



Analysis of Free Fatty Acids Content of Oil Used in Street Food Traders in Parangtambung Village, Makassar 2016

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Abstract

Cooking oil is one of the basic human needs as a means of processing the foodstuffs. Free fatty acids is the result of the degradation of triglyceride, as a result of damage to oil. The aim of this study was to determine the levels of free fatty acids in edible oils is eligible based SNI 01 -3741-2002 about quality standard of cooking oil before frying and how the content of free fatty acids after 2 times, 3 times and 4 times the addition of cooking oil during the frying process from start to finish frying. The study was conducted in a descriptive approach that is the objective description with purposive sampling method. Analysis of free fatty acids was conducted using a titrimetry method in Balai Besar Laboratorim Kesehatan Makassar. Based on the research results, free fatty acids for the initial sample of traders 1 0.15% traders 2 0.20%, the traders 3 0.15%. Based on 2 times the addition of free fatty acids content results are varied, for traders I second sample of 0.25%, traders 2 second sample of 0.30%, and for the traders 3 second sample of 0.25%. Based on the addition of 3 times the content of free fatty acids results are varied, for the first traders third sample 0.59%, 2 traders third sample 0.55%, and for the third sample 3 traders 0.30%. Based on the addition of 4 times the content of free fatty acids results are varied, for the first traders fourth sample of 0.65%, 2 traders fourth sample 0.85%, and for the fourth sample 3 traders 0.34%. The results showed that out of 12 total sample there were 5 samples that are not eligible where the maximum limit of 0.30% of free fatty acids. Dangers of free fatty acids can cause cancer and heart disease. Therefore, traders are advised to the public and street food to not use cooking oil repeatedly, in addition, for the agencies that are supposed to provide socialization on the use of cooking oil are often used repeatedly.

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Keywords: Cooking oil; fatty oils; street food.

1. Introduction

In Indonesia, food in hawker (street food) has become an integral part of people's lives, both in urban and street food in the villages community. Street food consumption in community is counted continue rising due to the limited time family members to process food itself. Superiority street food is cheap and easy obtained, and the taste is delicious and fit most society tastes [1]. According to [2] it mentioned fried foods chosen by almost half of all households in Indonesia (49%). The food was fried well-liked and widely consumed by the various people of all ages. Fried foodstuffs occupy a fairly large portion of daily food menu. In the process of frying, the oil serves as a medium of heat, add a savory taste, and add nutritional value and calories in food. Frying is a way to cook food that is widely practiced in Indonesia that used cooking oil that serves as a conductor of heat finalizing meals [3]. Numbers of demand fried food is a good proof of how much the amount of fried food consumed by human all ages of society [4].

One of the important requirements needed by the people of Indonesia are cooking oil. Cooking oil is a vegetable oil that has been purified and can be used as a food ingredient. Oil in addition to providing numbers caloric value of the largest among other nutrients can also provide a savory taste, texture and appearance of food become more attractive, as well as a dry surface [5]. Cooking oil also makes food crisp, dry and golden brown / tan, but if the cooking oil used repeatedly can be harmful to health [6].

Cooking oil is used repeatedly for frying can be harmful to health because of the oil constituent compounds can undergo physical and chemical changes. Repeatedly use of cooking oil usually found in shops or places that sell street food [4]. Cooking oil that has not been used is composed of unsaturated fatty acids or fatty acid-containing chemical bonding. Degree of unsaturation of oil decreases with increasing temperature and even heating can cause fatty acid chains break up into free radicals that are harmful to health. Based on research by heating the oil for 30 minutes with temperatures above 125 degrees Celsius could lead to the emergence of new compounds that are toxic to the body from breaking the chains of fatty acids. Besides continuous heating of the oil can be also produced several other compounds that are toxic to the body of the 4-hifroksihekseksal, 4-hidroksioktenal and hepta 2,4-dienal [7].

