



ASSESSMENT OF SELECTED QUALITY PARAMETERS OF COCONUT OIL IN KURUNEGALA DISTRICT

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Coconut oil is extracted from coconut (*Cocos nucifera*) kernel, commonly known as copra. Due to its extensive use in daily life, coconut oil is highly demanded in Sri Lanka. Lauric acid accounts for the majority of the fatty acids in coconut oil. This research seeks to identify whether the quality of coconut oil produced by coconut oil manufacturers in Kurunegala district are up to Sri Lanka Standards (SLS) under SLS 32:2017. This research is designed to compare selected quality parameters such as peroxide value, free fatty acid value and iodine value of coconut oil produced locally within the Kurunegala district, Sri Lanka. In total, 15 coconut oil samples were collected under three categories as small-scale manufactured coconut oil, coconut oil obtained from grocery shops and branded coconut oil from supermarkets. Five samples were collected under each category and tests were performed in triplicate. The results indicated that peroxide value ranged from 0.22 meq/kg to 3.89 meq/kg, free fatty acid value (FFA) ranged from 0.09% to 1.16% and iodine value ranged from 7.495% to 31.320%. Peroxide values of all samples obtained from the grocery shops were less than the maximum allowable limit (3.0 meq/kg). Higher peroxide values were observed in three small scale manufactured coconut oil samples. Several samples had a high FFA value than the standard value (0.8%) but most of them were marginal to standard value. A very low FFA value (0.09%) was observed in two samples, one from small scale manufacturers and the other from branded samples. Samples obtained from grocery shops had a higher iodine value than SLS (7.5%-11.0%). The results indicate that the majority of the coconut oil samples were not up to the SLS quality criteria. Therefore, it is required to improve quality of coconut oil manufactured in the district to be on par with SLS standards.

Keywords: Coconut oil, Free fatty acids, Iodine content, Kurunegala district, Peroxide content, Quality



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INTRODUCTION

Coconut oil is produced from the coconut (*Cocos nucifera* Linn) kernel which is also known as copra, by a process of crushing or solvent extraction. Kurunegala, Gampaha and Puttalam districts are known as the coconut triangle due to the high oil production in these districts. Coconut oil is made of fatty acids, and lauric acid is the major component of coconut oil. The objectives of this study were to investigate the quality of coconut oil manufactured in the Kurunegala district using selected quality parameters, to evaluate the quality parameters (peroxide value, iodine value, and acid value) of coconut oil, and to compare the quality of different coconut oil samples collected and with SLS standards. This research will provide small-scale coconut oil manufacturers in the Kurunegala district with information to raise knowledge about techniques of quality control in coconut oil.

METHODOLOGY

Sample Collection

For the research, 15 coconut oil samples were collected from Kurunegala district, Sri Lanka, and were divided into three categories: coconut oil samples from small scale manufacturers, coconut oil samples obtained from grocery stores, and coconut oil samples obtained from supermarkets. All 15 coconut oil samples were stored in 100ml plastic bottles with lids. All the samples were examined at the Horizon Campus research laboratory.

Determination of Peroxide value

Peroxide value was determined by following AOCS cd 8-53 method in triplicate with the control.

Determination of Free Fatty Acid value (FFA)

Free fatty acid value determined by following AOCS Ca 5a-40 method in triplicate with the control.

Determination of Iodine value

Iodine value was determined according to ISO 3961: 2018 method in triplicate with the control.

RESULTS AND DISCUSSION

Figure 01 compares the peroxide value of coconut oil samples obtained from small scale manufacturers, grocery stores, and various coconut oil brands to the standard peroxide value for coconut oil provided by the Sri Lanka Standards Institution (SLSI).

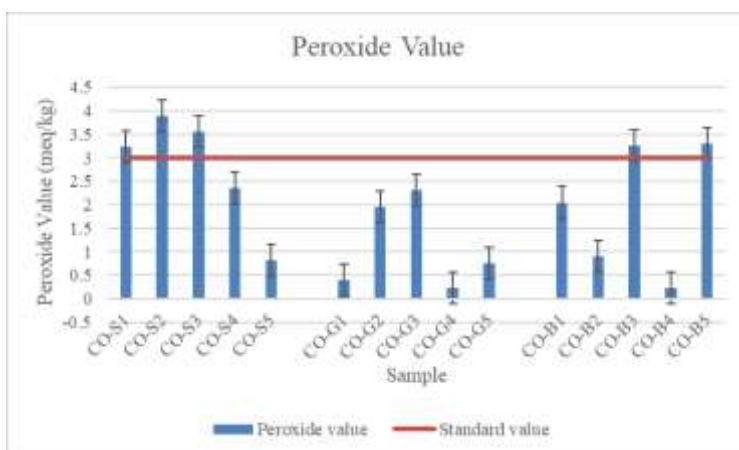


Figure 01. Peroxide value (mEq/kg) of coconut oil samples and maximum peroxide value for coconut oil. CO-S indicates small scale manufactured coconut oil samples, CO-G indicates oil samples obtained from grocery shops and CO-B indicates branded coconut oil sample types.

The maximum value for peroxide in coconut oil is 3meq/kg, as stated in Sri Lanka Standard Institute SLS 32:2017 (Specification for coconut oil, 2017). According to the results (Figure 1), all coconut oil samples collected from grocery stores (Co-G) have peroxide values less than 3meq/kg. There are 5 samples out of 15 that have higher peroxide value than the standard, however they are all marginal. Unsaturated fatty acid oxidation can produce significant amounts of peroxide. Oxidation results in the production of low molecular-weight off-flavour compounds, which reduce the consumer or industrial acceptance of oil as a food ingredient (Bhatnagar et al., 2009). In branded samples values range from 0.23meq/kg to 3.30meq/kg. Low levels of peroxide created during the process result in the development of higher-quality oils because higher levels of peroxide would cause the oils to quickly go rancid (Sajeetha et al., 2021).

