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A Review on the Fabrication and Characterization of Anti ACNE Gel for Herbal Plants

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ABSTRACT

Herbal remedies have been used to cure a variety of infectious diseases throughout human history. Acne vulgaris affects over 85% of adult Americans, especially in young adults. Acne lesions can arise from the combination of several factors. Usually, due to inherited and environmental variables, it runs in families.

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Introduction

Acne vulgaris is the medical word for acne. Patients with the condition range in age from 11 to 25 in 70% to 80% of cases. Both inflammatory and noninflammatory lesions of the pilo-sebaceous unit, which consists of hair follicles and/or sebaceous glands, can occur in acne vulgaris [1]. While some acne in adolescence is normal, severe acne can be uncomfortable and often leave scars long after treatment. Acne can show up in two main ways that don't involve swelling: whiteheads, which are little bumps with a white top, and blackheads, which are dark spots in your pores. Nodules, cysts, pustules, and papules are examples of inflammatory skin lesions [2-4].

DEFINITION

Acne is also called as "Acne vulgaris" in medical terminology [5]. Acne is basically the involvement of sebaceous gland which comprised pustules and papules means solid lesions occur on the skin or puss occurs on the skin. Normally, this sebaceous gland protects and moistures the skin and is very important for the skin. However, due to certain changes such as extreme dirt, dust, or germs infections, it harms the skin [6].



OCCURRENCE

Day-to-day exposure of human skin leads to number of problems such

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as acne, pimples, pigmentations, and sunburns marks [7] Typically begins around puberty and early adolescence, it tends to present earlier in females 12 or 13 years then in males 14 or 15 years due to late onset of puberty in males. Acne has been estimated to affect 95–100% of 16–17-year-old boys and 83–85% of 16–17-year-old girls acne is a pleomorphic disease that occurs on the face 99%, back 60%, and chest 15%. The individual lesions of acne vulgaris are divisible into three types; non-inflamed lesions, inflamed lesions, and scars [8].

CAUSES OF ACNE

Infectious contribution

Microorganisms such as Propionibacterium acnes and Staphylococcus aureus are one of the causative agents for acne. They have ability to adapt the abnormal oil production, inflammation, and inadequate sloughing of acne pores. A parasites mite, Demodex, has been shown to be associated with the development of acne.

Dietary involvement

Acne vulgaris is seen to be associated with foods with having high glycemic index such as milk, salt, and chocolates. Studies have also shown the relation of obesity with acne.

Genetic contribution

In some peoples, the cause of acne could be genetic rate of acne which is seen among first degree relatives and in twins' studies as well. The genes, which attributed to acne, are polymorphisms in IL-1alpha, TNF-alpha, and CYP1A1.

Hormonal changes

Puberty menstrual cycles cause hormonal changes that contribute acne vulgaris. Androgen is the sex hormones that increases during puberty and pregnancy causes the more sebum production in follicular glands. Anabolic steroids can also lead to the development of acne vulgaris in adult women.

- A. Increased sebum production
- B. Hypercornification of the pilosebaceous ducts
- C. Abnormal bacterial function (microbial invasion)
- D. Production of inflammation

TYPES OF ACNE

Acne vulgaris

It is the medical name for common acne. The presence of blackheads, whiteheads, and other types of pimples on the skin. The most common spots for breakouts are the face, chest, shoulders, and back. Although mild acne may improve with over-the-counter treatment, more severe forms should be treated.



Comedones-

A comedo, also known as a basic acne lesion, is a plugged hair follicle caused by the buildup of sebum and dead skin cells. Whiteheads and blackheads are lumps that form from comedones (the plural of comedo). Items that may cause comedones to form are referred to be "comedogenic." Makeup that is "noncomedogenic" means it will not clog pores and cause acne.



Papules

Inflamed comedones, known as papules, appear as little red or pink pimples on the skin. This blemish could be painful if touched. Squeezing or picking at the sore can increase the inflammation and perhaps cause scars. Multiple papules may be indicative of severe acne.



Nodules

Nodules are raised, firm lumps caused by inflammation. They form deep under the skin and cause a lot of discomfort. Since nodules have the potential to scar, dermatological care is recommended. While OTC remedies may not be successful, prescription medication often does the trick.



Mild Acne

Less than 20 comedones (whiteheads and blackheads), 15 red bumps, or 30 lesions in total define "mild" acne. Over-the-counter topical treatments are effective for mild acne. Significant progress may not be visible for up to eight weeks.