Throughout the world counted 50 million deaths each year and 39 million deaths are in developing countries (WHO, 1995). Cardiovascular disease are the leading cause of death throughout the world with 12 million (24%) deaths per year in the world [8]. Based on health research in 2009 and 2013 in Indonesia obtained the data that the Indonesian people who consume excess fat increased from 12.8 percent to 40.7 percent, so the increase in the percentage of unhealthy foods is increasing and this became necessary because too closely associated with increase in patients affected by diseases caused by excessive fat consumption. Should we restrict the consumption of fried foods and other fatty foods because if the excess will likely to cause diseases such as heart disease to cancer. It is advisable to consume fats and oils in the daily diet of no more than 25% [9].

Free fatty acids in palm oil is a long-chain fatty acids that are unesterified free fat. Acids containing long-chain

saturated fatty acids. The more free fatty acids consumption, will increase levels of low density lipoprotein (LDL) in the blood which is the bad cholesterol. If the oil continues to be consumed then cholesterol levels in the blood will rise, so that the buildup of fatty streaks in the arteries so clogged blood vessels (*atherosclerosis*). Thus it would be lead to heart disease [10].

The National Standardization Agency (BSN) has set the Indonesia Nasional Standard (SNI) on the quality of cooking oil. One indicator of the quality of the cooking oil is free fatty acids content of the oil. Indonesian National Standard SNI 01-3741-2002 restricts the free fatty acids content as much as 0.30% in each pack. Based on the results of preliminary observations conducted by researchers at the Parangtambung village there are 20 Street Food Traders and the results of a brief interview traders using cooking oil many times during the frying process at least two times the additions and at most 4 times increase. Based on the description of the background, the authors are interested in taking this title because, given the high consumption of edible oils is by every levels of society that makes shifting patterns of disease in the community that originally dominated by communicable and infectious diseases, has now switched to degenerative diseases. So that the authors want to analyze the content of Free fatty Acid of cooking oil used at Street Food Traders in Parangtambung Village Makassar city.

2. Materials and Method

2.1 Types of research

This study uses *observational* with descriptive approach about cooking oil use repeatedly through the free fatty acids content.

2.2 Time and Location Research

1. When the study

Time sampling and processing of the results of research carried out for a month, starting in February 2016.

2. Research sites

The research location is specified in the Parangtambung Village Makassar City.

2.3 Population and Sample

1. Population

The population in this study is all street food traders in Parangtambung Village Makassar City

- a. An unknown number of street food traders in Parangtambung Village Makassar City as 15 traders.

2. Samples

In this study, the sample is divided into two, namely:

- a. Subjective : 3 street food traders in the Parangtambung Village
- b. Objective : 12 samples of cooking oil used by the street food traders.

3. Sampling technique

Sampling was done by using *purposive sampling* method, with the following considerations:

- a. Traders want to be interviewed
- b. The most crowded and frequently visited and
- c. Most types of fried foods

