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Formulation and Evaluation of Cream Turmeric Extract Preparations from Turmeric Rhizomes *(Curcuma domestica Val.)*

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Abstract. The use of plants as a method of herbal treatment is a step currently being developed by many researchers to produce effective and minimal side effects. Turmeric is one of the most widely used cooking spices by Indonesians. The main ingredients possessed by turmeric include curcumin (77%), demethoxy (17%) and bisdemethoxy (3%). One of the pharmaceutical preparations with a topical delivery system is a cream preparation which is a semi-solid dosage form, containing one or more drug ingredients dissolved or dispersed in an appropriate base material. Turmeric can be formulated in various preparations, one of which is a cream dosage form. The advantage of using cream preparations is that they are practical, easy to wash and clean. The purpose of this study was to formulate turmeric extract in a cream preparation. The results of the evaluation test showed that the formula produced a cream with a yellow-orange color, a characteristic odor of turmeric, and a preparation with a semisolid cream texture, had good homogeneity, good dispersing ability, the pH of the preparation was 5.84; 6.32; 6.24; 5,94;5,94 and the type of emulsion is O/W (Oil in Water).

Keyword: turmeric, turmeric extract, cream, evaluation of cream preparations

Abstrak. Penggunaan tanaman sebagai metode pengobatan herbal adalah langkah yang saat ini banyak sedang dikembangkan oleh para peneliti untuk menghasilkan pengobatan yang efektif dan minimal efek samping Kunyit merupakan salah satu bumbu masakan yang banyaj dimanfaatkan oleh masyarakat Indonesia. Kandungan utama yang dimiliki oleh kunyit diantaranya kurkumin (77%), demetoksik (17%) dan bisdemetoksik (3%). Salah satu sediaan farmasi dengan sistem penghantaran topikal adalah sediaan krim yang merupakan bentuk sediaan setengah padat, mengandung satu atau lebih bahan obat terlarut atau terdispersi dalam bahan dasar yang sesuai. Kunyit dapat diformulasikan dalam berbagai sediaan, salah satunya adalah bentuk sediaan krim. Keuntungan menggunakan sediaan krim adalah penggunaannya yang praktis, mudah dicuci dan dibersihkan. Tujuan dari penelitian ini adalah untuk memformulasikan ekstrak kunyit dalam seiaan krim. Hasil uji evaluasi menunjukkan formula menghasilkan krim berwarna warna kuning jingga kecoklatan, bau khas kunyit, dan sediaan dengan tekstur krim semisolid, memiliki homogenitas yang baik, kemampuan menyebar yang baik, pH sediaan yaitu 5,84; 6,32; 6,24; 5,94;5,94 dan tipe emulsi M/A (Minyak dalam Air).

Kata Kunci: *kunyit, ekstrak kunyit, krim, evaluasi sediaan krim*

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1 Introduction

The use of plants as herbal treatment methods is a step that is currently being widely developed by researchers to produce effective treatments and minimal side effects. Traditional medicine is a medical system that utilizes natural materials used through generations based on people's experience [1].

Turmeric is one of the plants that has been conducted research testing as a treatment of diseases herbally. The general public uses turmeric as a cooking spice. The main content owned by turmeric is curcumin (77%), demetoksik (17%) and bisdemetoksik (3%). Turmeric extract is one of the research samples that has a lot of potential to overcome diseases such as antioxidants, anticancer, anti-inflammatory, antialergi and antidiabetic [2].

The methods used to extract turmeric are most commonly performed are maceration, percussion, reflux and socletation. However, this extraction method has drawbacks such as long extraction time and temperature in the heating process that can not be constant, as well as a laborious extraction process because there must be tooling and the use of many synthetic solvents. But at this time began to develop a new extraction method that is *green extraction* method using *microwave* by utilizing microwaves to speed up the extraction process [3].

Topical delivery of the drug through the skin is the administration of drugs used to provide a localized effect on the place of application of preparations through penetration of the inside of the skin [4]. One of the pharmaceutical preparations with topical delivery system is a cream preparation which is a semi-solid dosage form, containing one or more dissolved or dispersed medicinal ingredients in the appropriate base ingredients. Turmeric can be formulated in a variety of preparations, one of which is the dosage form of cream. The advantage of using cream preparations is their practical use, easy to wash and clean and can be applied directly without leaving any residue on the skin [5].

