Abstract

Introduction: Streptomyces produce secondary metabolites used in creating new antibiotics, with 2/3 of clinically significant natural antimicrobials derived from these bacteria. This study aimed to determine the prevalence, diversity, and potential antimicrobial activity of hospital effluents Streptomyces at Mbarara Regional Referral Hospital, Southwestern Uganda.

Methodology: Twenty soil samples were collected randomly from soil contaminated with effluent at the hospital. Air dried for 1 week, crushed to obtain 1 gram of the soil which was dissolved in 10mls of sterile distilled water, 10 fold dilutions were made. The samples were plated and incubated for 5 days on Starch Casein Agar (SCA) at 37°C. After 2-3 days, Streptomyces-like colonies were purified/sub-cultured, incubated for a further 5 days, and then streaked with inoculum from different standard bacterial strains for primary screening. The Streptomyces organisms that showed activity against pathogenic bacteria were then fermented on Soy M Protein broth, and secondary metabolites were extracted for powdered products. The extracts were dissolved in dimethyl sulfoxide (DMSO), and secondary screening for antimicrobial activity was done by serial-diluting the products and 150uL added in agar wells of plates of Muller Hinton agar (MHA) seeded with standard Organisms and clinical isolates and incubated (Appendix III). Zones of inhibition were measured in mm and reported as antimicrobial activity.

Results: From the 20 samples, 143 bacterial species **68 (47.55%)** were Streptomyces. Out of these, 22 isolates showed antimicrobial activity on primary screening and secondary screening. Streptomyces organisms presented with different shades of color, margin, elevation, and texture, and demonstrated variations in the utilization of lactose, fructose, and glucose. Out of 22 Streptomyces isolates that showed activity on primary screening, two did not show on secondary screening. The mean zones of inhibition were higher in gram-negative as compared to gram-positive bacteria.

Conclusions: The prevalence of Streptomyces in Hospital effluent was 47.55% with a diversity of Streptomyces showing variations in the shades of colors, margin, texture, and utilization of sugars. Streptomyces exhibited potential antimicrobial activity against both gram-negative and gram-positive bacteria, with higher activity against gram-negative based on mean zones of inhibition.