Majalah Farmaseutik Vol. 16 No. 1: 20-26
ISSN-p : 1410-590x
ISSN-e : 2614-0063

Formulation and Evaluation of Physical Characteristics of Red Rice Extract (*Oryza Glaberrima Steud*) Lotion

Rety Setyawaty, Widayat, Dewanto
Pharmacy Academy of Kusuma Husada Purwokerto
Corresponding author: Rety Setyawaty: Email: rety.setyawaty@gmail.com
Submitted: 22-05-2019 *Revised: 01-07-2019* *Accepted: 02-07-2019*

ABSTRACT

Red rice (O*ryza Glaberrima Steud*) is source of carbohydrates. The components of red rice (O*ryza Glaberrima Steud*) are vitamin E, thiamin, magnesium, vitamin B6, minerals and fiber. Red rice, besides having many nutrients, is also beneficial for skin care. The purpose of this study was to make lotion preparations using red rice extract as raw materials (*Oryza Glaberrima Steud*) under variation of stearic acid and triethanolamine. The extraction of red rice (*Oryza Glaberrima Steud*) used maceration. The yield of red rice extract is 8.6%. Variations used were variations in stearic acid, 1.5%, 3% and 4.5% and triethanolamine, 0.5%, 0.75% and 1.5%. Other ingredients used as lotion makers are 1% glycerin, 0.1% methyl paraben and as much volume as aquadest lotion. The volume of lotion made is 50 ml. The concentration of red rice extract used is 5%. The test of lotion products is organoleptic, homogeneity, pH, dispersion, adhesion and type of emulsion. The results showed that the lotion smelled distinctive, had a bitter taste and was creamy/ brownish white. The use of a 4 times stearic acid emulgator combination of the amount of the use of triethanolamine affects the spread of lotion and the adhesion of lotion. The red rice extract (*Oryza Glaberrima Steud*) lotion that is formed is very thick, but the sticky power, homogeneity and pH of the lotion produced are in accordance with the good lotion parameters. Based on the results of the study it can be concluded that red rice can be used as a raw material for lotions.
Keywords: formulations; lotion; maceration; red rice (*Oryza Glaberrima Steud*)

INTRODUCTION

Red rice (*Oryza Glaberrima Steud*) is one carbohydrate source that contains anthocyanin. Anthocyanin is an antioxidant that can fight cancer, cure inflammation and injection. Antioxidants in red rice are much stronger (Gupta and Sharma, 2006). Red rice extract (*Oryza Glaberrima Steud*) has been shown to have antioxidant effects. Study of Tisnadjaja *et al*., (2012) showed that ethanol extract from brown rice fermentation (angkak *Oryza Glaberrima*) had antioxidant activity with a lower IC50 value, which ranged between 90-100 ppm. Ethanol extract of red rice (*Oryza Glaberrima Steud*) in addition to reducing LDL and increasing HDL, also has the ability to inhibit lipid oxidation.

The content of flavonoids in red rice extract (*Oryza Glaberrima Steud*) is needed as an alternative use of antioxidants by utilizing available natural resources. Red rice extract (*Oryza Glaberrima Steud*) which has natural antioxidants in this case is not supported by physical form if used topically because of the difficulty of the extract in penetrating the inner layer of the skin and the absence of comfort when used. To facilitate the application of red rice extract which has an antioxidant effect, it certainly requires an effective delivery system formulated in a dosage form to achieve optimum therapy.

Lotion is a liquid emulsion consisting of an oil phase and a water phase stabilized by the emulgator, containing one or more active ingredients in it. Lotion is intended for external use of the skin as a protector. Liquid consistency allows quick and even use of the surface of the skin, so that it is easy to spread and can dry out immediately after applying and leaves a thin layer on the surface of the skin (Lachman, 1994).

Emulgator is a surface active material that reduces the interface voltage between oil and water and surrounds dispersed droplets as a strong layer which prevents the coalescence of the dispersed phase and phase separation (Parrot, 1974). The emulsifying agent used can be single, mixed, or combined with other additives (Martin, 1993).

