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Extremophilic actinomycetes isolated from soil in kazakhstan: Classification and antimicrobial activities

Saikal Shamkeeva

Nazarbayev University, Kazakhstan

Most threatening healthcare problem nowadays is infection caused by antibiotic resistant bacteria, such as ESKAPE pathogens. Actinomycetes are the most known antibiotic producers. However, high potential of extremophilic actinomycetes has not been studied. Our study aims to test inhibitory activity of the extracts produced by extremophilic actinomycetes isolated from soil in Kazakhstan against prevalent antibiotic pathogens in Kazakhstani hospitals and identification of its chemical composition. Soil from extreme environments of Kazakhstan has been collected from different regions and actinomycetes were isolated for further antibiotic synthesis of active components. Special conditions that mimic natural habitat of bacteria have been optimized. Morphological analysis were performed by culturing selected actinomycetes species in different agar media for viewing aerial and substrate mycelium, and characterization by microscopic examinations. Extracts were further tested against hospital strains of resistant pathogens *A. baumannii*, *P. aeruginosa*, and *K. pneumoniae*. Afterwards, potent extracts were analyzed on HPLC for identification of chemical composition. Extracts grown in extreme environments showed inhibitory activity against ESKAPE pathogens. By microscopic examination, the spore chains of actinomycetes were observed to be shaped like hooks, loops, and spirals (designated as “RA”; retinaculum-apertum). Occasionally, long straight chains were also observed (“RF”; rectus-flexibilis). HPLC analysis showed differential composition of the extracts grown in different media conditions. Further analysis of the chemical composition is needed to identify the active component within these potentially novel antibiotic extracts.

Biography

Saikal Shamkeeva has completed her MSc degree in 2018 from Chester University, UK. She has joined Nazarbayev University, Kazakhstan extremophile project and team in 2018, after graduation. During this time one paper was published and one book chapter on methods and protocols for growing extremophilic actinomycetes and antibiotic extraction has been submitted for publication. Currently, she is holding a PhD position at Leipzig University, Germany and continues putting contribution towards extremophile project.

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