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ANTIMICROBIAL AND ANTIBIOTIC SYNERGISTIC EVALUATION OF PORPHYRIDIUM PURPUREUM CHLOROFORMIC EXTRACT

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Until 2050, is estimated that bacterial resistance will cause 39 mllion deaths worldwide. Therefore, natural compounds have been investigated as alternatives that work synergistically with antibiotics. *Porphyridium purpureum* is a microalgae known as a potential source of bioactive metabolites, such as fatty acids, with antimicrobial properties. These compounds destabilize the bacterial membrane, favoring the action of antibiotics. Therefore, this study aims to characterize the lipid profile of the chloroform extract of *P. purpureum* and evaluate its antimicrobial activity against gut pathogens. The biomass was obtained in a 15 L photobioreactor with F/2 medium and light irradiance at 450 nm. After 9 days, the biomass was lyophilized and subjected to extraction with chloroform (1:6 g/mL) by percolation. The extract was rotary evaporated and resuspended in 50% DMSO (40 mg/mL). Chemical analysis was performed using Gas Chromatography-Mass Spectrometry (GC-MS), and the samples were identified by the NIST 2020 library. The antimicrobial activity was performed by broth microdilution method to determine the Minimum Inhibitory Concentration (MIC) against *Escherichia coli* (ATCC 25922) and *Salmonella enterica* Typhimurium (ATCC 14028). The activity evaluation was made with the extract isolated (800–6.25 µg/mL) and combined with ciprofloxacin (32–0.25 µg/mL). Therefore, the Fractional Inhibitory Concentration Index (FICI) was determined, where FICI ≤0.5 suggests a synergistic effect. GC-MS analyses allowed the identification of the following major compounds: palmitic acid (42.05%), arachidonic acid (22.73%), linoleic acid (17.91%), eicosapentaenoic acid (8.64%), oleic acid (4.35%), linolenic acid (2.30%) and stearic acid (2.02%). Did not show antimicrobial activity in the concentrations tested, but, when the extract, at 6.25µg/mL, were combined with ciprofloxacin, it was observed bacterial growth inhibition. Thereby, the MIC against *S. typhimurium* was reduced from 4 to 1 µg/mL (FICI = 0.25) and *E. coli* from 4 to 2 µg/mL (FICI = 0.50). These results suggest synergism between *P. purpureum* chloroformic extract and ciprofloxacin, which can be a strong tool against infections caused by bacterial, especially against gut pathogens.

Keywords: *fatty acids, antibacterial activity, microalgae, natural products, marine.*