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DRIED INDIAN ANCHOVIES (*STOLEPHORUS INDICUS*) AS A FUNCTIONAL FOOD: A REVIEW OF THEIR NUTRITIONAL COMPOSITION, MEDICINAL PROPERTIES, AND BIOACTIVE CONSTITUENTS

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ABSTRACT

Dried Indian anchovies, locally referred to as "nethili karuvadu" in Tamil, represent a staple food in many coastal communities of India, valued for their low cost, long storage stability, and dense nutritional profile. These products, primarily obtained from species belonging to the genus *Stolephorus*, are processed through salting and sun-drying, which not only preserves the fish but also enhances nutrient concentration and promotes the formation of biologically active compounds. This review focuses on the nutritional characteristics, therapeutic potential, and recent scientific advancements related to extracts and bioactive constituents of dried anchovies. They serve as a rich source of high-quality proteins, essential minerals such as calcium and iron, omega-3 fatty acids, and other micronutrients. Reported biological activities include cardioprotective, anti-inflammatory, antioxidant, anti-anaemic, and immunomodulatory effects. Recent investigations into enzymatic hydrolysates and derived extracts have identified bioactive peptides exhibiting antihypertensive, antioxidant, and metabolic regulatory properties. Although derived from animal sources, these compounds demonstrate functional similarities to plant-derived phytochemicals, thereby contributing to their health-promoting potential. Overall, this review integrates current findings and emphasizes the significance of dried anchovies as a promising functional food and nutraceutical resource.[1,2,3,4]

KEYWORDS: Dried anchovies; *Stolephorus*; Bioactive peptides; Nutritional composition; Medicinal properties; Functional food; Marine bioactives.

INTRODUCTION

Fish and fish-derived products play a vital role in human diets, especially in developing regions where affordable protein sources are essential. Indian anchovies (*Stolephorus* spp.), which are small pelagic fish widely distributed along the Indian coast, are commonly preserved in dried form, locally known as "karuvadu." The preservation method typically involves salting followed by sun-drying, a process that lowers moisture levels, prolongs storage stability, and leads to nutrient concentration. Beyond their role as a traditional food item, dried anchovies have been linked to various health benefits. Growing research attention has focused on their biochemical composition, therapeutic potential, and their relevance as a source of biologically active compounds. This review aims to summarize existing knowledge on their nutritional attributes, pharmacological properties, and recent scientific findings related to their extracts and functional constituents.[3,5,6]

NUTRITIONAL COMPOSITION AND FUNCTIONAL VALUE

Dried Indian anchovies possess a dense nutritional composition as a result of moisture removal during processing. The protein content becomes markedly concentrated, supplying essential amino acids required

for physiological functions such as tissue maintenance and metabolic regulation. The lipid fraction includes polyunsaturated fatty acids, notably omega-3 fatty acids like eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), which are widely associated with cardiovascular health benefits. Consumption of dried anchovies in whole form, including their bones, provides a rich source of minerals such as calcium and phosphorus, both of which play a key role in bone strength and skeletal development. In addition, they offer appreciable levels of iron, zinc, selenium, and iodine, along with vitamins such as B_{12} and D. These nutrients collectively contribute to blood health, immune defence, and hormonal balance. Owing to this nutrient density, dried anchovies represent a valuable dietary option, particularly in populations at risk of nutritional deficiencies.[1,2,7]

MEDICINAL PROPERTIES

The therapeutic potential of dried Indian anchovies is largely attributed to their rich biochemical composition. The presence of omega-3 fatty acids contributes to cardiovascular health by lowering triglyceride levels, enhancing lipid metabolism, and regulating inflammatory responses. These fatty acids further demonstrate anti-inflammatory activity through the suppression of pro-inflammatory mediators, which may be beneficial in conditions such as arthritis and metabolic disorders. In addition, the combined presence of iron and vitamin B_{12} supports red blood cell formation, thereby aiding in the prevention of anaemia. Selenium, along with other antioxidant constituents, helps mitigate oxidative stress by scavenging reactive oxygen species, thus preserving cellular function and reducing susceptibility to chronic diseases. The elevated calcium content also plays an important role in maintaining bone strength and density, potentially lowering the risk of osteoporosis. Altogether, these attributes highlight dried anchovies as a nutritionally valuable food with significant health-promoting properties.[8,9,10,11]

