Phytochemicals for human disease: An update on plant-derived compounds antibacterial activity

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\textbf{ABSTRACT}

In recent years, many studies have shown that phytochemicals exert their antibacterial activity through different mechanisms of action, such as damage to the bacterial membrane and suppression of virulence factors, including inhibition of the activity of enzymes and toxins, and bacterial biofilm formation. In this review, we summarise data from the available literature regarding the antibacterial effects of the main phytochemicals belonging to different chemical classes, alkaloids, sulfur-containing phytochemicals, terpenoids, and polyphenols. Some phytochemicals, besides having direct antimicrobial activity, showed an in vitro synergistic effect when tested in combination with conventional antibiotics, modifying antibiotic resistance. Review of the literature showed that phytochemicals represent a possible source of effective, cheap and safe antimicrobial agents, though much work must still be carried out, especially in in vivo conditions to ensure the selection of effective antimicrobial substances with low side and adverse effects.

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\textbf{Abbreviations:}
MDR, multi-drug resistant; MIC, minimum inhibitory concentration; MRSA, methicillin resistant Staphylococcus aureus; MBC, minimum bactericidal concentration; MRSE, methicillin resistant Staphylococcus epidermidis; MSSA, methicillin susceptible Staphylococcus aureus; QS, quorum-sensing; IZ, inhibition zone; PIC, fractional inhibitory concentration; IC, epicatechin; EGC, epigallocatechin; ECG, epicatechin gallate; ECGG, epigallocatechin gallate; ND-1, New Delhi metallo-beta-lactamase-1; ATP, adenosine triphosphate; VRE, vancomycin-resistant Enterococcus faecalis; PACS, proanthocyanidins; PPC, purple prairie clover.

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