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| RESEARCH ARTICLE

Formulation of Natural Coffee Cream in Increasing Antioxidants as an Effort to Prevent Skin Aging

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| ABSTRACT
Skin aging is caused by the excessive production of free radicals in the body, thus causing damage to skin tissue; this also results in damage to skin collagen, which further accelerates the aging process of the skin. The purpose of this study was to determine the effect of giving coffee cosmetic creams on reducing superoxide dismutase (SOD) levels in the skin aging process. This study used a true experiment design with a post-test-only group design research design. The population in this study was an old female Wistar (Rattus norvegicus) weighing 200-250 grams and aged 14-16 months. The overall sample count was 24 female wistars divided for each group was 6 in 4 treatment groups. SOD level data were measured using the ELISA (Enzyme Linked Immune-Sorbent Assay) method. The data obtained were analyzed using the Kruskal Wallis Test and the Mann Whitney Test. The results showed that there was a significant increase in SOD levels ($p < 0.05$), so it can be concluded that giving coffee cosmetic creams increases SOD levels, meaning that there is an increase in SOD or the main antioxidant enzyme that can ward off free radicals.

| KEYWORDS

Cosmetic creams of coffee, SOD, antioxidants

| ARTICLE INFORMATION

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1. Introduction

The aging process of the skin is a physiological process that cannot be avoided (Ahmad & Damayanti, 2018). Normally cells in the body produce free radicals as part of metabolic processes (Marius-Daniel, Stelian, & Dragomir, 2010); this causes damage to skin tissue (Sharma, Gupta, & Rao, 2012) besides; it also results in damage to skin collagen which further accelerates the aging process of the skin (Pangkahila et al., 2017). The aging process can be overcome by the use of anti-aging cosmetics, but the chemicals contained in cosmetics can cause side effects (Alifah & Susilawati, 2018). Retinoic acid is an anti-aging ingredient that is quite dangerous. Retinoic acid has an effect on disorders of the central nerve, face, heart and thymus, as well as cheilitis (wounds in the corners of the lips) (Khalil et al., 2017). Cases of malformations in the ears of babies born also occur in women who always use tretinoin cosmetic creams (Makatita, Wardhani, & Nuraini, 2020). Beauty products to prevent skin aging are usually produced in the form of chemicals that cause side effects, so herbal products in the form of coffee contain phenolic compounds as antioxidants that have a protective effect against free radical oxygen (Yuwono, 2014, Dhurhania & Novianto, 2019) Research also shows that coffee for the spa is able to inhibit an increase in cortisol and catecholamine levels which are useful for warding off stress on the skin, (Young Park & Pyung Lee, 2015) coffee administration affects the increase in collagen levels by giving 10% coffee extract (Girsang, Fachrial, & Lister, 2020). The potential of coffee as an anti-aging cosmetic cream has benefits in preventing skin aging, so further research needs to be done.

Coffee, as a herbal ingredient, is useful for increasing SOD levels and increasing collagen levels in an effort to prevent skin aging. Coffee contains antioxidant compounds that are considered the most relevant against the action of free radicals as a major contributor to the development of oxidative stress. Oxidative stress occurs when the production of oxidant molecule cells exceeds the availability of antioxidants that are able to defeat free radicals (Martini et al., 2016); there is an increase in collagen levels by

giving coffee extract 10%, and the magnitude of concentration and duration of administration has a positive influence on increasing collagen levels (Girsang et al., 2020). Coffee contains phenolic compounds as antioxidants that have the effect of protecting the skin from free radical oxygen (Yuwono, 2014; Dhurhania & Novianto, 2019). Several previous studies have examined coffee with ingredients that can be used as anti-aging but have not researched coffee in the form of a cream that is able to increase SOD, the main antioxidant enzyme that can ward off free radicals to prevent skin aging.

2. Literature Review

Aging is a stage of decline in the biological functions of the body, the speed of which depends on internal and external factors. Internal factors that cause the aging process are free radicals, changes in hormone levels, methylation, glycosylation processes, apoptosis, a declining immune system and genes. This factor can be minimized in order to slow down the aging process, including if the cause of aging is free radicals, it can be overcome by giving antioxide.

The benefits of coffee cream in preventing skin aging Residents in coffee-producing areas have long used coffee to care for the skin and prevent aging. This habit is currently still widely practiced by residents in urban areas to tighten the skin to look youthful.