In general, cosmetic preparations are made in the form of emulsions for reasons that are cheaper, easier to make, more comfortable to use because they are not so sticky, and spread

Table I. Formulation lotion

Materials	Formulations			
	F0	F1	F2	F3
Red rice extracts	-	2.5 g	2.5 g	2.5 g
Glycerine	1g	1 g	1 g	1 g
Stearic acid	1.5g	0.75 g	1.5 g	2.25 g
Methyl Paraben	0.05g	0.05 g	0.05 g	0.05 g
Triethanolamin	0.375g	0.25 g	0.375 g	0.75 g
Aqua ad	50 mL	50 mL	50 mL	50 mL

faster to the surface of the skin and are cooler. Some emulsifiers used in the emulsion o/w include sodium lauryl sulfate, stearic triethanolamine, self emulsifying glyceryl monostearate and so on (Wasitaatmadja, 1997). Therefore, red rice extract (*Oryza Glaberrima Steud*) is made in lotion emulsion preparations by varying stearic acid and triethanolamine.

METHODOLOGY

Materials

Red rice extract (*Oryza Glaberrima Steud*), stearic acid, glycerin, methyl paraben, triethanolamine and aquadest (Sari and Putri, 2015).

Equipments

The tools used in this study are analytical scales, juicers, mortar and pestle, water bath, spatula, spatula, lotion containers, transparent glass, laboratory glassware, stirrers, porcelain dishes, and universal pH (Sari and Putri, 2015).

Procedures

Determination

Determination is done to ensure that the plant used is red rice (*Oryza Glaberrima Steud*). Determination was carried out at the Plant Taxonomy Laboratory of the Faculty of Biology, Jendral Soedirman University, Purwokerto, Central Java, Indonesia.

Extraction Processes

The red rice is washed first. After that, red rice is weigh of 0.5 kg. 0.5 kg of red rice is powdered. 400 g of powder red rice was macerated using 96% of ethanol acidified with 1% HCl and a ratio of 9: 1 for 3 x 24 hours with occasional stirring (modification o f Putri *et al*., 2015). Liquid macerate is concentrated with a water bath until a thick extract is obtained.

Lotion Production

The oil phase material (Stearic Acid) is dissolved at 65^{o}-75^{o}C above the waterbath. Water phase material (Aquadest, Glycerin, Trieanolamine, Methyl Paraben) dissolved separately at 65^{o}-75^{o}C. After all dissolved phases, the water phase is added to the oil phase gradually while constant stirring is carried out to form an emulsion. The mixture is then added to the red rice extract. The lotion preparation was put into a container and a preparation evaluation was carried out (Megantara *et al*., 2017). Each variation of stearic acid and amine triethanol is made according to the work method. Table of lotion formulations can be seen in Table I.

In Table I, it can be seen that the variations used in the research with the raw materials of red rice extract are variations in stearic acid and triethanol amine. Variations of stearic acid used were 0.75 g, 1.5 g and 2.25 g. While the variation of triethanol amine used is 0.25 g, 0.375 g, and 0.75 g.

Test of Lotion

Tests of physical characteristics of lotion performed were pH test, homogeneity test, dispersion test, adhesion test, and emulsion type test.

RESULT AND DISCUSSION

Determination

Based on the results of the determination of the red rice plant (*Oryza Glaberrima Steud*), it was obtained certainty that the plants that were determined and used for this study were truly species of *Oryza Glaberrima Steud* from the family of *Poaceae*, and genus of *Oryza*.

Tabel II. Result of homogeneity test of lotion

Formulation/ Replication	F0	F1	F2	F3
1	Homogeneous	Homogeneous	Homogeneous	Homogeneous
2	Homogeneous	Homogeneous	Homogeneous	Homogeneous
3	Homogeneous	Homogeneous	Homogeneous	Homogeneous

Tabel III. Results of pH test of lotion

Formulation/ Replication	F0	F1	F2	F3
1	6	6	6	6
2	6	6	6	6
3	6	6	6	6
Average	6	6	6	6

Yield of thick extract of Red Rice (Oryza Glaberrima Steud)

