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METABOLIC SYNDROME Now and Future Trend



high blood sugar
metabolic disease
diabetes

LABORATORIUM TERPADU
FFS UHAMKA

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CONCENTRATION EFFECT OF LIME RIND ESSENTIAL OIL ON PHYSYCO-CHEMISTRY OF ANTIACNE CREAM

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Abstract: Lime rind known contains essential oil compounds, steroids and triterpenoids which have an effect as the antibacterial such as D-Limonene, β -pinene, terpinen-4-ol, α -Terpineol, γ -terpinene, and others. The Compounds in the essential oil of lime rind is also known have an effect on *Propionibacterium acnes* bacteria. This study aims at determining the effect of concentration of essential oils of lime rind on quality of chemical physics and activity of anti-acne cream preparations and obtain the best formula of preparation creams essential oils of lime rind. Cream formulation was done by using variation of concentration of essential oils based on the value of MIC of antibacterial on the bacteria *Propionibacterium acnes* with a concentration of 2.5%; 5.0%; 7.5%. Cream Preparations was made by heating the water facet and the oil facet respectively at a temperature of 70°C, and then mixed using a stirrer until it forms a homogeny cream preparation. The cream was evaluated for quality of physics, chemistry, and effective inhibition of *Propionibacterium* bacteria as an anti-acne. The results obtained formula that meet the quality requirements of physics and chemistry. Based on one-way ANOVA statistical analysis, obtained that Formula I as the best formula for the concentration of essential oils of lime rind of 2.5%. From the results of the evaluation for Formula I obtained preparation was white cream, distinctive smell of lime and soft texture with 68 380 cP (0.5 rpm) of viscosity with plastic thixotropic flow properties, the value of the yield of 55.3873 dyne / cm² in size globules of 71.9 μ m, cream type O/W, the ability to spread amounted to 51.2 cm², pH value 3.91, and DDH *Propionibacterium acnes* bacteria by 17.33 mm.

Keywords: Essential oil, lime rind, *Propionibacterium acnes*, cream

Introduction

Acne is a chronic inflammatory disease of the sebaceous pilo unit accompanied by blockage and accumulation of keratin material which is characterized by comedones, papules, postul, and cysts. (Stawiski MA, 1994). Factors that affect the incidence of acne are, genetics, infections, trauma, hormonal, cosmetics, pharmaceuticals, skin conditions, and occupational factors, stress and climatic factors. Inflammation is triggered by the bacterium *Propionibacterium acnes*, *Staphylococcus epidermidis* and *Staphylococcus aureus*. There are already cosmetic products which are produced to deal with the problem of acne, such as antibiotics, benzoyl peroxide, azelaic acid, and retinoids. However, these medications have side effects in its use as an anti-acne (Stawiski MA.,1994 and The Oxsoid.,1980). That is what lies behind this research to find alternative treatments derived from natural materials that have minimal side effects. One of the plants that is empirically and based on the scientific data which have anti acne is the essential oil lime rind (*Citrus hystrix* DC). Essential oil of lime rind contains terpenoids and linoleic acid which can help in preventing and eliminating acne. Terpenoids works by destroying the bacterial cell membrane. Linoleic acid works as an anti-inflammatory, so as to overcome the inflammation caused by acne (Darlimartha S,1999). The use of essential oil of lime rind as anti-acne by applying it directly on the face. This usage is considered less uncomfortable, impractical and unstable, so as to improve the comfort and practicality created in cream dosage forms. This research will develop 3 formulas using the creamy foundation with varying concentrations of essential oil of lime rind is based on the value of Minimum Inhibitory Concentration (MIC) *Propionibacterium acnes*, which is 2.5%; 5.0%; 7.5% (Seyed FH,2013). Foundation cream that has been formed evaluated both in physics, chemistry, and effectiveness against bacteria *Propionibacterium acnes* in vitro. The evaluation results of the third dosage of anti-acne cream essential oil of lime rind and then analyzed using ANAVA one direction, and determined the best formula produced.



Research Methods

Materials

Essential oil lime rind, propylene glycol, glyceryl monostearate, sodium lauryl sulfate, methyl paraben, propyl paraben, cetyl alcohol, paraffin liquid, α -tocopherol, distilled water, buffer solution, DMSO, broth peptone, methylene blue, nutrient gelatin, a solution NaCl diluent, bacteria *Propionibacterium acnes*.

