

SKINCARE CREAM PREPARATION AND EVALUATION OF PARE (*MOMORDICA CHARANTIA*) LEAVES USING THREE DIFFERENCE BASE

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ABSTRACT

Objective: The purpose of this research is to make a skincare cream that contains bioactive from *Momordica charantia* leaves (MCL) using three kinds of base cream.

Methods: The dried MCL made into powder shape and then extracted using 96% ethanol solvent. The liquid extract was evaporated using a vacuum evaporator until obtained by the viscous extract. The *Momordica charantia* leaves ethanol extract (MEE) with a concentration of 4.00% made into a cosmetic product used vanishing, cold, and hand and body cream as a base. Creams made by mixing the oil phase and water phase at 70 °C until cream mass formed, then added MEE at 40 °C. All the product creams were evaluated their physical and chemical characteristics and stability tested.

Results: Cream of *Momordica charantia* leaf ethanol extract had semisolid form, yellowish color, the peculiar smell of *Momordica charantia* ethanol extract, homogeneous, pH 6.37-6.67, easily spread with spreading ability 2,081.21-2,835.43 mm², has viscosity 125,000-18,0000 cps and stable 3 mo in a room and 60 °C temperature storage.

Conclusion: *Momordica charantia* leaves can be made become a good cream for skincare cosmetics that more beneficial and profitable than as waste. This skincare creams using vanishing base cream, cold cream, and hand and body cream as base creams.

Keywords: Cold cream, Lotion, *Momordica charantia* leaves extract, Vanishing cream

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INTRODUCTION

Pare (*Momordica charantia* L.) from the Cucurbitaceae family has many health benefits [1-3]. *Momordica charantia* fruit is eaten in Indonesia as a vegetable with a bitter taste, while the leaves are usually thrown away as waste (fig. 1) [4]. Whereas Pare (*Momordica charantia* Linn.) leaves (MCL) contained amino acids, α tocopherol, flavonoids, ascorbic acid, phenolic acids, and carotenoids that effective for regenerate skin, affect skin pigment and brighten dead skin due to scars [5-7].



Fig. 1: *Momordica charantia* plant [4]

The ethanol extract of *Momordica charantia* Linn leaves (MEE) has antioxidant activity with IC₅₀ value 3.951 mg/ml for the extract of green *Momordica charantia* leaves, 5.135 mg/ml for the extract of white *Momordica charantia* leaves and 7.366 mg/ml for the extract of *Momordica charantia* leaves. Traditionally, MCL has been squeezed and added rice flour and used to disguise scars [6, 7].

For maintaining the stability of MCL traditional preparation and comfortable usage, it needs to be developed by making cosmetic preparations. Various kinds of herbal cosmetics are widely used, such as powder, soaps, solutions cream, and other products [8-10]. Creams

are emulsions that are either oil-in-water or water-in-oil type. Base cream can classification to 5 groups based on its function, ie. vanishing and foundation cream; cleansing and cold cream or lotion; night and massage cream; hand and body cream; moisturizing cream; and all of the purpose cream [10, 11]. It was observed that vanishing cream containing natural base was pleasant, effective, easily washable, and completely safe for human use [11]. Cold creams not only moisturize the skin but are also used for removing makeup and temporary tattoo marks. The cream is rubbed on tattoo marks and then erased with a cotton ball. Cold cream uses are also associated with the preparation of facial paints for kids [11-13].

The main advantage of applying topical emulsions (creams) is that they increase the solubility and bioavailability of therapeutic drugs as well as the ability to favor the topical transport of hydrophilic solute [11]. The cream is an emulsion with semisolid form so it can be disrupted by alcoholic agents, acidic agents, and refrigeration [14, 15].

The aims of this research are for optimization the use of *Momordica charantia* Linn leaves more benefit and more profitable. The purpose of this research is to make a skincare cream that contains bioactive from *Momordica charantia* leaves (MCL) using three kinds of base cream

MATERIALS AND METHODS

Material

The *Momordica charantia* Linn leaves samples were collected from the Indonesian Spices and Medicinal Crops Research Institute (ISMCRI)/Balai Penelitian Tanaman Rempah dan Obat (BALITTRO), Bogor, West Java. The *Momordica charantia* Linn leaves have the taxonomic plant identification No. 1167/IPH.1.02/lf.8/II/2015 at Herbarium Bogoriense, Botanical Division, Research Center for Biology, Indonesian Institute of Sciences (LIPI) Bogor. Stearic acid, triethanolamine, glycerin, emulsifying wax (beeswax or cera alba), cetaceum, liquid paraffin, propylene glycol, sorbitol, butylated hydroxytoluene, glyceryl monostearate, disodium ethylenediamine, ethanol, methylparaben, propylparaben, and distilled water were purchased from Brataco Co. (Jakarta, Indonesia).

