The Characterization and Testing Liquid Soap Nanoparticles of Tamarillo Extract as Antioxidants

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Abstract. The technology of nanoparticles is a formulating technology of a particle which dispersed on the nanometer size or scale per thousand microns. This study aims to characterization and produce the liquid soap preparation from nanoparticles of 'terong belanda' extract which is very good for the antioxidants. This technology has very significant effect as the antioxidants, so it possibly produced as cosmetic ingredients. The extraction method used here is maceration using of methanol solvent. Meanwhile, the making of technology of 'terong belanda' extract nanoparticles used biopolymer-based nanoparticle method. It was formulated as a liquid soap. The result of particle size analysis is extract nanoparticle for about 183,4 µm, the size of the nanoparticles in liquid soap has achieved 186.2 µm. Moreover, the result of antioxidants activity test which was conducted by the free radical scavenger method of DPPH obtained IC50 nanoparticle liquid soap preparation of 47 mg/ml, compared with scorbut acid IC50 at 49 mg/ml. Water content liquid soap nanoparticles tamarillo extract is 7,4% Besides, the results of the stability test for liquid soap nanoparticles, consisting pH 8.3- 8.6, viscosity (3928 – 3930 poise), Foam stability power test is 85.87 and 89%, stated there is no consistency changing of each formula. From organoleptic test, it resulted a light yellow from 'terong belanda' color, a characteristic soap odor and a physical condition with thick / semi-solid consistency. The last, it could be concluded from the nanoparticles liquid soap testing; there is no changing of nanoparticles size. However, it resulted a strong antioxidant power and the stability of the preparation meets the SNI requirements.

Keywords: Liquid soap nanoparticles, Tamarillo extract, Antioxidants

1 Introduction

Tamarillo fruits is a domestic commodity that has good potential to be developed. Therefore, research is needed to make use of tamarillo so that it is easily distributed and promoted. This fruit is mostly consumed as fruit, whether it is used fresh, made in syrup, or juice. Other than that, may be useful for cosmetics. The use of cosmetic preparations in the form of nanoparticles is developing.

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The contribution of this research is development of nanoparticles in natural ingredients that are useful for cosmetics, thus increasing innovation in cosmetic preparations. The use of cosmetic preparations of nanoparticles is still possible to develop more widely, considering that

BIS-HSS 2020, November 18, Indonesia

DOI 10.4108/eai.18-11-2020.2311660

now every human being, whether male or female, needs cosmetics according to their portion for their appearance every day.

2 Method

2.1 Equipment and Materials

Equipment used is blender, oven, sieve mesh 40, glass jar, spoon, evaporator, stirrer magnetic, sentrifuge, baker glass, analytical balance, filter paper, Particle Size Analyzer (PSA), Scanning Electron Microscopy (SEM), mortir, pH meter, viskometer ostwald, piknometer, test tube, microscope. Materials used is atsiri oils 3%, VCO 30 gr, NaOH 5,1 gr, NaCl 0,2 gr, Sitrit acis 0,3 gr, Stearic acid 5 gr, Aquadest 15 mL, alcohol 96%, gliserin, glucose solution, coloring and fragrance to taste.

2.2 Preparation of nanoparticles extract tamarillo

The amount of 1 gram extract was dissolved in 35 mL of ethanol pa mixed with 15 mL of distilled water in a 2000 ml glass beaker, then added 100 mL of chitosan solution in 1% glacial acetic acid solution. Then add 350 ml of NaTPP gradually to the mixture, while stirring with a magnetic stirrer at a stable speed for 2 hours [1]. After all the ingredients are mixed with colloid nanoparticles, chitosan NaTPP, tamarillo extract is separated by centrifugation of the solids obtained and then put in a freezer ± 4 ° C for ± 2 days. Storage is moved in a refrigerator ± 3 degrees Celsius until dry [1], which is then dried by spray dying so that a dry powder of ethanol extract nanoparticles is obtained [3].

2.3 Nanoparticles characterization

The nanoparticles characterization of the ethanol extract of tamarillo was characterized using a Particle Size Analyzer and a zeta sizer (PSA) to determine the particle size and zeta potential value of tamarillo extract nanoparticles [4]. The Particle Size Analyzer is able to measure particles ranging from 0.02 nm to 2000 nm [5]. The particle size is calculated based on the Stokes-Einstein correlation function and the brown motion is defined as the translational diffusion coefficient so as to produce a size distribution in intensity, number and volume [4].