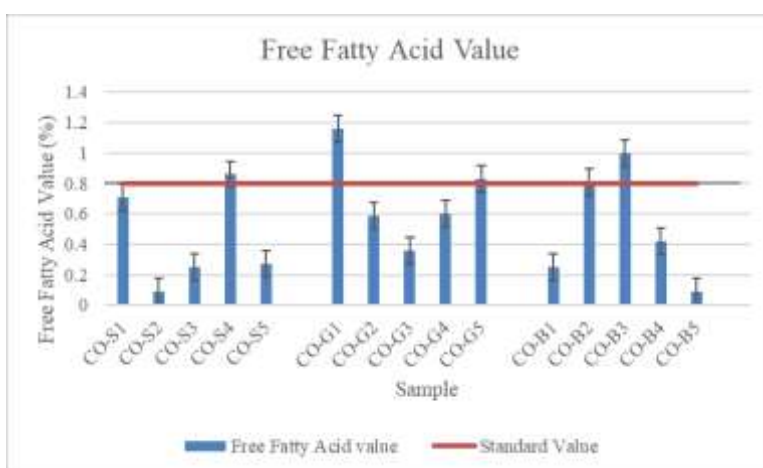


Figure 02. Free Fatty Acid value (%) of coconut oil samples and maximum Free Fatty Acid value for coconut oil. CO-S indicates small scale manufactured coconut oil samples, CO-G indicates oil samples obtained from grocery shops and CO-B indicates branded coconut oil sample types.



Figure 02 compares the free fatty acid (FFA) value of coconut oil samples obtained from small scale manufacturers, grocery stores, and various coconut oil brands to the standard free fatty acid value for coconut oil provided by the Sri Lanka Standards Institution (SLSI).

From samples collected from small scale manufacturers only one sample had a high FFA value than the standard value and two samples from grocery stores had a high FFA value. This could be caused by improper handling of copra; free fatty acids are produced by hydrolysis of oils and fats.

Therefore, FFA value depends on moisture content, temperature, time which oils are exposed for heating, frying and processing (Mahesar et al., 2014). In small scale manufactured coconut oil samples FFA values range from 0.09% to 0.86%. In grocery store samples FFA value ranges from 0.36% to 1.16% and in branded samples FFA values range from 0.09% to 1.00%.

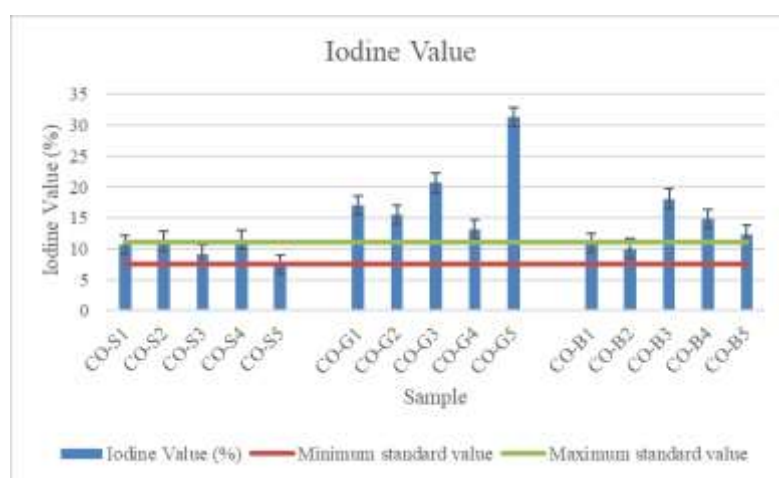


Figure 03. Iodine value (%) of coconut oil samples and Standard minimum and maximum Iodine value range for coconut oil. CO-S indicates small scale manufactured coconut oil samples, CO-G indicates oil samples obtained from grocery shops and CO-B indicates branded coconut oil sample types.

Figure 03, compares the iodine value of coconut oil samples obtained from small scale manufacturers, grocery shops, and various coconut oil brands to the standard iodine value for coconut oil provided by the Sri Lanka Standards Institution (SLSI).

Standard range for iodine value of coconut oil given by Sri Lanka Standards Institution is between 7.5%-11% (Specification for coconut oil, 2017). According to the results, all the small-scale manufactured coconut oil samples are either lower or marginal to standard maximum iodine value. All the samples obtained from grocery stores (CO-G) have exceptionally high iodine values. According to the results, most of the small-scale manufactured coconut oil samples are between the standard iodine value (7.5%-11%). However, samples collected from grocery stores and branded samples are above the standard values.



CONCLUSIONS/RECOMMENDATIONS

This study evaluated the peroxide value, free fatty acid value and iodine value of coconut oil samples collected from small scale manufacturers, grocery shops and different brands. Therefore, it is indicated that samples obtained from different sources have different quality status. It is recommended to determine fatty acid composition to confirm the authenticity of coconut oil samples. It is recommended that more laws and regulations are needed to standardize coconut oil manufacturing which are inspected by verified authorities for small scale coconut oil mills.

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ACKNOWLEDGMENTS

The authors would like to express our deepest gratitude to Faculty of Science, Horizon Campus, Sri Lanka for providing all the necessary laboratory facilities.