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## Antimicrobial Activity of *Moringa oleifera* Leaf and *Ganoderma lucidum* Extract Against Bacteria

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### Structured Abstract

**Background:** Bacterial infection is defined as the ability of bacteria to grow and proliferate within an organism and caused clinically significant diseases. The emergence of infectious diseases posed a threat to public health, causing an increasing number of morbidity and mortality. In the past few decades, medicinal plants have been used as natural remedies and are known to exert antimicrobial properties against bacteria due to their rich secondary metabolite contents. This has led in finding novel antimicrobial agents from herbal medicines as a natural way to mitigate the prevalence of bacterial infections. *Moringa oleifera* Lam. and *Ganoderma lucidum* are well-known medicinal herbs for their rich phytochemicals content that can act as antibacterial agent in numerous applications.

**Methods:** This study aims to determine the antibacterial activity of polyherbal *M. oleifera* leaf and *G. lucidum* biofermented and ethanolic extract in various concentrations (500, 250, 125, 62.5, 31.25 and 15.63 mg/ml) against *Bacillus subtilis*, *Staphylococcus hominis* and *Salmonella typhi* using disk diffusion assay. The minimum inhibitory concentration (MIC) and minimum bactericidal activity (MBC) of both polyherbal extracts were also determined using broth microdilution method.

**Results:** The disk diffusion assay revealed a negative result. However, the MIC values of biofermented polyherbal extract were observed to be at 125 mg/mL against *B. subtilis*, 250 mg/mL against *S. hominis* and 125 mg/mL against *S. typhi*. As for ethanolic extract, the MIC value was observed to be at 31.25 mg/mL against *B. subtilis*, 125 mg/mL against *S. hominis* and 250 mg/mL against *S. typhi*. The study showed that antimicrobial efficacy of the polyherbal ethanolic extract is higher than the biofermented extract. This might be due to the polarity or molecular sizes of extracted phytochemicals were significantly influenced their diffusion ability in the assay's medium. Therefore, future optimization on the best assay to be conducted to test the antimicrobial activity of biofermented polyherbal is needed. Based on MBC/MIC ratio  $\leq 4$ , the ethanolic polyherbal extract demonstrated bactericidal effects towards all Gram-positive and negative bacteria.

**Conclusion:** Findings on the observed antimicrobial efficacy of polyherbal *M. oleifera* and *G. lucidum* extracts of this study may aid and support their potential applications as natural sources for antimicrobial agents.

**Keywords:** Antimicrobial, Polyherbal, *Moringa oleifera*, *Ganoderma lucidum*

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