Based on the background above, this study aims to formulate the preparation of turmeric extract cream from turmeric rhizomes with the comparison of turmeric extract used as well as conduct evaluation tests on cream preparations to determine the character of formulated cream preparations.

2 Materials and Methods

2.1 Materials and tools

The ingredients needed in this study include atheist, turmeric powder, stearate acid, setyl alcohol, adeps lanae, glycerin, liquid paraffin, span 80, tween 80, triethanolamine, methyl paraben, mayer, dragendroff, boucahdart, $FeCl_{3,}$HCl, propyl parabens, VCO and the equipment

used in this study were glassware (Iwaki Pyrex), cups, pH meters, spring rolls, stampers, analytical scales (Shimadzu).

2.2 Stages of Research Implementation

2.2.1 Preparation of turmeric simplisia

The making of simplisia from turmeric rhizomes is done by collecting turmeric, cleaned, sliced and dried, then mashed with a blender until turmeric powder is sifted with sieve No.60.

2.2.2. Phytochemical Screening and Simplisia Characterization

Phytochemical screening is performed to determine the metabolite compounds found in turmeric powder [6]. Phytochemical screening of alkaloids, saponins, tannins, steroids/triterpenoids and flavonoids. Characterization of simplisia is done to know the quality and quality of simplisia. The characterizations tested include the determination of water content, determination of water soluble cider levels, determination of soluble cider levels in ethanol, determination of total ash content and determination of insoluble acid ash levels.

2.2.3 Preparation formulations of turmeric extract cream

Cream preparation formula can be seen in Table 1 below:

Table 1. Turmeric Extract Cream Formula

NO	Materials	Concentration % (b/b)				
		F1	**F2**	**F3**	**F4**	**F5**
1	Turmeric extract	0,5	2,5	5	10	20
2	Stearic acid	5	5	5	5	5
3	Cetyl alcohol	4	4	4	4	4
4	Adeps lanae	5	5	5	5	5
5	Glyserine	15	15	15	15	15
6	Paraffin liquid	5	5	5	5	5
7	Span 80	4	4	4	4	4
8	Tween 80	4	4	4	4	4
9	Triethanolamine	2	2	2	2	2
10	Metyl paraben	0,1	0,1	0,1	0,1	0,1
11	Propyl paraben	0,05	0,05	0,05	0,05	0,05
12	Aquades	ad 100	ad 100	ad 100	ad 100	ad 100

The procedure of making turmeric extract cream is made by heating the spring roll to be used. Cream preparation formulations are made by melting the oil phase (strearat acid, cetyl alcohol, adeps lanae, tween 80 and methyl parabens) with a steamer cup at a temperature of 80 °C above waterbath until the oil phase melts perfectly (Mass 1), then make a water phase (glycerin, liquid paraffin, span 80, propyl parabens and aqueous) mix up homogeneous (Mass II) TEA dissolved with hot water then mix slowly mass 1 and mass 2 in a spring roll that has

been heated rapidly until a mass of cream is formed then added little by little turmeric extract then stir until homogeneous until it forms a homogeneous cream period [1]

2.2.4 Evaluation of turmeric extract cream preparations

2.2.4.1 Homogeneity preparation

A certain amount of preparation if applied to a piece of glass or other suitable transparent material, the preparation must show a homogeneous arrangement and do not appear to be coarse grains [1].

2.2.4.2 pH preparation

The sample was made in a concentration of 1%, i.e. weighed 0.5 g of preparation and dissolved in 50 ml of accumulated. Then the electrodes are dipped in the 24 solutions. Left the tool to show the pH value until it is constant. The number indicated by the pH meter is the dosage pH [1].

2.2.4.3 Stability preparation

Stability observations are carried out at room temperature storage. Each preparation formula is inserted into a plastic pot, covered on top. Furthermore, observations are made when the preparation has been made, storage of 1, 4, 8, and 12 weeks is carried out at room temperature. Furthermore, observations were made in the form of rupture or absence of emulsions, discoloration and odor of the preparations [7].

