Molecular insights into Coumarin analogues as antimicrobial agents: Recent developments in drug discovery

ABSTRACT

A major global health risk has been witnessed with the development of drug-resistant bacteria and multidrug-resistant pathogens linked to significant mortality. Coumarins are heterocyclic compounds belonging to the benzophenone class enriched in different plants. Coumarins and their derivatives have a wide range of biological activity, including antibacterial, anticoagulant, antioxidant, anti-inflammatory, antiviral, antitumour, and enzyme inhibitory effects. In the past few years, attempts have been reported towards the optimization, synthesis, and evaluation of novel coumarin analogues as antimicrobial agents. Several coumarin-based antibiotic hybrids have been developed, and the majority of them were reported to exhibit potential antibacterial effects. In the present work, studies reported from 2016 to 2020 about antimicrobial coumarin analogues are the focus. The diverse biological spectrum of coumarins can be attributed to their free radical scavenging abilities. In addition to various synthetic strategies developed, some of the structural features include a heterocyclic ring with electron-withdrawing/donating groups conjugated with the coumarin nucleus. The suggested structure−activity relationship (SAR) can provide insight into how coumarin hybrids can be rationally improved against multidrug-resistant bacteria. The present work demonstrates molecular insights for coumarin derivatives having antimicrobial properties from the recent past. The detailed SAR outcomes will benefit towards leading optimization during the discovery and development of novel antimicrobial therapeutics.