IOSR Journal Of Pharmacy And Biological Sciences (IOSR-JPBS)
e-ISSN:2278-3008, p-ISSN:2319-7676. Volume 16, Issue 4 Ser. I (Jul. – Aug. 2021), PP 45-49
www.Iosrjournals.Org

Formulation, Evaluation of Paper Mask Essence from Bovine Colostrum Kefir and Determination of Its Biological Activity

Fenti Fatmawati[1*], Yanni Dhiani Mardhiani[1], Garnadi Jafar[1], ED Yunisa Mega Pasha[1], Rahmayanti Nurraeni[1], Ilma Naila Saidah[1], Angga Putra Pribadi[1]
[1](*Faculty of Pharmacy, Bhakti Kencana University, Indonesia)*

Abstract:
Background*: The use of colostrum in Indonesia has not been widely used. At the farmer level, if the early lactation cow production is too high, colostrum is sometimes discarded because it is considered milk that does not meet the requirements and will be rejected after being stored, this is very detrimental to smallholders. Bovine colostrum and kefir both have biological benefits for the body. Therefore, in this study, an essence for a paper mask was made from bovine colostrum kefir. The aim of this study was to formulate and evaluate of paper mask essence made from Bovine Colostrum kefir and to determine its biological activity.*
Materials and Methods *The material used was Bovine colostrum kefir. This study using the titration method to calculate the levels of lactic acid, diffusion method for antibacterial activity, DPPH for antioxidant activity, formulation evaluation, and data were analyzed using SPSS.*
Results*: Formula F1 can be said to be good because it meets all the evaluation criteria for the preparation. Homogeneous preparations with pH 4.6-4.64, viscosity 264-232 cps, non-irritating to the skin, and stable for 4 weeks of storage. By using the non-parametric Kruskal Wallis test to see the effects of pH value, viscosity, and the lactic acid content from the formulas caused by the storage time , obtained a value of p<0,05 means there were significant differences between formulations. Contains antioxidants with an IC50 value of 76,689 ppm and has moderate inhibitory activity against Staphylococcus epidermis bacteria.*
Conclusion: *Based on the results of the evaluation shows that BC kefir can be formulated into paper mask essence preparations and have an antioxidant and antibacterial activity*
Key Word*: Antibacterial ; Antioxidant; Bovine colostrum; Essence; Kefir*

Date of Submission: 08-07-2021 Date of Acceptance: 23-07-2021

I. Introduction

Bovine colostrum (BC) is a nutrient-rich biological liquid produced by cows after parturition[1]. Difference from milk, bovine colostrum contains more lactalbumin and lactoprotein. It also contains protein, immunoglobulin, lactoferrin, carbohydrates, oligosaccharides, fats, vitamins, minerals, anti-microbial compounds, and growth factors [2]. Colostrum is also used as a topical healing agent that contains growth factors that are important for healing new skin. Kefir is a fermented milk product using a lactic acid microbial starter (bacteria and yeast). Kefir has antimicrobial, antitumor, anti-inflammatory, and antioxidant activity [3]. Kefir was considered good for skin health because it contains lactic acid which functions to treat the skin, for example as an antibacterial agent, helps in the regeneration of dead skin cells, and brightens the skin. The aim of this study was to formulate and evaluate of paper mask essence made from BC kefir and to determine its antioxidant and antibacterial activity.

II. Material And Methods

The material used was Bovine colostrum (BC). Other ingredients used were *Staphylococcus epidermis* bacteria, xanthan gum, glycerin, propylene glycol, PEG-40 Hydrogenated Castor Oil, DMDM Hydantoin, aqua dest, PP, Nutrient agar, 96% ethanol, methanol, DPPH, ascorbic acid, aqua DM, NaOH, oxalate acid.

Procedure methodology

Essence formulation was made with BC kefir concentration of 5% in the F1 formula, 10% in the F2 formulation, and 15% in the F3 formulation. F0 was used as a comparison made without using BC kefir. Xanthan gum was dissolved with hot distilled water, then stirred until it swelled using a magnetic stirrer for 1 hour at a speed of 250 rpm. BC kefir was added little by little stir until homogeneous. Propylene glycol and glycerin were homogenized (mixture A). PEG-40 hydrogenated castor oil was dissolved using distilled water,

added to mixture A, stirred until homogeneous. DMDM hydantoin was added to mixture A, homogenized until an essence mass was formed using a magnetic stirrer for 1 hour.

