Title : Antibacterial and antioxidant activity of northern Thai honey from *Apis mellifera* bee

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ABSTRACT

Honey has long been prized for its antioxidant and antibacterial properties, which make it a promising natural product for medicinal and therapeutic use. This study investigates the antibacterial and antioxidant activities of 18 honey samples produced by *Apis mellifera* bees from various regions of northern Thailand. The antibacterial properties were evaluated using the agar-well diffusion method against four bacterial strains: *Micrococcus luteus* (M. luteus) and *Staphylococcus aureus* (S. aureus) as representatives of Gram-positive bacteria, and *Klebsiella pneumoniae* (K. pneumoniae) and *Escherichia coli* (E. coli) as representatives of Gram-negative bacteria. All honey samples exhibited antibacterial activity to varying extents, with the most pronounced inhibition observed against *S. aureus*, suggesting that honey may be particularly effective against Gram-positive bacteria. However, when compared to conventional antibiotics, honey demonstrated a weaker antibacterial effect. In addition to the antibacterial analysis, the antioxidant properties of the honey samples were assessed using the DPPH assay. The results showed that all honey samples exhibited antioxidant activity, with variations influenced by their floral sources and geographical origins. Furthermore, several physicochemical properties including pH, electrical conductivity, moisture content, and color were analyzed to explore their correlation with antibacterial and antioxidant activity. The findings suggest that these factors play a crucial role in honey's bioactivity, with darker honeys generally exhibiting higher antioxidant capacity and conductivity, lower pH values correlating with stronger antibacterial activity, and lower moisture levels being associated with greater antibacterial effectiveness.

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