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EFFECT OF THE ADDITION OF NORI (*Porphyra yezoensis*) ON THE DEVELOPMENT AND CHARACTERIZATION OF FUNCTIONAL FOOD

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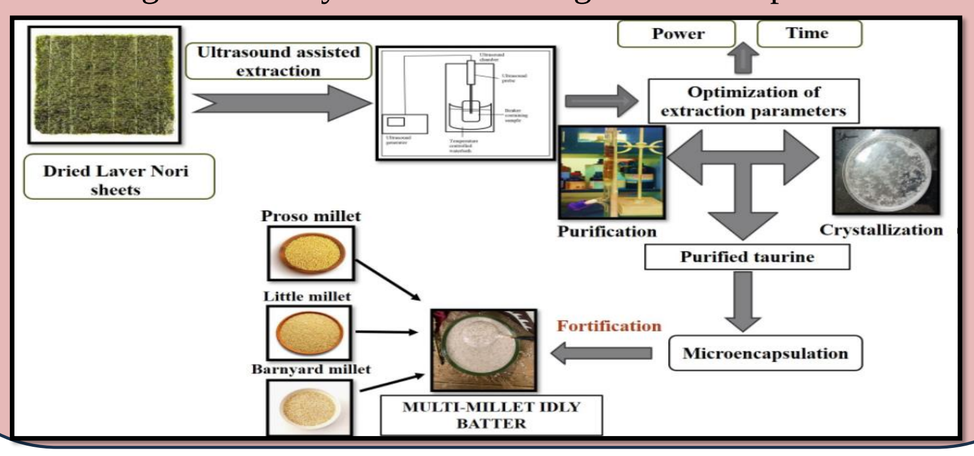
INTRODUCTION & AIM

INTRODUCTION: Taurine is a sulphur-containing amino acid abundant in the body but often deficient in vegan and vegetarian diets. This study focuses on extracting taurine from Nori *(Porphyra yezoensis*), a vegan source, and fortifying it in multi-millet idly batter to combat taurine deficiency.

AIM: To extract and purify taurine from Nori and develop a taurine-fortified multi-millet idly batter using ultrasound-assisted extraction and ensuring the stability of taurine through microencapsulation.



METHODOLOGY

LAVER NORI EXTRACT PREPARATION

Laver Nori sheets were ground to a particle size of 245 µm and subjected to ultrasound-assisted extraction (UAE) using a 70% ethanol solvent system. Extraction parameters were optimized based on variations in sonication power (10%-90%) and time intervals (10-40 minutes). The optimal conditions for the highest taurine yield were 70% power for 40 minutes at 60°C.

MICROENCAPSULATION OF TAURINE

Microencapsulation was carried out using Gum Arabic as the wall material to protect taurine from cooking degradation and enhance its thermal stability. The encapsulated taurine particles were spray-dried, and the thermal stability was tested using Differential Scanning Calorimetry (DSC), which revealed a significant increase in taurine stability up to 319.8°C.