Homogeneity test is carried out to find out whether the preparations formulated are homogeneous or not[4]. Organoleptics was observed color, odor, and consistency for 4 weeks. pH of formulation was determined using pH meter for 4 weeks. Viscosity was measured using a Brookfield viscometer then a spindle was mounted and the rotor is run. Viscosity results are recorded after the viscometer needle shows a stable number after five turns[5]. Lactic acid content was determine by the titration method[6]. Formulation was tested for antibacterial activity against test organisms namely *Staphylococcus epidermidis* using diffusion method[7]. Formulation was tested for antioxidant activity using DPPH method[8]. Data were analyzed using SPSS. The t-test was performed to ensure significant differences between the mean values of the continuous variables and confirmed by the nonparametric Mann-Whitney test [9].

III. Result

The paper mask essence formulation can be seen in table no 1 below

Table no 1: Shows essence formulation

Ingredients	concentration (%)			
	F0	F1	F2	F3
BC kefir	-	5	10	15
Glycerin	5	5	5	5
Propylene glycol	5	5	5	5
PEG-40 *Hydrogenated Castor Oil*	0.5	0.5	0.5	0.5
Xanthan Gum	1	1	1	1
DMDM Hydantoin	0.6	0.6	0.6	0.6
Aqua DM	q.s	q.s	q.s	q.s

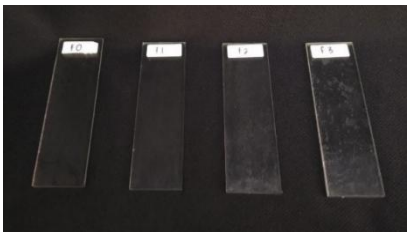

Figure no 1: shows the results of the homogeneity test

Table no 2: show organoleptic observation data

Formula	Color	Odor	Concistency
F0	Colorless	Odorless	thick
F1	Weak yellow	specific	thick
F2	Slightly yellowish	specific	thick
F3	Slightly yellowish	specific	thick

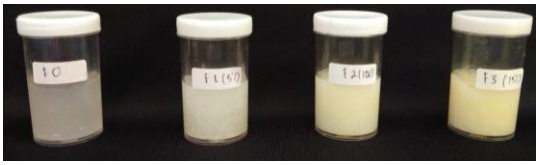

Figure no 2 : shows the results of the organoleptic

Table no 3 : shows stability observation data

Formula	After 7 day			After 14 day			After 21 day			After 28 day		
	DC	OD	LC	DC	OD	LC	DC	OD	LC	DC	OD	LC
F0	-	-	-	-	-	-	-	-	-	-	-	-
F1	-	-	-	-	-	-	-	-	-	-	-	-
F2	-	-	-	-	-	-	-	-	-	-	-	-
F3	-	-	-	-	-	-	-	-	-	-	-	-

- : there was no change to the sample ; DC: Discoloration ; OD : Odor change ; LC: lack of consistency

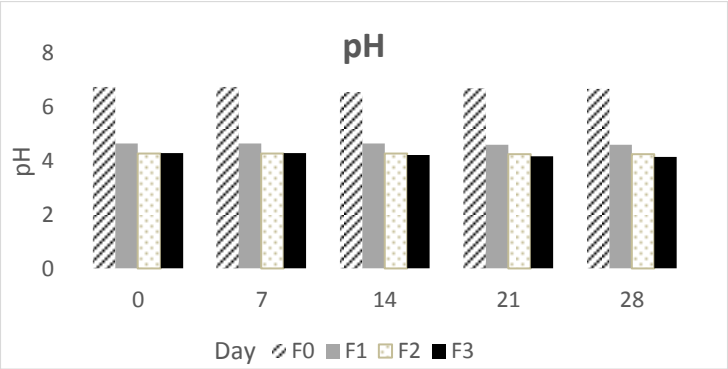

Figure no 4 : pH observation data

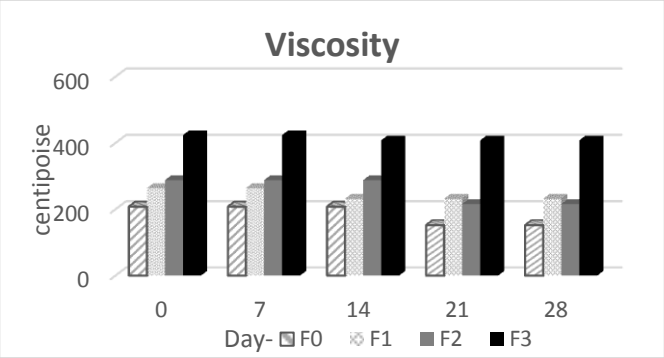

Figure no 5 : viscosity observation data

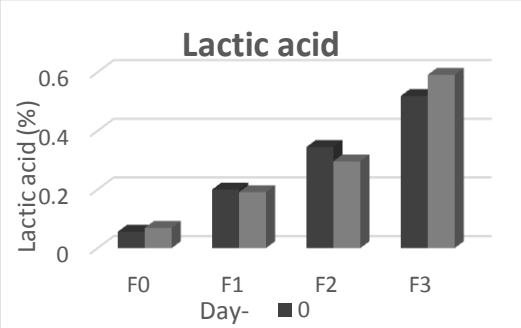

Figure no 6 : lactic acid content

Table no 4 : antimicrobial evaluation

Formula	Inhibition zone diameter (mm)	Interpretation
F0	0	No inhibition
F1	6,5	Medium
F2	7,5	Medium
F3	10,5	Medium
Aquadest	0	No inhibition

