

ABSTRACT

Diatoms are a dominant group of marine phytoplankton that serve as sensitive bioindicators of changes in coastal water quality. Oil pollution resulting from industrial and anthropogenic activities has the potential to alter marine ecosystems by affecting the distribution and abundance of diatom communities. This study aimed to evaluate the relationship between diatom abundance and oil and grease concentrations in the coastal waters of Lhokseumawe City, Aceh, Indonesia. Field sampling was conducted at four coastal stations representing distinct environmental characteristics: a tourism area, an oil industrial area, a residential area, and a fishing area. Diatom samples were collected by filtering 50 L of surface seawater through a 20 μm plankton net, preserved with Lugol's solution, and identified microscopically using a hemocytometer. Oil and grease concentrations were determined using the Non-Dispersive Infrared (NDIR) spectroscopy method. Water quality parameters including temperature, salinity, pH, dissolved oxygen, transparency, nitrate, sulfate, and ammonia were also measured. The relationship between diatom abundance and oil and grease concentrations was analyzed using simple linear regression. The results showed that diatom abundance varied across sampling stations, ranging from 375 to 475 cells/mL. The highest abundance was recorded at the tourism station, while the lowest was found near the oil industrial area. Oil and grease concentrations ranged from 0.50 to 0.67 mg/L, with the highest concentration detected at the industrial station. Water quality parameters generally remained within ranges suitable for diatom growth. Simple linear regression analysis reveals a very weak relationship between diatom abundance and oil and grease concentrations, with a coefficient of determination (R^2) of 0.0008. These results indicate that 0.08% of the variation in diatom abundance is explained by changes in oil and grease concentrations, while the remaining 99.92% is influenced by other environmental factors. The negative regression trend further indicates that higher oil and grease concentrations are associated with lower diatom abundance, confirming that oil and grease concentrations are not a major factor influencing diatom abundance at the study area.

Keywords: coastal area, diatom, oil and grease concentrations, pollution, water quality.