous based carbopol-934 gel system. Three formulations of the gel were prepared by varying the proportions of polymers and evaluated for their physicochemical properties like colour, consistency, washability, pH, spreadability and microbial assay. Based on these tests, formulation F-3 containing 1.5% carbopol-934 was selected as best formulation. The microbial assay of all the poly herbal formulations demonstrated better inhibitory activity against Propionibacterium acne and Staphylococcus epidermidis compared to the marketed clindamycin phosphate gel in equivalent amounts of application. It was concluded from the study that aqueous extract of *Gloriosa superba* and *Litsea glutinosa* can be formulated in an aqueous based gel system for topical therapy of mild acne vulgaris.

Keywords: *Gloriosa superba*, Antiacne, *Litsea glutinosa*, Gel, Topical

INTRODUCTION

Acne vulgaris is a common skin condition, causing changes in pilosebaceous units (PSU) and skin structure consisting of a hair follicle and its associated sebaceous gland, via androgen stimulation. It is characterized by noninflammatory follicular papules or comedones and by inflammatory papules, pustules and nodules in its more severe forms. The opportunistic bacteria Propionibacterium acne (P. acne) residing within the pilosebaceous follicle cause inflammation when exposed to the dermis with ruptured follicle.[1] The P. acne produces substances that promote inflammation, including chemotactic factors along with lipolytic and proteolytic enzymes. The enzyme hydrolytic action of P. acne converts triglycerides residing in the glands into free fatty acids that stimulate inflammation [2] and edema that results into breakdown of the follicular wall.[3]

Acne may also arise due to change in dietary habits, climate, allergy, mental stress and can cause embarrassment and depression leading to social withdrawal.[4] Many synthetic drugs like benzoyl peroxide, antibiotics, anti-androgens are used to treat this disorder but exhibit several side effects like dryness of skin, dermatitis, bleaching cloth, darkening of skin and recurrence after withdrawal. [5]

In the literature review it was found that *Gloriosa superba* is used in wounds, skin related problems, fever, inflammation, piles, blood disorders, uterine contractions, general body toner, poisoning. [6, 7] *Gloriosa superba* Linn. is an important medicinal plant belonging to the family Liliaceae. It is a semi-woody herbaceous branched climber reaching approximately 5 meters height, with brilliant wavy-edged yellow and red flowers.[8]

Paste prepared by grinding bark of *Litsea glutinosa* with water is used as a plaster in cases of sprain, bruises, wounds, inflammation, back pain, rheumatic and gouty joints, bone fractures etc. *Litsea glutinosa* (Lour.) C.B. Rob is an aromatic tree belongs to the family Lauraceae and is found to be sparsely distributed in the Western Ghats, India. *L. glutinosa* is an evergreen medium-sized tree and plant can attain a height of 20 meters.[9]

Considering the above mentioned fact efforts were made to separate incorporate *Gloriosa superba* and *Litsea glutinosa* aqueous extract into a topical gel with the purpose to develop a safe, effective and cheaper remedy for healing acne. The results will be useful in designing specific, novel and effective herbal anti-acne formulation for cosmetic and dermatological application with the aim to prevent the adverse effects of existing non herbal formulations.

Development of poly herbal formulation (Gel)

Various formulation batches were prepared according to the Table 1.[11, 12] The desired concentration of gelling agents were weighed accurately and dispersed in hot purified water (not more than 60 °C; 50 % weight of the batch size) with moderate stirring, avoiding air entrapment and allowed to soak overnight. Desired quantity of methyl paraben was dissolved in remaining amount of water by gentle heating. Desired quantity of polyethylene glycol 4000, propylene glycol and herbal extracts were added to the above mixture. This was finally mixed with previously soaked gel formulation. Triethanolamine was added at last to adjust the pH. Prepared formulations were filled in a suitable container and labeled accordingly.

Table 1: Composition of developed poly herbal formulations (Gel) (Quantity taken per 100 gm gel (in grams)

Ingredients	F-1	F-2	F-3
Gloriosa superba	1.0	1.0	1.0
Litsea glutinosa	1.0	1.0	1.0
Carbopol-934	0.5	1.0	1.5
Polyethylene glycol 4000	5.0	5.0	5.0
Propylene glycol	15.0	15.0	15.0
Methyl paraben	0.2	0.2	0.2
Triethanolamine	Q.S.	Q.S.	Q.S.
Purified Water	Q.S.	Q.S.	Q.S.

Evaluation of poly herbal formulations (Gel)

Physical evaluation

Physical parameters such as colour, appearance and consistency were checked visually.

Washability

Formulations were applied on the skin and then ease and extent of washing with water were checked manually.

pH

pH of 1% aqueous solution of the formulation was measured by using a calibrated digital pH meter at constant temperature.[13]

Spreadability

Spreadability was determined by an apparatus suggested by Perez et al.[14] The apparatus consist of a wooden block with a fixed glass slide and movable glass slide with one end tied to weight pan rolled on the pulley, which was in horizontal level with fixed slide. The spreadability of the formulated gel was measured on the basis of 'Slip and Drag' characteristics of gel. An excess of gel (about 2g) under study was placed on this ground slide. The gel was then sandwiched between two slides. One kg weight was placed on the top of the two slides for 5 min to expel air and to provide a uniform film of the gel between the slides. Excess of the gel was scrapped off from the edges. The top plate was then subjected to pull off 50 gm. (M) with the help of string attached to the hook and the time (T, in seconds) required by the top slide to move a distance (L) of 7.5 cm be noted. A shorter interval indicated better spreadability. Spreadability (S) was calculated using the following formula:

