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Ointment Formulation and Test Preparation from *Manilkara zapota* L. Leaf Extract Using Variation of Ointment Base as Boils

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ABSTRACT

Leaf extract of *Manilkara zapota* L has antibacterial activity against *Staphylococcus aureus* at a base on potency test of 50%, where the bacteria are the cause of boils. Some of effort to facilitate the use and increase the activity of active substances, then ointments are prepared on a variety of ointment bases. This study aims to prepared *Manilkara zapota* L leaf extract into ointment formulations, and chosed the best of ointment base formulations that meets the requirements standards for good ointment preparations. The extract was obtained by maceration using ethanol 96%. Ointments are formulated with four different types of ointment bases, which are hydrocarbon base, absorbing base, water removed bases, and water soluble base. The ointment that has been produced is tested for the physical characteristics such as organoleptic test, homogeneity, pH, spreadibility, adhesion, and viscosity had been tested on manufactured ointments. The results of this study indicate that leaf extract of *Manilkara zapota* L can be formulated into ointment preparations, variations in the ointment base affect the physical characteristics of ointment preparations.

Keywords: Ointment, *Manilkara zapota* L Leaf, Antibacterial, *Staphylococcus aureus*

1. Introduction

One plant that can be developed as an herbal medicine is *Manilkara zapota L*. These plants are found in Java, West Sumatra and West Nusa Tenggara [1].

Manilkara zapota L plants have many chemical contents in them, among them, in *Manilkara zapota L* tree there are resin compounds, in flowers and seeds there are many saponin compounds, while flavonoids and tannins are found in many young fruits, bark and leaves [2]. Flavonoids work by damaging the permeability of bacterial cell walls, microsomes, and lysosomes as a result of interactions between flavonoids and bacterial DNA [3].

This is proven by research conducted by Octaviani and Syafrina (2018) on "Antibacterial Activity Test for Ethanol Extract of Leaves and Bark of *Manilkara zapota L.*" which shows the results that leaf extract of *Manilkara zapota* L has antibacterial activity against *Staphylococcus aureus* at a base on potency test of 50% [4].

Boils is an infectious disease caused by the bacterium *Staphylococcus aureus* [5]. Treatment of boils requires preparations of drugs that are easy to use on the skin and have good penetration power. These preparations are ointments, ointments are semi-solid preparations that are easily applied and used as an external medicine. Medicines must be soluble or homogeneous dispersed in a suitable ointment base [6].

2. Materials and Methods

2.1. Tools

The tools used in this research were analytical balance (Henherr BL-H2), mortar and stamper, scatter power test equipment, sticky test equipment, Brookfield DV-E viscometer, Glass equipments, stir bar, stopwatch.

2.2. Materials

The materials used in the research were *Manilkara zapota L* leaves, aethanolum 96% (PT. DPH), adeps lanae (Quadrant Lab), alpha tocopherol (PT.DPH), cera alba (PT.DPH), stearyl purity alcohol (PT.

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DPH), methylparaben (PT.DPH), natriumlaurylsulfat (PT.DPH), polyaethylenglycolum-4000 (PT.DPH), polyaethylenglycolum-400 (PT.DPH), propylene glycol (PT.DPH), propylparaben 0,01% (PT.DPH), vaselin album (PT.DPH), aqua destillata (Sanqua).

2.3. Preparation Leaf Extract of Manilkara zapota L

Manilkara zapota L leaves are taken are old leaves, then *Manilkara zapota L* leaves are washed, leaves that have been drained clean. After that the leaves are dried in the sun or roasted until dry, the leaves are mashed with a blender. Simplisia of the crushed leaves was then extracted by maceration method using 96% ethanol solvent for 5 days occasionally stirring. After the maserate was obtained, the maserat is evaporated to a temperature of 60^{0}C and gets a thick extract. Repeated 3 times.

2.4. Manilkara zapota L Leaf Extract Ointment

A. Hydrocarbon Base

Cere alba and albumelin manus are heated on waterbath until melted, add propyl parabens to it, stir until homogeneous, after chilling enter mortar add alpha tocopherol and extract sapodilla manila crushed to homogeneous .

B. Absorbing Base

Insert cera alba, stearil alcohol, lanae adeps, and vaseline album into a porcelain cup, then heat it on a waterbath until it is fused and homogeneous, add propyl paraben, stir until homogeneous, then remove and cool. After a cold put the base of the ointment into the mortar, add alpha tocopherol and sawila manus crushed leaf extract until homogeneous.

C. Water Removed Bases

Method of making the base can be washed with water is made into 2 phases namely the water and oil phases. Weigh all the ingredients needed. Heat the mortar and stamper. Then make the oil phase by entering stearyl alcohol, alpha tocopherol, vaseline albumin and propyl parabens into the porcelain cup after it is heated on a water bath until it is fused and homogeneous. The oil phase has formed, then make the water phase by heating distilled water, sodium lauryl sulfate, propylene glycol, and methyl paraben over a homogeneous stirring bath. After two phases are formed, the oil phase is then added to the water phase while stirring until an ointment base emulsion is formed, after a homogeneous base add the sapodilla manila leaf extract and crushed until homogeneous.