Treatment of acne

If you've tried OTC (over-the-counter) acne remedies for a while and they haven't helped, it may be time to talk to your doctor about stronger prescription drugs. A dermatologist is able to aid you by:

- A. Control your acne
- B. Avoid scarring or other damage to your skin
- C. Make scars less noticeable

Medication for acne typically targets oil production, inflammation, or bacterial infection. It can take anywhere from four to eight weeks for the majority of prescription acne medications to work. It may take months or even years for your acne to entirely disappear. Your doctor will recommend a course of action for treating your acne based on your age, skin type, the severity of your condition, and your level of commitment. Discuss the potential adverse effects of any drugs or other therapies with your doctor. And until your skin clears up, schedule checkups every three to six months with your doctor [9].

List of Allopathic drugs used in the treatment of acne

Acne treatment usually contains one of the following ingredients (some of which are only available on prescription): Benzoyl peroxide, salicylic acid, resorcinol, azelaic acid, dapsone gel, retinoids and retinoidlike creams, gels, lotions, topical antibiotics, oral antibiotics, combined oral contraceptives, oral isotretinoin, spironolactone's, lasers and photodynamic therapy, and steroid injection.

Some medicinal plants used in the treatment of acne

- 1 *Azadirachta indica* Linn: (NEEM)
- 2 *Aloe barbadensis* Mill: (ALOE VERA)

PLANT PROFILE

A. Indica (Plant profile):

Taxonomical classification:

Kingdom: Plantae

Division: Magnoliophyte

Class: Magnoliopsida

Order: Sapindales

Family: Meliaceae

Genus: Azadirachta

Species: Azadirachta indica

Scientific name: Azadirachta indica

Common name: Neem, Nimtree, Margosa

Azadirachta indica, a Meliaceae plant, generates antibacterial, anti-inflammatory, and immune-boosting oil. This supports topical acne treatment and prevents recurrence, keeping skin healthy. Some oils are non-comedogenic and won't clog pores, but others can treat acne and prevent future breakouts. Neem oil has been used to treat acne for years. The limited research on neem oil and acne vulgaris is insufficient. Thus, a novel method may be needed to properly understand neem oil's anti-Acne vulgaris benefits. Idea may help us understand how neem oil fights acne vulgaris. ^[10,11]

MATERIALS AND METHODS

A. Indica



Sr. No	Source	Chemical Constituents	Uses
1.	Seed Oil	Nimbidin	Anti-inflammatory, Antiarthritics, Hypoglycemic, Antipyretic, Spermicidal, Antifungal, Antibacterial, Diuretic.
2.	Seed Oil	Azadirachtin	Antimalarial
3.	Seed Oil	Nimbin	Spermicidal
4.	Seed Oil	Nimbolide	Antimalarial, Antibacterial
5.	Seed Oil	Gedunin	Antimalarial, Antifungal
6.	Seed Oil	Mahmoodin	Antibacterial
7.	Bark	Gallic Acid and Catechin	Antibacterial
8.	Bark	Margolone, Margolonone and isomargolonone	Antibacterial
9.	Leaf	Cyclic Trisulphide and Cyclic tetrasulphide	Antifungal
10.	Leaf	Polysaccharides	Anti-inflammatory
11.	Bark	Polysaccharides G1A, G1B	Antitumour
12.	Bark	Polysaccharides G2A	Anti-inflammatory
13.	Bark	NB-2 Peptidoglucon	Immunomodulatory

Table: Source, Chemical Constituents and Uses of Neem.

Collection of plant material: The plant of *A. Indica* leaves is collected from the medicinal garden.

Drying of plant leaves

1. First, take a few fresh neem leaves and wash them in clean water to remove dirt.
2. Then strain the leaves of any water and lay them on a flat plate or pan.
3. Now, place the leaves in a shaded area for 3 days until all the moisture from the leaves gets dried out becoming dry and crispy. (Don't sundry the leaves because it can reduce nutrient content).
4. Next, break the dried leaves into smaller pieces using your hands.
5. Then put the pieces into a grinder or food processor and grind into a fine powder.

6. Use a sieve to remove large particles of the ground leaves.

7. Finally, place the neem powder in an air tight container and store in a clean, dry area.

Extraction Process

The dried powdered plant leaves of *A. Indica* extracted with ethanol using Soxhlet method. After extraction, the collected ethanolic extract was subjected to distillation to obtain the pure drug of extract. Finally, place the neem powder in an airtight.

METHOD OF PREPARATION OF GEL CONTAINING EXTRACT

One gram of Carbopol 940 was dispersed in 50 ml of distilled water kept the beaker a side to swell the Carbopol 940 to form gel. Take 5 ml of distilled

water and required quantity of methylparaben and propylparaben were dissolved by heating on water bath solution was cooled and propylene glycol 400 and sodium lauryl sulfate added. Further required quantity of extract was mixed to the above mixture and add this solution into the Carbopol 940 gel with continuous stirring and add triethanolamine was added dropwise to the formulation for adjustment of required skin Ph and to obtain the gel at required consistency [12].