2.4 Conceptual framework

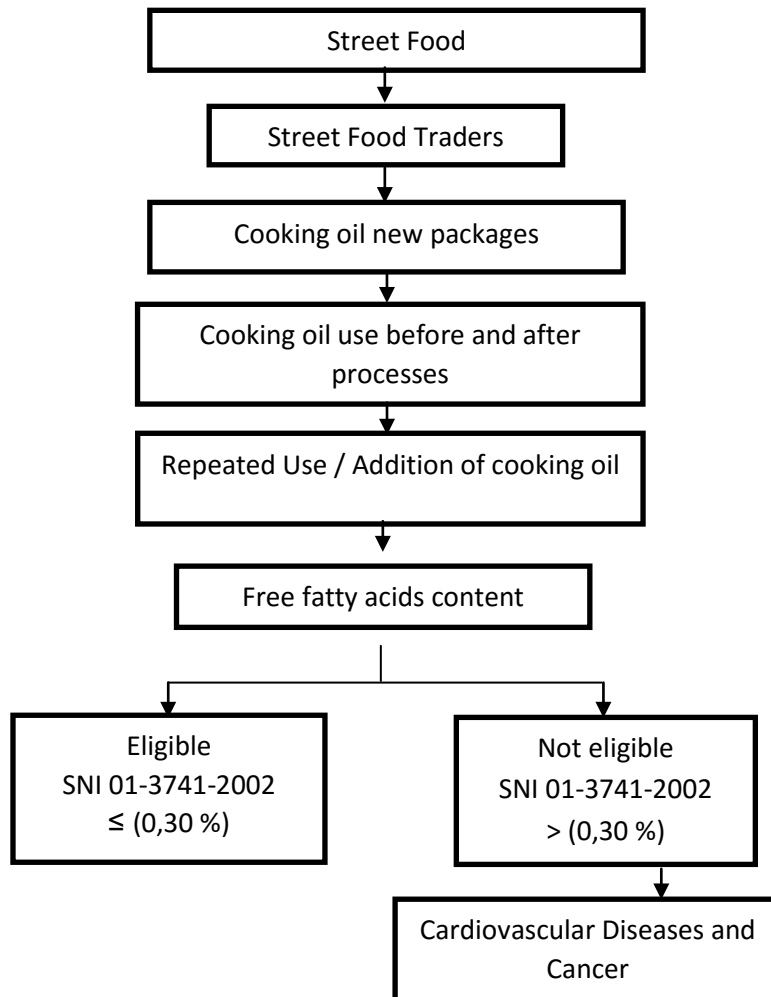


Figure 1

2.5 Operational definition

1. Cooking oil

Cooking oil is referred to in this research is oil packaging and bulk oil used to fry foods in this cider and fried sea which was selected as the test sample before and after frying.

2. Free Fatty Acids

Free fatty acids are referred to in this research is the content of free fatty acids that are in the cooking oil samples before and after the frying process at the traders marine cider and fried snacks.

3. Street Food Traders

Street Food Traders referred to in this research is the Street Food Traders has been used as a test sampling in this Street Food Traders who was in the Parangtambung Village Makassar City.

2.6 Objective criteria

1. Eligible: Cooking oil is eligible if free fatty acids $\leq 0.30\%$ by the Indonesian National Standard 01-3741-2002.
2. Not eligible: Cooking oil is not eligible if free fatty acids $> 0.30\%$ by the Indonesian National Standard 01-3741-2002.

2.7 Data collection technique

1. Primary data

The primary data obtained from interviews with street food traders and fried, observations and laboratory tests were performed.

2. Secondary data

Secondary data were obtained from literature study, internet and literature supporting this research.

2.8 Analysis and Presentation of Data

1. Univariate

Results of laboratory analysis of samples analyzed by referring to the Indonesian National Standard 01-3741-2002 presented in tables and analyzed descriptively.

2. Bivariate

The results of the laboratory analysis on the samples were analyzed with the aim of comparing the results of the

analysis of the samples using Comparative Test.

3. Results and Discussion

3.1 Result

Based on the research that has been conducted in March 2016, the measurement of free fatty acids in the oils used by the street food traders in Parangtambung Village 2016. Samples were taken from three street food traders that are obtained in Parangtambung Village. Result of sample analysis of conducted at the Balai Besar Laboratorim Kesehatan Makassar processed and analyzed descriptively and then adapted to the purpose of research. Data presented in tables that are equipped with the following explanation:

1. Results of Laboratory Tests for Free Fatty Acids Content

Table 1: The results of the free fatty acids analysis of the cooking oil used by the Street Food Traders in Parangtambung Village

No.	Samples	Time Usage	Free Fatty acids (FFA) (Traders)			Value Standard SNI *
			I	II	III	
1	Initial sample	17:00	0.15%	0.20%	0.15%	0.30%
2	2 x	20:00	0.25%	0.30%	0.25%	
3	3 x	23:00	0.59%	0.55%	0.30%	
4	4 x	1:00	0.65%	0.85%	0.34%	
Average			0.41%	0.47%	0.26%	
explanation			TMS	TMS	MS	

