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RESARCH ARTICLE ON FORMULATION OF ACNE GEL CONTAINING CITRUS AURANTIFOLIA FRUIT JUICE USING CARBOPOL

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ABSTRACT

This study investigates the efficacy of an acne gel formulated with Citrus aurantifolia (lime) fruit juice. Through controlled experiments, we explore the potential anti-inflammatory and antimicrobial properties of the gel, aiming to provide insights into its effectiveness in acne management. Results suggest promising outcomes, supporting the use of Citrus aurantifolia in topical formulations for skincare, particularly in addressing acne-related concerns. Further research is warranted to elucidate the underlying mechanisms and optimize formulation for enhanced therapeutic benefits.

The objectives of this study was to design a product of anti - acne gel containing fruit juice as an effectives antibacterial to treat acne caused by propionibacterium acne and staphyloccus epidermidis using carbopolas gelling agent .

The fresh juice of C. Aurantifollia fruit was obtain by juicer and pasteurized for 30 min . at 65 – 75 degree. The minimum inhibitory concentration (MIC) .Of the fruit juice was determine using microdilution method then , carbopol in different concentration was in corporate in a gel base the fesh juice in different formulas was evaluted for 28 d the color Ph and viscosity of each formula were observed in addition the anti bacterial potency of each formula was analysed using the agar diffusion method against both testes bacteria .

The citrus MIC values of the both tested bacteria showed different results 20- 40 % v/v for p. acne 5-10% v/v for S . epidermidies the MIC values were converted into vivo concentration & resulted concentration for each formula were 25, 50 and 75% v/v for supporting the formula .

Keywords: citrus aurantifolia , juice, carbopol, Anti-acne, gel

INTRODUCTION

Acne is a skin disease with the highest prevalence among other skin disorders. Almost everyone has experienced acne prone skin, especially in an adolescent. Although it is considered not as a dangerous disease, but in fact, almost all acne sufferers feel disturbed appearance that often leads to lower levels of confidence and interfere with the daily activities. No wonder, if most patients who come to the skin care clinic are those who seek a solution to overcome the acne. According to one of a dermatologist, about 70 percent of patients who come, have acne problems.

The infection of acne vulgaris exhibits wide distribution and its prevalence increase over time . Acne is the most dominant skin disease reported based on large studies in the USA, France, and the UK . In Indonesia, about 95-100% of men and 83-85% of women aged 16-17 y suffer acne. The prevalence of acne in adult females is about 12% and in adult males 3%. Another study found that acne is a skin problem of adolescence with a higher prevalence of women than men in the age range of 20

Acne vulgaris is characterized by various clinical conditions such as scaly red skin (seborrhea), erythematous papules and pustules, comedones, nodules, deep pustules, and sometimes piples . The pathogenicity mechanism of acne was the production of sebums, follicular hyperkeratinization, bacterial colonization, and inflammation . P. acne plays a role in the development of inflammatory acne by activating complements and can metabolize sebaceous triglycerides into fatty acids, which neutrophils were attracted . In addition, S. epidermidis within sebaceous unit responsible in superficial infection . When bacteria colonize into the comedons, then the inflammatory factors are released by those bacteria. This made the comedons transformed into pustules and pimples. The inflamed acne becomes rupture and forms nodulus, also probably forms scars after healing

The type of acne, acne severity grading, number of lesions and anatomic location will determine the treatment. The treatment of acne can be given by topical or systemic therapy. The topical therapies include antibiotics, anti-inflammatory and comedolytic agent .Benzoyl peroxide or its combination with clindamycin or erythromycin can treat acne effectively and recommended as an antibacterial agent for P. acne through the release of free oxygen radicals, also reported has a comedolytic agent . But the limitation of benzoyl peroxide therapy is its concentration-dependent irritation, bleaching of bed linen, hair and fabric and causing irritant dermatitis . For systemic therapy, oral antibiotics such as tetracyclines and its derivatives were the first choice . It is indicated mainly for moderate-to-severe inflammatory acne But long-term therapy of oral antibiotic, not only can induce bacterial resistance but also associated with the incidence of upper respiratory tract infection The presence of bacterial resistance and unexpected side effects opens the opportunities for traditional medicine to replace the effectiveness of synthetic drugs in overcoming acne vulgaris.

