Metabolic variations in seaweed, sargassum polycystum samples subjected to different drying methods via 1H-NMR-based metabolomics and their bio- activity in diverse solvent extracts

ABSTRACT

Seaweeds are known as excellent sources of unique bioactive metabolites. In the present study, proton nuclear magnetic resonance (1H NMR) combined with principal component analysis (PCA) was used to distinguish the metabolic variations in Brown seaweed, Sargassum polycystum treated under different drying processes. The study also evaluated the phytochemistry, antioxidant, and antimicrobial effects of S. polycystum extracted in different solvents. Mutually under the different drying processes investigated, a total of 12 metabolites were identified from 1H NMR analysis. Freeze drying emerged as the most efficient process that preserved most of the potentially beneficial metabolites in the samples. The results of the qualitative phytochemical screening of differentially dried S. polycystum extracts revealed the presence of various secondary metabolites. The 70% ethanol extract exhibited the highest total phenolic (627 ± 50.81 mg GAE/100 g dried samples) and also displayed the highest DPPH scavenging activity (61.4 ± 0.171%) at the highest concentration (3 mg ml−1) tested. Methanol extract on the other hand contained the highest total antioxidant capacity (121.00 ± 0.003 mmol/g) followed by 70% ethanol extract (120.00 ± 0.001 mmol/g) at concentration of 1.25 mg/mL. The 70% ethanol extract also showed inhibition zone towards all bacteria samples tested compared to others solvent extracts. Based on these results, the identification of metabolites variations using PCA is considered as very useful procedure as a basis to recommend the most efficient processing (drying) method. The potential utilization of the tested Brown seaweed S. polycystum species as a source of antioxidants and antibacterial agents were also highlighted. The commercial cultivation of the species therefore, needs to be encouraged and promoted.

Keyword: Antioxidant; Phytochemistry; Principal component analysis (PCA)Sargassum polycystum