Optimization of fermentation parameters for enhanced APHE production from Streptomyces griseocarneus through submerged fermentation

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Abstract

Increasing resistance of microbes against antimicrobial drugs keep scientists busy in exploring novel and potent antibiotics. The present study is concerned with the production of antitumor antibiotic from Streptomyces griseocarneus NRRL B1068 using submerged fermentation technique. The antibiotic activity was tested against three test microorganisms including A. niger, E. coli and B. subtilis by agar well diffusion method. The production of antibiotic was enhanced by optimizing culture and physical conditions. Different culture media were screened and M1 medium consisting of (g/L), potassium dihydrogen phosphate, 3.24; dipotassium hydrogen phosphate, 5.65; hydrated magnesium sulphate, 1.0; and 1 ml stock solution of salts (ferrous sulphate, 0.1; manganese chloride, 0.1; and zinc sulphate, 0.1) supplemented with 7.5% glucose and 2.0% lysine was found best for antibiotic synthesis. Optimum temperature, pH and incubation period for the production of antitumor antibiotic were found to be 30ºC, 7.2 and 7 days, respectively. Seven days old inoculum in a concentration of 8% (v/v) was determined best for antitumor antibiotic production by Streptomyces griseocarneus NRRL B1068

Immuno-modulatory and antimicrobial activity assays reveal a link between the biological actions of these compounds and the length of their aliphatic chains. Thus, antibiotics with longer aliphatic chains exhibited improved antimicrobial and immune modulatory activities. APHE-3 inhibits the proliferation of lymphocyte in the presence of phytohemagglutinin by more than 50% at a concentration of 10~4 M while APHE-1 and APHE- 2 are less effective. This is due to the smaller size of APHE-3 being better able to bypass the membrane barrier of the cells (Fildago et al., 1992).The present study is aimed at the optimization of some critical parameters for the production of antitumor antibiotics from Streptomyces griseocarneus and having an insight into the production process for obtaining maximum titer of antibiotic for commercial productions.

Keywords: Streptomyces griseocarneus; Antitumor; Hydrated Magnesium Sulphate; Potassium dihydrogen Phosphate; Dipotassium Hydrogen Phosphate; Bacterial resistance; Antimicrobial activity; Fermentation; Sensitivity;

Biography

Abida Rafique has done her BSc (Hons) and MPhil in Microbiology from Government College University Lahore. She has completed an internship at Chughtais Lahore Lab (CLL) where she shadowed senior members of the department and took part in numerous investigations. With use of samples of faeces, urine and wound swabs, she prepared and viewed agar plates and microscopic slides which allowed her to acquire a greater knowledge about the variety of skills and methods required in a Microbiology laboratory. She has also done a two weeks' work at Shaukat Khanum Memorial Cancer Hospital & Research Center Lahore

Conclusion

The purpose of the study was to optimize the fermentation parameters for the APHE antibiotics Production from Streptomyces griseocarneus NRRL B1068. It is concluded that microorganism showed maximum titers of APHE antibiotics under the optimized conditions of submerged fermentation. The optimization of the process significantly enhanced the yield of APHE antibiotics. The microorganism showed antimicrobial activity against all the three microorganisms tested and it can be accomplished that Streptomyces griseocarneus NRRL B1068 acts as a promising source of antimicrobial agent in future.