Macerate obtained was concentrated with a water bath until a fixed weight was obtained, which was 34.75 grams or 8.6%. MOH RI (2000) states the specified water content limit is not less than 10%. But in this study, because the simplicia was too crude, the yield obtained was only 8.6%. According to Lestari (2006), there are several factors that affect the yield and quality of oleoresin, which include varieties, conditions and sizes of spice powder, solvent selection, extraction conditions and solvent evaporation processes. This is in line with Heath and Reineccius (1986). According to Heath and Reineccius (1986), the smaller the size of the material used, the wider the area of contact between the material and the solvent and the greater the speed of achieving system equilibrium. Tissue material/simplicia can affect the effectiveness of extraction. The size of the appropriate material will make the extraction process going well and does not take a long time.

Test of Lotion

Homogeneity test

Observation of homogeneity is done to determine whether there is a separation phase of a preparation, whether all the ingredients have been mixed evenly and homogeneously or not (Zulkarnain, 2015).

This observation is done by applying lotion to the glass object and then seen if there are no coarse grains, the lotion tested is homogeneous. The following are the homogeneous test results of lotions in Table II.

The results of the lotion homogeneity test are that there are no coarse particles, there is no clumping and phase separation. In addition, the base of the lotion, active ingredients and other additives are evenly mixed so that it is declared homogeneous, this is in line with the research (Hanum, 2018). Hanum (2018) conducted research on the formulation and test of cream activity of red rice extract (*Oryza Nivara L.*) as anti aging and obtained the results of homogeneous lotions.

pH test

pH measurement is carried out using a universal pH indicator. The pH indicator paper is dipped into the preparation and then matched with the indicator color printed on the container.

The measurement of pH of the preparation obtained results still meet the physiological pH limit of the skin. According to the pH of cosmetics it is tried to be the same or as close as possible to the physiological pH of the skin which is 4.5-6.5 (Muliyawan, and Suriana, 2013). The following are the test results of pH lotion in Table III.

Skin irritation that can be caused such as the skin becomes dry, cracked, and easily develops infections. If the pH is too acidic it will cause skin irritation and if it is too alkaline it will cause itching on the skin (Tranggono and Latif, 2007).

Based on Table III, it can be seen that lotions from F1, F2 and F3 have a pH of 6, this is

Table IV. Result of spread power test of lotion (diameter; cm)

Formulation/ Replication	F0		F1		F2		F3	
Load of 100gr	No loading	With loading	No loading	With loading	No loading	With loading	No loading	With loading
1	2.42	3.52	2.52	3.79	2.52	3.73	2.26	3.39
2	2.52	3.71	2.60	3.86	2.65	3.66	2.39	3.44
3	2.52	3.66	2.69	3.79	2.60	3.79	2.45	3.39
Average	2.49	3.63	2.61	3.81	2.59	3.73	2.37	3.40

in line with the research (Hanum, 2018). Hanum (2018) conducted research on the formulation and test of cream activity of red rice extract (*Oryza Nivara L.*) as antiaging and obtained the results of lotion having a pH of 6.

Spread power test

Spread power test means the ability of the lotion to spread on the skin. The purpose of the spread test is to determine the scattering power that can be taken by the preparation of lotions made. The easier the spread shows its ability in even distribution. The following are the results of spread power test of lotion in Table IV.

Diameter spread power requirements for topical preparations are around 5-7 cm (Garg, *et al*., 2002). According to Putri (2013), spread power cannot be used as absolute data because there is no literature that mentions the ideal number in a definite manner.

Based on Table IV, it can be seen that the diameter of the spread of lotion does not meet the good dispersion parameters. The spread of lotion is not good because the use of stearic acid is too large when compared to triethanolamine (almost 4 times the amount of triethanolamine). This causes the lotion to become thick. The more amount of stearic acid used, the cream produced will also be thicker and the level of viscosity determined by the amount of triethanolamine as the water phase emulgator used (Dina *et al*., 2017).

Sticky power test

The parameter that is considered in this sticky power test is sticky time. The consistency of the sample gets be thicker, the time needed to separate the two glasses of the object will be longer. Conversely, the thinner the consistency of the sample, the more time needed to separate will be faster. The time requirement for good adhesion is not less than 4 seconds (Susanti, *et al.,* 2012). The following are the results of the sticky power test in Table V.

