

Formulation And Evaluation Of Anti Acne Gel

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Abstract:-

The objective of this study is to develop and evaluate the anti-acne gel containing garlic juice against *P. acnes* to facilitate the topical usage. The garlic juice contains alkaloids, saponins, tannins, monoterpenes, and sesquiterpenes. The garlic juice at 7.5% has anti-acne activity to *P. acnes*, and the gel of 3% HPMC is the most stable and preferable. *Propionibacterium acnes* is an anaerobic Gram-positive bacterium that produces propionic and acetic acid. These bacteria are involved in the development of inflammatory acne by activating complements and metabolizing sebaceous triglycerides into fatty acids that irritate the follicular wall and surrounding dermis.

Keywords :-Garlic juice , *P.Acne* , anti -acne gel.

Introduction :-

All of us on this Earth wanted to have a young and beautiful skin and we take cream , gel and ointment to diminish acne, wrinkles and signs of aging . Nowadays most of us prefer natural ingredients than synthetic one when specially it is skin.

The present work is attempt to develop a natural anti acne gel, which can work on the bacteria *P.Acne* . Garlic contains some sulfur containing compound such as allicin , allin, ajoene,diallyl sulfide, dithin and some non-sulfur compound including vitamin B , proteins , minerals , saponins, and flavonoids. Application of garlic directly on acne is troublesome , hence it is necessary to develop topical dosage form, such as gel.

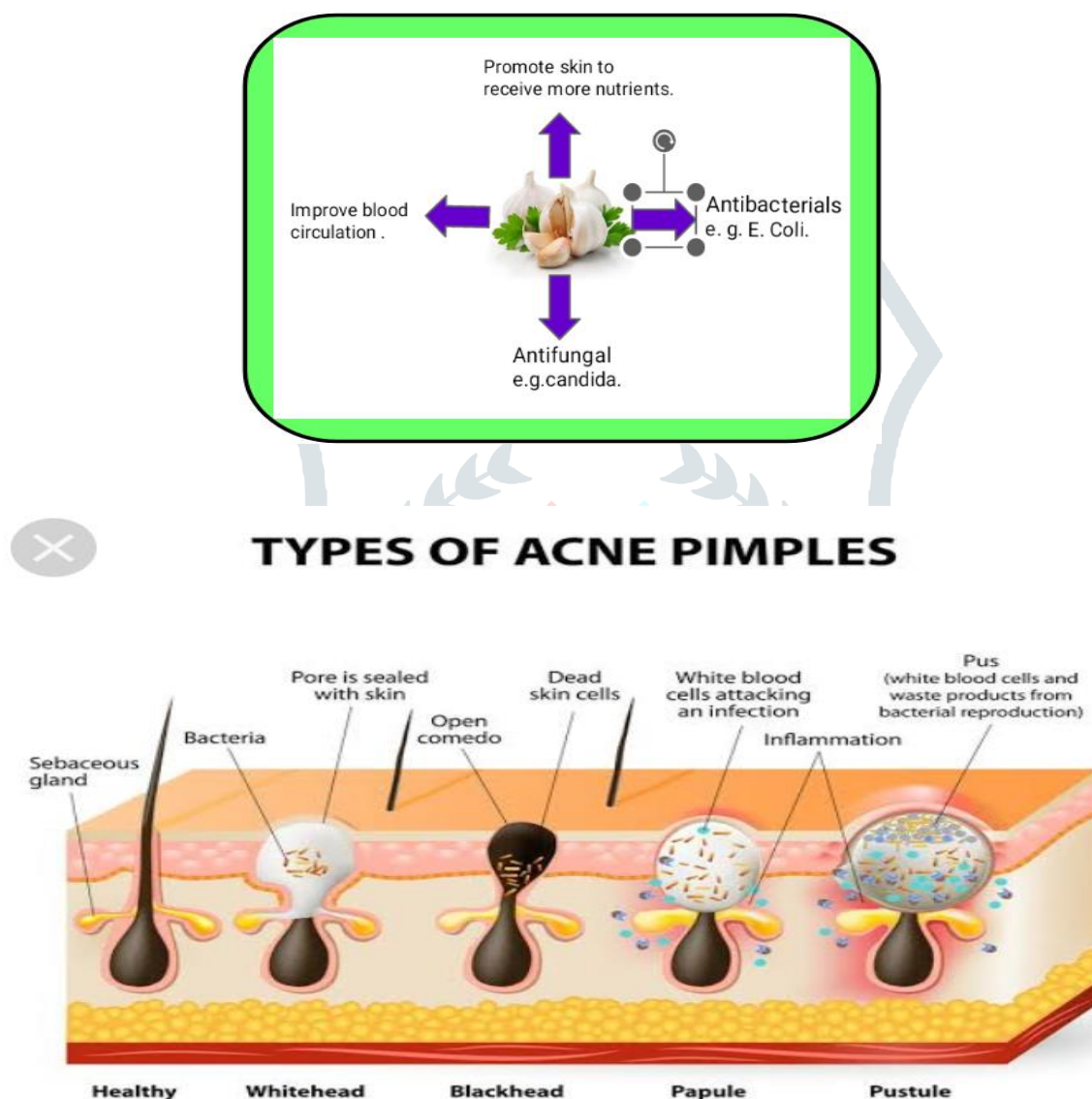
Acne vulgaris is a most common chronic inflammatory skin disorder of pilosebaceous unit that affect areas containing the largest oil glands, including the face, back, and trunk ³.

