

## 1. Introduction

Indonesia is a country with high biodiversity and also the second-highest number of native medicinal plants, with a high potential for pharmaceutical and biotechnology research (Elfahmi et al., 2014). *Pangium edule* is one of the local Indonesian plants from the Achariaceae family and is commonly used for traditional medicine and as an ingredient for specific Indonesian cuisine (Sari & Suhartati, 2015). Currently, there is no study of *P. edule* for medicinal purposes. Meanwhile, most of the studies aimed to assess the use of *P. edule* as a food preservative agent that is not targeted to specific bacteria, nor they assess specific extracted compounds.

A study by Lubis et al. in 2019 showed that *Escherichia coli*, *Klebsiella pneumonia*, and *Staphylococcus aureus* are often found in street food in Indonesia. Contaminated food can lead to food poisoning and can cause various symptoms such as fever, nausea, vomiting, and diarrhea ("Food Poisoning Symptoms," 2021). Previous studies showed that foodborne pathogens such as *S. aureus*, *E. coli*, *Salmonella Typhimurium*, and *K. pneumoniae* show antibiotic resistance, which is more challenging for the treatment and increases the mortality risk (M. Mancilla-Becerra et al., 2019; Hartantyo et al., 2020)

Phenolic acid, also called a polyphenol, is most widely distributed in plants and available in many forms, such as free, conjugated soluble, and insoluble bound (Chandrasekara, 2019). The polyphenolic compound has several antibacterial mechanisms of action: (1) inhibition of bacterial virulence factors, including their enzymes and toxins, (2) damaging the bacterial membrane by interacting with the cytoplasm membrane, and (3) inhibition of biofilm formation. Some also show synergistic effects with antibiotics (Miklasińska-Majdanik et al., 2018). Based on the structure, polyphenolic compounds can be divided into two classes which are flavonoid and non-flavonoid compounds. This study aims to investigate the antibacterial effect of phenolic acid derived from *P. edule*, a local spice from Indonesia, towards foodborne pathogens such as *S. aureus*, *E. coli*, *S. typhimurium*, and *K. pneumoniae*. The focus of this study is to investigate the antimicrobial activity of phenolic acid extracted from *P. edule* seeds and their potency as antibiotic alternatives. Throughout

the process, the optimum effect and efficiency of the extract concentration against bacterial growth will be determined.