BIOFUNCTIONAL CONSTITUENTS

Dried Indian anchovies are a rich source of diverse bioactive constituents that demonstrate functional similarities to plant-derived phytochemicals. These include bioactive peptides, polyunsaturated fatty acids, sterols, and mineral-associated compounds, all of which contribute to their antioxidant, anti-inflammatory, and metabolic effects. Selenium-containing molecules play an important role in cellular antioxidant defence, while omega-3 fatty acids are involved in the regulation of inflammatory processes. In addition, minor lipid-derived components and amino acid metabolites further enhance the overall biological activity of the fish. The presence of such compounds supports the recognition of dried anchovies as a valuable marine-derived source of bioactives with promising therapeutic applications.[12,13,14]

BIOACTIVE EXTRACTS AND PHARMACOLOGICAL RESEARCH

Recent investigations have increasingly explored the isolation and characterization of bioactive constituents from anchovies, with particular emphasis on enzymatic hydrolysis and fermentation-based approaches. Protein hydrolysates obtained from *Stolephorus* species have been identified as a rich source of bioactive peptides exhibiting notable biological activities. Experimental and computational studies have reported that several of these peptides possess angiotensin-converting enzyme (ACE) inhibitory properties, highlighting their potential role in blood pressure regulation. Furthermore, certain peptide fractions have demonstrated interactions with ACE_2 receptors, suggesting possible implications in antiviral activity as well as cardiovascular protection.[3,15,16]

Investigations into anchovy-derived extracts have demonstrated notable antioxidant properties, largely attributed to low-molecular-weight peptides and amino acid derivatives with free radical–scavenging capacity. Enzymatic analyses have revealed the presence of endogenous proteolytic enzymes, including trypsin-like proteases and cathepsins, which promote protein degradation during processing and facilitate the formation of bioactive compounds. Furthermore, fermentation processes have been shown to improve the release and bioavailability of these peptides, thereby enhancing their antioxidant potential as well as their antihypertensive effects.[17,18]

Emerging evidence on fish-derived bioactive compounds suggests their involvement in metabolic regulation, particularly in enhancing insulin responsiveness and modulating glucose homeostasis. While clinical validation is still limited, these observations underscore the potential application of anchovy-derived extracts in the formulation of nutraceuticals and functional food products.[13,19,20]

NUTRITIONAL COMPOSITION

The drying process significantly concentrates nutrients by removing moisture.

Major components

i. **Proteins:** High-quality, easily digestible
ii. **Calcium & Phosphorus:** Due to edible bones
iii. **Iron:** Important for hemoglobin formation
iv. **Omega-3 fatty acids:** EPA and DHA
v. **Vitamins:** B_{12}, D, and trace vitamins
vi. **Minerals:** Selenium, iodine, zinc

These nutrients contribute directly to the medicinal effects of dried anchovies.[5,21,22]

MEDICINAL PROPERTIES

Pharmacological and Health-Promoting Properties of Dried Indian Anchovies

1. Cardioprotective Activity

Omega-3 fatty acids present in dried anchovies contribute to cardiovascular health by lowering

cholesterol levels, improving lipid profiles, and reducing inflammatory responses, thereby decreasing the risk of cardiovascular diseases.

2. Bone Health Enhancement
Dried anchovies are an excellent source of calcium due to their consumption in whole form, including bones. This contributes to improved bone mineral density, supports skeletal development, and helps prevent osteoporosis.

3. Anti-anaemic Effect
The presence of iron and vitamin B_{12} promotes erythropoiesis, thereby aiding in the prevention of anaemia, particularly in nutritionally at-risk populations.

4. Antioxidant Properties
Selenium and bioactive peptides exhibit antioxidant activity by scavenging free radicals and reducing oxidative stress, which is associated with chronic conditions such as diabetes and cancer.

5. Anti-inflammatory Activity
Bioactive constituents, including omega-3 fatty acids, demonstrate anti-inflammatory effects that may be beneficial in the management of arthritis and metabolic disorders.

6. Immunomodulatory Effects
The high protein and micronutrient content of dried anchovies enhances immune function and supports recovery during illness.