FORMULATION

As per method described below the formula were mentioned in Table 2. Gel was prepared by addition of 1 g and 2 g of extract to prepared 1% and 2% formulation, respectively.

RESULTS AND DISCUSSION

The result of evaluation are displayed in Table 1. Formulation was yellowish-green in color whereas marketed formulation was black in color formulation F1, F2 was found to have semisolid consistency. All formulations were found homogenous easily washable. All the formulations have slightly alkaline Ph which was compatible with skin physiology.

EVALUATION PARAMETER

Physical evaluation

Physical parameters such as color and consistency were checked manually (Table 1).

S. No.	Chemical	Uses
1	Carbopol 940	Gelling agents
2	Methyl paraben	Preservative
3	Propyl paraben	Preservative
4	Propylene glycol 400	Solubility
5	Triethanolamine	Neutralizer

Table 1: Method of Preparation of gel.

S. No.	Ingredients name	Formulation
1	Extract	1 g
2	Carbopol 940	1 g
3	Methylparaben	0.2 g
4	Propyl paraben	0.1 g
5	Triethanolamine	1.2 ml
6	Propylene glycol 400	5 ml

Table 2: Formulation of anti-acne gel.

Formulation batch	Color	Consistency	Washability	Ph	Extrude ability	Spredability	Sign marks
Marketed	Black	Semisolid	Easily wash	6.12	Good	Good	No
1	Green	Semisolid	Easily wash	6.12	Good	Good	No
2	Green	Semisolid	Easily wash	6.12	Good	Good	No

Table 1: Comparing evaluation parameter of marketed product with F1 and F2 formulation



Washability

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

Ph

Ph of 1% aqueous solution of the formulation was measured using a calibrated digital Ph meter at constant temperature.

Extrudability study

It is important for the patient to accept the gel once it's been extruded from the tube. When the consistency of your gel is high, it may not extrude from a tube, whereas Gels with low viscosity may extrude from a tube, due to their high flow rate. A suitable consistency will extrude the gel efficiently.

Extrudability of gel both formulations were found to be good. Whereas, Extrudability of base gave satisfactory result.

IN-VITRO antibacterial activity

Test using agar well diffusion was performed to evaluate the antibiotic activity of active ingredients against. Plant extract of namely Neem showed significant inhibitory effect against. Out of them, 80mg/ml concentration of neem extract was used for the development of formulation a sit showed comparatively higher inhibition zone. 36.65 mm. And recorded 13.27 mg/ml of IC₅₀ value. Moreover, two other Herbal extracts were unable to stop the tested microbes' development.

CONCLUSION

Herbal formulation shares growing demand in the world market. It is very good attempt to establish the herbal face wash containing aqueous extracts of neem leaves, The plants have been reported in literature having good antimicrobial, anti-inflammatory, refreshing activity, cleansing agent, dirt absorbent, and antioxidant formulation which are prepared using varied concentration of extract prepared formulation (F1 and F2) where evaluated for various parameters such as color, appearance, consistency, washability, Ph and Spredability, extrudability, and skin irritation and compared with marketed formulation.

After evaluation study shows that both formulations gives good affect as marketed formulation and neither shows any side effect or skin irritation.