3. Methodology

This study used a true experiment design with a post test only group design research design. The population in this study was an old female wistar (Rattus norvegicus) weighing 200-250 grams who was 14-16 months old and had been conditioned or adapted and fed for 4 days. Female wistar is very suitable for disease research in humans with the similarity of DNA organization and gene expression, where 98% of human genes have genes comparable to wistar genes. The research to be carried out is divided into 4 groups, namely variations in coffee cream concentration consisting of 0% (control), 10%, 15% and 20%. Based on calculations, it is known that the number of samples as a whole is 24 wistar females divided for each group 6 heads.

Macroscopic observations of the total pasteurity of SOD levels in the aging process of female wistar skin. Measurement of the total capacity of SOD levels of each female wistar group was carried out from day 21. This refers to the research of Nuzantry and Widayanti, who conducted research on the administration of aloe vera extract and olive oil in preventing dryness on the skin; the results showed that the use of aloe vera extract and olive oil applied on the hand for 21 days increases moisture on the skin and effectively prevents skin dryness, (Nuzantry & Widayati, 2015) it can be assumed that the administration of the cream is effective in increasing the amount of collagen after 21 days. Measurement of SOD levels using the ELISA (Enzyme Linked Immune-Sorbent Assay) method. The blood that has been taken is centrifuged and put into the ESTA tube. The plasma obtained was examined for SOD levels using the ELISA (Enzyme Linked Immune-Sorbent Assay) method. Superoxide dismustase (SOD) is one of the main antioxidant enzymes that counteract free radicals (Winarsih, 2017; Knight, 2020).

The observational data were analyzed statistically non-parametrically with the Kruskal Wallis Test. This statistical analysis uses the SPSS (Statistical Product and Service Solution) program, and $p < 0.05$ is selected as the minimum level of signification. The Kruskal Wallis Test was chosen because the study data were not normally distributed, and the study used more than two groups to test generalizations so that the sample data was considered representative of the population. Furthermore, the Pabila in the Kruskal-Wallis Test produced a $p < 0.05$, followed by conducting the Mann Whitney Test (Sopiyudin Dahlan, 2013).

4. Results and Discussion

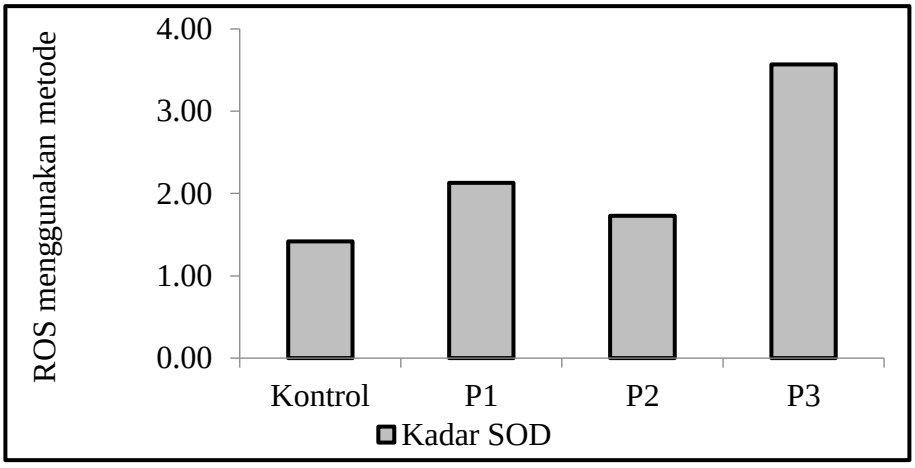
The results of the statistical analysis of the effectiveness of giving coffee cosmetic creams against superoxide dismutase (SOD) levels in the aging process of female wistar skin in this study can be described in table 1.

Table 1. Total SOD Content Data

Variable	Group				p-value
	Control n=6 Mean SD±	P1 n=6 Mean SD±	P2 n=6 Mean SD±	P3 n=6 Mean SD±	
SOD levels	1. 42 0±. 51	2.13 0.27±	1.73 0.37±	3.57 2.42±	
Saphiro Wilk	0.797	0.988	0.799	0.728	
Levene Test					0.000
Kruskal-Wallis Test					0.030

Based on data on SOD levels, it can be seen that the largest SOD level is in the administration of coffee cosmetic creams with a concentration of 20% with a Mean value of 3.57 2.42; this shows that giving coffee cosmetic creams with a concentration of 20% has the greatest contribution in increasing SOD levels. Coffee consists of phenolic compounds as antioxidants that have a

protective effect against the influence of free radical oxygen as antioxidants so as to reduce the number of cell damage (radical scavenger) by inhibiting lipid peroxidation. (Yuwono, 2014) Phenolic compounds, namely compounds that contain Phenolic Acid consisting of: Chlorogenic Acid, 3-Caffeoylquinic Acid, and Hydrooxicinnamates, have been known to have anti-inflammatory properties, namely reducing the effects of hislamin, bradykinin, and lecotriene, and which in akhimya can reduce the effect of increased capillary permeability during the inflammatory phase so as to prevent the exit of macromolecules from microcirculation and reduce swelling (edema). ±