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

Microbial assay

The antibacterial activities of different formulations were determined by modified agar well diffusion method. In this method, nutrient agar plates were seeded with 0.2 ml of 24 h broth culture of *Propionibacterium acne* and *Staphylococcus epidermidis*. The agar plates were allowed to solidify. A sterile 8 mm borer was used to cut wells of equidistance in each of plates. 0.5 ml of poly herbal formulations and marketed clindamycin gel were introduced into the wells. The plates were incubated at 37 °C for 24 hours. The antibacterial activities were evaluated by measuring the zones of inhibition (in mm). The results of evaluation are displayed in Table 3. [13, 14]

RESULTS AND DISCUSSION

Formulation F-1-F-3 had semisolid consistency. All the formulations were found homogenous, easily washable. All the formulations had very slightly alkaline pH which were compatible with normal skin

physiology. All the formulations F-1, F-2 and F-3 had very optimum spreadability. All the formulations showed considerable zone of microbial inhibition. The antimicrobial property of the aqueous extract of *Gloriosa superb* and *Litsea glutinosa* was reconfirmed as depicted in Table 3. Poly herbal formulation F-3 of *Gloriosa superba* (flower) and *Litsea glutinosa* (bark) showed better antibacterial activity.

Table 2: Evaluation of formulations

Formulation	Colour	Consistency	Washability	pH	Spreadability (gm-cm/sec)
Marketed formulations	Colorless	Semi-solid	Good	7.01	7.70
F-1	Brown	Semi-solid	Good	7.43	1.31
F-2	Brown	Semi-solid	Good	7.38	3.74
F-3	Brown	Semi-solid	Good	7.05	8.56

Table 3: Microbial Studies on the poly herbal formulation (Gel)

Zone of Inhibition (mm) of poly herbal formulation (Gel) against *Staphylococcus epidermidis*				
Formulation/S.No.	Marketed formulations	Polyherbal Formulation		
		25 mg/ml	50 mg/ml	100mg/ml
1	9	7	8	9
Zone of Inhibition (mm) of poly herbal formulation (Gel) against *Propionibacterium acne*				
Formulation/S.No.	Marketed formulations	Polyherbal Formulation		
		25 mg/ml	50 mg/ml	100mg/ml
1	10	8	9	10

The results of the antimicrobial studies obtained for the aqueous extract of *Gloriosa superb* and *Litsea glutinosa* reflect the potential for its delivery as a topical agent for treatment of acne vulgaris which forms the basis of our study. The topical approach is effective because the medication is applied directly to the lesions and the herbs are less likely to cause side effects. The formulated herbal gel also has the added advantage over the currently used antibiotic treatment in the fact that the bacteria which often develop tolerance and resistance to the antibiotics over time may not be seen here.

Conclusion

Acne vulgaris is a common skin disorder and many formulations are available in the global market but existing non herbal formulations cause many side effects. Moreover development of antibiotic resistance in acne causing organisms has been rising steadily since the 1980s. Hence development of polyherbal topical formulation with synergistic effect is a very promising approach for its treatment. The present study confirms the efficacy of polyherbal gel comprising of two aqueous extracts. It could be theorized that the developed topical polyherbal gel is suitable for the treatment of moderate to severe type of acne.

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References

1. Christy C, Riddle MD, Kathani Amin and Schweiger ES. A review of azithromycin for the treatment of acne vulgaris. Cosmetic Dermatology. 2009; 20(5): 299-302
2. Kaur P, Kaur S, Kumar S and Singh P. *Rubia cordifolia* L. and *Glycyrrhiza glabra* L. medicinal plants as potential source of COX-2 inhibitors, American J Biomed Sci. 2010; 2(2): 108-120.
3. Yuangang Zu, Huimin Yu, Liang Lu, Yujie Fu, Efferth T, Liu X and Nan Wu. Activities of ten essential oils towards *Propionibacterium* acne and PC-3, A-549 and MCF-7. Cancer Cells. 2010; 15: 3200-3210.
4. Mamgain RK. Acne vulgaris and its treatment by indigenous drugs SK-34 (Purim) and SK-235 (Clarina). The Antiseptic. 2000; 3: 76-78.
5. Said HK. Traditional medicine in the service of health, Hamadard foundation press. 2005: 73-75.
6. Haroon K, Murad AK and Iqbal H. Enzyme inhibition activities of the extracts from rhizomes of *Gloriosa superba* Linn (Colchicaceae). J Enzyme inhibition Med Chem. 2008; 22(6): 722-725.
7. Srivastava UC and Chandra V. *Gloriosa superba* Linn. (Kalihari) - An important colchicine producing plant. J Res Indian Med. 1977; 10: 92-95.
8. Rajak RC and Rai MK. Herbal Medicines Biodiversity and Conservation Strategies. International Book Distributors. 1990, 75-79
9. Pradeepa K, Krishna V, Venkatesh, Girish Kumar K, Thirumalesh BV and Naveen Kumar KJ. Antibacterial screening of the stem bark and leaves extracts of *Litsea glutinosa* (Lour.)C.B. Rob – an ethnomedicinally important tree of the Western Ghats. Phcog J. 2011; 3(21): 72-76.
10. Kokate CK. Practical Pharmacognosy. Vallabh Prakashan, New Delhi, India. 1994; 54.
11. Josias A Hamman. Composition and Application of *Aloe vera* leaf gel. Molecules. 2008; 13:1599-1616.

12. WHO Monograph on selected Medicinal Plants. Department of essential Drugs and medicines Policy, World Health Organization. www.google.co.in. ,206-216.
13. Pratchayasakul W, Pongchaidecha A, Chattipakorn N and Chattipakorn S. Ethnobotany and ethnopharmacology of *Tabernaemontana divaricata*. Ind J Med research. 2008;127:317-335.
14. Perez C, Pauli A and Bazerque P. An antibiotic assay by agar well diffusion method. Acta Biol Med Exp. 1990; 15:113-115.