Notes: * Values according to SNI 01-3741-2002 terms of Quality of Edible Oils

MS : Eligible

TMS : Not eligible

Table 1 shows that the results of the free fatty acids in cooking oil that is used by the Street Food Traders , at 17:00 the initial sample indicates that the result of 0.15% free fatty acids but still eligible SNI 01-3741-2002 where the maximum limit of free fatty acids is 0.30% of the eligible standard of cooking oil. At one stall, the second sample shows the oil usage time at 20:00 by 2 times the addition of 0.25% the result of oil contains free fatty acids. The third sample at 23:00 with three times addition of oil shows the result 0.59% contained free fatty acids. 01:00 The fourth sample with 4 times addition of oil shows the results 0.65% contained free fatty acids.

Based on these samples, two samples of fourth sample with addition of oil three times and four times did not eligible SNI 01-3741-2002 which the maximum limit of free fatty acids is 0.30% of the quality standard of

cooking oil.

The second trader indicate the results of free fatty acids in cooking oil that is used by the Street Food Traders , at 17:00 the initial sample indicates that the result of 0.20% contained free fatty acids but still eligible SNI 01-3741-2002 where boundaries maximum free fatty acids is 0.30% of the quality standard of cooking oil. At time of 20:00 oil consumption by 2 times the addition of 0.30% result oil contains free fatty acids. Samples to three at 23:00 with the addition of oil did 3 shows the result of 0.55% free fatty acids. The fourth sample 01:00 with 4 times addition of 0.85% of oil shows the results contain free fatty acids. Based on these samples, two of fourth samples that are adding oil to 3 times and 4 times did not eligible SNI 01-3741-2002 which the maximum limit of free fatty acids is 0.30% of the quality standard of cooking oil.

In the third trader indicate the results of free fatty acids in cooking oil that is used in the initial sample at 17:00 shows the result 0.15% free acid fatty but still eligible SNI 01-3741-2002 which the maximum limit of free fatty acids is 0.30% of the quality standard of cooking oil. On the third traders, second sample shows the oil usage at 20:00 with 2 times addition shows the result 0.25% of oil contains free fatty acids. The third samples at 23:00 with 3 times addition of oil shows the result contain 0.30% free fatty acids. The fourth sample at 01:00 with 4 times addition of oil shows the results contain 0.34% free fatty acids. Based on these fourth samples, one sample with the addition of oil four times are not eligible SNI 01-3741-2002 which the maximum limit of free fatty acids is 0.30% of the quality standard of cooking oil.

Test results of samples which have been examined at the Balai Besar Laboratorim Kesehatan Makassar then analyzed using statistical tests and are described as follows:

2. Statistical Test Result Inter-Sample Cooking Oil

Table 2: Free Fatty Acids Content

No.	Code	Mean	± SD	P. Value
1	Sample 1	0.1667	0.02887	0.368
2	Sample 2	0.2667	0.02887	0.368
3	Sample 3	0.4800	0.15716	0.368
4	Sample 4	0.6133	0.25697	0.368

Source: Data Primer, 2016

Table 2 shows that the average of free fatty acids content of the sample 1 was 0.1667 ± 0.02887 SD, sample 2 the average free fatty acids content was 0.2667 ± 0.02887 SD, samples 3 the average content free fatty acids was 0.4800 ± 0.15716 SD, and for the sample 4 the average free fatty acids content was 0.6133 ± 0.25697 SD.

Based on the statistical test by using test T-test shows that there is no difference in the content of free fatty acids in the sample 1 ($p = 0.368$), sample 2 ($p = 0.368$), sample 3 ($p = 0.368$), and samples 4 ($p = 0.368$).