It is almost a universal disease occurring in all races and affecting 95% of boys and 83% of girls. Acne vulgaris is generally characterized by formation of seborrhea, comedone, inflammatory lesions and presence of bacteria *Propionibacterium acnes*, *Staphylococcus epidermidis* and *Staphylococcus aureus* in the follicular canal and sebum production⁴. *P. acnes* have been described as an obligate anaerobic microorganism. It is implicated in the development of inflammatory acne by its capability to activate complements and by its ability to metabolize sebaceous triglycerides into fatty acids, which chemotactically attract neutrophils. On the contrary, *S. epidermidis*, an aerobic organism, usually involves in superficial infections within the sebaceous unit⁵ . When the chemicals produced by *P. acnes* destroy the cellular structure of skin cells, *Staphylococcus aureus*, grows causing acne lesions. These factors provide a potential target for treatment. *P. acnes*, *S. epidermidis* and *S. aureus* are the target sites of antiacne drugs ^{6,7}.

With the excessive use of antibiotics for long periods has led to the increased resistance in acne causing bacteria i.e. *P. acnes*, *S. epidermidis* and *S. Aureus*. The development of antibiotic resistance is multifactorial, including the specific nature of the relationship of bacteria to antibiotics, how the antibacterial is used, host

characteristics, and environmental factors. To overcome the problem of antibiotic resistance, medicinal plants have been extensively studied as alternative treatments for diseases ^{10 11}.

In the present study, three medicinal plants, which have been traditionally used as antimicrobial and anti-inflammatory agents were examined for antimicrobial activities against microorganisms frequently involved in acne inflammation, such as *Propionibacterium acnes*, *Staphylococcus epidermidis* and *Staphylococcus aureus*.



Material and methods :-

Garlic bulb :-

- Synonym:- allium , garlic
- Biological source:- cloves of plant 'allium sativum
- Family :- Amaryllidaceae

❖ Methods:-

1. Extraction of drug
2. Standardized bacterial culture
3. Antimicrobial activity assay of garlic juice

4. Determination of anti-acne activity of drug
5. Formulation of gel

1. Extraction of drug :

The papery skin of garlic cloves was removed, then weighed 500 g, crushed and squeezed. Phytochemical screening was carried out according to the color reaction⁸.

2. Standardized bacterial culture:

The culture of *P. acnes* was standardized by spectrophotometric method using McFarland turbidity standard. The inoculum suspension was prepared by picking several colonies and suspending the material in 5 mL sterile 0.85% sodium chloride to match that 0.5 McFarland turbidity standard. This produced a cell suspension containing 1×10^6 cells per mL, which was diluted in the ratio 1:100 with the desired test medium to provide starting inoculum of 1×10^4 cells per mL⁹.

3. Antimicrobial activity assay of garlic juice:

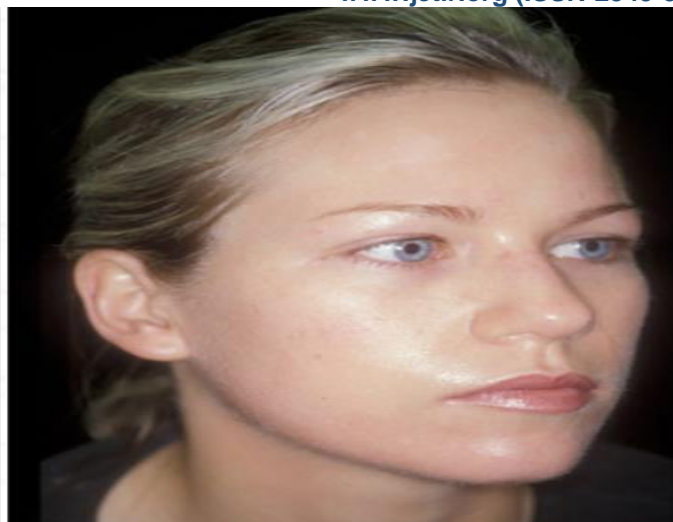
The bacteria suspension (25 μ L) and 20 mL of nutrient agar were dispensed into sterile Petri dishes and allowed to solidify (n=3). The solid agar was riddled with a perforator, then put 50 μ L of extract, 0.1% clindamycin, and sterile water into each hole. Incubation for 18 hrs at 37°C. Diameter of the clear zone was measured using a caliper.

4. Formulation of gels:

Required quantity of carboxymethyl cellulose was soaked in hot distilled water for 15 minutes (Phase I). The garlic juice was dissolved in the propylene glycol, then tartaric acid, benzoate sodium and citrus oleum were added (Phase II). Phases I and II were mixed, and the remaining quantity of distilled water was added to make up the final 100 g weight. Stir the formulation with a mechanical stirrer to homogenize the formulation (Table 1).