Preparation of MEE

Preparation of MEE by using dried *Momordica charantia* Linn leaves 1 kg was grounded using a blender and 50 g defatted in a Soxhlet apparatus. The extraction process was continued 12 h using one l of 96% ethanol as a solvent and do for 9 times. All extracts obtained were mix and concentrated using a rotary evaporator. The solvent was removed by vacuum evaporation and exposure to heat in a drying oven at 40 °C until produced viscous extract [4, 16].

MEE phytochemical screening

The crude MEE extract was evaluated for phytochemical screening for the content of its metabolic metabolites such as alkaloids, flavonoids, saponins, tannins, and triterpenoids [17, 18].

Preparation of cream

The wax was melted at 75 °C and mixed with ingredients to form a liquid oil phase. All of the water-soluble ingredients were dissolved in deionized water and warmed to 75 °C. The water phase was warmed to 75–80 °C until all ingredients were dissolved. When the water and oil phase was at the same temperature, the aqueous phase was slowly added to the oil mixed with oil phase with moderate agitation and was kept stirred until the temperature dropped to 40 °C. The emulsion was cooled to room temperature to form a semisolid cream base. The active ingredient is *Momordica charantia*; leave viscous extract, then added to it and stir until homogeneous. The cream formulation of MEE could be seen in table 1 [11, 12, 19–20].

Table 1: The cream formula of ethanol extract of *Momordica charantia* Linn leaves

S. No.	Material	Amount (%)					
		Vanishing cream		Cold cream		Hand and body cream	
		B1	F1	B2	F2	B3	F3
1	Extract of <i>Momordica charantia</i> leaf	-	4.00	-	4.00	-	4.00
2	Stearic acid	12.00	12.00	-	-	5.00	5.00
3	Triethanolamine	0.80	0.80	-	-	1.00	1.00
4	Glycerin	10.00	10.00	-	-	3.00	3.00
5	Beeswax	3.50	3.50	10.00	10.00	5.00	5.00
6	Cetaceum	-	-	12.50	12.50	-	-
7	Liquid paraffin	-	-	50.00	50.00	-	-
8	Propylene glycol	-	-	-	-	2.00	2.00
9	Sorbitol	-	-	-	-	5.00	5.00
10	Butylated hydroxytoluene	-	-	1.00	1.00	0.10	0.10
11	Glyceryl Monostearate	3.50	3.50	3.50	3.50	-	-
12	Disodium Edetate	0.05	0.05	0.05	0.05	-	-
13	Methyl Paraben	0.18	0.18	0.18	0.18	0.18	0.18
14	Propyl Paraben	0.05	0.05	0.05	0.05	0.05	0.05
15	Water distillate ad	100.00	100.00	100.00	100.00	100.00	100.00

Note: B1= Vanishing cream base; B2= Cold cream base; B3= Hand and body cream base; F1= Vanishing cream of *Momordica charantia* Linn leaves; F2= Cold cream of *Momordica charantia* Linn leaves; F3= Hand and body cream of *Momordica charantia* Linn leaves.

Cream and lotion characteristic test

The characteristic test was done by storing all cream formulas at 25 °C-30 °C (room temperature) and then evaluate about organoleptic, homogeneity, pH, cream type, viscosity, and flow properties every month for 3 mo [19, 20].

RESULTS AND DISCUSSION

Momordica charantia extraction

From 50 g MCL dry powder was produce total products of six l liquid extract and result 150 ml of condensed MEE. The result of concentrate leaf extracts *Momordica charantia* had a dark green color with a strong *Momordica charantia* leaf odor. The results from the organoleptic test show that the extract had a viscous form, specific of strong *Momordica charantia* leaf and dark green color.

The result of concentrate *Momordica charantia* leaf extracts had a dark green color with a strong *Momordica charantia* odor. The results from the organoleptic test show that the extract had a viscous form, specific of strong *Momordica charantia* leaf and dark

green color. This result is similar according to the expected from the viscous leaf *Momordica charantia* extract [1, 2].

