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Propolis Extract: A Possible Antiseptic Oral Care against Multidrug-Resistant Non-Fermenting Bacteria Isolated from Non-Ventilator Hospital-Acquired Pneumonia

By

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Abstract: Non-ventilator Hospital-acquired Pneumonia (NV-HAP) is a significant burden in acute care hospitals and poses a risk to nonelderly, non-intensive care unit (ICU) patients, which have been increasing worldwide. In addition, poor oral hygiene has been associated to significant increases in the number of cases of NV-HAP. Unfortunately, preventive options are limited. Thus, there is a need for oral antiseptics, similar to those of natural products or plant sources. The aim of this study was to assess the antibacterial activity of various bee products (BPs); for example, honey, propolis, and bee venom against multidrug-resistant (MDR) non-fermenting bacteria (e.g., *Pseudomonas* and *Acinetobacter*), which were collected from NV-HAP patients to investigate its use as a possible antiseptic oral care. Bacterial susceptibility to different antibiotics were performed. The antimicrobial activity of BPs against non-fermenting bacteria, the minimum inhibitory concentration (MIC), and the minimum bactericidal concentration (MBC) were assessed. Eighteen *Pseudomonas aeruginosa* isolates and five *Acinetobacter baumannii* isolates were identified. *P. aeruginosa* isolates displayed high resistance to the antibiotics: meropenem and imipenem (55.6% and 77.8% respectively), whereas *A. baumannii* isolates were 100% resistant to meropenem and imipenem. All isolates remained sensitive to colistin.

Propolis showed the best antibacterial activity (*p<0.001)* in comparison to honey and bee venom against *P. aeruginosa* (13 – 36 mm, MIC =1.4-22.5%, and MBC=2.8-45%) and *A. baumannii* (7-20 mm, MIC=5.6-22.5%, and MBC=11.3 -22.5%). While bee venom expressed the least antibacterial activity against all isolates with a zone diameter ranging from 0-12 mm, propolis, which is a non-toxic, natural, and inexpensive, had antibacterial activity towards the MDR bacteria: *P. aeruginosa* and *A. baumannii* collected from pneumonic patients. Additionally, we confirmed that propolis could be used as a potential antiseptic oral care product.