ABSTRACT

Aquaculture plays a pivotal role in global food security by providing a substantial portion of animal protein to millions of people worldwide. This burgeoning industry, while critical for nourishing populations, faces significant challenges, notably bacterial diseases and biofilm-related issues that result in substantial economic losses. In this study, we isolated and genetically characterized pathogenic strains from diseased Labeo rohita, a highly cultivated fish species in South Asia. We assessed the antibiotic susceptibility of these strains, revealing variations in resistance patterns across different antibiotics. Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) values were determined, offering insights into the effective dosages required for inhibiting bacterial growth and achieving bacterial eradication.The study also investigated the antibiofilm activity of antibiotics and probiotics independently, showcasing their potential in mitigating biofilm formation, a prevalent issue in aquaculture. Probiotics, particularly Psudomonas spp., exhibited promising antibiofilm properties, providing a natural alternative to antibiotics. Furthermore, we explored the synergistic effects of combining antibiotics and probiotics in addressing biofilm-related infections. The results demonstrated a remarkable biofilm dispersal potential, reducing the dependence on high antibiotic doses and offering new strategies for effective disease management in aquaculture. These findings have practical implications for the aquaculture industry, offering a holistic approach to combat bacterial diseases and biofilm-related challenges. By optimizing antibiotic and probiotic combinations, aquaculture practices can become more sustainable, economically viable, and less prone to antibiotic resistance development. Further research is warranted to understand the underlying mechanisms and validate these strategies in real-world aquaculture settings.