The Potensial of Banana Kepok (Musa Acuminata Balbisiana Colla) Skin on Free Fatty Acid Levels in Oil

by Nastiti Kartikorini

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The Potential of Banana kepok (*Musa acuminata balbisiana Colla*) skin on free fatty acid levels in oil

Nastiti Kartikorini*, Baterun Kunsah, Diah Ariana, Sulistiyorini Damayanti

Medical Laboratory Technology, Department of Health Chemistry, Faculty of Health Science, Muhammadiyah University of Surabaya, Surabaya 60113, Indonesia.
*Corresponding Author E-mail: **nastitikartikorini4956@gmail.com**

ABSTRACT:

Physically, used cooking oil, which is an oil that has been damaged, can be seen from its brown color, rancid smell, thick, foamy and has a high free fatty acid content. This study aims to determine the potential effect of kepok banana peels (*Musa acuminata balbisiana Colla*) on free fatty acid levels in used cooking oil. The study used an experimental research design. Free fatty acid was measured by titration with the Alkalimetric method and expressed in percent.The mean free fatty acid level in used cooking oil without kepok banana peel powder was 0.993%, the mean free fatty acid content in used cooking oil with the application of kepok banana peel powder of 0.095%. After giving kepok banana powder, used cooking oil decreased rancidity, the color of brown cooking oil was brighter, the smell was fresher, indicating that there was a potential effect of kepok banana peel on free fatty acid levels in used cooking oil. There was a difference in the free fatty acid content of used cooking oil when kepok banana peel powder was administered (p=0.000).Administration of kepok banana peel powder affected reducing free fatty acid levels in used cooking oil.

KEYWORDS: Banana, Kepok banana peel powder, Fatty acid levels, Cooking oil, Antioxidant.

INTRODUCTION:

One of the essential needs needed by the people of Indonesia is cooking oil. Many small and medium industries use cooking oil as auxiliary material in producing a product. In food processing, the oil serves as a medium for conducting heat, adding to the distinctive taste, adding to the calorific value of foodstuffs, and adding to the nutritional value of food[1]. Oil is a medium for frying foodstuffs that are widely consumed by the public. The high demand for fried foods is clear proof of how large fried foods are consumed by people of all ages[2]. Oil or fat is a more effective source of energy than carbohydrates and proteins[3]. Dietary fat is a heterogeneous mixture consisting primarily of triglycerides. Triglycerides are called fats if they are solid at room temperature and are oils if they are liquid at room temperature.

One gram of oil can produce 9 kcal[4]. In addition to providing the most excellent calorific value among other nutrients, oil can also provide a savory taste, texture and appearance of a more attractive material[5].

Repeated use of cooking oil can cause the oil to be damaged. Physically, used cooking oil, which is an oil that has been damaged, can be seen from its brown color, rancid smell, thick, foamy and has high levels of free fatty acids[6]. The hydrolysis process causes the formation of free fatty acids in used cooking oil during the frying process.The water vapor produced during the frying process causes hydrolysis of triglycerides, producing free fatty acids[7]. The increased content of free fatty acids is hazardous for health, such as affecting fat and blood, which can then cause obesity,

poisoning in the body such as diarrhea, cancer, deposition of fat in the blood vessels[8]. The high acid number of a used cooking oil indicates the poor quality of the used cooking oil. Many people prefer to use used cooking oil, for example, for homemakers and fried food sellers, so it is necessary to regenerate used cooking oil. Regeneration of used cooking oil can be done so that used cooking oil can be reused. Substances or compounds are needed that can prevent damage and regenerate used cooking oil, including antioxidants. Antioxidant compounds are found in, leaf[9–12], peel, flower[13,14], vegetables[15,16], fruit[17] and many more[18]. Antioxidant have a lot of beneficial effect[19].

The skin of the kepok banana (*Musa acuminata balbisiana Colla*) can reduce the number of peroxides in used cooking oil[20]. The kepok banana peel is rich in fat-soluble beta-carotene antioxidants and can inhibit the oxidation process and absorb short-chain fatty acids oxidized in oil. The presence of antioxidant in the skin of the kepok bananais expected to reduce the number of free fatty acids in used cooking oil.In addition, banana peel is a waste material (banana fruit waste) which is quite a lot. In general, banana peels have not been used for real, only disposed of as organic waste or used as fodder for livestock such as goats, cows, and buffalo[21]. A large number of banana peels will have a high use value if they used to improve the quality of used cooking oil.This study aims to determine the potential effect of kepok banana peels on free fatty acid levels in used cooking oil.