Equipment

Tools laboratory glassware, tools volumetric, refractometer, an analytical balance, an oven, a pH meter, viscometer Brookfield (DV-II + Pro), stirring spoon, glass objects, cover glass with a gauge, calipers, test equipment dispersive power, pycnometer, thermometer, autoclave, vortex mixer, Laminar Air Flow Cabinet, incubator, water bath, microscope, light spirits, tube rack, test tubes, petri dishes, needle ose, centrifugal tube, centrifugation, penetrometer.

Procedures

The Determination of Minimum Inhibitory Concentration (MIC) of essential oil of lime rind
Created the mother liquor essential oil of lime rind in a concentration of 2.5%. From the mother liquor, made the test solution essential oil of lime rind with a concentration of 2.0%; 1.5%; 1.0%; 0.5%; 0.25%; 0.125%. Into a tube containing 5 mL of test solution at each concentration, added 0.5 mL bacterial suspension, mixed, followed incubated at 37°C for 24 hours. Obtained the lowest concentration that can inhibit microbes, the Minimum Inhibitory Concentration (MIC) to be used as a dose of lime rind oil in the cream dosage formulations.

Optimizing Of Speed And Stirring Time Cream Preparation

Optimizing of speed and stirring time of cream preparation is carried out to determine the speed and stirring time optimum for the preparation of lime rind cream, in order to obtain a homogeneous cream preparation and frothy.

Evaluation of physics, chemistry, and the effectiveness of the preparations

Prepared cream organoleptic evaluation, homogeneity, cream type, viscosity, flow properties, the power spread, the size of the globules, centrifugation, pH, as well as the effectiveness of in vitro by analyzing the value of the Regional Diameter Inhibition (DDH) of the preparation of cream to the bacteria *Propionibacterium acnes* (Seyed FH et al,2013).

Results and Discussions

MIC essential oil of lime rind

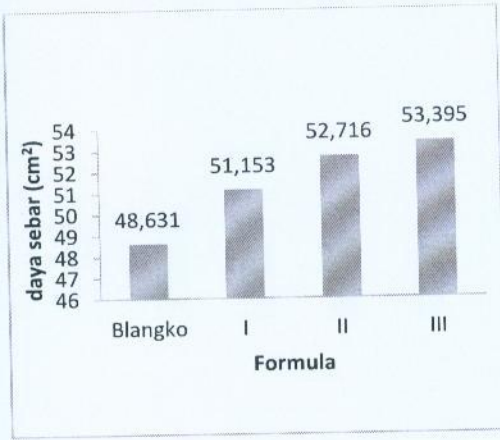
Essential oil of lime rind MIC value is determined by liquid dilution method. MIC obtained was 2.5%.

Organoleptic, homogeneity, the type of cream, and centrifugation

In preparation for the cream essential oils of lime rind and dosage forms dosage results obtaining cream type M / A white, odorless with a soft texture, homogeneous, and the lack of separation between the phases after centrifugation

Dispersive Power

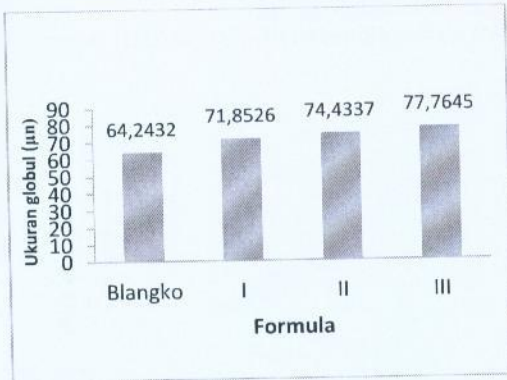
Figure 1: Relationship Between Formulation with Coverage



Based on the evaluation, it was found that the greatest dispersive power contained in the formula III is 53.395 cm², followed by Formula II, namely 52.716 cm², and the formula I with 51.153 cm². Increasing the concentration of essential oils of lime rind would increase the dosage spread cream is formed. This is because the essential oils of lime rind as the active ingredient will reduce the viscosity of the cream, resulting in an increase of the cream spread (Loyd V.D., et al. 2005).