Based on Table V, the lotion that has the longest adhesion is F3, which is 5.73 seconds and the fastest adhesion is F1. F1 does not meet the standard requirements for good lotion which is 3.86 seconds, while F2 has adhesion that meets the standard good lotion which is 4.68 seconds. This is in line with research (Zulkarnain, 2015). Zulkarnain (2015) conducted an in vitro spf test and the physical properties of some sunscreens on the market and obtained the results of lotions having a stickiness of not less than 4 seconds.

Emulsion type test

A certain amount of preparation is placed on top of the glass object and then add 1 drop of methylene blue and stir it with a stirring rod. Methylene blue spread evenly means that the preparation type is emulsion o/w. Type o/w is an emulsion consisting of oil grains which are dispersed into water. Oil is an internal phase and water as an external phase. This is in line with the research (Hanum, 2018). Hanum (2018) conducted research on the formulation and test of cream activity of red rice extract (*Oryza Nivara L.*) as antiaging and obtained the results of lotion having the type o/w. The emulsion type test image can be seen in Figure 1.

In general, cosmetic preparations are made in the form of emulsions for reasons that are cheaper, easier to make, more comfortable to use because they are not so sticky, and spread faster to the surface of the skin and are cooler. Some emulsifiers used in the emulsion o/w include sodium lauryl sulfate, stearic triethanolamine, self emulsifying glyceryl monostearate and so on (Wasitaatmadja, 1997).

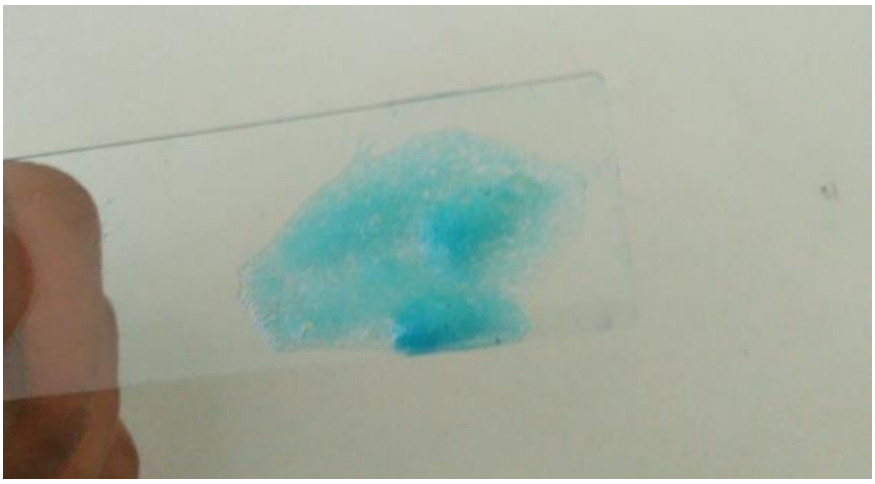

Figure 1. Emulsion type test

Table V. Result of sticky power test of lotion

Formulation/ Replication	F0	F1	F2	F3
1	3.83 second	2.42 second	4.65 second	5.72 second
2	3.78 second	3.23 second	4.72 second	5.82 second
3	3.75 second	2.5 second	4.68 second	5.65 second
Average	3.78 second	3.86 second	4.68 second	5.73 second

The effect of using a variety of emulgators on lotions

In making lotion using red rice extract, it was found that the combination of stearic acid weighing 1.5 grams and trietanolamine weighing 0.375 grams produced a lotion that was suitable in terms of dispersion and adhesion. The viscosity of the lotion is not tested.

Viscosity is a measure of thickness which states the size of friction in a fluid. The greater the viscosity of a fluid, the more difficult it is for an object to move in the fluid (Hasim, 2014). This can be seen from the results of the spread test (Table IV). Spread is inversely proportional to viscosity. The more dilute a lotion, the greater the spread of power (Shintaningsih, 2007).