REFERENCES

- Sawarkar, H. A., S. S. Khadabadi, D. M. Mankar, I. A. Farooqui, and N. S. Jagtap. "Development and biological evaluation of herbal anti-acne gel." *Int J pharmtech Res* 2, no. 3 (2010): 2028-31
- Bezawalwar Pratik, M., V. Gomashe Ashok, and A. Gulhane Pranita. "A quest of anti-acne potential of herbal medicines for extermination of MDR Staphylococcus aureus." *International Journal of Pharmaceutical Science Invention* 3 (2014): 12- 17
- David, Michael Z., and Robert S. Daum. "Community-associated methicillin- resistant Staphylococcus aureus: epidemiology and clinical consequences of an emerging epidemic." *Clinical microbiology reviews* 23, no. 3 (2010): 616-687.
- Chambers, Henry F., and Frank R. Deleo. "Waves of resistance: Staphylococcus aureus in the antibiotic era." *Nature Reviews Microbiology* 7, no. 9 (2009): 629-641
- Leyden JA. Review of the use of combination therapies for the treatment of acne vulgaris. *J Am Acad Dermatol* 2003;49:S200-10.
- Kim J. Review of the innate immune response in acne vulgaris: Activation of Toll-like receptor 2 in acne triggers inflammatory cytokine responses. *Dermatol* 2005;211:193-8.
- Miyague L, Macedo RE, Meca G, Holley RA, Luciano FB. Combination of phenolic acids and essential oils against *Listeria monocytogenes*. *LWT Food Sci Tech* 2015;64:333-6.
- Abu-Qatouseh LF, Butanone H, Boussouf L, Madani K, Shihab P, Al-Qaoud K. In vitro anti-Helicobacter pylori and urease inhibitory effects of polyphenolic extracts of local herbs from Algeria. *IJA* 2014;3:5. 9.
- Cunliffe, W. J., M. Poncet, C. Loesche, and M. Verschoore. "A comparison of the efficacy and tolerability of adapalene 0.1% gel versus tretinoin 0.025% in patients with acne vulgaris: a metaanalysis of five randomized trials." *Journal of the European Academy of Dermatology and Venereology* 11 (1998): S189.
- Eid, A.; Jaradat, N.; Elmarzugi, N. A Review of chemical constituents and traditional usage of Neem plant (*Azadirachta Indica*). *Pal. Med. Pharm. J.* 2017, 2, 75-81.
- Brahmachari, G. Neem—an omnipotent plant: A retrospection. *Chembiochem* 2004, 5, 408-42.
- Rajan RG, Kumar MV, Rao CV, Shirwaikar A, Mehrotra S, Pushpangadan P. Healing potential of *Anogeissus latifolia* for dermal wounds in rats. *Acta Pharm* 2004;54:331-8 .
- Fatima Grace, X., Joan Vijetha, S. Rahul Raj, S. Shanthi, S. Latha, and S. Shanmuganathan. "Formulation and evaluation of polyherbal anti-acne Gel." *Advanced Journal of Pharmacy and Life Science Research* 3, no. 1 (2015): 5-8.

14. GALLEGOS, SALINER Ana, Andrew WORTH, and Grace PATLEWICZ. "Review of literature-based models for skin and eye irritation and corrosion."
15. Gatne, M., K. Tambe, and K. Ravikanth. "Acute dermal irritation study of polyherbal gel mastilep in rabbits." International Journal of Pharmaceutical Sciences and Research (IJPSR) 6, no. 8 (2015): 3473-3476.
16. Ghodsi, S. Zahra, Helmut Orawa, and Christos C. Zouboulis. "Prevalence, severity, and severity risk factors of acne in high school pupils: a community-based study." Journal of investigative Dermatology 129, no. 9 (2009): 2136-2141.
17. Graupe, K., W. J. Cunliffe, H. P. Gollnick, and R. P. Zaumseil. "Efficacy and safety of topical azelaic acid (20 percent cream): an overview of results from European clinical trials and experimental reports." Cutis 57, no. 1 Suppl (1996): 20-35.
18. Haider, A., & Shaw, J. C. (2004). Treatment of acne vulgaris. Jama, 292(6), 726-735.
19. Hajheydari, Zohreh, Majid Saeedi, Katayoun Morteza-Semnani, and Aida Soltani. "Effect of Aloe vera topical gel combined with tretinoin in treatment of mild and moderate acne vulgaris: a randomized, double-blind, prospective trial." Journal of Dermatological Treatment 25, no. 2 (2014): 123-129.
20. Hamilton, James B. "Male hormone substance: a prime factor in acne." The Journal of Clinical Endocrinology 1, no. 7 (1941): 570-592. 25. Jones, D. H., Kathrine King, AJ MILLER, and W. J. Cunliffe. "A dose-response study of 13-cis- retinoic acid in acne vulgaris." British Journal of Dermatology 108, no. 3 (1983): 333-343.
21. Kola-Mustapha, Adeola Tawakalitu, Muhabat Adeola Raji, Oluwakorede Adedeji, and George Oche Ambrose. "Network Pharmacology and Molecular Modeling to Elucidate the Potential Mechanism of Neem Oil against Acne vulgaris." Molecules 28, no. 6 (2023): 2849.
22. Law, M. P. M., A. A. T. Chuh, A. Lee, and Nicolas Molinari. "Acne prevalence and beyond: acne disability and its predictive factors among Chinese late adolescents in Hong Kong." Clinical and experimental dermatology 35, no. 1 (2010): 16-21.
23. Lehmann, Harold P, John S. Andrews, Karen A. Robinson, Victoria L. Holloway, and Steven N. Goodman. "Management of acne." Evidence report/technology assessment (Summary) 17 (2001): 1-



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