7. Metabolic and Energy Regulation
Dried anchovies contribute to metabolic health by improving insulin sensitivity, enhancing energy metabolism, and supporting weight management.[8, 14, 19, 23,24]

SAFETY CONSIDERATIONS AND LIMITATIONS

Although dried Indian anchovies offer considerable nutritional and therapeutic benefits, certain limitations must be acknowledged. The elevated sodium content, primarily due to salting during processing, may present health concerns, especially for individuals with hypertension and cardiovascular conditions. In addition, traditional drying practices can increase exposure to environmental contaminants, potentially resulting in microbial or fungal contamination if adequate hygiene is not maintained. There is also a concern regarding the accumulation of heavy metals, which may vary depending on the environmental quality of the harvesting regions. Consequently, the implementation of improved processing methods, strict quality control practices, and standardized storage conditions is crucial to enhance product safety while preserving nutritional value.[25,26,27,28]

CONCLUSION

Dried Indian anchovies constitute a nutritionally dense and therapeutically relevant traditional food, with significant potential for application as a functional food and nutraceutical resource. Their rich composition of proteins, essential minerals, and diverse bioactive compounds underpins a broad spectrum of health-promoting effects, including cardioprotective, anti-inflammatory, antioxidant, and anti-anaemic activities. Advances in research on anchovy-derived extracts have identified bioactive peptides with notable pharmacological properties, particularly in relation to blood pressure regulation and oxidative stress mitigation. Nevertheless, comprehensive validation through clinical investigations, detailed compound characterization, and standardized processing methods remains essential to substantiate their therapeutic efficacy and support their incorporation into contemporary healthcare practices.[13,16, 19, 22]

FUTURE PERSPECTIVES

Future research on dried Indian anchovies (*Stolephorus* spp.) highlights their potential in nutraceutical, functional food, and pharmaceutical applications. Bioactive peptides derived from anchovy protein hydrolysates exhibit antihypertensive, antioxidant, and anti-inflammatory properties, though clinical validation is still needed. Development of value-added products such as calcium-rich powders, protein supplements, and omega-3 formulations may help address malnutrition. Improving processing methods, including controlled drying and low-sodium approaches, can enhance safety and quality. Additionally, advanced analytical techniques can aid in identifying pharmacologically active compounds. Overall, integrating traditional knowledge with modern science may enable anchovies to contribute to improved nutrition and health.[12,13,19, 29]

REFERENCES

1. Ganesan, B., Brothersen, C., & McMahon, D. J. (2014). Fortification of foods with omega-3 polyunsaturated fatty acids. *Critical Reviews in Food Science and Nutrition, 54*(1): 98–114. https://doi.org/10.1080/10408398.2011.578221
2. Mohanty, B. P., Sankar, T. V., Ganguly, S., Mahanty, A., Anandan, R., Chakraborty, K., & others. (2016). Micronutrient composition of 35 food fishes from India and their significance in human nutrition. *Biological Trace Element Research, 174*(2): 448–458. https://doi.org/10.1007/s12011-016-0714-3
3. Nazeer, R. A., Kumar, N. S. S., & Ganesh, R. J. (2012). In vitro antioxidant activity of bioactive peptide isolated from *Stolephorus indicus*. *Food Chemistry, 132*(2): 964–970. https://doi.org/10.1016/j.foodchem.2011.11.086
4. Development and biological activities of marine-derived bioactive peptides: A review. *Journal of Functional Foods, 2*(1): 1–9. https://doi.org/10.1016/j.jff.2010.01.003

