ABSTRACT

Petroleum pollution is becoming serious with the continuously increasing demands for oil and other oil-related products. This type of pollution has adverse detrimental effects on both aquatic and terrestrial environments. Frequent activities such as compressor condensates, cooling and lubricant agents' usage, metal processing, as well as oil misuse and transportation lead to petroleum pollution. Biofilm-based bioremediation is an attractive choice for petroleum removal instead of using planktonic cells for pollutants removal. Qualitative examination of biofilm was performed in test tubes. Previous research has shown that the EPS matter of biofilm has a powerful association with degradation of PAH. In many Gram-negative bacteria, biofilm is formed under stress conditions. Various factors influence the biofilm-mediated bioremediation of PAH, including biofilm thickness, total biomass (cell content and EPS), diffusion distance, and the other factors like nutrients availability, pH, and salinity. In that case, it is termed in situ bioremediation, whereas if the polluted sample is treated typically away from the original spot, it is termed ex-situ bioremediation. Time kinetics was utilized to check the biofilm forming ability of bacteria at 72h, 120h and 168h. Three out of six strains PA3, PA4 and PA6 formed the biofilm. According to the time kinetics biofilm formation assay, biofilm-forming bacterial strains formed mature biofilm on test tube walls on the 5th day and then after further 5 days petroleum was degraded by the biofilm. The IR spectrum of each sample is recorded using Fourier Transform Infrared Spectrometer (FTIR). FTIR will be applied to investigate the participation of biofilm containing functional groups before and after petroleum bioremediation. Percentage of crude oil degradation determined using spectrophotometer. Light microscope was used to examine the morphological characteristics of the isolated colonies. Gram staining performed for each isolate. All the statistical analysis done using confidence SPSS v.20. The most commonly reported genera of hydrocarbon-degraders are *Pseudomonas*, *Acinetobacter*, *Nocardia*, and *Achromobacter*. Storage, refining, exploration, production, and transporting petroleum-based products cause accidental spills and leaks. Therefore, further research is conducted, and various strategies are being used to sustain the environment. The hydrocarbons have the ability to alter the structure and functions of the ecosystem's microbial communities. Soil contributes significantly to the air quality, food, and water, all of which directly impact human health.