Digital Detection of Frying Oil Rancidity Levels and Colour Profiles Using a Mobile Application

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Deep-fat frying is one of the most often used methods for preparing and producing foods worldwide. In the catering industry, repeated heating of oil is done up to a certain level while achieving the customer safety and profit margins. If the level is exceeded oil quality becomes undesirable and rancidity can be developed. To ensure the safe margin of frying oil, various test kits are used in the catering industry. However, these test kits are less affordable as they are very expensive. In this study, an economically feasible test kit and a mobile application were developed based on image analysis to determine the rancidity levels of frying oil. The study was done by two methods (direct and chemical). In the direct method, total polar materials (TPM %) of the samples were determined by *Vito* oil tester and colour analysis was done by a digital colourimeter. There were strong positive correlations among the TPM (%), L* a* b* values and acid values which were above 0.90 linear regression (R^2). The chemical method was developed as an advanced version of the direct method and used a chemical solution which is sensitive to the free fatty acid percentage in frying oil. The Mobile application was developed using the *React Native* software. It was compatible with the android operating system. The mobile application was validated using randomly selected oil samples and TPM (%) values were determined by both mobile application and *Vito* oil tester. Results were analyzed using *R* statistical software. Based on the results, there was not a significant difference ($P>0.05$) between the TPM (%) values, which were obtained by the mobile application and *Vito* oil tester. The results also indicated that the proposed method can be used as an alternative method to detect the rancidity levels of frying oil with high accuracy.

Keywords: Deep frying, Mobile application, Rancidity, Reheating, Test kit

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