



A comprehensive review of the antibacterial, antifungal and antiviral potential of essential oils and their chemical constituents against drug-resistant microbial pathogens



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ABSTRACT

Essential oils are a complex mixture of odoriferous, volatile organic compounds. There are an extensive number of published articles which highlight the antimicrobial action of a variety of essential oils from various parts of the world. The main aim of this review article is to compile these antimicrobial essential oils and their constituents from reliable sources and put them together. The published literature indicates that essential oils possess a wide-spectrum of antibacterial, antifungal and even anti-viral activity. Essential oils have also been shown to inhibit the growth of drug-resistant microbial strains which are even difficult to be treated by conventional antibiotics. As for as their mode of action is concerned, in fungal pathogens, essential oils establish a membrane potential across cell wall and disrupt ATP assembly, leading to cell wall damage. Essential oils can also disintegrate mitochondrial membrane interfering with the electron transport system (ETS) pathway. In bacterial pathogens, essential oils primarily destabilize the cellular architecture, leading to breakdown of membrane integrity, disrupting many cellular activities including energy production and membrane transport. Membrane rupture induced by essential oils can lead to leakage of cellular components and loss of ions. Several essential oils have antiviral activities against many RNA and DNA viruses, such as type 1 and type 2 herpes simplex virus (HSV-1 and HSV-2), dengue virus type 2, influenza virus, adenovirus type 3, poliovirus, Junin virus, and coxsackievirus B1. In conclusion, the current review article discusses in detail the various aspects of antimicrobial activity of essential oils in a comprehensive manner.