3. Statistical Test Result ALB Content Change Between Samples

Table 3: Free Fatty Acids Content Changes After the addition of 1, 2, 3, and 4

No.	Sample Code	Mean	± SD	P. Value
1	1-2	0.1167	0.2887	0.368
2	1-3	0.3133	0.14844	0.368
3	1-4	0.4467	0.23459	0.368
4	2-3	0.2133	0.14844	0.368
5	2-4	0.3467	0.23459	0.368
6	3-4	0.1833	0.12014	0.368

Table 3 shows that the average free fatty acids content changes between samples 1-2 was 0.1167 ± 0.2887 SD, sample 1-3 was 0.3133 ± 0.14844 SD, samples 1-4 0.4467 ± 0.23459 SD, sample 2-3 was 0.2133 ± 0.14844 SD, the sample 2-4 was 0.3467 ± 0.23459 AD, and to sample 3-4 was 0.1833 ± 0.12014 SD. So we get the results of changes in free fatty acids content of the lowest value between samples is 1-2, while changes in free fatty acids content highest between samples 1-4.

Based on the statistical test result using T-Test test result that there is no difference in changes in free fatty acids content between the samples 1-2, 1-3, 1-4, 2-3, 2-4, and 3-4 with $p = 0.368 < \alpha 0.05$.

4. Statistical Test Result ALB content changes Between Traders

Table 4: Free Fatty acids Content Changes Inter Street Food Traders

No.	Sample Code	Trader 1	Trader 2	Trader 3	P. Value
		Mean	Mean	Mean	
1	1-2	0.1000	0.1000	0.1500	0.368
2	1-3	0.4400	0.3500	0.6500	0.368
3	1-4	0.5000	0.6500	0.1900	0.368
4	2-3	0.3400	0.2500	0.0500	0.368
5	2-4	0.4000	0.5500	0.0900	0.368
6	3-4	0.0600	0.3000	0.1900	0.368

Table 4 shows that the average change in free fatty acids content in the samples 1-2 is highest in the trader 3 (0.1500) and the lowest in the trader 1 & 2 (0.1000), the highest in the sample 1-3 trader 3 (0.6500) and the lowest in the trader 2 (0.3500), the highest in the sample 1-4 trader 2 (0.6500) and the lowest in three trader (0.1900), at least 2-3 samples high on the trader 1 (0.3400) and the lowest in three trader (0.0500), to sample 2-4

second highest in the trader (0.5500) and the lowest in three trader (0.0900) whereas for sample 3-4 is a trader second highest (0.3000) and the lowest in the trader 1 (0.0600).

Based on the statistical test by using Kruskal Wallis Test result that there is no difference between the changes in fatty acids content street food traders with a value of $p = 0.368$.

5. Differences Statistical Test Result Sample Content between Traders

Table 5: Differences Free Fatty acids Content Each Sample Interagency Oil Traders

No.	Sample Code	Traders 1	Traders 2	Traders 3	P. Value
		Mean	Mean	Mean	
1	1	0.1500	0.2000	0.1500	0.368
2	2	0.2500	0.3000	0.2500	0.368
3	3	0.5900	0.5500	0.3000	0.368
4	4	0.6500	0.8500	0.3400	0.368

Table 5 shows that the average of difference in the free fatty acids content of the sample 1 as the highest, the traders 2 (0.2000) is the lowest in the trader 1 & 2 (0.1500), to sample the second highest in the traders 2 (0.3000) and the lowest in the trader 1 & 2 (0.2500), to sample 3 were highest in the traders 1 (0.5900) and the lowest in three traders (0.3000), whereas for sample 4 is the highest is 2 traders (0.8500) and the lowest in three traders (0.368) with each value of $p = 0.368$.

Based on the statistical test by using Kruskal Wallis Test result that there is no difference in free fatty acids content of each sample of oil between Street Food Traders.

3.2 Discussion

Results of research conducted in March 2016 is the analysis of Free Fatty Acids (FFA) in the cooking oil used at Street Food Traders Parangtambung village at the Balai Besar Laboratorim Kesehatan Makassar using tetrimetry, showed that out of 12 total sample there were 5 samples (41.67%) were not eligible and 7 samples (58.33%) eligible by SNI 01-3741-2002 about quality standard of cooking oil in which the maximum limit of 0.30% of free fatty acids.