MATERIALS AND METHODS:

This study was an experimental study that aimed to determine the effect of kepok banana peel (*Musa acuminata balbisiana Colla*) on free fatty acid levels in used cooking oil. The population in this study were all used cooking oil used by fried food traders in Sutorejo Street, Surabaya, Indonesia. About 16 samples examined used cooking oil taken randomly from fried food vendors along Sutorejo Street, Surabaya, Indonesia. The minimum experimental in this study were 32 experimental units. The location for taking used cooking oil samples was carried out along Sutorejo Street, Surabaya, Indonesia. Meanwhile, the location for free fatty acid levels examination was carried out at the Health Chemistry Laboratory of the D3 Medical Laboratory Technology Study Program, Faculty of Health Sciences, University of Muhammadiyah Surabaya, Indonesia. The research was carried out from November 2020 to May 2021, while the examination was carried out from January to February 2021.

The dependent variable was free fatty acid content.There were several free fatty acids (calculated as lauric acid) contained in used cooking oil, expressed in percent and measured by titration with the Alkalimetric method. The independent variables were used cooking oil given kepok banana peel powder and used cooking oil not given kepok banana peel powder. The control variables were oil volume, heating time, heating temperature, and kepok banana peel powder weight. The volume of used cooking oil was 10 grams, and the heating time was 35 minutes, the heating temperature was 70°C, the weight of the kepok banana peel powder was 3 grams.
We used data collection methods in the form of observation methods with laboratory test instruments to obtain quantitative data. The principles used in this research were acid number expressed as the amount of NaOH used to neutralize free fatty acids in 1gram of fat or oil.The tools used in this research were Erlenmeyer with 250mL asa cap, burette, volumetric flask, beaker glass, volume pipette, water bath, thermometer, mortal, stirring rod, oven, funnel.The reagents used in this study were 0.1 N NaOH, 0.1 N oxalic acid, 1% PP indicator, 96% neutral alcohol.

Finally, we analyzed data on the potential effect of kepok banana peel on free fatty acid levels in used cooking oil using a t-test statistical test with a significance level (α) of 0.01 was used and carried out using the help of SPSS.

RESULTS:

Data showed the potential effect of kepok banana peels on free fatty acid levels in used cooking oil conducted at the Health Chemistry Laboratory of Medical Laboratory Technology Study Program, Faculty of Health Sciences, Muhammadiyah University Surabaya (Table 1).

Table 1. Data of examination of free fatty acid levels in cooking oil

Sample Code	Free Fatty Acid Rate (%)	
	WithoutKepok Banana Skin Powder	WithKepok Banana Skin Powder
1	0.89	0.07
2	1.22	0.16
3	1.15	0.12
4	0.82	0.05
5	1.90	0.18
6	0.45	0.03
7	0.54	0.07

8	0.60	0.06
9	0.63	0.05
10	1.02	0.07
11	1.09	0.12
12	1.15	0.14
13	1.06	0.09
14	1.92	0.19
15	0.48	0.05
16	1.01	0.07
Total	15.91	1.52
Mean	0.994	0.095
Standard Deviation	0.439	0.502

Based on Table1, there was a decrease in free fatty acid levels between used cooking oil that was not given kepok banana peel powder and used cooking oil given kepok banana peel powder, or it can be said that as many as 100% of cooking oils had met the maximum requirements for free fatty acids. The paired t-test showed an effect of gave kepok banana peel powder on the levels of free fatty acids in used cooking oil (p=0.000).

Figure 1 shows the mean free fatty acid content in used cooking oil that was not given kepok banana peel powder was 0.993%, and the mean free fatty acid content in used cooking oil-fed kepok banana peel powder was 0.095%.

