

ORIGINAL ARTICLE

DETERMINATION AND ITS CORRELATION OF ACID VALUE IN THE VARIOUS OIL
SAMPLES

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ABSTRACT

Acid value of oil is the amount of alkali (KOH or NaOH) is required to neutralize the organic acids present in the oils. It is used to measure the free fatty acids present in the oils. The higher percentage of free fatty acids in oil which indicates the rancidity hydrolysis of triglycerides and it was converted into fatty acids. This study deals with the determination of acid value in different oils from the commercially available samples in Kanyakumari district was taken in to consideration.

Keywords: Ethanol, oils, free fatty acids

1.INTRODUCTION

The acid number is used to quantify the acidity of a substance. Normally, the acid value is the neutralization number and it is a common parameter in the specification of oils and fats.⁽¹⁾ The hydrolysis of triglycerides which is converted in to fatty acid, such reaction occurs by the action of lipase enzyme and it is a inadequate processing and storage conditions like, high temperature, tissue damage and relative humidity. Oil contains saturated and unsaturated bond is increasing acid value.⁽²⁾ The effect of rancidity in oil causes the unpleasant odour and flavour which results from deterioration. The reason for unpleasant odour is hydrolysis of triglycerides which released the free fatty acids due to exposure to atmosphere air and moisture. The rancidification of oils decreases the nutritional value of food and some vitamins.⁽³⁾ The quality of oils also decreased by microorganisms or molds use their enzymes such as lipase to breakdown the fat.

Coconut oil:

Normally, coconut oil contains 99% fat which comprised of saturated fat. It is slow down the oxidation process and thus resistant to rancidification.⁽⁴⁾

Palm oil:

Palm oil contains palmitic acid. It is one of the few highly saturated vegetable oil and having high oxidative stability. The high intake of palm oil which increasing blood cholesterol level and also increasing risk of developing cardiovascular diseases.⁽⁵⁾

Mustard oil

It has about 60% of monounsaturated and 21% of poly unsaturated fatty acids. The high level of alpha-linolenic acid and erucic acid which leads to toxic effects on the heart at high enough doses.⁽⁶⁾

Sesame oil:

Sesame oil was composed of the linoleic acid, oleic acid, palmitic acid, stearic acid and other acids in trace amounts. It approximately equal quantity of monosaturated and polyunsaturated fat, totaling together 80% of the fat content. It may produce the allergic reaction in human.⁽⁷⁾

Sunflower oil:

It contains the mixture of monounsaturated acid, polyunsaturated acid, oleic acid and linoleic acid.⁽⁸⁾ The health benefits of sunflower oil include its ability to improve heart function, boost energy, strengthen the immune system, improve the skin health, prevention of cancer, lower the

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cholesterol, protection against the asthma and reduce the inflammation.⁽⁹⁾

Rice bran oil:

It contains 38% monounsaturated, 37% polyunsaturated and 25% saturated fatty acids. A component of rice bran oil is antioxidant Y-oryzanol and 2% of crude oil. It improves the blood cholesterol by reducing total plasma cholesterol and triglycerides then increasing the HDL cholesterol. The rice bran oil decreases the calcium content in body which may help to reduce the formation of certain kidney stones.⁽¹⁰⁾

2.MATERIALS AND METHODS

Chemicals required:

Sodium hydroxide, ethanol, oxalic acid, phenolphthalein indicator.

Standardization of sodium hydroxide:

20 ml of 0.1N oxalic acid was poured into 250 ml of conical flask and 2 drops of phenolphthalein indicator is added to the solution. This solution is titrated against the sodium hydroxide taken in the burette until a permanent pink colour appears. The volume of sodium hydroxide solution was recorded. The normality of sodium hydroxide was calculated using the standard formula.

Determination of acid value in different oil samples:

10 gram of oil sample was weighed and taken in a 250 ml conical flask. Then 50 ml of ethanol was added to the conical flask and boiled in a water bath for 15 minutes. The solution was shaken well to dissolved the free fatty acids and add about 1ml of phenolphthalein indicator. The hot solution was titrated against the sodium hydroxide taken in the burette as early as possible. The appearance of pale permanent pink colour is the end point. The acid value of oil sample was calculated from the following formula,

$$\text{Acid value} = 40 \times V \times N_{\text{NaOH}} / W$$

V= volume of NaOH

N=normality of NaOH

W=weight of oils taken

The above processes were subjected to the different oil samples commercially availed in the market.

3.RESULTS AND DISCUSSION

The data revealed that the percentage of acid value in coconut oil, mustard oil and rice bran oil samples were 22.6%, 17.6% and 16.4%. Similarly, 13.6%, 10.8% and 9.0% were observed in the oil samples of sesame oil, palm oil and sunflower oil. The percentage of acid value in coconut oil was higher than that of the other oil samples because due to the high levels of saturated fatty acids (82.5%), monounsaturated (9.3%) and polyunsaturated fatty acids (1.7%). The free fatty acids in coconut oil which increases the acid value content in the oils. This is the reason that World Health Organization, Food and Drug Administration and British National Health Service are advised that the coconut oil consumption should be limited or avoided. The earlier works reported that the 100 gm of

coconut oil contains 99 gm of fat. The higher amount of saturated fatty acids in oils which cause the risk factors for cardiovascular diseases. The restricting the consumption of saturated fats to reduce that risk. This study confirm that the sunflower oil contains only 9% of acid value as compared as the other oil samples. The low acid value in oils indicated that the lower rancidity of oils. But, higher the acid value in coconut oil ie, 22.6%, which represents that was more rancid than other oil samples. The intake of high saturated fatty acid is unhealthy because it has increases the bad Low Density Cholesterol (LDL) in the body. The LDL which increases the risk of heart diseases.

Table – 1 Acid value in various oil samples

Samples	Acid Value
Coconut Oil	22.6 %
Mustard Oil	17.6 %
Rice bran Oil	16.4 %
Sesame Oil	13.6 %
Palm Oil	10.8 %
Sunflower Oil	9.0 %

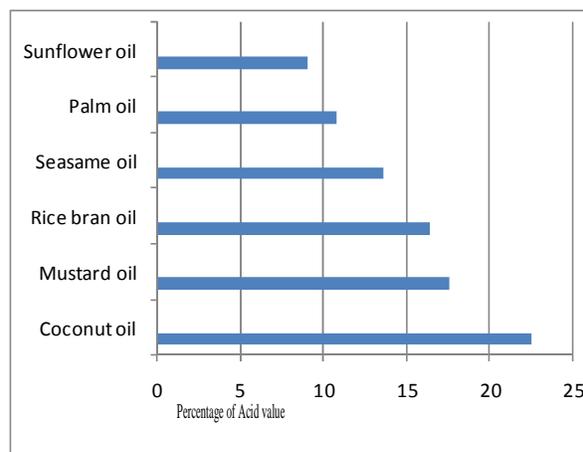


Fig – 1 Percentage of Acid value Vs oil samples

4.CONCLUSION

The Kanyakumari district is a southern tip of India and it has massively cultivation of coconut oil which plays a vital role in day to day life. It is the rich coconut producing regions and hence the present study is an attempt to analyze the percentage of acid value in different oil samples. The low acid values are indication of lower rancidity of oils. But the higher percentage of acid content was found in the case of coconut oil, which shows that it is more rancid than other oils and increases the bad LDL cholesterol in the body, if consumed more quantity.

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