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with oven drying

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The use of different concentrations of curcuma (*Curcuma xanthorrhiza* Roxb) on the chemical quality of *Bedak Lotong* kefir face mask with oven drying

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Abstract. *Bedak Lotong* kefir face mask is a combination of kefir and a traditional black face powder of the Buginese in South Sulawesi, Indonesia. The *Bedak Lotong* face powder used natural ingredients that are rich in phenol compounds, i.e., black glutinous rice (*Oryza Sativa* L. *glutinosa*), Curcuma (*Curcuma xanthorrhiza* Roxb) and tamarind (*Tamarindus indica* L.). This study was aimed to analyze the effect of different concentrations of curcuma (*Curcuma xanthorrhiza* Roxb) on the chemical quality of *Bedak Lotong* kefir face mask. This research was conducted at the Laboratory of Biotechnology of Dairy Processing, Hasanuddin University, Makassar. A completely randomized design was used, the curcuma concentrations were 0%, 15%, 30% and 45%, and with oven drying. Each concentration was done three times. The result showed that an increase in the concentration of curcuma on *Bedak Lotong* increased antioxidant activity and alcohol content and also reduced the level of fat oxidation or Thiobarbituric acid (TBA) value of *Bedak Lotong* kefir face mask with oven drying.

1. Introduction

Kefir is a good fermented beverage for body health and also beneficial for skin [1–3]. Kefir can be applied as a face mask [2]. The content of lactic acid in kefir prevented the growth of several types of bacteria that cause acne (*Propionibacterium acne* and *Sthapylococcus epidermis*) [2], as a moisturizer and exfoliation of the skin [4], inhibited the activity of enzymes (*tyrosinase*) that cause browning of the skin [5]. Phenolic compounds in kefir are very effective in overcoming skin problems caused by free radicals [6].

Various natural ingredients were readily available and had active components for skincare. A natural product that resembles a mask and is a typical product of the Buginese in South Sulawesi, Indonesia, is *Bedak Lotong* (read: black face powder). Especially for Buginese women, *Bedak Lotong* is believed to treat skin health and traditionally processed. The natural ingredients are black glutinous rice (*Oryza sativa* L. *glutinosa*) containing anthocyanin as natural coloring, curcuma (*Curcuma xanthorrhiza* Roxb) with a high content of curcumin as an antioxidant and an anti-inflammatory, and Javanese tamarind (*Tamarindus indica* L) containing flavonoids, saponins, and alkaloids which can prevent the growth of pathogenic microorganisms, as well as antioxidants [7]. This study aimed to determine the effect of different concentrations of curcuma in *Bedak Lotong* kefir face mask on antioxidant activity, TBA values, and alcohol content.



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2. Materials and methods

2.1. Research and procedure

Cow milk kefir combined with *Bedak Lotong*, with a ratio of 50:50, was stirred evenly with curcuma on the concentration of 0%, 15%, 30%, and 45%. The drying process was conducted using an oven. The samples were put into the chamber and then dried with a temperature of 40-50°C for ±48 hours until completely dry. Further, dry *Bedak Lotong* kefir was mashed for 2 minutes and sieved with a 60 mesh filter so it became a soft powder [8].

2.2. Measured parameter

The parameters measured in this study were the antioxidant activity of DPPH (*1,1-diphenyl-2-picrylhydrazyl*), the level of fat oxidation or TBA, and the alcohol content [8].

3. Data analysis

This study used a completely randomized design with curcuma concentration of 0%, 15%, 30%, and 45% with oven drying. Each concentration was repeated three times. Data were analyzed using analysis of variance and processed with SPSS 16.0. The Duncan method was used for further tests.

3. Results and discussion

3.1. Antioxidant activity of *Bedak Lotong* kefir face mask

The antioxidant activity of the *Bedak Lotong* kefir face mask with different concentrations of curcuma (*Curcuma xanthorrhiza* Roxb) was presented in figure 1.

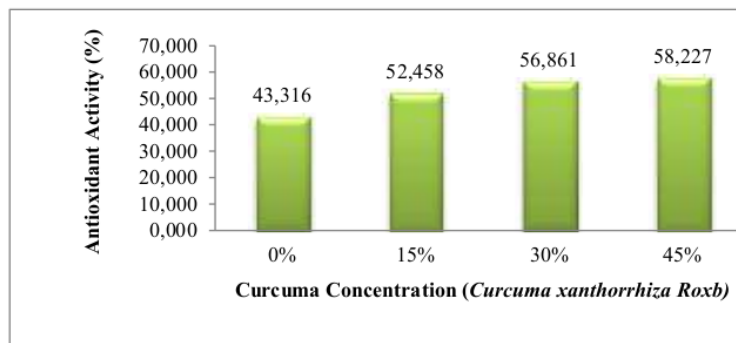


Figure 1. Antioxidant activity of *Bedak Lotong* kefir face mask with different concentrations of curcuma (*Curcuma xanthorrhiza* Roxb).