2.4 Preparation Liquid soap Nanoparticle's tamarillo extract

Liquid soap Nanoparticle's tamarillo extract containing 3 formulas with different concentration variations as presented in Table 1.

Tabel 1. Liquid Soap Nanoparticle tamarillo extract

No	Materials	Formulas and composition (%)		
		F1	F2	F3
1	Tamarillo Nanoparticles extract	10	15	20
2	Sodium Lauryl Sulfate	18,5	18,5	18,5
3	NaCl	5	5	5
4	Propylene Glycol	1	1	1
5	Sitrit Acid	0,5	0,5	0,5
6	Aquadest	ad 100	ad 100	ad 100

The method of preparation is Na Lauril Sulfate mixed with NaCl, stirring until homogeneous. The mixture was added with citric acid and propylene glycol, then added with aqua destilata and tamarillo extract nanoparticles, stirring until homogeneous. After all the ingredients are mixed, the volume is sufficient using aqua destilata to 100 mL [4].

Antioxidant test. 0.5 ml of sample solution from various concentrations (10 ppm, 50 ppm, 100 ppm and 150 ppm and 200 ppm) then each one is added with 3.5 ml of DPPH. Then, vortexed and incubated on temperature 37ºC in a dark room. Be measured absorbance at a wavelength of 517 nm.

Test The Preparation. Organoleptic test, Observed the consistence, color and aroma of the liquid soap preparation.

Water Content test. Water content in Liquid soap nanoparticles used moisture meter.

Homogeneity test. Take a little dosage form of the formula, then put a little dosage between the two slides. The arrangement of coarse or inhomogeneous particles is observed.

pH test. pH test is carried out by preparing each sample preparation. The electrodes are immersed in the preparation until the pH meter shows a steady reading. Record the results of the examination.

Viscosity test. Viskositas testing used Viscosimeter Rionseri VT 04 rotor no 2.

Foam Stability power test. The height of liquid soap solution stirred at speed certain magnetic uses stirrer measured high foam formed measured and observed each week for 6 weeks.

Cycling test. The cycling test is an accelerated test by storing the sample at 24 ° C for 24 hours, then transferring it to an oven at 40 ° C for 24 hours. This treatment is 1 cycle. The treatment was repeated for 6 cycles, observations were made with organoleptic parameters, homogeneity, pH, spreadability, and viscosity [5].

3 Results and Discussion

3.1 Result

The DPPH test results were 50% inhibitory concentration (IC_{50}) of free radical nanoparticle liquid soap of 47 mg / mL and IC50 of vitamin C was 49 mg / mL. Test DPPH result are shown in Figure 1.

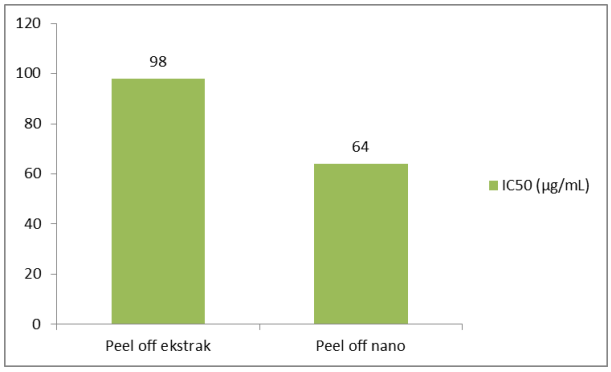

Fig. 1. result test antioksidant

The homogeneity of liquid soap nanoparticles tamarillo extract from the first week to the third week, the results were stable, namely good homogeneity. In accordance with SNI standards that product homogeneity must always be good. The homogeneity test result are shown in the Table 2.

Table 2. result of homogeneity test

Formula	**week**		
	1	**2**	**3**
I	Homogen	Homogen	Homogen
II	Homogen	Homogen	Homogen
III	Homogen	Homogen	Homogen

The result of this test is that all formulas produce the same viscosity in the same week. The change in viscosity for each week increases by 1 poise, but is still within the SNI requirement range (less than 20,000 poise). So that it can be concluded that the viscosity is included in the SNI requirements. The results of viscosity test are shown in the Table 3.

