Antibacterial Activity of Liquid Soap Enriched with *Sargassum Crassifolium* and *Caulerpa Racemosa*

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Seaweeds are marine macro algae which contain a variety of bioactive compounds with antimicrobial and antioxidant properties. Therefore, seaweeds are in high demand for the development of skincare products. The present study was designed to evaluate the antibacterial effect of liquid soap formulated using *Sargassum crassifolium* and *Caulerpa racemosa* against the *Escherichia coli* and *Staphylococcus aureus*. Ethanolic extracts of both seaweed species were obtained using maceration technique and analyzed for phytochemical screening for assessing the bioactive compounds. The hot process method was used to prepare the soap base, which was included with different levels of crude extracts to prepare treatments with three concentrations as 250 ppm (SC/CR250), 500 ppm (SC/CR500) and 750 ppm (SC/CR750) for each seaweed. Antibacterial activity of formulated liquid soaps was measured using disc diffusion method. A soap base without seaweed extract was used as the negative control (NC), while a commercial antibacterial handwash served as the positive control (PC). Results revealed that the crude extract of *S. crassifolium* composed of alkaloids, diterpenes, saponins, flavonoids, phenols and tannins and *C. racemosa* composed of saponins, diterpenes, phenols and tannins. Inhibition zone diameters were measured in triplicates (in mm), and the mean values of all eight treatments were compared using one-way ANOVA. Mean inhibition zone diameter (IZD) in liquid soaps formulated with *S. crassifolium* and *C. racemosa* against *E. coli* range from 7.42 ± 0.08 (NC) to 17.29 ± 0.08 (SC750) and 7.42 ± 0.15 (NC) to 9.28 ± 0.12 (CR750) respectively. Mean IZD in liquid soaps formulated with *S. crassifolium* and *C. racemosa* against *S. aureus* range from 5.30 ± 0.24 (NC) to 7.29 ± 0.20 (SC750) and 5.29 ± 0.02 (NC) to 6.65 ± 0.29 (CR750) respectively. Furthermore, SC750 was the most effective liquid soap with significantly higher ($p < 0.05$) inhibition against both bacteria species. However, the antibacterial effect of SC750 against the *E. coli* and *S. aureus* was significantly lower ($p < 0.05$) than that of positive control. These findings indicate that among the tested seaweed-based liquid soaps, SC750 exhibited the strongest antibacterial activity against *E. coli* and *S. aureus*. By increasing the concentration than 750 ppm or by using combination of both seaweeds can be achieve an antibacterial effect comparable to or exceeding that of commercially available liquid soaps.

Keywords: Disc diffusion method, *E. coli, S. aureus*, phytochemical