

Characterization of Protein Extracted from the Omani Seaweed “*Hypnea bryoides*”

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ABSTRACT

Hypnea bryoides (*H. bryoides*), a species belonging to the red seaweed group (Rhodophyta), was previously found to contain a significant amount of protein. This study aimed to extract protein from *H. bryoides* and examine its functional and chemical properties. The protein was extracted in an alkaline solution (0.3 M NaOH, pH 12). HPLC analysis was performed to assess the protein's molecular weights and amino acid profile. The molecular characteristics of the protein extract were analyzed using the FTIR-ATR technique. The extraction yield was $6.00 \pm 0.35\%$, and the purity was $88.50 \pm 0.71\%$. The protein demonstrated a higher oil-holding capacity (13.56 ± 0.26 g oil/g protein) compared to its water-holding capacity (9.61 ± 0.15 g water/g protein). The highest protein foaming capacity, solubility, emulsifying capacity, and stability were observed at pH 8 and 10 ($P \leq 0.05$), while the greatest foaming stability occurred at pH 4. The in-vitro digestibility of the protein was $62.62 \pm 3.29\%$. Furthermore, the FTIR-ATR analysis revealed that β -sheet structures constitute the primary secondary structural component of *H. bryoides* proteins. Different protein molecules with a broad range of molecular weights (0.4 -125.2 kDa) were identified by HPLC. The amino acid profile results indicated that essential amino acids accounted for 35.08% of the total amino acids, with methionine + cysteine being the limiting amino acid (Amino acid score: 0.003). Overall, the protein from this seaweed exhibited good functional and chemical properties, making it suitable as an emulsifying or foaming agent in various food products. Moreover, future research is needed to enhance the yield and investigate the biological activities of *H. bryoides* protein.