Table 3. Result of viscosity test

Formula	**Week**		
	1	**2**	**3**
I	3928	3929	3931
II	3928	3929	3931
III	3928	3929	3931

3.2 Discussion

Zeta potensial describes the potential for nanoparticle molecules to move away from each other or clump together. The normal value of zeta potential is <30 mV, or more than> 30 mV [7]. The result of making tamarillo nanoparticles is -8.3 mV, thus allowing these nanoparticles to settle easily, so the next preparation must be done immediately. The ideal nanoparticle size is 1-1000 micro [6]. The result of measuring the nanoparticles of tamarillo was 182.4 um. The measurement result of nanoparticles from liquid soap was 186.2 µm. The nanoparticle particle size is relatively unchanged. This is because the soap making is not overheated, so the particle size is relatively stable.

Antioxidant testing is intended to test the activity of a sample against antioxidant or anti-free radical power Antioxidant testing uses DPPH. DPPH is a stable free radical compound so that if it is used as a reagent in the free radical scavenging test, it is sufficient to dissolve it and when it is stored in dry conditions with good and stable storage conditions for years. DPPH absorbance values ranged from 515-520 nm. DPPH free radical reduction method is based on reduction of colored DPPH free radical methanol solution by free radical inhibition. When the purple DPPH solution meets the electron donor material, the DPPH will be reduced, causing the purple color to fade and be replaced by a yellow color coming from the picryl group. The DPPH test results were 50% inhibitory concentration (IC50) of free radical nanoparticle liquid soap of 47 mg / mL and IC50 of vitamin C was 49 mg / mL.

Organoleptic test carried out on liquid soap nanoparticles tamarillo extract is test of the aroma, color and form/consistency of the soap [8]. This test was carried out for 3 weeks. The result of this test are Aroma: Formula 1, 2, and 3, there was no change in smell / aroma during the 3 week observation. The aroma produced is the distinctive smell of soap.

Color: In the observation of colors in formulas 1,2 and 3 for 3 weeks, a constant color is produced. The first, second- and third-week colors are the same / there is no color change.

Form / Consistency: The consistency or form of semi-solid / viscous tamarillo nanoparticles liquid soap. The observation for 3 weeks resulted that there was no change.

The homogeneity pf liquid soap nanoparticles tamarillo extract from the first week to the third week, the results were stable, namely good homogeneity. In accordance with SNI standards that product homogeneity must always be good.

The result of tes pH of formulas 1,2, and 3 liquid soap nanoparticles of tamarillo extract ranged from 8.3 to 8.6. The results obtained are in accordance with SNI standards for pH of skin preparations 8-11. Formula 1 has a lower pH because the composition of formula 1 has a lower level of active substance with the same solvent.

The purpose of the viscosity test was to determine the stability of liquid soap nanoparticles tamarillo extract in viscosity parameters. The result of this test is that all formulas produce the same viscosity in the same week. The change in viscosity for each week increases by 1 poise, but is still within the SNI requirement range (less than 20,000 poise). So that it can be concluded that the viscosity is included in the SNI requirements. The results of the viscosity test are shown in the table 3.

Foam stability is a condition in which a soap preparation has a relatively constant foam, so that the lathering power of the preparation is constant. In accordance with the Indonesian National Standard, the stability of the foam is not less than 70% (<70%). The results of the foam stability observations from formulas 1,2 and 3 were 85%, 87% and 89%, respectively. The results of this observation are in accordance with the SNI regulation.

Used to test the water content in the liquid soap nanoparticle tamarillo extract. The water content required for liquid soap is less than 10% (<10%). The water content produced in the liquid soap nanoparticles of tamarillo extract is 7.4%, so that this water content is in accordance with SNI and Indonesian pharmacopoeia requirements.

4 Conclusion

The IC50 value of liquid soap nanoparticle is 47 µg/ml. The particle size of nanoparticle extract was 182.4 µm and the particle size of the liquid soap nanoparticle is 186 µg/ml. Liquid soap nanoparticle Tamarillo extract has a moisture content of 7.4%, pH 8.3-8.9, foam stability

test of 85.87, and 89%, viscosity of 3928-3931 poise, homogeneous consistency and organoleptic (aroma, color, consistency) is stable. It is necessary to make other dosage forms for cosmetic.

Acknowledgement

We would like to thank the head of the institute for research, community service innovation and creativity, Universitas Muhammadiyah Pekajangan Pekalongan for the financial support provided so that this research can be completed smoothly.

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