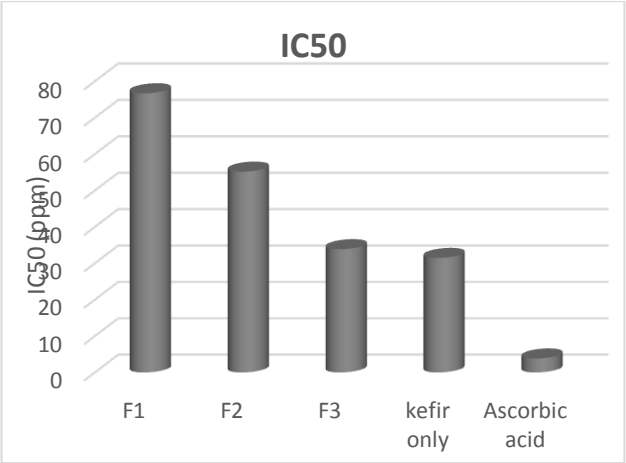

Figure no 7 : shows antioxidant activity

Statistical analysis

Data were analyzed using SPSS. The t-test was performed to ensure significant differences between the mean values of the continuous variables and confirmed by the nonparametric Mann-Whitney test (SPSS)

IV. Discussion

Essence was made from BC kefir which functions as an active substance that has antibacterial and antioxidant activity. Glycerin acts as a humectant. The reason for using glycerin as a humectant is because glycerin has hygroscopic properties that can attract water to the skin layer so that it can increase skin moisture and prevent skin from becoming dry. Propylene glycol serves as a humectant that can keep the preparation stable, because propylene glycol can also work as a solvent for water-insoluble and unstable materials and has antibacterial activity. PEG-40 Hydrogenated oil functions as an emulsifier that can dissolve insoluble materials, by reducing the surface tension of insoluble substances and then forming an emulsion [10]. DMDM Hydantoin was used as a preservative because it has antibacterial activity with a broad spectrum, has stability over a wide range of pH and temperature, and has excellent solubility in water. Xanthan gum was used as a thickening agent, stabilizer, suspending agent. The reason for using xanthan gum is because it has hydrophilic properties, is easily soluble in water, and has a fairly good viscosity even though the concentration used is low [11].

Homogeneity

From the results of Figure 1, it can be concluded that the formulations F0 to F3 were homogeneous during storage, this was indicated by the fused preparation and the absence of lumps during 4 weeks of storage. However, at F1, F2, and F3 there is still fiber. This is due to the characteristics of the kefir. These results are in line with research [4]. Preparations can be said to be homogeneous if the preparation is united and there are no coarse grains**.**

Organoleptic

There was no change in color, aroma, or consistency of the preparation for 4 weeks. It can be concluded that this preparation was stable. The results of organoleptic testing of the preparations in the formulations (F1, F2, and F3) meet the requirements because based on the Indonesian National Standard (SNI) organoleptic testing on kefir has a liquid consistency, a normal or distinctive odor, and a yellowish color. This is in line with research [4].

pH

From the results of the 1 to 4 weeks of pH testing, it was found that F1 met the standard compared to other formulations (table no. 4). It can be said that the formulation is safe to use on the skin (pH must be in the range of 4 -5.5) [12].

Viscosity

Based on these results, it can be concluded that the three formulas (F0, F1, F2) have good dosage viscosity and meet the viscosity requirements of mask essence preparations. While the F3 formula produces a viscosity of 414 Cp, therefore it can be concluded that the F3 formula has a viscosity that was not good [13].

Statistical analysis

By using the non-parametric Kruskal Wallis test to see the effects of pH value, viscosity, and the lactic acid content from the formulas caused by the storage time , obtained a value of $p<0,05$ means there were significant differences between formulations.

Lactic Acid Content

The measurement results of total lactic acid in F1 to F3 were still in the standard range. The value of F0 does not meet the criteria because F0 does not contain BC kefir . Based on the Indonesian National Standard that the levels of lactic acid bacteria in kefir are 0.2 - 0.9% [12].