Globular Size

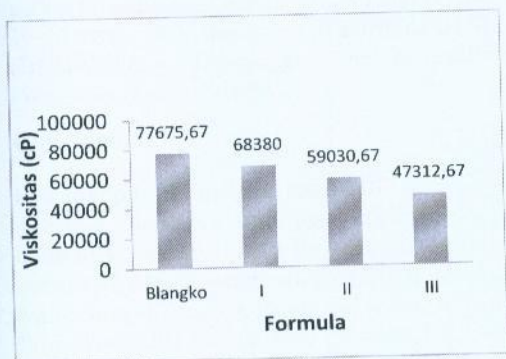
Figure 2: Relationship Between Formulation With GlobularSize



Based on the evaluation, it was found that the average size of the largest globules contained in the formula III is 77.7645 µm, followed by formula II is 74.4337 µm, and the formula I with the size of 71.8526 lm. These results indicate that increasing the concentration of essential oils of lime will increase the size of the globules produced. This is due to the increased oil concentrated lime rind will reduce the stability of the emulsion formed in the cream, so that the globules form has a greater viscosity.

Viscosity And Flowing Properties

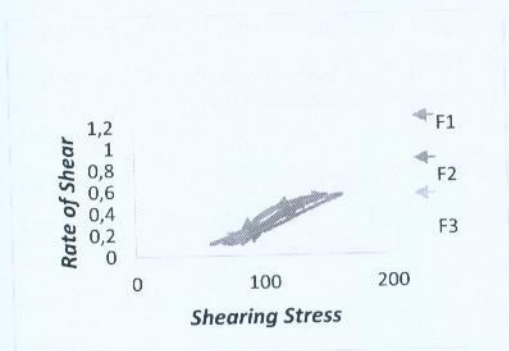
Figure 3: Relations between formulation and viscosity



In Formula I, obtained the highest viscosity cream preparations, rating to 68380.00 cP. In Formula II, earned a lower viscosity creams, i.e. 59030.67 cP. In Formula III, obtained viscosity creams lowest at 47312.67 cP. This is because the active substance lime rind oil used affects the viscosity of the cream produced. Increasing concentrations of lime rind oil will reduce the viscosity of the resulting cream preparation.

Graph of the relationship between shearing stress and rate of shear show that both blank and formulas have thixotropy flow properties of the plastic. This can be seen with the rising curve on the left and downhill curve on the right. From these curves it can be concluded that the preparation of cream requires a certain pressure to be able to flow because the curve does not start from the point (0,0). Thixotropic systems have characteristics with increased shear stress, the viscosity decreases and the viscosity of the stocks will be back to normal if left for a certain period.

Figure 4: Relationship Between Shearing Rate of Shear Stress



pH

The results pH of formula I, II, III are 3.91; 3.56; 3.44. These results indicate that the cream form acidic. Acidity is generated due to the influence of oil concentration of lime rind acidic.

Table 1. Anti-acne effectiveness invitro

Formula	DDH <i>Propionibacterium acnes</i>
Blangko	-
I	17,33 ± 0,25 mm
II	19,23 ± 0,55 mm
III	21,13 ± 0,21 mm
Kontrol (+)	15,05 ± 0,30 mm

Increasing the concentration of essential oils of lime rind would increase DDH bacteria *Propionibacterium acnes*. Foundation cream formula I and II have inhibitory strong *Propionibacterium acnes* (DDH is between 10-20 mm), while the cream of Formula III has inhibitory bacteria *Propionibacterium acnes* is very strong (DDH > 20 mm). This suggests that the resulting cream preparations are effective in inhibiting the bacteria *Propionibacterium acnes*.

Conclusion

Essential oils of lime rind has a MIC value of 2.5%. 2. Based on the results of statistical analysis ANAVA one direction, there is a significant effect of the concentration of essential oil of lime rind physicochemical and inhibitory activity against *Propionibacterium acnes* bacteria preparations cream. The best cream preparation obtained by the concentration of essential oils of lime rind 2.5% (Formula I) Preparations cream produced in white, lime distinctive smell and soft texture with a viscosity of 68 380 cP (0.5 rpm) with nature Thixotropic flow plastically, the value of the yield value of 55.3873 dyne / cm², has a globule size of 71.8526 μ m, cream type M / A, the ability to spread amounted to 51.153 cm², and a pH of 3.91. Foundation cream essential oils of lime rind has DDH *Propionibacterium acnes* of 17.33 to 21.13 mm.

Suggestion

Essential oils of lime rind developed by nanotechnology to form nanoparticles essential oil of lime rind to improve the stability of the preparations. Use a solution of alkaline pH regulator, such as NaOH and triethanolamine to obtain an appropriate pH.

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