D. Water Soluble Base

Insert PEG 4000 into porcelain cup then dissolve it on waterbath until it melts, after melting add PEG 400 stir until homogeneous and formed a thick mass, add methyl paraben into it homogeneous stir and chill. After the ointment base is formed, enter the base in the mortar add alpha tocopherol and sawila manila crushed leaf extract until homogeneous

Table 1. *Manilkara zapota* L Leaf Ointment Formulation Formula Using Variation Ointment Base

Materials	Concentration (%)			
	F1 (Hydrocarbon Base)	F2 (Absorbing Base)	F3 (Water Removed Base)	F4 (Water Soluble Base)
Manilkara zapota L leaf extract	50	50	50	50
Alpha tocopherol	0,001	0,001	0,001	0,001
Cera alba	2,5	4	-	-
Na. laurylsulfate	-	-	0,5	-
Methyl paraben	-	-	0,02	0,02
Propyl paraben	0,01	0,01	0,01	-
Adeps lanae	-	1,5	-	-
Stearyl alcohol	-	1,5	12,5	-
PEG 400	-	-	-	30
PEG 4000	-	-	-	20
Propilen glykol	-	-	6	-
Vaselin album	47,5	43	12,5	-
Aqua destillata	-	-	Ad 100	-

Table 2. Organoleptic Test Results of Ointment *Manilkara zapota L* Leaf Extract Using Base Ointment Variations.

Formula	Color	Shape	Consistency	Odor
F1	Dark brown soupy	Semi solid	Bit lumpy	Typical leaf extract of *Manilkara zapota L*
F2	Dark brown soupy	Semi solid	Condensed	Typical leaf extract of *Manilkara zapota L*
F3	Dark green dense	Semi solid	Very thick	Typical leaf extract of *Manilkara zapota L*
F4	Dark green dense	Semi solid	Condensed	Typical leaf extract of *Manilkara zapota L*

2.5. Evaluation of Ointment

A. Organoleptic

Observations using the five senses are observed from the shape, texture, color, and odor of the ointment preparation [7].

B. Measurement of pH

Measurement of pH is done using universal pH dipped in 0.5 gram ointment that has been diluted with aqua destillata of 5 mL [8].

C. Homogeneity Test

Test is done by applying an ointment to a piece of glass [6]. Homogeneous ointment marked by absence blobs on the smearing, flat structure and has uniform color of the dot initial smearing until the point end of basting.

D. Spreadibility Test

Weigh the ointment as much as 0.5 gram, then place it in the middle of a round glass plate. After that the top is covered with the same round glass plates, or other transparent material and add 100 gram of weight, leave it in the span of 1-2 minutes. After that the diameter of the spread of the ointment was measured by a ruler at each additional load when the preparation stopped spreading [8].

E. Adhesion

Test The adhesion test is carried out by weighing 1 gram of ointment placed on one surface of the glass plate and then covered with another glass plate. The glass plate is weighed with a weight of 1 kg for 5 minutes and then released. Squeezed glass plates are then mounted on the sticky power test and turn on the stopwatch [9].

F. Vicosity Test

Measured using a Brookfield viscometer by means of a dosage of 30 grams put into a 30 gram ointment pot, then a spindle no.64 is mounted and the rotor is run. Viscosity results are recorded after the viscometer needle shows a stable number after five turns [10].

3. Result and Discussion

3.1. Extraction

Manilkara zapota L leaf extract produced is 200 grams, according to the research needs for 4 formulas, each formula requires 50 gram per 100 gram of ointment preparations. Simplisia of *Manilkara zapota L* leaves used as many as 738 gram with 5.67 liter of ethanol 96% solvent so as to get the 200 gram extract. The extraction process takes 5 days for one maceration with repetition 3 times the maceration extraction process [4]. Sapodilla manila leaf extract yields 27.1 gram.

3.2. Evaluation of Preparations

A. Organoleptic Tests

Judging from the literature, ointment preparations should not be rancid, have a soft texture and have a distinctive odor and color from the extract [6]. Ointment from sapodilla manila leaf extract with variations in the base of the ointment shows that the difference in the base of the ointment affects the color, odor, and consistency of the ointment.

B. Homogeneity Test

Test is carried out to find out whether the preparations formulated as ointment preparations are homogeneous or not.

Table 3. Homogeneity Test Results of Ointment *Manilkara zapota L* Leaf Extract Using Ointment Base Variations.