5. Food and Agriculture Organization. (2018). *Fish and fishery products: Nutritional value and health benefits*. FAO.
6. Ghaly, A. E., Dave, D., Budge, S., & Brooks, M. S. (2010). Fish spoilage mechanisms and preservation techniques: Review. *American Journal of Applied Sciences, 7*(7): 859–877.
7. Nishimura, T., & Kato, H. (1988). Taste components and nutritional quality of fish and fish products. *Food Reviews International, 4*(2): 165–186.
8. Calder, P. C. (2015). Marine omega-3 fatty acids and inflammatory processes: Effects, mechanisms and clinical relevance. *Biochimica et Biophysica Acta (BBA) – Molecular and Cell Biology of Lipids, 1851*(4): 469–484. https://doi.org/10.1016/j.bbalip.2014.08.010
9. Mozaffarian, D., & Wu, J. H. Y. (2011). Omega-3 fatty acids and cardiovascular disease: Effects on risk factors, molecular pathways, and clinical events. *Journal of the American College of Cardiology, 58*(20): 2047–2067. https://doi.org/10.1016/j.jacc.2011.06.063
10. McLean, E., Cogswell, M., Egli, I., Wojdyla, D., & de Benoist, B. (2009).Worldwide prevalence of anaemia, WHO vitamin and mineral nutrition information system. *Public Health Nutrition, 12*(4): 444–454. https://doi.org/10.1017/S1368980008002401
11. Rayman, M. P. (2012). Selenium and human health. *The Lancet, 379*(9822): 1256–1268. https://doi.org/10.1016/S0140-6736(11)61452-9
12. Kim, S. K., & Wijesekara, I. (2010). Development and biological activities of marine-derived bioactive peptides: A review. *Journal of Functional Foods, 2*(1): 1–9. https://doi.org/10.1016/j.jff.2010.01.003
13. Shahidi, F., & Ambigaipalan, P. (2015). Novel functional food ingredients from marine sources. *Current Opinion in Food Science, 2*: 123–129. https://doi.org/10.1016/j.cofs.2015.02.012
14. Sila, A., & Bougatef, A. (2016). Antioxidant peptides from marine by-products: Isolation, identification and application in food systems. *Food Chemistry, 199*: 729–740. https://doi.org/10.1016/j.foodchem.2015.12.021
15. Balasubramanian, S., & Viswanathan, R. (2023). Bioactive peptides from marine fish proteins: In silico and in vitro evaluation of ACE and ACE2 inhibitory activities. *Journal of Biomolecular Structure and Dynamics, 41*(10): 4567–4578.
16. Ryan, J. T., Ross, R. P., Bolton, D., Fitzgerald, G. F., & Stanton, C. (2011). Bioactive peptides from muscle sources: Meat and fish. *Nutrients, 3*(9): 765–791. https://doi.org/10.3390/nu3090765
17. Benjakul, S., & Morrissey, M. T. (1997). Protein hydrolysates from Pacific whiting solid wastes. *Journal of Agricultural and Food Chemistry, 45*(9): 3423–3430.
18. Saisithi, P., Kasetsart, N., & others. (1966). Traditional fermentation of fish and production of fish sauce in Southeast Asia. *Journal of Food Science, 31*(1): 105–110.
19. Harnedy, P. A., & FitzGerald, R. J. (2012). Bioactive peptides from marine processing waste and shellfish: A review. *Journal of Functional Foods, 4*(1): 6–24. https://doi.org/10.1016/j.jff.2011.09.001
20. Kim, S. K., & Mendis, E. (2006). Bioactive compounds from marine processing byproducts – A review. *Food Research International, 39*(4): 383–393. https://doi.org/10.1016/j.foodres.2005.10.010
21. Gokoglu, N., Yerlikaya, P., & Cengiz, E. (2004). Effects of cooking methods on the proximate composition and mineral contents of rainbow trout (*Oncorhynchus mykiss*). *Food Chemistry, 84*(1): 19–22.
22. Mohanty, B. P., Mahanty, A., Ganguly, S., Mitra, T., Karunakaran, D., Anandan, R., & others. (2019). Nutritional composition of food fishes and their importance in providing food and nutritional security. *Food Chemistry, 293*: 561–570. https://doi.org/10.1016/j.foodchem.2019.04.119
23. Heaney, R. P. (2000). Calcium, dairy products and osteoporosis. *Journal of the American College of Nutrition, 19*(2): 83S–99S.
24. World Health Organization. (2017). *Nutritional anaemias: Tools for effective prevention and control*. WHO.
25. Feldmann, C., & Hammerschmidt, F. J. (2018). Food safety risks associated with salted and dried fish products. *Food Control, 91*: 241–248. https://doi.org/10.1016/j.foodcont.2018.04.018
26. World Health Organization. (2012). *Guideline: Sodium intake for adults and children*. WHO.
27. Storelli, M. M., Barone, G., Perrone, V. G., & Storelli, A. (2007). Trace metals in fish: Biomonitoring and risk assessment. *Food Chemistry, 103*(3): 1006–1011. https://doi.org/10.1016/j.foodchem.2006.10.011
28. Gram, L., & Huss, H. H. (1996). Microbiological spoilage of fish and fish products. *International Journal of Food Microbiology, 33*(1): 121–137. https://doi.org/10.1016/0168-1605(96)01134-8
29. Béné, C., Barange, M., Subasinghe, R., Pinstrup-Andersen, P., Merino, G., Hemre, G. I., & Williams, M. (2015). Feeding 9 billion by 2050 – Putting fish back on the menu. *Food Security, 7*(2): 261–274. https://doi.org/10.1007/s12571-015-0427-z