The different concentrations of curcuma (*Curcuma xanthorrhiza* Roxb) did not show any significant effect. However, there was still an increase in antioxidant activity with the addition of curcuma concentration in the *Bedak Lotong* kefir face mask. The starch color in the curcuma rhizome was yellowish-white because it was rich in curcuminoids. Curcuminoids were effective in neutralizing toxins and act as an antioxidant to prevent free radical compounds [9,10]. Phenol compounds in curcuma rhizomes also functioned as antioxidants because of their ability to eliminate free radicals and peroxide radicals [9]. In addition to the curcuma component, the composition of black powder consisting of black glutinous rice (*Oryza Sativa* L. *glutinosa*) and Javanese tamarind (*Tamarindus indica*), which also had an antioxidant component, i.e., anthocyanin in black glutinous rice [11] and saponins in Javanese tamarind [12].

3.2. Thiobarbituric acid (TBA) value of *Bedak Lotong* kefir face mask

The TBA value of the *Bedak Lotong* kefir face mask with different concentrations of curcuma (*Curcuma xanthorrhiza* Roxb) was presented in figure 2.

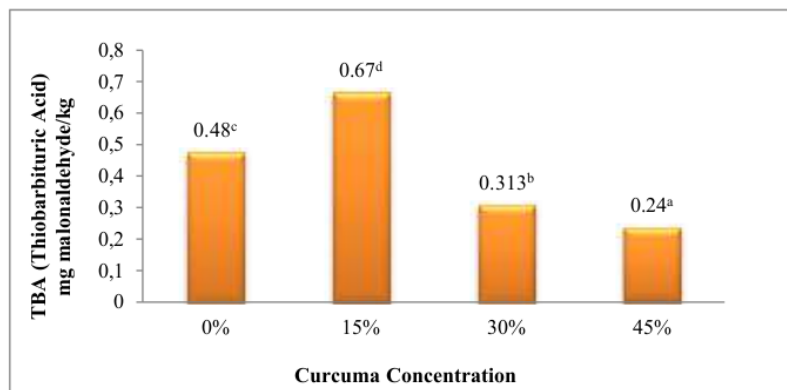


Figure 2. The TBA value of *Bedak Lotong* kefir face mask with different concentrations of curcuma (*Curcuma xanthorrhiza* Roxb). ^{a,b,c} different superscripts on the diagram showed significant differences ($P < 0.05$).

The results show that the addition of curcuma (*Curcuma xanthorrhiza* Roxb) on *Bedak Lotong* kefir face mask had a significant effect ($P < 0.05$) on the level of fat oxidation or the TBA value. The higher concentration of curcuma in *Bedak Lotong* kefir face mask, the higher ability to inhibit free radicals and reduced levels of fat oxidation. This was due to the essential oil content of curcuma (*Curcuma xanthorrhiza* Roxb), which able to provide inhibition against oxidative damage. The inhibition of oxidative damage was related to the antioxidant activity of essential oils [13]. Also, kefir contains antioxidants that interact with free radicals and stabilize free radicals to prevent cell damage. Kefir contributed more protons than unfermented milk so it can inhibit free radicals and reduce levels of fat oxidation [14].

3.3. The alcohol content in *Bedak Lotong* kefir face mask

The alcohol content of *Bedak Lotong* kefir face mask with different concentrations of curcuma (*Curcuma xanthorrhiza* Roxb) was presented in figure 3. The results showed that curcuma concentration (*Curcuma xanthorrhiza* Roxb) on the *Bedak Lotong* kefir face mask had a significant effect ($P < 0.05$) on the alcohol content. The alcohol content increased with the enhancing levels of curcuma concentration. Kefir is alcoholic; it contained about 1% lactic acid and 0.5-1.0% alcohol. The alcohol content in kefir is influenced by the metabolism of yeast and heterofermentative bacteria that produce alcohol. Also, the curcuma component contained starch and alcohol extracts [8], which were converted by kefir microbes to lactic acid and produced alcohol. Acidity affected the ability of yeast to produce alcohol. Lactic acid bacteria (LAB) and yeast lived in mutualism, where the yeasts utilized lactic acids produced by LAB, and H_2O_2 produced by LAB were removed by catalase produced by yeast. Furthermore, yeast produced alcohol and compounds that stimulate the growth of LAB [3,15–17].

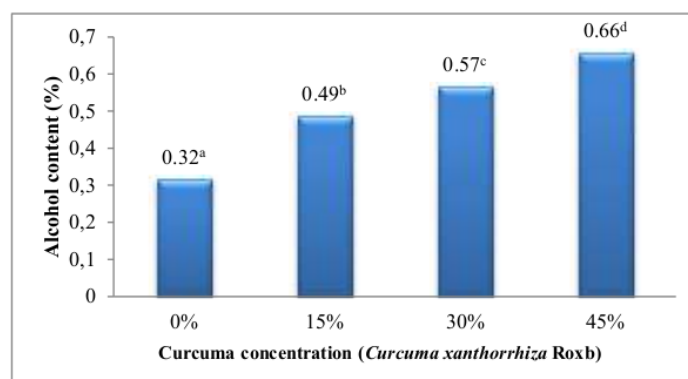


Figure 3. The alcohol content of *Bedak Lotong* kefir face mask with different concentrations of curcuma. ^{a,b,c} different superscripts on the diagram showed significant differences ($P<0.05$).

4. Conclusion

The higher concentration of curcuma (*Curcuma xanthorrhiza* Roxb) increased antioxidant activity and alcohol content. It was able to reduce the level of fat oxidation or TBA (Thiobarbituric acid) value in *Bedak Lotong* kefir mace mask with oven drying.

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