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In Vitro Antagonistic Potential of Gut Bacteria Isolated from Indigenous Honey Bee Race of Saudi Arabia Against Some Human Pathogens

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Abstract

Antimicrobial resistance (AMR) is a critical health issue today. Over several decades, to varying degrees, bacteria causing common infections have developed resistance to each new antibiotic, and AMR has evolved to become a worldwide health threat. Due to increasing development of resistance by microorganisms, numerous studies have been conducted to find new alternative sources of antimicrobial agents, especially from natural sources. Honey is an ancient remedy that has recently been introduced into modern clinical practice in developed countries. The aims of this project were to examine the antimicrobial properties of gut microbiota isolated from indigenous honeybee race of Saudi Arabia (*Apis mellifera jemenitica*) against various Gram-positive and Gram-negative bacterial strain including MRSA and *Candida albicans*. Disc diffusion assays and scanning electron microscopy (SEM) were used to check the antimicrobial of gut bacterial isolates. Seven of the 100 evaluated gut bacterial isolates, *Fructobacillus fructosus* (KY027123); *Proteus mirabilis* (KY027132); *Bacillus licheniformis* (KY027142); *Lactobacillus kunkeei* (KY027158); *Bacillus subtilis* (KY027169); *Enterobacter kobei* (KY027178); and *Morganella morganii* (KY027186) showed strong inhibitory effects against bacterial and fungal microorganism. To our knowledge, this the first demonstration of antagonistic activity of *F. fructosus*, *P. mirabilis*, *E. kobei*, and *M. morganii* isolated from honey bee gut against MRSA and *C. albicans*. The tested gut isolates exhibited significant antimicrobial activities against tested bacteria and *C. albicans* and could lead to the development of new broad-spectrum antimicrobials that have the potential to prevent the emergence of resistant bacterial strains and could be a valuable antimicrobial agent for management of infections caused by these organisms.