Phytochemical screening of *Momordica charantia*

The results of the phytochemical screening test can be seen in table 2. Identification test with Dragendorff reagent formed orange-brown color and with Mayer reagents formed white or yellow deposits form to indicate the presence of alkaloids. The identification test using n-hexane and ethyl acetate reagents formed orange-red to red-purple indicate the presence of flavonoid compounds. The identification test with a strong shake and no foam/foam showed a negative result different from the previous data; this is likely that the saponins contained are lost during the drying or extraction process. The identification test used FeCl₃ formed blue-black color indicates the presence of tannins. Identification with Lieberman Buchard reagents formed in green or purple-blue color indicated the presence of triterpenoid compounds. *Momordica charantia* leaf powder and *Momordica charantia* leaf extract contain alkaloids, flavonoids, tannins, and triterpenoids characterized by positive results and saponin obtained negative results [21, 22].

Table 2: Phytochemical screening result

S. No.	Compound	MCL powder	MEE
1	Alkaloids	+	+
2	Flavonoids	+	+
3	Saponin	-	-
4	Tannins	+	+
5	Triterpenoids	+	+

Note: MCL=*Momordica charantia* Linn leaves, MEE= ethanol extract of *Momordica charantia* Linn leaves

The organoleptic observation

All cream products that store in 1, 2 and 3 w have semisolid forms, broken white colors, specific *Momordica charantia* odors, homogeneity. All base cream has white color and homogeneity. Vanishing cream base (B1); hand and body cream base (B3); vanishing cream of MCL (F1); and hand and body cream of MCL (F3) have oil/water emulsion type. Cold cream base (B2) and cold cream of MCL (F2) have water/oil emulsion type. These results of

organoleptic determination in 25–30 °C can be seen in table 3 and table 4.

The three cream formulas with different bases contain 4% leaf *Momordica charantia* extract. The content of 4% extract in this cream preparation is based on Hendro research, which stated that *Momordica charantia* leaf extract has IC_{50} 3.951. Also, based on the range of minimum and maximum levels of limits for traditional medicine used as cosmetics is 0.50-4.00% [5, 6].

Table 3: Organoleptic creams

Formula	Organoleptic								
	Form	Color	Odor	Form	Color	Odor	Form	Color	Odor
Time (mo)	1			2			3		
B1	ss	w	MC	ss	w	MC	ss	w	MC
F1	ss	bw	MC	ss	bw	MC	ss	bw	MC
B2	ss	w	MC	ss	w	MC	ss	w	MC
F2	ss	bw	MC	ss	bw	MC	ss	bw	MC
B3	ss	w	MC	ss	w	MC	ss	w	MC
F3	ss	bw	MC	ss	bw	MC	ss	bw	MC

Note: ss=semisolid; w=white, bw=broken white, MC= *Momordica charantia*; B1= Vanishing cream base; B2= Cold cream base; B3= Hand and body cream base; F1= Vanishing cream of *Momordica charantia* Linn leaves; F2= Cold cream of *Momordica charantia* Linn leaves; F3= Hand and body cream of *Momordica charantia* Linn leaves.

The result of the evaluation, all creams have semisolid form, broken white color, homogenous, specific *Momordica charantia* odor, pH 6.37-6.67 with spreading ability (2488,21-2835,43) mm². Those cream characteristics can be expected that the extracted content is homogeneous and does not irritate the skin in the presence of pH around the pH of the skin (4.5-6.5). Spreading ability all creams were 2488.21 up to 2835, 43, so expect to be smeared on the surface of the skin well [10, 19, 23, 24]. Flow properties of all creams can be seen in fig. 1 and 2. Viscosity

decreased after the addition of *Momordica charantia* leaf condensed extract. F1 has pseudo-plastic rheology, while F2 and F3 have plastic thixotropic rheology [24].

The characterization of *Momordica charantia* cream

PH of cream F1, F2, and F3 were 6.37, 6.42, and 6.67, while vanishing cream base, cold cream base and hand and body cream base 6.23, 6.31, and 6.62. All pH creams stable after 3 mo stores in room temperature (25 °C-30 °C). The results can be seen in table 5.