The results of the analysis free fatty acids of cooking oil used that is obtained free fatty acids content of the initial sample as much as 0.15% at one traders, the traders 2 0.20%, while 0.15% of traders 3. Bulk cooking oil is cooking oil without the brand being sold free-market and without SNI markets or the marketing authorization of POM or the Health Department. This oil is only supplied by the manufacturer in the packaging drum marketed to retail traders [10].

In trader 1, second sample shows the oil usage at the time 20:00 by 2 times the addition shows contains 0.25%

free fatty acids. Samples to three at 23:00 with the addition of oil did 3 shows contains 0.59% free fatty acids. 01:00 The fourth sample by 4 times the addition of oil shows the results contain 0.65% free fatty acids. Based on these samples two samples of fourth with adding oil 3 times and 4 times did not eligible SNI 01-3741-2002 which the maximum limit of free fatty acids is 0.30% of the quality standard of cooking oil.

In trader 2, second sample showed oil usage time at 20:00 by 2 times the addition of 0.30% the result of oil contains free fatty acids. Samples to three at 23:00 with the addition of oil did 3 shows the result of 0.55% free fatty acids. 01:00 The fourth sample by 4 times the addition of 0.85% of oil shows the results contain free fatty acids. Based on these samples two samples fourth with adding oil to 3 times and 4 times did not eligible SNI 01-3741-2002 which the maximum limit of free fatty acids is 0.30% of the quality standard of cooking oil.

In the trader 3, second sample shows the oil usage at the time 20:00 by 2 times the addition of oil shows contain 0.25% free fatty acids. Samples three at 23:00 with the addition of oil 3 times shows contain 0.30% free fatty acids. The fourth sample at 01:00 with 4 times the addition of oil shows contain 0.34% free fatty acids. Based on these fourth samples, one sample with the addition of oil 4 times are not eligible SNI 01-3741-2002 which the maximum limit of free fatty acids is 0.30% of the quality standard of cooking oil.

Based on statistical test of the average change in free fatty acids content between samples 1-2 was 0.1167 ± 0.2887 SD, sample 1-3 was 0.3133 ± 0.14844 SD, samples 1-4 0.4467 ± 0.23459 SD, the sample was 0.2133 ± 0.14844 2-3 SD, the sample was 0.3467 ± 0.23459 2-4 AD, and to sample 3-4 was 0.1833 ± 0.12014 SD. So we get the results of changes in free fatty acids content of the lowest value between samples is 1-2, while changes in free fatty acids content highest between samples 1 - 4. If it is associated with laboratory test results for all traders on samples 1 and 2, content of free fatty acids not too much improvement, namely for traders 1, 2 and 3 changes in free fatty acids content of samples 1 and 2 only rose by 0.10%. As for samples 1 and 4 changes the fatty acids content is very much the increase is for traders 1 changes the content of the samples 1 and 4 increased 0.50%, the second trader changes in samples 1 and 4 increased to 0.65%, while 3 changes for traders samples 1 and 4 increased 0.19%.

This is due between samples 1 and 2 levels of damage to oil during the frying process has not occurred because the heating process is still fairly briefly seen in the physical state of the oil itself is still brown and the distinctive smell of oil. As for samples 1 and 4 changes are high because of the sample 1 has begun to increase as much oil as 2, 3, and 4 times and have gone through the process of heating at high temperatures continuously as a result of oil will be damaged as a result of the oxidation of fatty acids that are bound to position of triglycerides and formation of compounds for the polymerization reaction of addition polymerization of unsaturated fatty acids. This is proven for their form resembles gum material which precipitate in bottom of the frying pan and physical changes of the oil has been changed to black, and smelled rancid.

Based on the results of statistical test to changes in free fatty acids content between the Street Food Traders that the average change in free fatty acids content in the samples 1-2 is highest in the traders 3 (0.1500) and the lowest in the trader 1 & 2 (0.1000) , the highest sample 1-3 on traders 3 (0.6500) and the lowest in the traders 2 (0.3500), the highest in the sample 1-4 2 traders (0.6500) and the lowest in the traders 3 (0, 1900), the highest in

the sample 2-3 trader 1 (0.3400) and the lowest in three traders (0.0500), to sample 2-4 second highest in the traders (0.5500) and the lowest in three traders (0.0900), while the highest for the sample 3-4 is a trader 2 (0.3000) and the lowest in the trader 1 (0.0600).

