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GC-MS Study of Bioactive Compounds of *Peperomia pellucida* and Its Antibacterial Activity against *Streptococcus mutans*

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Abstract

Streptococcus mutans is the primary bacterium causing dental caries. Pepper elder (*Peperomia pellucida*) might prevent this disease due to its antibacterial bioactive content. Correspondingly, the present study aimed to identify the bioactive profile of pepper elder ethanol extract and its antibacterial activity against *Streptococcus mutans*. Bioactive compounds were analyzed using Gas Chromatography-Mass Spectrometry (GC-MS). The antibacterial activity was tested through an inhibition test using the well-diffusion method, the Minimum Inhibitory Concentration (MIC) test, and the Minimum Bactericidal Concentration (MBC) test. The most detected compounds in pepper elder ethanol extract were n-Eicosane, n-Hexadecane, and glycerol. There were also antibacterial bioactives such as phenols, flavonoids, alkaloids, and terpenoids. The inhibition test of 500 mg/mL extract revealed a clear zone of 8.25 mm diameter. The MIC and MBC values were 50 mg/mL and 100 mg/mL, respectively. Based on the results, pepper elder ethanol extract demonstrated potential as an antibacterial, although its inhibitory effectiveness still needed to be improved.

Keywords: Antibacterial, GC-MS, *Peperomia pellucida*, *Streptococcus mutans*

Introduction

Dental caries, an infectious disease attacking the dental hard tissues, is mainly caused by the interaction between certain bacteria and a high-sugar diet (Bradshaw & Lynch, 2013; Oliveira et al., 2019). The primary bacterium involved is *Streptococcus mutans* (Karpiński & Szkaradkiewicz, 2013; Shetty et al., 2016). It is part of the oral microflora that has evolved pathogenic characteristics due to its ability to adhere to tooth surfaces, form dental plaque, and thrive in an acidic environment (Alejandra & Daniel, 2020). These factors make it a significant contributor to the development of dental caries. The acid produced by *Streptococcus mutans* damages the dental layer and promotes the formation of cavities.

One way to prevent dental caries is by administering natural or synthetic antibacterials. However, synthetic or chemical antibacterials are known to have long-term side effects (Chen et al., 2020). Therefore, to minimize the side effects of synthetic drugs, research development is needed to explore alternative agents that can prevent dental caries. One such alternative is natural medicines made from herbs. The pepper elder plant (*Peperomia pellucida*) is a wild herbaceous plant with various medicinal properties, including anti-inflammatory, analgesic, antipyretic, antimicrobial, anticancer, and antidiabetic activities (Sheikh et al., 2013; Soboyejo & Ade-Ademilua, 2017; Teoh et al., 2021). The stems and leaves of pepper elder are reported to contain bioactive secondary

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