2.2.4.4 Iritation test to volunteer skin preparation

The study was conducted on 10 volunteers. The preparation is applied on the forearm, then left for 48 hours and seen changes in the form of redness and swelling of the skin [8]

2.2.4.5 Viscosity of cream turmeric extract preparations

The cream is inserted into the beaker glass container then the mounted spindle is lowered so that the spindle boundary is dipped into the cream. The speed of the tool mounted at 20 rpm is then read and scaled. When the red needle is moving it has stabilized. Viscosity value (n) is expressed in centipoise (cps) [9]

2.2.4.6 Spread of cream turmeric extract preparation

Spread test is done by weighing 0.5 grams of cream, then placed in the middle of the petri dish with an upside down position, silenced for 1 minute and given a load of 50 grams to 250 grams every 1 minute to 5 minutes. Standard spread of cream is 5 cm – 7 cm [10]

2.2.4.7 Types of t-silent extract cream

Determination of cream type using *methylene blue* when the color is evenly spread on the preparation means the type of oil preparation in water (m/a). But if the color is only bitnik-speckled blue means water-type cream in oil (a/m) [10]

3. Result and Discussion

3.1 Phytochemical Screening

In the phytochemical content testing turmeric powder obtained results that can be seen in Table 2 below

Table 2. Phytochemical screening results

Secondary Metabolites	Reagent	Result	Conclusion
Alkaloids	Mayer	White Precipitate	(+)
	Dragendorff	Chocolate Deposits	
	Bouchardat	Red Brick Precipitate	
Flavonoids	Mg, HCl(p)	Reddish color formed	(+)
Tannins	$FeCl_3$ 1%	Formed a blackish blue color	(+)
Saponins	Hot water + HCl 2N	No foam formed	(-)
Steroids	Chloroform + H_2SO_4	Formed green color	(+)

3.2 Characteristics of turmeric powder simplisia

Simplisia characterization is one aspect of standardization parameters of herbal medicine quality. The results of the examination of the characteristics of simplisia are seen in Table 3.

Table 3. Characteristics of simplisia

No.	Parameters	Result (%) (n=3)
1	Moisture content	5.14 ± 0.04
2	Water soluble cider content	17.49 ± 0.48
3	Ethanol soluble cider content	19.48 ± 0.80
4	Total ash content	7.12 ± 0.12
5	Insoluble acid ash content	0.75 ± 0.06

Water content test of simplisia powder is 5.14 ± 0.04%. The result of determining the moisture content of simplisia meets the requirements of the book Farmakope Herbal Indonesia,, namely <12% . Thehigh water content causes instability of drug preparations, bacterial and fungal growth,, and the active ingredients contained can be decomposed. Changes in chemical compounds are efficacious due to enzyme activity because certain enzymes in cells can still work to decompose the active compound after the cell dies and as long as the extract still contains a certain amount of water [11].

The result of determination of water-soluble and ethanol-soluble compounds from simplisia amounted to 17.49 ± 0.48% and 19.48 ± 0.80%. Water-soluble compounds are

glycosides, sugars, goms, proteins, enzymes, dyes, and organic acids. Determination of ethanol-soluble cider levels is used to determine the content of sari soluble in polar solvents. Compounds that can be soluble in ethanol are glycosides, antrakuinon, steroids, alcolloids, flavonoids, chlorophyll, and in small amounts soluble, namely fats and saponins [11].

Determination of total ash content and insoluble acid ash content of simplisia powder of 7.12 ± 0.12% and 0.75 ± 0.06% of this result is in accordance with Herbal Pharmacopeia where the yield of insoluble acid ash content is less than 0.8%. The purpose of determining total ash content and insoluble acid ash content is to provide an overview of internal and external mineral content derived from the initial process of work, sample collection until the formation of symplisia and extracts [11].

These substances can be derived frominorganic oxide compounds. High levels of total ash indicate the presence of inorganic substances of metals (Ca, Mg, Fe, Cd,, and Pb) that may partly come from impe matter. High levels of heavy metals can harm health so it is necessary to determine the total ash content and insoluble ash content of acids to provide assurance that simplisia does not contain certain heavy metals exceeding the set value because it is dangerous (toxic) for health [12].