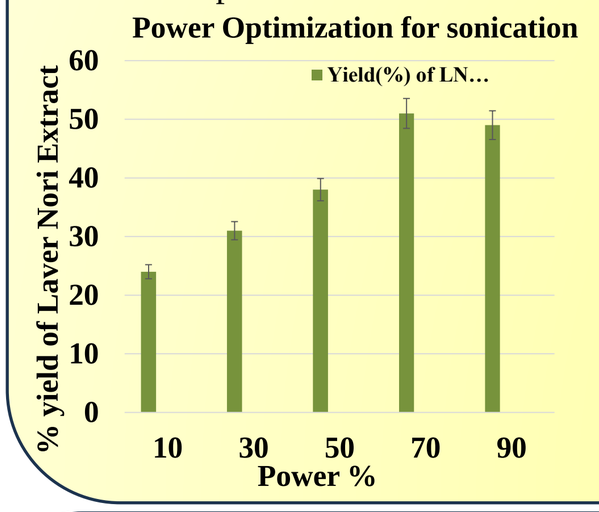
PREPARATION OF MULTI-MILLET IDLY BATTER

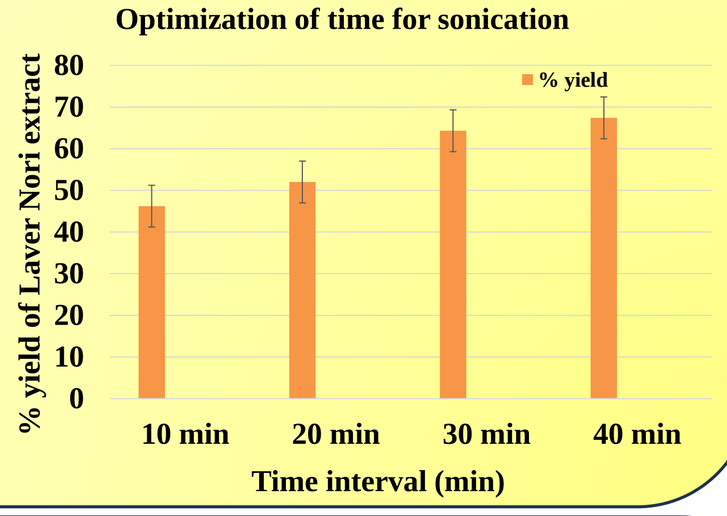
Multi-millet batter was formulated using **Proso millet, Little millet, and Barnyard millet** in equal proportions, along with fenugreek and black gram. The ingredients were soaked, ground, and fermented for 12 hours. Microencapsulated taurine was added at a concentration of 0.416 g/100 g of batter before fermentation.

RESULTS & DISCUSSION

OPTIMIZATION OF TAURINE EXTRACTION

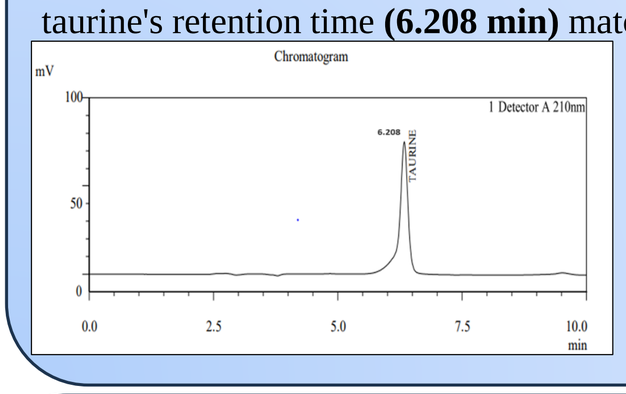
The highest taurine yield was achieved at 70% sonication power for **40 minutes**, using **70% ethanol**. The yield increased with power up to 70% but declined at 90% due to solvent evaporation.





QUANTIFICATION AND PURIFICATION OF TAURINE

HPLC analysis confirmed a taurine concentration of **0.22%** in the extract. The purified taurine's retention time **(6.208 min)** matched the standard.



SNO	PARAMETER		INSTRUMENT	RESULT
1.	Content of Taurine (%)		LCMSMS	0.22±0.12
PEAK	NAME	RET. TIME	AREA	AREA %
1.	Taurine	6.208	913211	100%
Total			913211	100%

MICROENCAPSULATION OF TAURINE

The encapsulated taurine particles were spray-dried, and the thermal stability was tested using Differential Scanning Calorimetry (DSC), which revealed a significant increase in taurine stability up to **319.8°C**.

PHYSICOCHEMICAL PROPERTIES OF THE BATTER

The fortified idly batter exhibited slight changes in its physicochemical properties compared to the control batter. The pH of the taurine-fortified batter decreased slightly from **5.3 to 5.2**, while the titratable acidity increased marginally from **0.507% to 0.563%.** There was a minor reduction in bulk density from 0.77 g/cm³ to 0.73 g/cm³.

PROXIMATE ANALYSIS OF IDLY

Moisture content increased from **49.53%** in the control idly to **51.23%** in the taurine-fortified idly. Protein content increased slightly from **5.6% to 5.72%.** Crude fat content showed a minor increase from **5.2% to 5.32%.** The overall energy content decreased from **206.8 kcal to 200.5 kcal**, which is favorable for low-calorie diets.

SENSORY ANALYSIS

The addition of encapsulated taurine did not significantly affect the sensory attributes such as taste, texture, and color of the idly. However, there was a minor increase in firmness due to the thickening properties of Gum Arabic, used in the microencapsulation process.

CONCLUSION

This study demonstrates that taurine extracted from **Laver Nori** can be effectively purified, microencapsulated, and fortified into multi-millet idly batter. The encapsulation ensured taurine's stability during cooking without compromising the sensory and nutritional properties of the idly. This approach provides a promising solution to address taurine deficiencies in vegan, vegetarian, and elderly populations through a plant-based functional food.

FUTURE WORK

Future research should explore taurine fortification in other food products and assess its long-term health benefits in populations with dietary restrictions. Optimizing encapsulation techniques to enhance taurine bioavailability could also be investigated

REFERENCES

- Chelliah, R., Ramakrishnan, S. R., Premkumar, D., & Antony, U. (2016). Bio-fortification and shelf-life extension of idly batter using curry leaves (Murraya koenigii). Journal of Food Science and Technology, 53(6), 2851–2862. https://doi.org/10.1007/s13197-016-2264-2
- Gupta, R., Win, T., & Bittner, S. (2005). Taurine Analogues; A New Class of Therapeutics: Retrospect and Prospects. *Current Medicinal Chemistry*, *12*(17), 2021–2039. https://doi.org/10.2174/0929867054546582

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