CONCLUSION

Based on the results of research on the manufacture of red rice extract lotions, it can be concluded that, red rice extract (*Oryza Glaberrima Steud*) can be made into lotion preparations. The use of a 4 times stearic acid emulgator combination of the amount of the use of triethanolamine affects the spread of lotion and the adhesion of lotion. The red rice extract (*Oryza Glaberrima Steud*) lotion that is formed is very thick, but the sticky power, homogeneity and pH of the lotion produced are in accordance with the good lotion parameters.

REFERENCES

Aryani, N. L. D and Widjaja, F. N. 2015. *Peningkatan Mutu dan Variasi Produk Bagi Usaha Kecil Menengah (UKM) Industri Kosmetik (Quality Improvement and Product Variation for Small and Medium Enterprises (SMEs) in the Cosmetics Industry)*, Prosiding SNaPP 2015 Kesehatan, pp. 275-280.

MOH RI, 2000, *Parameter Standar Umum Ekstrak Tumbuhan Obat (General Standard Parameters of Medicinal Plant Extracts)*, Dirjen Pengawasan Obat dan Makanan (Director General of Drug and Food Control), Vol.1: Jakarta

Dina, A., Pramono, S., and Nining Sugihartini, 2017, *Formulation Ethyl-Acetate Fraction from Jackfruit Bark Extract (Artocarpus heterophyllus Lamk), Jurnal Ilmu Kefarmasian Indonesia*, 15 (2), pp. 134-139.

Garg, A., D. Aggarwal, S. Garg, and A. K. Sigla, 2002, *Spreading of Semisolid Formulation: An Update, Pharmaceutical Tecnology*, September: 84-102.

Gupta, V. K., and Sharma, S. K, 2006, *Plant as Natural Antioxidants, Indian Journal of Natural Products and Resources*, 5(4): 326-334.

Hanum, T. I., 2018, *Formulasi dan Uji Aktivitas Krim Ekstrak Beras Merah (Oryza Nivara L.) Sebagai Antiaging (Formulation and Activity Test for Cream of Red Rice Extract (Oryza Nivara L.) as Antiaging)*, Talenta Conference Series: Tropical Medicine, pp. 237–244.

Hasim, M., 2014, *Penentuan Koefisien Viskositas Minyak kelapa Menggunakan Prinsip Stokes (Determination of the Viscosity Coefficient of Coconut Oil Using the Stokes Principle),* Other thesis, Universitas Negeri Gorontalo.

Heath, H.B and Reineccius, G., 1986, *Flavor Chemistry and Technology*, AVI Publ. co. Inc.,Westport, Connecticut.

Lachman, L., H.A. Lieberman, and J.L. Kanig, 1994, *Teori dan praktek Farmasi Industri (Theory and practice of industrial pharmacy),* jilid (volume) II, edisi (edition) III, Universitas Indonesia. pp. 1119-1120.

Lestari, W.E.W., 2006, *Pengaruh Nisbah Rimpang Dengan Pelarut dan Lama Ekstraksi Terhadap Mutu Oleoresin Jahe Merah (Zingiber officinale var. rubrum) (The Effect of Rhizome Ratio with Solvents and Length of Extraction on the Quality of Red Ginger Oleoresin (Zingiber officinale var. Rubrum)*, Skripsi (Essay), Fakultas Teknologi Pertanian (Faculty of Agricultural Technology), Institut Pertanian Bogor, Bogor.

Megantara, I. N. A. P. , Megayanti, K. , Wirayanti, R.1 , Esa, I. B. D. , Wijayanti, N. P. A. D. , and Yustiantara, P.S., 2017, *Formulasi Lotion Ekstrak Buah Raspberry (Rubus rosifolius) dengan Variasi Konsentrasi Trietanolamin sebagai Emulgator serta Uji Hedonik terhadap Lotion (Lotion Extract of Raspberry Fruit (Rubus rosifolius) with Variation of Triethanolamine Concentration as Emulgator and Hedonic Test for Lotion)*, Jurnal Farmasi Udayana, 6(1), ISSN 2301-7716.