Table 4: Homogeneity and emulsion type of cream in three weeks

Formula	Homogeneity			Emulsion type		
	1w	2w	3w	1w	2w	3w
B1	H	H	H	o/w	o/w	o/w
F1	H	H	H	ow	ow	ow
B2	H	H	H	w/o	w/o	w/o
F2	H	H	H	w/o	w/o	w/o
B3	H	H	H	o/w	o/w	o/w
F3	H	H	H	w/o	w/o	w/o

Note: H=Homogen; B1= Vanishing cream base; B2= Cold cream base; B3= Hand and body cream base; F1= Vanishing cream of *Momordica charantia* Linn leaves; F2= Cold cream of *Momordica charantia* Linn leaves; F3= Hand and body cream of *Momordica charantia* Linn leaves; o/w=oil/water emulsion type; w/o=water/oil emulsion type.

Table 5: PH of cream

Formula	pH								
	1 w			2 w			3 w		
B1	6.23	±	0.05	6.23	±	0.05	6.23	±	0.05
F1	6.37	±	0.05	6.37	±	0.05	6.37	±	0.05
B2	6.31	±	0.05	6.31	±	0.05	6.31	±	0.05
F2	6.42	±	0.05	6.42	±	0.05	6.42	±	0.05
B3	6.53	±	0.05	6.53	±	0.05	6.53	±	0.05
F3	6.67	±	0.05	6.67	±	0.05	6.67	±	0.05

Note: B1= Vanishing cream base; B2= Cold cream base; B3= Hand and body cream base; F1= Vanishing cream of *Momordica charantia* Linn leaves; F2= Cold cream of *Momordica charantia* Linn leaves; F3= Hand and body cream of *Momordica charantia* Linn leaves. The data are given as mean±SD (n = 3).

The spreading ability of base cream and all formula cream can be seen in table 6. Each formula has a spreading ability more than its base. The

spreading ability F3 2,835.43 mm²>F1 2,488.21 mm²>F2 2,321.65 mm². Spreading ability all formula stable after 3 mo store three in 25 °C.

Table 6: The spreading ability of cream

Formula	Spreading ability (mm ²)								
	1 w			2 w			3 w		
B1	2,417.99	±	0.050	2,417.99	±	0.050	2,417.99	±	0.050
F1	2,488.21	±	0.080	2,488.21	±	0.080	2,488.21	±	0.080
B2	2,081.21	±	0.050	2,081.21	±	0.050	2,081.21	±	0.050
F2	2,321.65	±	0.050	2,321.65	±	0.050	2,321.65	±	0.050
B3	2,668.13	±	0.050	2,668.13	±	0.050	2,668.13	±	0.050
F3	2,835.43	±	0.050	2,835.43	±	0.050	2,835.43	±	0.050

Note: B1= Vanishing cream base; B2= Cold cream base; B3= Hand and body cream base; F1= Vanishing cream of *Momordica charantia* Linn leaves; F2= Cold cream of *Momordica charantia* Linn leaves; F3= Hand and body cream of *Momordica charantia* Linn leaves. The data are given as mean±SD (n = 3).

The result of all evaluation shows the results of stability tests of F1, F2, and F3, which include organoleptic test, cream type, homogeneity, pH, and dispersion showed that all creams did not show any change in color, odor, taste, homogeneity, and spreadability. There is no sign of phase separation. This is because the extract of *Momordica charantia* leaves and base all of the cream are homogeneously mixed and the emulsifier can stabilize the emulsion [19, 24].

Rheology all cream every month for three months after storage at 20-30 °C can be seen in fig. 2-4. The curve of vanishing cream blank

coincide with F1 (fig. 2), cold cream lanks coincide with F2 (fig. 3), hand, and body base with F3 (fig. 4). All cream had plastic thixotropic flow.

The test results of the flow properties of all the cream preparations showed that all of the preparations still had thixotropic plastic properties and did not change until 3 mo. All formula cream stable after store for three months at 25-30 °C (room temperature). Base on all evaluation, all cream formulas were included good cream categories. So the *Momordica charantia* leaves can be made become skincare cream cosmetics that more profitable.