Anti-acne activity :

The effic acy of anti-acne gel formulas was performed using the agar diffusion method w ith per foration technique agai nst P. acne and S. epidermidis. A total of 20 µl bacterial suspension was fed into ste rile petri dishes and suspended in 20 ml of the which was poured into the sterile petri dish. The test medium was homogenized and allowed to solidify. Media that has been solidifie d, the n perforated to make holes for sample reservoir. The tested juice concentrations were 10, 25, 50, and 75 w /w. A total of 50 mg of each concentra tion was i ntroduce d using a steri le syringe into the reservoir on the test medium. The negative and positive control was prepared, where the negative contr ol contains the only medium, meanwhile the positive contr ol consisted of the inoculated bac terial suspension usi ng the streak inoculation method. All test and control media were incubated at 37 °C for 24 h. The inhibitory diameter formed was measu red using a cali per.

CARBOPOL :

Carbopol also are not absorbed into the body and irritation free. Carbopol polymer proved to be a promising carrier for controlled release of active phytoconstituents in the gel formulation. Another study reported that the gel formulations prepared with Carbopol as a gelling agent were found to be superior to the gel formulations. Hence the effective concentration of formulatingcarbopol was determined for the best base gel formulation. Carbopol is a synthetic polymer made of carbomers that are cross-linked together to form a microgel structure. In nature, carbopol is anionic, therefore, need neutralization for microgel structure by adding triethanolamine . Triethanolamine was added as a neutralizing agent for acidic carbopoles, since triethanolamine contains 56 to 86% carboxylic acid. Triethanolamine also acts as a stabilizer and developer of carbopol and prevents the disruption of disperse from carbopol when exposure to light causes the gel to become cloudy. Methylparaben is added as a preservative. This is because the use of water medium, which is very vulnerable to microbial growth. While the addition of propylenglikol used as humektan. Propylene glycol is reported to be the two best permeation enhancers . Meanwhile, triethanolamine were used in the formulation

in order to adjust the pH of the formulation. In this study, three different base gel formulations were prepared using different concentrations of carbopol (0.8;1 and 1.2 %w/v). Carbopol with 1% concentration yields the most stable gel base formula among other formulas. The pH of the base of the gel throughout the formula shows an alkaline pH over the same range, but until the end of storage, the formula with 1% carbopol concentration shows a clear gel base with a stable viscosity. Thus carbopol 1% will be continued as a gelling agent in the next stage of formulation.

AIM AND OBJECTIVES

AIM :

citrus aurantifolia (lime) juice contains natural acids that may have some antibacterial properties, using it directly on the skin can be harsh and may cause irritation. It's crucial to be cautious when applying citrus juices to the skin, especially if you have sensitive or acne-prone skin. Consider consulting with a dermatologist before using such DIY remedies to ensure they align with your skin type and condition. There are dedicated acne gels formulated with proven ingredients that might be more effective and less risky for treating acne.

OBJECTIVES :

The objective of using an acne gel containing citrus aurantifolia (lime) fruit juice may be to leverage its natural acidity and potential antibacterial properties to address acne. However, it's important to note that scientific evidence supporting the effectiveness of citrus juices for acne treatment is limited. If pursuing this approach, the goal is likely to reduce acne lesions and inflammation. Keep in mind the potential risks of skin irritation, and always conduct a patch test or consult a dermatologist to ensure compatibility with your skin type.