Muliyawan, D. dan Suriana, N., 2013, *A-Z Tentang Kosmetik (A-Z About Cosmetics)*, Jakarta: PT Elex Media Komputindo, pp. 14,16-17, 21-25, 141-142, 312.

Putri, N. K. M., Gunawan, I. W. G., and I Wayan Suarsa, 2015, *Aktivitas Antioksidan Antosianin dalam Ekstrak Etanol Kulit Buah Naga Super Merah (Hylocereus costaricensis) dan Analisis Kadar Totalnya (Anthocyanin Antioxidant Activity in Ethanol Extract of Super Red Dragon Fruit Skin (Hylocereus costaricensis) and Total Level Analysis)*, Jurnal Kimia, 9(2), 243-251.

Putri, V. S., 2013, *Formulasi Krim Ekstrak Etanol Herba Pegagan (Centella asiatica (L.) Urban) Konsentrasi 6% dan 10% dengan Basis Cold Cream dan Vanishing Cream serta Uji Aktivitas Antibakteri terhadap Staphylococus aureus (Formulation of Ethanol Extract of Pegagan Extract (Centella asiatica (L.) Urban) 6% and 10% Concentration with Base Cold Cream and Vanishing Cream and Antibacterial Activity Test on Staphylococus aureus)*, Naskah Publikasi Fakultas Farmasi (Publication Script of Pharmacy Faculty), Universitas Muhammadyah Surakarta.

Sari, A, and Putri, N. A., 2015, *Studi Farmasi Sediaan Lotion Anti Nyamuk Dari Minyak Atsiri Daun Legundi (Vitex Trifolia Linn) (Pharmacy Study of Anti Mosquito Lotion from Legundi Leaf Essential Oil (Vitex Trifolia Linn)*, Prosiding Seminar Nasional & Workshop "Perkembangan Terkini Sains Farmasi Klinik 5" (Proceedings of the National Seminar & Workshop "The Latest Development of Clinical Pharmacy Science 5"), Padang, 6-7 November.

Shintaningsih, L., 2007, *Optimasi Komposisi Polysorbate 80 & Cetyl Alcohol Sebagai Emulsifying Agent Dalam Lotion Virgin Coconut Oil Dengan Aplikasi Desain Faktorial (Optimization of Polysorbate 80 & Cetyl Alcohol Composition as Emulsifying Agent in Virgin Coconut Oil Lotion with Factorial Design Application)*, Yogyakarta: Universitas Sanatadharma.

Susanti, M., Dachriyanus, D. P Putra, 2012, *Aktivitas Perlindungan Sinar UV Kulit Buah Garcinia Mangostana Linn Secara In Vitro (Activity of Garcinia Mangostana*

Linn Fruit Rays UV Protection in In Vitro), PHARMACON. Fakultas Farmasi, Universitas Andalas, Surakarta. 13.2: 61-64.

Tisnadjaja, Djadjat, Irawan, Herman and Bustanussalam, 2012, *Pengkajian Aktivitas Antioksidan dari Beras Merah Hasil Fermentasi (Angkak) (Assessment of Antioxidant Activities of Fermented Red Rice (Angkak))*, Pusat Penelitian Bioteknologi-LIPI, Bogor.

Tranggono, R. I. and Latifah, F., 2007, *Buku Pegangan Ilmu Pengetahuan Kosmetik (Handbook of Cosmetic Sciences)*, Jakarta: PT Gramedia Pustaka Utama, pp. 3-4, 11-12, 76-78, 83, 119

Wasitaatmadja, S. M., 1997, *Penuntun Ilmu Kosmetik Medik (Guide to Medical Cosmetics Sciences)*, Jakarta: Universitas Indonesia, pp. 3,58-59, 62-63, 111-112.

Zulkarnain, K., 2013, *Stabilitas Fisik Sediaan Losion O/W dan W/O Ekstrak Buah Mahkota Dewa Sebagai Tabir Surya Dan Uji Iritasi Primer Pada Kelinci (Physical Stability of Lotion O/W and W/O Preparations for Crown Crown Extract as Sunscreen and Primary Irritation Test on Rabbits)*, Gadjah Mada University Press, Yogyakarta.