The highest changes were most common in the traders 2, if associated with laboratory test results traders 2 had an average of the highest fatty acids content that is equal to 0.47%, compared with traders 1 (0.41%) and wholesalers 3 (0, 26%).

It can also be in the clear up with their observations indicate that these traders use this type of bulk oil with a long sales process about 8 hours is never completely replace oil with new ones just adding oil as much as three times over the period addition 1 at 20:00, the addition 2 at 23.00 and addition 3 at 01:00. The use of cooking oil repeatedly can contain free fatty acids levels are high because it is easily oxidized. After frying many times, fatty acids contained in the oil will be more saturated and can be regarded as waste cooking oil. The physical condition of cooking oil in the second addition (sample 3) had turned black and smelled rancid still being used for frying foods and reduced oil is added after the new oil is not disposed at that time visitors crowded conditions. Also visible on the traders 2 types of food sold at most variations, therefore the oil used for frying foods in mixed / not distinguished by type. Edible oils (edible fat), derived from nature that is derived from animal and vegetable. Physically and chemically oil content differences are influenced by the variety and condition [11,12].

In the second trader who has a content of free fatty acids are high because traders are mixing between the deep fryer for animal products (fish, chicken, duck) and vegetable materials (tempeh, tofu) derived from soybeans. High levels of soy protein caused more widely used soy as a protein source compared to other sources of oil so that the fatty acids content will be high coupled with the results of free fatty acids derived from animal stuffs there was the process of accumulation of both ingredients that cause high free fatty acids content.

Fat or oil damage as a result of heating at high temperature (200-250 would cause toxicity in the body and various diseases, such as diarrhea, fat deposition in the blood vessels (athero sclerosis), cancer, and decrease fat digestibility value. Raw foods contain fat more peroxide would accelerate rancidity. Fats with peroxidation numbers greater than 100, it can poison the body.

Based on the results seen more and more amount of additional oil that is added by each trader the free fatty acids content is increasing because it is caused either because the free fatty acids is associated with an oil quality. Free fatty acids content which leads to high quality low oil becomes visible on the type of frying oil used, namely the third bulk oil traders. A free fatty acids content of food is one example of the compounds contained in food that can be particularly dangerous for the body when food is too often to be consumed. The use of cooking oil is repeatedly can contain free fatty acids levels are high because it is easily oxidized.

Based on the observation at the three traders were with in 8 hours during the sales process never stop frying foods, which means cooking oil that is on the griddle not stop having the heating process because the quality of the cooking oil is determined by the smoke point, the temperature of heating oil to form unwanted acrolein and

can cause itching in the throat. Free fatty acids in a food will be formed due to the process of heating food at high temperatures can increase the concentration of free fatty acids and increase the amount of free fatty acids are formed when the process is getting longer carried out to the detriment of the quality and nutritional value of that foodstuffs.

The process of adding oil to the frying affect the quality of the oil that is in use. The repeatedly use of oil resulted in oil quickly smoky or foaming and increase the brown color and flavor that is not liked in foodstuffs fried damage cooking oil that lasted for the frying process will also reduce the nutritional value and influence on the quality and value of food ingredients in cooking uses the oil that has been damaged.

Free fatty acids content is the amount of free fatty acids resulting from the oil hydrolysis process. The amount of free fatty acids in the oil showed a decrease in the quality of the oil. Fatty acids determination of free or called FFA (Free Fatty Acid) is crucial to the quality of the oil. Because the acid number is used to measure the amount of free fatty acids contained in the oil.

Larger number means that the free fatty acids content is higher, it can be derived from the hydrolysis or poor processing. Because the hydrolysis process can take place with the addition of heat. If the oil is heated or used for frying at high heating temperatures, the moisture content of the fried food and the ingress of oxygen from the air will change the structure of unsaturated fatty acids to form fatty acids to another.

