

ABSTRACT

Muhamad Dafa Fadilah. 24020221140078. ***Antibacterial Potential of Tempeh Extract Fermented with Rhizopus sp. R7 Isolate in Inhibiting the Growth of Escherichia coli.*** Under guidance of Sri Pujiyanto dan Puspa Hening.

Diarrhea is one of the significant global health problems, including in Indonesia, and one of its main causes is infection by the bacterium *Escherichia coli*. This study aimed to investigate the antibacterial potential of tempeh extract fermented with *Rhizopus* sp. R7 against *E. coli*, determine the effective extract concentration, and identify the active compounds involved. The research process included the production of tempeh with fermentation durations of 24, 48, and 72 hours; extraction of compounds using ethyl acetate; and antibacterial activity testing using the disk diffusion method. The extract concentrations used were 25%, 50%, and 75%. The effectiveness parameter was assessed based on the diameter of inhibition zones formed around the disks, followed by statistical analysis using *Two-Way ANOVA* and *effect size* calculation (*Cohen's f*). The results showed that *Rhizopus* sp. R7 tempeh extract was able to inhibit the growth of *Escherichia coli* with inhibition categories ranging from moderate to strong. The highest inhibition zone was obtained in the 48-hour fermentation treatment with a 75% extract concentration, measuring 11.167 ± 3.082 mm. Statistical analysis using *Two-Way ANOVA* indicated no significant differences between variations in fermentation time and extract concentration, while *Cohen's f effect size* calculation showed values ranging from medium to large, indicating that the inhibition activity was relatively consistent across all treatments. GC-MS analysis of the tempeh extract identified 27 compounds, 14 of which had antibacterial potential. The dominant compounds detected were fatty acids, such as linoleic acid (58.27%) and palmitic acid (17.4%), which are known to damage bacterial cell membranes and disrupt metabolism, leading to cell death. Based on these findings, tempeh extract fermented with *Rhizopus* sp. R7 has potential as a natural antibacterial source against *E. coli* and can be developed as an alternative for controlling pathogenic bacteria in food.

Keywords: Escherichia coli, tempeh, Rhizopus sp., antibacterial activity, GC-MS