

Characterization of Functional Proteins from Edible Bird's Nest (EBN) using Proteomic Techniques in Combination with Bioinformatics Analyses

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Introduction

- EBN is a highly prized delicacy that is made from the solidified saliva of swiftlets [1].
- Rich in proteins (over 50%), with a total amino acid content of 40% [2].
- Research problem:** little work has been done to characterize functional protein in EBN using proteomic-based techniques.
- Research objectives:** To explore the potential functional properties of EBN proteins and their potential benefits for human health.

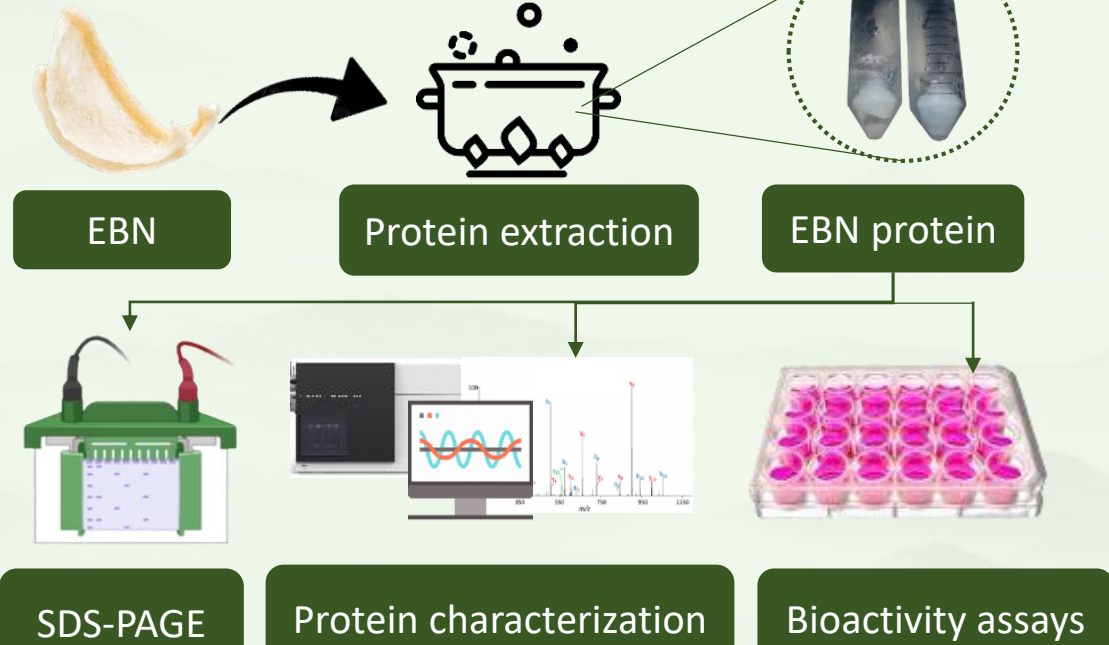
Good health and well-being (SDG 3)

Lead to the development of new functional foods and nutraceutical products that promote human health and well-being.

No Poverty (SDG 1)

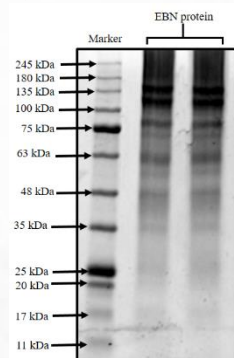
EBN has been identified as one of the National Key Economic Areas (NKEA) which provides a source of income for local communities.

Methodology



(A) Identification of EBN proteins using SDS-PAGE

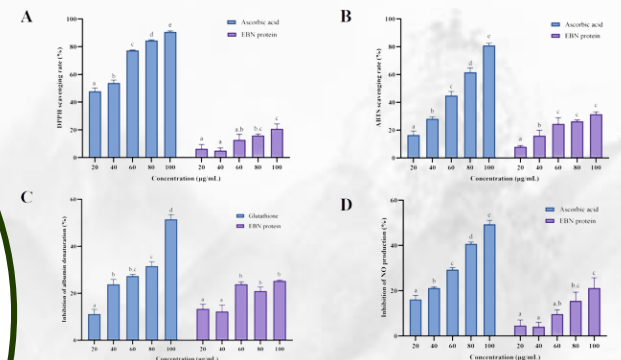
Different protein bands represent different proteins or protein subunits within the EBN sample.



Results & Discussion



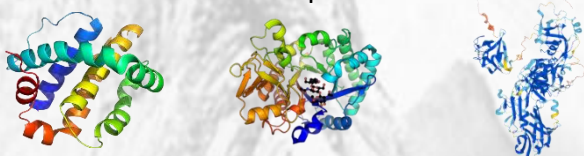
(C) Evaluation of antioxidant and anti-inflammatory activity of EBN proteins



Protein concentration of 100 µg/mL
 DPPH radical scavenging ability (20.84%),
 ABTS radical scavenging ability (31.49%),
 inhibition of albumin denaturation (25.30%),
 inhibition of NO production (21.30%).

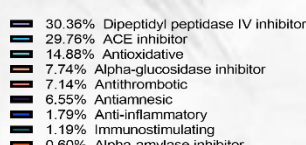
(B) Characterization of EBN proteins and functional proteins prediction

Identified 51 proteins in EBN



Deleted in malignant brain tumors 1 protein (DMBT1), acidic mammalian chitinase (AMCase), lysyl oxidase homolog 3 (LOXL3).

BIOPEP Database



Dipeptidyl peptidase (DPP) IV inhibitor (30.36%), ACE inhibitor (29.76%), antioxidative (14.88%), alpha-glucosidase inhibitor (7.74%), antithrombotic (7.14%), antiamnesic (6.55%), anti-inflammatory (1.79%), immunostimulating (1.19%), and alpha-amylase inhibitor (0.60%).

Conclusion

- 51 functional proteins were predicted to have potential biological activities.
- The antioxidant and anti-inflammatory properties of EBN proteins have been experimentally validated.
- Further research is required to isolate and purify functional EBN proteins.

References

- Lee, C.H.; Lee, T.H.; Wong, S.L.; Nyakuma, B.B.; Hamdan, N.; Khoo, S.C.; Ramachandran, H.; Jamaluddin, H. Characteristics and trends in global Edible Bird's Nest (EBN) research (2002–2021): a review and bibliometric study. *Journal of Food Measurement and Characterization* 2023, 1–22.
- Yan, T.H.; Babji, A.S.; Lim, S.J.; Sarbini, S.R. A Systematic Review of Edible Swiftlet's Nest (ESN): Nutritional bioactive compounds, health benefits as functional food, and recent development as bioactive ESN glycopeptide hydrolysate. *Trends in Food Science & Technology* 2021, 115, 117–132.



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