The use of cooking oil that repeated times can cause diseases including:

a. Cholesterol disease

You should know that the used cooking oil repeatedly definitely become discolored and there are remnants of this wok. This is what can lead to high cholesterol diseases.

b. Cancer

Cooking oil is used many times (more than 4 times) will undergo oxidation (reaction with air). This can cause gastrointestinal irritation, diarrhea, and cancer. Besides the cooking oil will also undergo rancidity thus damaging the texture and taste of food ingredients in cooking. Cooking oil is used repeatedly will turn into poison bentonil. These toxins that can cause dangerous cancer.

Increased free fatty acids content is very harmful to health, such as the effect on the fat and the blood which then can lead to obesity, encourage a narrowing of the arteries (arteriosclerolosis) that can lead to heart disease and cholestrol. Normal cholestrol blood levels is < 200 mg/dl, while the optimal limit LDL cholesterol (bad cholesterol) is <100 mg/dl. Consume fat lately also been linked with cancer.

4. Conclusion

1. Free Fatty Acids Content (FFA) in the cooking oil used by the Street Food Traders in Parangtambung

village Makassar city before frying eligible SNI 01-3741-2002 with an average free fatty acids content between traders is 0.16%.

2. Content of Free Fatty Acids (FFA) by treating the addition of oil two times during the frying process results still eligible SNI 01-3741-2002 with an average free fatty acids content between traders is 0.26%.
3. Content of Free Fatty Acids (FFA) by treating the additional oil 3 times during the frying process result varies, for traders 1 and 2 are not eligible SNI 01-3741-2002 with an average free fatty acids content is 0.57%.
4. Content of Free Fatty Acids (FFA) by treating the addition of oil 4 times during the frying process results have not eligible SNI 01-3741-2002 with an average free fatty acids content between traders is 0.61%.

References

- [1] Cahanar, P. & Suhandi, I. 2006. *Makan Sehat Hidup Sehat*, Jakarta, Kompas Media Utama.
- [2] Badan Standardisasi Nasional – BSN, SNI 01-3741-2002. *Syarat Mutu Minyak goreng*, Departemen Perindustrian, Jakarta.
- [3] Widyastuti, Palupi, 2006. *Penyakit Bawaan Makanan*. Penerbit Buku Kedokteran EGC, Jakarta.
- [4] Ketaren, S. 2005. *Pengantar Teknologi; Minyak dan Lemak Pangan*: Jakarta, UI-Press.
- [5] Dewi, M. T. I. & Hidajati, N. 2012. Peningkatan Mutu Minyak Goreng Curah Menggunakan Adsorben Bentonit Teraktivasi. *UNESA Journal of Chemistry*, 1, 47-53
- [6] Widayat, Suherman & Haryani, K. 2006. Optimasi Proses Adsorpsi Minyak Goreng Bekas Dengan Adsorbent Zeolitalam: Studi Pengurangan Bilangan Asam. *Jurnal Teknik Gelagar*, 17, 77 – 82.
- [7] Dewanti, Ratih, 2013. *Hazard Critical Control Point*. Penerbit Buku Dian Rakyat, Jakarta.
- [8] Darmojo Rb, 2010, *Ilmu Kesehatan Usia Lanjut*, Penerbit Buku Kedokteran EGC, Jakarta.
- [9] Health Ministry of Republic of Indonesia (2013). *Health prospective of Indonesia People*
- [10] Ketaren, S. 2008. *Pengantar Teknologi Minyak Dan Lemak Pangan*, Jakarta, Universitas Indonesia (UI-Press).
- [11] Chung, FK, 2005. *Penuntun Praktis Penyakit Kardiovaskuler*. Penerbit EGC, Jakarta.
- [12] Colby, DS, 2002. *Ringkasan Biokimia Harper*. Penerbit Buku Kedokteran EGC, Jakarta.