Figure1. Graph of the mean free fatty acid content in used cooking oil

Performed organoleptic test:

Physically, organoleptic tests were carried out on samples of used cooking oil. Based on Table 2, the organoleptic test of used cooking oil before being given kepok banana powder, rancid cooking oil taste, blackish-brown cooking oil color, sour cooking oil smell. After giving kepok banana powder, used cooking oil decreased rancidity, the color of brown cooking oil was brighter, the smell was fresher, meaning that there was a potential effect of kepok banana peel on free fatty acid levels in used cooking oil.

Table 2. Cooking oil organoleptic test

The Rancid	Before GaveKepok Banana Powder	After GaveKepok Banana Powder	Description
Taste	The rancid	Taste was reduced	There waspotential
Color	Dark brown color	Color Brighter brown	There was potential
Sour	Acid	Smell Fresher	There was potential

Based on Table 2, the organoleptic test of used cooking oil before gave kepok banana powder, rancid cooking oil taste, blackish-brown cooking oil color, sour cooking oil smell.After giving kepok banana powder, used cooking oil decreased rancidity, the color of brown cooking oil was brighter, the smell was fresher, meaning that there was a potential effect of kepok banana peel on free fatty acid levels in used cooking oil. The paired t-test showed an effect of gave kepok banana peel powder on the levels of free fatty acids in used cooking oil (p=0.000).

DISCUSSION:

The mean free fatty acid rate in used cooking oil without kepok banana peel powder is higher than the used cooking oil with kepok banana peel powder. There is an effect of giving kepok banana peel powder on free fatty acid levels in used cooking oil. In used cooking oil that is not given kepok banana peel powder, the free fatty acid content is high due to the oxidation process of the double bonds in the unsaturated fatty acids from cooking oil, indicating a double bond[22]. The unsaturated fatty acids will break up into saturated fatty acids, which form free radical compounds, one of which is free fatty acids. The oxidation process is caused by the air (in this case, oxygen) that is around during the heating process so that oxygen will bind the double bonds in unsaturated fatty acids. In addition to the oxidation process, free fatty acids will also be increased by the hydrolysis process during the heating process, where water vapor will be produced in the heating process. The water vapor will trigger the termination of the triglyceride chain into free fatty acids. The oil easily undergoes hydrolysis and oxidation processes to form carcinogenic compounds[23].

There was a decrease in free fatty acid levels in used cooking oil given kepok banana peel powder. Various antioxidant compounds in the kepok banana peel were given to used cooking oil, including vitamin C, antioxidant gallocatechin, and antioxidant beta carotene[24]. So that the antioxidant compounds contained in kepok banana peels are known to inhibit the oxidation and hydrolysis processes in unsaturated fatty acids by absorbing short-chain fatty acids resulting from oxidation in oil to prevent the breakdown of fatty acids from triglycerides into free fatty acids[25].These compounds cause further inhibition of oxidation in cooking oil that antioxidants have many double bonds that are easily oxidized so that when the oxidation process occurs, the unsaturated double bonds in the oil are oxidized first[25].

There is a non-uniformity in the decrease in free fatty acids. This is caused by several things, such as the size of the adsorbent, because the larger the surface area of the adsorbent, the more substances are adsorbed. In addition to the size of the adsorbent, the stirring speed also affects the adsorption process of a reaction[26]. If the stirring is too slow, then the adsorption process will run slowly too. In this case, the researchers also did not consider the stirring speed. In addition, the percent non-uniformity of the decrease in free fatty acid levels was also influenced by the significant non-uniformity of antioxidant compounds in the kepok banana peel powder[27]. There are several samples whose free fatty acid levels are relatively small. The decrease in free fatty acid levels tends to be small because the smaller the free fatty acid level, the more difficult it is to reduce it. This matter is caused by the smaller dispersion of the adsorbent so that it is more difficult for the active substance to diffuse or release the active substance, which causes the resulting inhibition to be smaller[7].

CONCLUSION:

Administration of kepok banana peel powder affected reducing free fatty acid levels in used cooking oil.The mean free fatty acid levels in used cooking oil without the application of kepok banana peel powder while the mean free fatty acid levels in used cooking oil with the application of kepok banana peel powder.

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CONFLICT OF INTEREST:

The authors declare no conflict of interest.

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