3.3 Formulations of Cream

Turmeric extract cream produced in the form of viscous cream, not sticky and not *creamy*. Cream made yellow and cream making in this formula using turmeric extract with a strip of alcohol is used as *a thickening agent* that serves as a thickener and binder between the water phase and the oil phase also serves as a viscosity regulator of cream preparations so as to achieve the purpose of dosage use (Mitsui, 1997). The concentration of setyl alcohol as thickening agent ranges from 2 – 10% [13].

Cream preparation formulations use stearate acid as an emulgator, span 80 and tween 80 as emulgators, propyl parabens and methyl parabens as preservatives and TEA is used as an emulsifier. The oil phase of this material includes stearate acid, setilalkohol and span 80. The water phase of this material is aqueous, TEA, methylparaben, propyl paraben, tween 80 on the formulation of cream preparations made [1].

3.4 Evaluation of Cream

Table 4. Evaluation of cream preparations

No.	Evaluation Test	Evaluation Results				
		0,5%	2,5%	5%	10%	20%
1.	Homogeneity	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Homogeneous
2.	Cream Type	a/m	a/m	a/m	a/m	a/m
3.	Preparation Stability	No discoloration, odor and phase	No discoloration, odor and phase	No discoloration, odor and phase	No discoloration, odor and phase	No discoloration, odor and phase
4.	pH	5,84	6,32	6,24	5,94	5,94
5.	Viscosity	12411 cP	12510 cP	18061 cP	17094 cP	19434 cP
6.	Irritation	Does not cause irritation of redness and itching in panelists	Does not cause irritation of redness and itching in panelists	Does not cause irritation of redness and itching in panelists	Does not cause irritation of redness and itching in panelists	Does not cause irritation of redness and itching in panelists
7.	Spreadability	2.7 cm	2.8 cm	2.5 cm	2.7 cm	3 cm

3.5 Discussion

The purpose of this organoleptic testing is to observe the shape, aroma and color of the cream preparations. Organoleptis preparations of turmeric extract cream give a yellow color derived from the color of turmeric extract used as a efficacious ingredient, the addition of turmeric extract affects the color of the cream to be made and the smell produced by the distinctive smell of coconut derived from the VCO solvent used [1].

The results of homogeneity observations showed that all turmeric extract cream preparation formulas have a homogeneous arrangement, there are no coarse grains on the glass plate used at the time of testing. Homogeneity testing is performed to ensure the use of safe and comfortable preparations for use does not cause rough grains when applied.

From the results of tests conducted cream preparations showed that the blue color is spread evenly in the cream that proves that the cream preparations made have a type of oil in water (m / a). Where this type of cream has the advantage of more easily spread on the surface of the skin, not sticky and easily removed by washing [14].

The purpose of this preparation stability test is to know the stability of the cream preparations made. According to Ansel (2005) the instability of the formulation can be detected in several ways with a change in the physical appearance, color, smell and texture of the preparation.

The resulting cream preparation should have a pH that is close to the normal pH of the skin which is 4.5 – 6.5 (Draelos, 2006). The pH value of the cream according to SNI 16-4399-1996 is in the range of 4.5 – 6.5. The pH value of creams containing turmeric extract indicates that the turmeric extract cream formula is still within the pH range allowed for use on the skin. The purpose of this pH measurement is to find out if the cream made is safe and does not irritate the skin when used [13].

Viscosity in cream preparations is a statement of the ability of a preparation to flow. The higher the volume of cream preparations, the higher the viscosity, so that the preparation will be more stable because the movement of particles tends to be difficult with the thicker a preparation and the speed of preparation flows the slower [1].

Irritant testing tested on panelists showed no visible side effects in the form of redness, itching and roughing of the skin caused by the preparation of creams applied to the skin. Thus it can be concluded that the cream made safe to use and applied to the skin [14].

Spread test is done to determine the ability of a cream preparation can spread on the surface of the skin when the preparation is applied. The ability to spread cream preparations on the skin is also one of the parameters to determine whether the cream preparations made provide convenience when applied to the skin.

4. Conclusion

Turmeric simplisia extracted by microwave green extraction method can be formulated into cream preparations that meet the standard of evaluation of cream testing.

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