➤ Gel evaluation

- i. Physical evaluation: Physical parameters such as color, appearance, and odor were examined by organoleptic.
- ii. Determination of pH: pH of 1% aqueous solution of the formulation was measured using a calibrated digital pH meter at constant temperature¹².
- iii. Determination of viscosity: Viscosities of the formulated gel were determined using a Brookfield Viscometer. Spindle No. 7 and spindle speed 60 rpm at 25°C were used for gels, the corresponding dial reading on the viscometer was noted and multiplied by the factor given in the viscometer catalog.
- iv. Determination of anti-acne activity: The bacteria suspension (25 μ L) and 20 mL of nutrient agar were dispensed into sterile Petri dishes and allowed to solidify (n=3). The solid agar was riddled with a perforator, then put 50 μ L of FI, FII, FIII, and sterile water into each hole. Incubation for 18 hrs at 37°C. Diameter of clear zone was measured using a caliper.
- v. Skin irritation test: There were 20 volunteers with various ages. The gel preparation (0.25 g) on the back of the right hand and the gel base (0.25 g) on the back of the left hand by the volunteers was applied and left for 60 minutes, then observed changes in skin color. Applied gels were covered with sterile pads for 24 hrs, then observed again. Primary irritation was shown by the skin reaction immediately after use, whereas secondary irritation was shown after few hours after usage.



- vi. Hedonic test: There were 20 volunteers with various ages. The parameters were texture, color, and odor. The assessment criteria were (1) liked extremely, (2) liked slightly, (3) neutral, (4) disliked extremely, and (5) disliked slightly¹³.

Formulation table:-

Garlic juice	7.5%	Anti-Acne
HPMC (hydroxy propyl methyl cellulose)	2%	Thickening Agent
Propylene glycol	1.5%	Humectant, Moisture
Benzoic Acid	0.1%	Preservative
Tartaric acid	0.035%	Antioxidants
Water	Q.S	Vehicle

Acne on skin

skin after using anti-acne gel

❖ RESULTS:

The garlic bulbs (500 g) were produced 73 g of extract, and the rendement was 14.6%. The phytochemical screening results showed that the garlic juice contains alkaloids, saponins, tannins, monoterpenes, and sesquiterpenes.

The gels were light cream-colored with specific odor, the gel color became more darker during storage. The optical density of garlic juice and gels was 50% and $37.56 \pm 1.78\%$, respectively. The pH gels were stable for 49 days, but the viscosity was decreased.

❖ DISCUSSION:

Extraction was conducted by extortion without solvent addition to obtain the secondary metabolites

optimally and to degradation prevention. The rendement was high (14.6%). The phytochemical screening results were consistent with literature. The clear zone showed that the garlic juice has an antimicrobial activity to *P. acnes*

❖ **Conclusion:-**

The garlic juice at 7.5% has anti-acne activity to *p. Acne* and the gel of 3% HPMC is the most stable and preferable

❖ **Reference:**

1. Cooney T, Peeters E, Nelis Hf , biofilm formulation by *p.acne* is accosiated with increased resistance to antimicrobial agent ,*Res.microbial* 2007
2. Mishra N , Behalf KK , antimicrobial activity of some spices against selected microbes in *Int J pharma science* - 2010-2(3):1879
3. Leyden JJ: Therapy for Acne vulgaris. *The New Eng J Med*. 1997; 156-1162.
4. Leyden JJ: Current issues in antimicrobial therapy for the treatment of acne. *J Eur Dermatol Venereol*. 2001; 15(3): 51-55.
5. Burkhart CG, Burkhart CN and Lehmann PF: Acne a review of immunologic and microbiologic factors. *J Post grad Med*. 1999; 75: 328-331.
6. Leyden JJ: The evolving role of *Propioni bacterium* *acnes* in acne. *Semin Cutan Med Surg*. 2001; 20: 139-143.
7. Hamnerius N: Acne-etiology and pathogenesis. *Treatment of Acne*. 1996; 32: 29-38.
8. Farnsworth NR. Biological and phytochemical screening of plants. *J Pharm Sci* 1966;55(3):225-76.
9. Bauer AW, Kirby WM, Sherris JC, Turck M. Antibiotic susceptibility testing by a standardized single disk method. *Am J Clin Pathol* 1966;45(4):493-6.
10. Kubo I, Muroi H and Kubo A: Naturally occurring antiacne agents. *J Nat Prod*. 1994; 57(1): 9-17.
11. Chien YW: Logics of transdermal controlled drug administration. **Drug Dev. Ind. Pharm.** 1983; 9: 497.
12. Dept Essential Drugs and Medicines Policy. Monograph on Selected Medicinal Plants. Geneva, Switzerland: World Health Organization; 2002.
13. Stone H, Sidel JL. Sensory Evaluation Practices. St. Louis, Missouri, USA: Academic Press; 2004

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