LITERATURE SURVEY

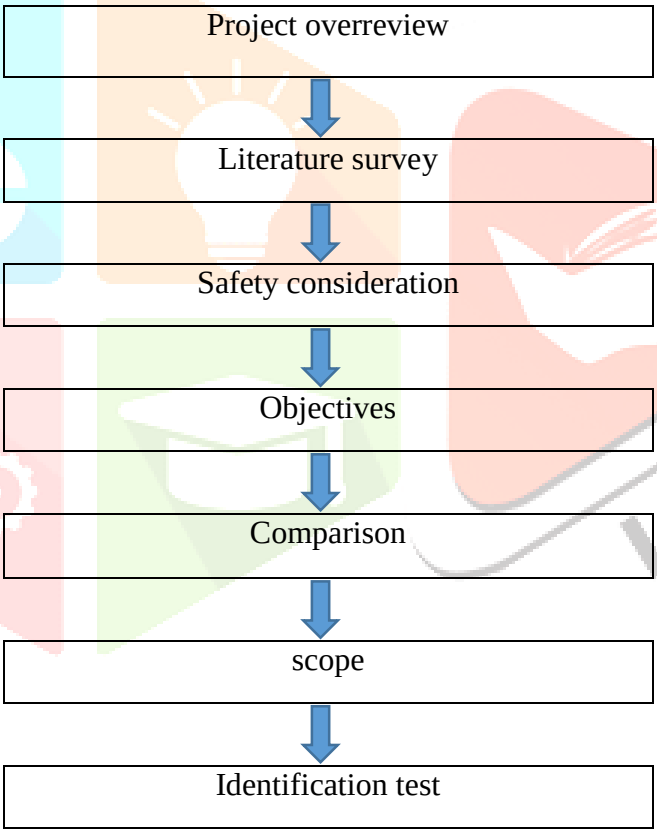
SR NO	TITLE	AUTHORS	YEAR
1	The epidermiology of acne vulgaris in late adolescence .	Lynn DD , Umari T ,Dunnick CA	2016
2	Development of herbal anti-acne gel and evaluation against acne-causing bacteria .	Shubbangi W, Mamta J	2013
3	Skin resurfacing	Sudharmono A	2008
4	Acne diagnosis and managememt	Cunliffe WF , Gollnick HP	2001
5	Antimicrobial effects of indian medical plants against acne inducing bacteria .	Kumar GS, Jayaveera KN	2007
6	Prolonged remisson of cystic and conglobate acne cisretinoic acid	Pandya M, Strauss JS, Olsen TG	1979
7	Short term treatment of acne vulgaris with benzoyl peroxide .	Bojor RA, Holland KT	1995
8	Topical antibiotic for the treatment of acne .	Eady EA, Cove JH	1990
9	Some soluble and in soluble of citrus fruit	Sinclarir WB	1984
10	Biological and phytochemical screening of plant	Fransworth NR	1966

Materials And Methods

The mature fresh fruits of C. aurantifolia were collected from Tasikmalaya, West Java, Indonesia and authenticated by Institute of plant determination in the department of biology, Faculty of mathematics and natural sciences, Padjadjaran University, Jatinangor, Indonesia. The tested bacteria used in this study were Propionibacterium acnes and Staphylococcus epidermidis, obtained from PT. Biofarma and Microbiology Laboratory, Faculty of Pharmacy Universitas Padjadjaran.

The growth medium used was Mueller Hinton Agar and Mueller Hinton Broth . The chemicals used were amyl alcohol, 10% ammonia, 2N hydrochloric acid, iron (III) chloride, ether, chloroform, anhydrous acetic acid solution in concentrated H_2SO_4, 1% gelatin, reagent Dragendorff (potassium bismuth iodide solution). Mayer reagents (potassium mercury iodide solution), 10% vanillin solution in concentrated H_2SO_4, 1N sodium hydroxide, potassium permanganate powder, magnesium powder, and sterile physiological sodium chloride, demineralized water, ethanol, carbopol, propylene glycol, methylparaben/propylparaben and triethanolamine.

PLAN OF WORK



RESULT AND DISCUSSION

RESULT :

Fruit juice result From 10 kg of C. aurantifolia fruits, a volume of 3.2 L rendemen juice was obtained. The pH of the juices was 5 and it is in accordance with the pH normal of the face is 4.5-6. The term of pH is used to describe the acid-alkaline ratio of a substance ranging. Skin pH is normally acidic, ranging between 4 and 6, while the body's internal environment maintains a neutral to slightly alkaline pH . Variable skin pH values are being reported in the literature, all in the acidic range, but with a broad range from pH 4.0 to 7.0. In another study, based on the measurement of the biophysical parameters of barrier function, moisturization and scaling, it found that skin with pH values below 5.0 is in a better condition than skin with pH values above 5.0 . The relation between skin pH and acne also had been reported that the majority of acne occurrences in the case group were related to high skin pH . Because one of the natural barriers of skin is the