Antimicrobial evaluation

F0 test against *Staphylococcus epidermis* bacteria showed that there was no zone of inhibition in the preparation. In F1 with the addition of bovine colostrum kefir as much as 5%, it shows that there is an inhibition zone in the preparation with a diameter of 6.5 mm which means the potential inhibition is moderate. In F2 with the addition of BC kefir as much as 10%, it showed that there was an inhibition zone in the preparation with a diameter of 7.5 mm which means the potential inhibition was moderate. In the F3 with the addition of BC kefir as much as 15%, it shows that there was an inhibition zone in the preparation with a diameter of 10.5 mm, which means that the potential for inhibition is medium. Tests with aquadest samples as a negative control showed that there was no inhibition zone in the disc area, because it was known that aquadest samples did not have antibacterial activity.

Antioxidant Activity

Determination of the value of antioxidant activity was carried out by the DPPH method with ascorbic acid as the comparison antioxidant. The activity was tested by calculating the amount of reduction in the intensity of purple light DPPH, where it was directly proportional to the decrease in DPPH levels[14]. The antioxidant activity in F1 was quite good, because, with the addition of 5% active substance concentration, the paper mask essence still had strong antioxidant activity. When compared with ascorbic acid standards, the antioxidant activity of the formulations of BC kefir was still weak. The weak of antioxidant activity was due to it still a mixture of various compounds, while ascorbic acid was a pure compound

V. Conclusion

This study shows that BC kefir can be formulated into paper mask essence preparations. Formula F1 can be said to be good because it meets all the evaluation criteria for the preparation. Homogeneous preparations with pH 4.6-4.64, viscosity 264-232 cps, non-irritating to the skin, and stable for 4 weeks of storage. Contains antioxidants with an IC50 value of 76,689 ppm and has moderate inhibitory activity against *Staphylococcus epidermis* bacteria

References

[1]. Uruakpa, F. O., Ismond, M. A. H. & Akobundu, E. N. T. Colostrum and its benefits: A review. *Nutr. Res.* **22**, 755–767 (2002).

[2]. Godhia, M. L. & Patel, N. Colostrum - Its composition, benefits as a nutraceutical : A review. *Curr. Res. Nutr. Food Sci.* **1**, 37–47 (2013).

[3]. Prado, M. R. *et al.* Milk kefir: Composition, microbial cultures, biological activities, and related products. *Front. Microbiol.* **6**, 1–10 (2015).

[4]. Fatmawati, F., Jafar, G. & Riantini, R. Pengujian Penghambatan Enzim Tirosinase Pada Formulasi Masker Pencerah Wajah Dari Kombinasi Kefir Susu Sapi Dan Rumput Laut …. *Anal. Anal. …* **5**, 42–52 (2020).

[5]. Mckenna, B. M. & Lyng, J. G. *Principles of food viscosity analysis*. *Instrumental Assessment of Food Sensory Quality* (Woodhead Publishing Limited, 2013). doi:10.1533/9780857098856.1.129.

[6]. Julijana Tomovska, Nikola Gjorgievski & Borche Makarijoski. Examination of pH, Titratable Acidity and Antioxidant Activity in Fermented Milk. *J. Mater. Sci. Eng. A* **6**, (2016).

[7]. Sharp, O., Wong, K. Y. & Johnston, P. *Segmental fracture of the scaphoid*. *BMJ Case Reports* vol. 2018 (Elsevier Inc., 2018).

[8]. Leaves, L. Antioxidant Activity by DPPH Radical Scavenging Method of Ageratum conyzoides. *Orient* **1**, 244–249 (2014).

[9]. MacRae, A. W. Descriptive and Inferential Statistics. *Companion Encycl. Psychol.* 1099–1121 (2019) doi:10.4324/9781315542072-28.

[10]. Sharma, G., Gadhiya, J. & Dhanawat, M. Textbook of Cosmetic Formulations. 51–52 (2018).

[11]. Fiume, M. M. *et al*. Safety Assessment of Microbial Polysaccharide Gums as Used in Cosmetics. *Int. J. Toxicol.* **35**, 5S-49S (2016).

[12]. Codex Alimentarius Commission. Codex Alimen. *Codex Stand. Fermented Milks* 243–2003 (2003).

[13]. Reveny, J., Tanuwijaya, J. & Stanley, M. Formulation and Evaluating Anti-Aging Effect of Vitamin E in Biocellulose Sheet Mask. *Int. J. ChemTech Res.* **10**, (322-330) (2017).

[14]. Poojary, M. M., Vishnumurthy, K. A. & Vasudeva Adhikari, A. Extraction, characterization and biological studies of phytochemicals from Mammea suriga. *J. Pharm. Anal.* **5**, 182–189 (2015).