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A Comparative Study on the Effectiveness of Lemongrass (*Cymbopogon Citratus*) Extract Obtained via Microwave-Assisted and Conventional Hydro distillation for Antimicrobial Activity

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Structured Abstract

Background: Food spoilage and microbial contamination remain major challenges in the preservation of fresh meat products, particularly minced chicken, which is highly perishable due to its large surface area and high moisture content. Conventional preservation methods often rely on synthetic preservatives, which have raised concerns regarding consumer health and food safety. In response to increasing demand for natural and clean-label alternatives, plant-based antimicrobials have gained significant attention. Lemongrass (*Cymbopogon citratus*) essential oil is known for its strong antimicrobial properties and natural aroma. This study investigates the effectiveness of lemongrass essential oil in extending the shelf life of minced chicken by evaluating its impact on microbial growth and quality attributes during storage.

Methods: Lemongrass extract was obtained using microwave-assisted hydrodistillation and conventional hydrodistillation methods. Fresh lemongrass was prepared and subjected to both extraction techniques under controlled conditions. The extracts were applied to minced chicken samples, which were then stored at refrigerated temperatures of 1–4 °C and 5–8 °C. Analyses were conducted at storage intervals of 3, 5, and 7 days to evaluate antimicrobial effectiveness and quality changes. The results were compared to determine the influence of extraction method, storage temperature, and storage duration.

Results: The results showed that lemongrass extract obtained through microwave-assisted hydrodistillation exhibited stronger antimicrobial activity compared to conventional hydrodistillation. Samples treated with microwave-assisted extracts demonstrated lower microbial counts and better quality retention during storage. Lower storage temperatures (1–4 °C) effectively slowed microbial growth compared to 5–8 °C. Prolonged storage duration resulted in increased microbial load in all samples; however, treated samples maintained acceptable quality up to day 7. Overall, extraction method, storage temperature, and storage time significantly influenced the antimicrobial effectiveness of lemongrass extract.

Conclusion: This study demonstrates that microwave-assisted hydrodistillation produces lemongrass extract with superior antimicrobial effectiveness compared to conventional methods. The extract successfully reduced microbial growth and preserved the quality of minced chicken, particularly at lower storage temperatures, highlighting its potential as a natural and clean-label food preservative.

Keywords: Lemongrass Extract, Microwave-assisted Hydrodistillation, Antimicrobial Activity, Minced Chicken, Shelf Life

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