Formula	Test Results Homogeneity
F1	Homogeneous
F2	Homogeneous
F3	Not Homogeneous
F4	Not Homogeneous

Terms of homogeneity in the ointment is an ointment should be homogeneous [6]. So ointments

that meet the homogeneity test requirements are F1 and F2 ointments.

C. pH Measurement Test

Ointment preparations must have a pH that matches the pH of the skin, which is between pH 4.5 - 6.5 [11], so that it is safe and comfortable to use on the skin. If the pH of the ointment is too acidic it will cause irritation to the skin, whereas if it is too alkaline the skin will be scaly [12].

Table 4. pH Test Results of Ointment *Manilkara zapota L* Leaf Extract Using Base Ointment Variations.

Formula	pH (Average ± SD)
F1	5 ± 0,00
F2	5 ± 0,00
F3	5 ± 0,00
F4	6 ± 0,00

D. Spreadibility

Power Test aims to see the ability of the spread of ointment preparations to the skin [13]. Good spreadability is 5-7 cm so that it shows the consistency of a comfortable semisolid preparation when used on the skin [14].

Table 5. Test Results of *Manilkara zapota L* Leaf Extract Ointment Using Variations Ointment Base.

Formula	cm (Average ± SD)
F1	4,76 ± 0,25
F2	5,03 ± 0,57
F3	4,43 ± 0,40
F4	3,43 ± 0,11

From the results of the tests that have been done can be seen in table 5. that the distribution capacity that meets the requirements is F2 which has a spread of 5.03 cm. The results of homogeneity and normality tests show significance results> 0.05 which means the data are homogeneous and normal. The results of one-way ANOVA analysis with a 95% confidence level produced a significance of 0,000 (P <0.005). This shows that there is an influence of ointment base variation on the physical characteristics of sawo manila leaf extract ointment in the form of a significant difference in the results of ointment spread test between the ointment base in formula one with other formulas. Next step is to do tukey analysis which aims to find out whether there is a significant difference or not between one formula and the other formula.

Table 6. Tukey Test Results for the Distribution of Ointment Extract in *Manilkara zapota L* Leaf Using Variations of Ointment Base.

Comparison of Test Formulas	Significance value	Information
F1 with F2	0,574	Insignificant difference
F2 with F3	0,068	Insignificant difference
F3 with F1	0,404	Insignificant difference
F4 with F2	0,000	Significant difference
F3 with F4	0,005	Significant difference
F1 with F4	0,001	Significant difference

Results of the tukey test indicate that each formula has a diffuse power difference. For F1, F2, F3 have differences but not significant, while F4 has significant differences when compared with F1, F2, and F3.

E. Adhesion

The test aims to see how long the ointment preparation is attached to the skin. Good adhesion requirements for topical preparations are more than 4 seconds [10].

Table 7. Test Results of Ointment Adhesion From *Manilkara zapota L* Leaf Extract Using Ointment Base Variations.

Formula	seconds (Average ± SD)
F1	5,33 ± 3,51
F2	3,00 ± 1,00
F3	6,00 ± 3,00
F4	1,67 ± 0,57

Longest attached ointment is the F3 ointment that is ointments on the basis of ointments can be washed with water, this is due to the consistency of the F3 ointment at the time after manufacture has a very thick consistency than other formulas so that when tested adhesion requires more time to remove the glass slab.

F1 is an ointment based on hydrocarbons whose purpose is to extend the contact of the ointment with the skin so that the time obtained in this test meets the ointment adhesion requirements [6]. So

the formula that meets the requirements of good ointment adhesion is F1 and F3 with values of more than 4 seconds [10].

Homogeneity and normality tests show the results that the data are homogeneous and normal with a significance value> 0.05, so that it can be followed by one-way ANOVA analysis. After one way ANOVA analysis was carried out it showed significance results> 0.05. Significance> 0.05 states that there is no effect of variations in the base of the ointment on the physical characteristics of the ointment of sapodilla manila leaf extract, so that from these results it is concluded that there is no significant difference from the test results of the ointment test of sapodilla manila leaf extract between the ointment base in formula one with in other ointment formulas.

F. Viscosity

The viscosity test of ointment preparations aims to see the thickness of the ointment preparations that have been made. The value of viscosity range by SNI 16-4399-1996 is in the range of viscosity values 2000 - 50,000 cPas.

Table 8. Test Results of Ointment Viscosity of *Manilkara zapota L* Leaf Extract Using Ointment Base Variations

Formula	cPas (Average ± SD)
F1	7880 ± 738,39
F2	3,00 ± 1,00
F3	6,00 ± 3,00
F4	10064,6 ± 138,07

Of the 4 formulas there are only 3 formulas that meet the requirements, namely F1, F2, F4. Formula F3 with a base can be washed with water, Test result of ointment viscosity on formula F3 because formula F3 has a very high level of viscosity, this is due to the consistent base of the ointment that is used is very thick than other ointment bases and also occurs because the stickiness test on the F3 ointment has a stickiness with more time long is 6 seconds, where the adhesion is affected on the viscosity of the preparation. Viscosity has a relationship with viscosity, the longer the viscosity of the ointment, the higher the viscosity value produced [15].