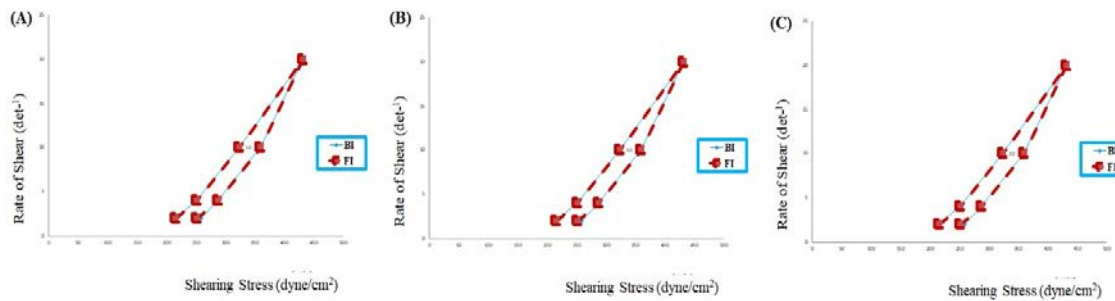


Fig. 2: Rheology of all vanishing cream after store in 25-30 °C every month: (A)= 1 mo; (B)= 2 mo; (C)=3 mo

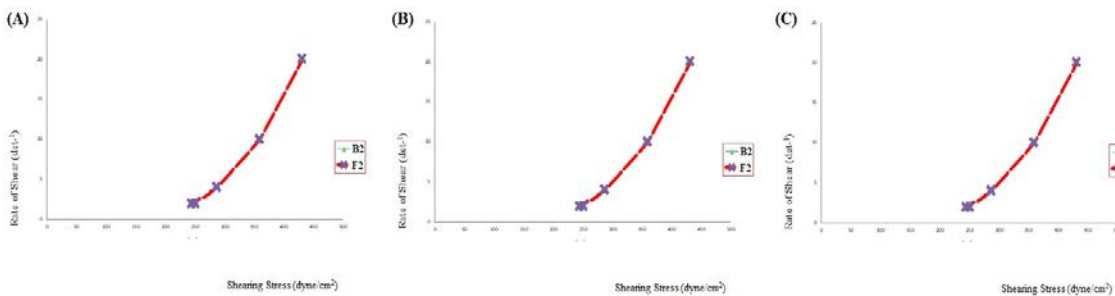


Fig. 3: Rheology of all cold cream after store in 25-30 °C every month: (A)= 1 mo; (B)= 2 mo; (C)=3 mo

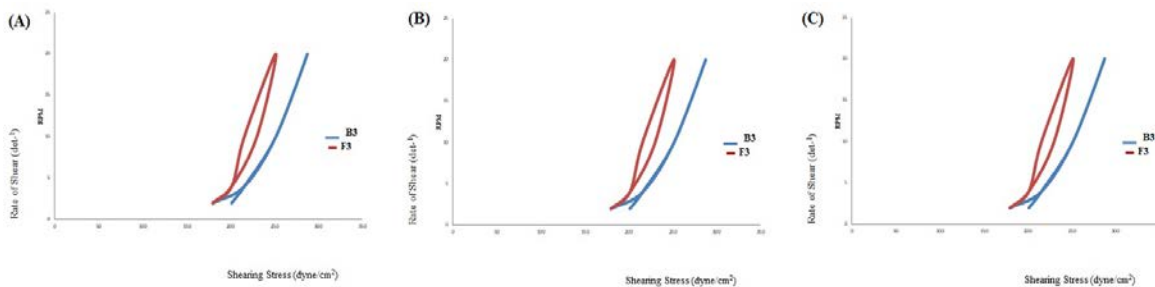


Fig. 4: Rheology of all hand and body after store in 25-30 °C every month: (A)= 1 mo; (B)= 2 mo; (C)=3 mo

CONCLUSION

Momordica charantia leave can be made become a good cream for skincare cosmetics that more beneficial than as a waste using vanishing base cream, cold cream, and hand and body cream as base creams. Cream of extract *Momordica charantia* leave have broken white and distinctive smell of *Momordica charantia*, homogeneous, spreading ability (2,081.21–2,835.43) mm², pH value 6.37-6.67, viscosity (140,000-18,000) cps and pseudo-plastic thixotropic and plastic thixotropic and stable.

AUTHORS CONTRIBUTIONS

Teti Indrawati (TI), Ismayanti Hajard (IH), and Diah Kartika Pratami (DKP) provided critical feedback and helped shape the research, analyze the manuscript. TI and IH conceived and planned the experiments. IH carried out the experiments, planned, and carried out the simulations. TI contributed to sample preparation. TI and DKP contributed to the interpretation of the results.

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AUTHORS CONTRIBUTIONS

All the authors have contributed equally.

CONFLICT OF INTERESTS

There is no conflict of interest.

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