acidic pH of stratum corneum. Thus, a shift in pH of the normal skin causes the barrier dysfunction and finally, acne vulgaris occur . As the skin pH rises, normal flora disturbed and diminished the antimicrobial peptide produced by the normal flora. Therefore, the population of acne vulgaris causing bacteria increased and infection resulted Phytochemical screening of fruit juice The following secondary metabolites were found to present in the fruit juice of C. aurantifolia. . Flavonoid is well known antibacterial agent that had been studied. Flavonoid had been reported showed antimicrobial activities against P. acnes, and S. epidermidis . In another study, tannins and flavonoids in green tea also proven that possess an anti-acne effect, since they seem to have an antiseptic effect while tannins also have an anti-inflammatory effect . Until now, the popularity of herbal drug increasing because of its advantages such as patient tolerance, long-term use with fewer side-effects and relatively cheap .

DISCUSSION :

The above discussion regarding the scope of natural therapeutics in the form of plant extracts and various isolated secondary metabolites spells out the worth of plant-derived treatment options against acne vulgaris. These findings were proposed C. aurantifolia fruit juice broad relevance against acne vulgaris causing bacteria. The antiacne activity of this juice was correlated with antibacterial phytomolecules containing in the C. aurantifolia juice. In addition, the increasing viscosity of the formula 3 showed that the use of carbopol plays a role in the replacement of active agent that improving its bacterial inhibition.

CONCLUSION

It can be concluded that the fruit juice of C. aurantifolia formulations prepared with the concentration of 1% carbopol as gelling agents, confirm the stable physical characteristics of the base gel. In this study, the formula 3 with a concentration of 75% fruit juice presented the excellent anti-acne topical against P. acne and S.epidermidis.

While citrus aurantifolia fruit juice, commonly known as lime juice, is often praised for its vitamin C content and potential antibacterial properties, it's crucial to approach acne treatments with caution. The acidity of citrus fruits may irritate the skin and exacerbate acne for some individuals. It's advisable to consult with a dermatologist before using an acne gel containing citrus aurantifolia fruit juice to ensure it aligns with your skin type and doesn't cause adverse reactions.

FUTURE SCOPE

The future scope for the report on the review topic "Acne Gel containing Citrus Aurantifolia fruit juice using gelling agent" could include:

1.Clinical Trials and Studies: [1,3]
Conducting extensive clinical trials to assess the efficacy and safety of the acne gel on a larger population, providing robust scientific evidence for its effectiveness.

2.Combination Therapies:[17]
Exploring the potential of combining the acne gel with other active ingredients to create synergistic effects for improved acne treatment.

3.Skin Compatibility Studies:[15]
Investigating the compatibility of the gel with different skin types and conditions to ensure its suitability for a broader range of users.

4.Mechanism of Action:[21]
Delving deeper into the molecular and cellular mechanisms underlying the gel's impact on acne, providing insights into its mode of action for better understanding and refinement.

5.Market Potential:[3,14]
Assessing market feasibility, consumer acceptance, and commercial viability to determine the product's potential in the skincare market.

6.Alternative Gelling Agents:[24,26]

Researching alternative gelling agents that may offer similar or enhanced benefits compared to carbopol, addressing potential concerns or limitations associated with the current formulation.

7.Long-Term Effects:[11]

Investigating the long-term effects of using the acne gel, ensuring its safety and efficacy over extended periods of use.

8.Customization for Different Skin Conditions:[16]

Adapting the formulation to address specific skin conditions beyond acne, such as oily skin, inflammation, or other dermatological concerns.

9.Environmental Impact:[26]

Assessing the environmental impact of the production and disposal of the acne gel, exploring sustainable practices and materials for a more eco-friendly product.

10. User Education and Awareness:[17]

Developing educational materials for users, including proper application techniques, potential side effects, and general skincare advice to optimize the gel's effectiveness.

These future avenues can contribute to a comprehensive understanding of the acne gel's potential, paving the way for further advancements in skincare technology.

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