



Regular Medication a Promising up-and-comer in Battling Microbial Biofilm

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INTRODUCTION

A biofilm is a natural form of bacterial growth ubiquitous in ecological niches, considered to be a generic survival mechanism adopted by both pathogenic and non-pathogenic microorganisms and entailing heterogeneous cell development within the matrix. In the ecological niche, quorum sensing is a communication channel that is crucial to developing biofilms. Biofilm formation leads to increased resistance to unfavourable ecological effects, comprising resistance to antibiotics and antimicrobial agents. Biofilms are frequently combated with modern conventional medicines such as antibiotics, but at present, they are considered inadequate for the treatment of multi-drug resistance; therefore, it is vital to discover some new antimicrobial agents that can prevent the production and growth of biofilm, in addition to minimizing the side effects of such therapies.

DESCRIPTION

In the search for some alternative and safe therapies, natural plant-derived phytomedicines are gaining popularity among the research community. Phytomedicines are natural agents derived from natural plants. These plant-derived agents may include flavonoids, terpenoids, lectins, alkaloids, polypeptides, polyacetylenes, phenolics, and essential oils. Since they are natural agents, they cause minimal side effects, so could be administered with dose flexibility. It is vital to discover some new antimicrobial agents that can control the production and growth of biofilms. This review summarizes and analyzes the efficacy characteristics and corresponding mechanisms of natural-product-based antibiofilm agents, i.e., phytochemicals, biosurfactants, antimicrobial peptides, and their sources, along with their mechanism, quorum sensing signalling pathways, disrupting extracellular matrix adhesion. The review also provides some other strategies to inhibit biofilm-related illness.

The prepared list of newly discovered natural anti-biofilm agents could help in devising novel strategies for biofilm-associated infections.

Bacterial infections threaten public health worldwide, and the severity of the crisis has intensified due to the appearance and proliferation of drug-resistant bacterial species. The majority of the microbes defend themselves by diverse survival mechanisms, including morphogenesis, proteolytic approaches, demographic heterogeneity, etc., to overcome environmental stress conditions. One of the prominent growth states for microorganisms that exist in 90% or more of bacteria strains is biofilm. Biofilms are considered heterogeneous assemblages of surface-associated microbes compressed in a matrix composed of different polysaccharides, proteins, and DNA. The matrix functions as a physical barrier to medications and provides microorganisms a safe ecological niche for their survival. Many microorganisms, such as *P. aeruginosa*, *C. albicans*, *S. epidermidis*, and *M. tuberculosis* Mycoplasma, pose intense health crises due to antimicrobial medication resistance and immune responses. The application of natural plant-derived ingredients in the field of antimicrobial therapy has emerged as a suitable alternative to combat the growing issues of antibiotic resistance and biofilm formation.

CONCLUSION

Another benefit of using phyto-constituents as antibacterial and antimicrobial agents are their ease of availability, low cost, and negligible side effects on the body. Thus, sustainable herbal antimicrobial therapy requires further isolation of active plant constituents that could be used as novel antimicrobial agents. Some of the essential phyto-constituents that have already been utilized as antibacterial agents are piperine, dictamnine, berberine, reserpine, conessine, matrine, caffeine, ajoene, baicalein, silybin, quercetin, chrysopenetin, gallic acid, naringenin, toxifolin, limonene, nerolidol, linalool, etc.

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