Besides being influenced by differences in the base of the ointment. The viscosity value in the preparation is influenced by temperature, the higher the temperature, the smaller the viscosity value. Viscosity is also affected by storage time [16].

The results of the viscosity of the ointment from sapodilla manila leaf extract with variations in this base can only be analyzed descriptively.

4. Conclusion

Manilkara zapota L leaf extract can be formulated as an ointment preparation. Variation of ointment base on the ointment preparation formulation of *Manilkara zapota L* leaf extract affects the results of the ointment physical characteristics test where the results of each ointment characteristic test have a significant difference including the spreadability. However, to test the physical characteristics of pH, homogeneity, organoleptic, adhesion, and viscosity have differences but are not significant.

References

[1] Herawati, S. Tips dan Trik Membuahkan Tanaman Buah dalam Pot. Jakarta: PT. Agromedia Pustaka; 2012.

[2] Juwita, J. Aktivitas Antibakteri Ekstrak Buah Muda, Daun dan Kulit Batang Sawo Manila (Manilkara zapota (L.) Van Royen) Terhadap Vibrio cholerae dan Clostridium perfringens, (Skripsi). Yogyakarta: Universitas Atma Jaya Yogyakarta; 2013.

[3] Sabir, A. Aktivitas Antibakteri Flavonoid propolis Trigon asp terhadap bakteri Streptococcus mutans (in vitro). Majalah Kedokteran Gigi 38 (3), Hal : 135-141; 2005

[4] Octaviani, M. dan Syafrina. Uji Aktivitas Antibakteri Ekstrak Etanol Daun dan Kulit Batang Sawo (Manilkara zapota (L.) Van Royen). Jurnal Ilmu Kefarmasian Indonesia. 2018;16(2): 131-136.

[5] Brooks, G.F., J. S. Butel, dan S. A. Morse. Jawetz, Melnick & Adelberg's : Mikrobiologi Kedokteran. Edisi 23, Terjemahan oleh Hartanto, H.,dkk. Jakarta: EGC; 2008.

[6] Departemen Kesehatan RI. *Farmakope Indonesia*, Edisi ketiga. Jakarta: Dirjen POM; 1979.

[7] Widodo, H. Ilmu Meracik Obat Untuk

Apoteker. Yogyakarta: Penerbit D-Medika; 2013.

[8] R., Wulan. Formulasi Dan Uji Stabilitas Fisik Sediaan Salep Antifungi Ekstrak Daun Ketepeng Cina *(Cassia alata L.)*. (Skripsi). Makasar: UIN Allaudin Makasar; 2017.

[9] Allen, L. V. The Art and Terminologi of Pharmaceutical Compounding. American Pharmaceutical Association. Hal : 322-323. Whashington DC; 1998.

[10] Wibowo, A. S., Budiman, A., dan Hartant, D. Formulasi Dan Aktivitas Antijamur Sediaan Krim M/A Ekstrak Etanol Buah Takokak (*Solanum torvum* Swartz) Terhadap *Candida albicans*. Jurnal Riset dan Teknologi. 2017;1(1).

[11] Tranggono, R. I., dan Latifah, F. Buku Pegangan Ilmu Pengetahuan Kosmetik, PT. Gramedia; 2014.

[12] Naibaho, H. O., Y.V., Paulina., dan Wiyono, W. Pengaruh Basis Salep Terhadap Formulasi Salep Ekstrak Daun Kemangi (*Ocimum sanctum* L.) Pada Kulit Punggung Kelinci Yang Dibuat Infeksi *Staphylococcus aureus*. Jurnal Ilmiah Farmasi Universitas Sam Ratulangi Manado. 2013; 2(2).

[13] Voigt, R. Buku Pelajaran Teknologi Farmasi, Terjemahan Noerono, Edisi kelima. Yogyakarta: UGM Press; 1995.

[14] Garg, A. D., Aggarwal, S. Garg., dan A. K. Sigla. Spreading of Semisolid Formulation: An Update : Pharmaceutical Tecnology, September, Hal : 84-102; 2002.

[15] Fatimah, Y. Pengaruh Basis Salep Terhadap Sifat Fisik Sediaan Salep Ekstrak Etanolik Bonggol Pisang Ambon (*Musa Paradisiaca var.sapientum* L.) Sebagai Penyembuhan Luka Terbuk Pada Tikus. (Skripsi). Surakarta: Universitas Muhammadiyah Surakarta; 2017.

[16] Mollet, H. dan Grubenman, A. Formulation Technology. New York: Weley VCH. Hal. 316; 2001.