Kruskal-Wallis test: *mean difference significant p < 0.05
Figure 1. Graph of SOD Levels in All Research Groups
(*significant p < 0.05)

Table 2. Mann Whitney Test of SOD Levels between Research Groups

Group	Group Checklists	Significance
Control	P1*	0.041
	P2	0.180
	P3*	0.026
P1	Control	0.041
	P2	0.093
	P3	0.818
P2	Control	0.180
	P1	0.093
	P3	0.093
P3	Control*	0.026
	P1	0.818
	P2	0.093

Based on the picture above, it appears that the administration of coffee cosmetic creams significantly affects the increase in SOD levels, but the administration of coffee cosmetic creams is not significant at a concentration value of 15%. In the descriptive data of SOD levels of each group, a normality test was carried out using Saphiro Wilk and a Homogeneity Test using the Levene Test. Normality and homogeneity test results obtained insignificant values in group 3 (P3) with p < 0.05. The results showed that the data were not distributed normally and homogeneously, so a non-parametric Kruskal-Wallis Test was carried out, and the Mann Whitney Test was continued. The Kruskal-Wallis Test difference test obtained p < 0.05, and the results of the Kruskal-Wallis Test further test are presented in the form of graphs in figure 5.1 and table 5.2. In this study, a significant difference of P < 0.05 was obtained between giving coffee cosmetic creams at concentrations of 10% and 20% with the research group.

Coffee is known to have a composition that has the potential to be an antioxidant. The content of this coffee includes the minerals manganese (Mn), zinc (Zn), and copper (Cu), which stimulate the enzyme superoxide dismutase (SOD) to work. Serum SOD levels

are one of the indicators that indicate the status of antioxidants in the body. SOD is an endogenous enzymatic antioxidant. SOD is needed to compensate for high oxidative stress in the body (Aritanoga, Effendi, & Herawati, 2019). Low serum SOD levels can occur due to an imbalance between the amount of antioxidants produced by the body and the amount of free radicals formed as a result of acute submaximal physical exercise performed by the subject. Free radicals that are too high will interfere with the synthesis of SOD, and this disturbance will cause a decrease in the levels of SOD produced, so it cannot compensate for the free radicals formed (Poljsak, 2011). Coffee as an exogenous antioxidant ingredient can increase endogenous antioxidant enzymes such as SOD, catalase (CAT), and glutathione peroxidase (GPx). The flavonoid content in coffee works as an antioxidant by increasing SOD levels by donating hydrogen ions and electrons to superoxide anions so that it becomes more stable to protect lipo-proteins and DNA from oxidation (Dembinska-Kiec, Mykkänen, Kiec-Wilk, & Mykkänen, 2008). In this study, researchers found that giving coffee cosmetic creams can increase SOD levels depending on the amount of concentration.

Phenolic compounds in coffee are the largest group of compounds that act as natural antioxidants in plants. Phenolic compounds have one (phenol) or more (polyphenols) phenol rings, that is, hydroxy groups bound to aromatic rings so that they are easily oxidized by donating hydrogen atoms to free radicals. Its ability to form stable phenoxy radicals in oxidation reactions causes phenolic compounds to have great potential as antioxidants (Dhurhania & Novianto, 2019). Antioxidants are very beneficial in preventing aging and degenerative diseases. Aging is a process that occurs in all living things that can cause progressive changes in all organs, including the skin (Nurulita, Sundhani, Amalia, Rahmawati, & Dian Utami, 2019). Antioxidants found in coffee are Flavonoids. Flavonoids are a large group of plant polyphenol compounds that are widespread in various foodstuffs and in various concentrations. Polyphenols are one of the non-nutritional bioactive components that provide healthy functional effects on the body. Many polyphenol compounds are contained in tea, coffee, spices, cocoa, grains, cereals, flowers, vegetables, and others. Many polyphenol compounds show their activity as antioxidants. Polyphenols are chemical compounds that work as powerful antioxidants in coffee (Almada, 2009).

5. Conclusion

Based on the results of the study, it can be concluded that there is a significant increase in SOD levels ($p < 0.05$), so it can be concluded that giving coffee cosmetic creams increases SOD levels, meaning that there is an increase in SOD or the main antioxidant enzyme that can ward off free radicals to prevent skin aging.

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