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THE MUD CRAB (*SCYLLA SERRATA*): NUTRITIONAL COMPOSITION AND THERAPEUTIC HEALTH BENEFITS

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Abstract:

Scylla serrata, commonly known as the mud crab, is a significant marine resource widely consumed in various regions around the world. This review aims to summarize the nutritional composition of *S. serrata* and highlight its potential therapeutic health benefits. The crab is rich in proteins, essential fatty acids, vitamins, and minerals, contributing to its status as a nutritious food source. Furthermore, *S. serrata* has demonstrated various health benefits, including anti-inflammatory, antioxidant, and antimicrobial properties. This paper discusses the implications of these nutritional and therapeutic attributes, emphasizing the importance of *Scylla serrata* in the human diet and its potential role in health promotion.

Keywords: *Scylla serrata, crabs, nutrition, mud crab, human health.*

1. Introduction

Scylla serrata is a commercially valuable species of crab found in the Indo-Pacific region, including estuaries and mangroves (Kumar et al., 2020). Its popularity as a food source can be attributed to its unique flavor and versatile culinary applications.

Crab (*Scylla serrata*), commonly known as the mud crab, is a highly valued seafood species widely consumed across the Indo-Pacific region due to its rich flavor and nutritional benefits. The nutritional composition of *S. serrata* is characterized by high-quality proteins, essential fatty acids (particularly omega-3), vitamins (such as B12 and E), and minerals like calcium, iron, and zinc, making it a nutrient-dense food source (Kumar, Sahu, & Yadav, 2020). Beyond its nutritional value, *S. serrata* offers several therapeutic health benefits, including anti-inflammatory, antioxidant, and antimicrobial properties, which have been linked to its bioactive compounds, particularly omega-3 fatty acids and other essential nutrients (Ghosh &

Das, 2018). These attributes support cardiovascular health, cognitive function, and immune system efficiency, positioning *S. serrata* as a functional food with significant health-promoting potential (Radhakrishnan & Nandakumar, 2019).

Recent research has focused on the nutritional and health-promoting properties of this species, recognizing its potential contributions to human health beyond its culinary value.

Systematic Position of Crabs (*Scylla serrata*):

- *Scylla serrata* (Forskål,1775)
- Kingdom- Animalia
- Phylum- Arthropoda
- Subphylum- Crustacea
- Class- Malacostraca
- Order- Decapoda
- Genus- *Scylla*
- Species- *Scylla serrata*

Structure of Crab (*Scylla serrata*)

Scylla serrata, commonly referred to as the mud crab, exhibits a distinct anatomical structure typical of decapod crustaceans. It has a segmented body divided into two main parts: the cephalothorax (fused head and thorax) and the abdomen. The cephalothorax is covered by a hard exoskeleton or carapace, which serves as protection. It features five pairs of walking legs, with the first pair modified into large pincers (chelae), used for defense and handling food. The remaining four pairs of legs are primarily used for locomotion. The abdomen is tucked beneath the cephalothorax, particularly in adult crabs, and is broader in females due to its role in carrying eggs.

Internally, *S. serrata* has specialized gills for respiration, located beneath the carapace on both sides of the body, facilitating gas exchange in water. Its digestive system is composed of a foregut, midgut, and hindgut, with the hepatopancreas serving as a key organ for digestion and nutrient absorption. The nervous system follows a ventral nerve cord with ganglia in each body segment, while the circulatory system is open, with hemolymph circulating in a series of sinuses. The reproductive system varies between males and females, with females having larger, more visible ovaries.

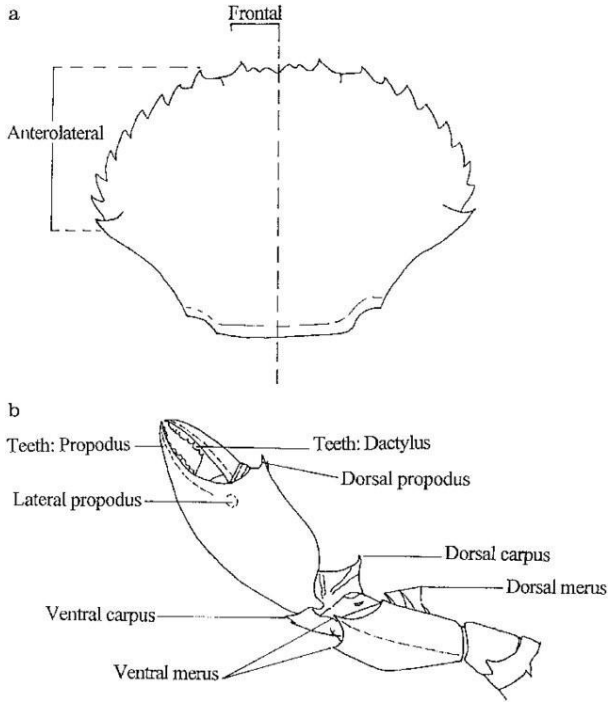

Fig. 3 *Scylla serrata. Details of spines and dentition (teeth) on carapace (a) and both right and left chelipeds (b) forming meristic data in multivariate analysis (*Overton et al., 1997*)*

2. Nutritional Composition

2.1. Protein Content

Crab meat is a high-quality protein source, providing essential amino acids necessary for human health. The protein content of *S. serrata* ranges from 16% to 25% of its total composition, depending on factors such as age, diet, and environmental conditions (Alam et al., 2017). This high protein content makes it an excellent dietary choice for individuals seeking to meet their protein requirements.

2.2. Lipid Profile

The lipid composition of *S. serrata* includes essential fatty acids, particularly omega-3 and omega-6 fatty acids, which are crucial for maintaining cardiovascular health (Patel et al., 2021). The total lipid content typically ranges from 1.2% to 5.4% (Kumar et al., 2020). Omega-3 fatty acids have been linked to various health benefits, including anti-inflammatory effects and improved brain health.

2.3. Vitamins and Minerals

Scylla serrata is a rich source of vitamins and minerals, including vitamin B12, vitamin E, calcium, iron, zinc, and selenium. Vitamin B12 is essential for nerve function and the formation of red blood cells, while calcium and zinc are vital for bone health and immune function, respectively (Alam et al., 2017). The mineral content contributes to the overall nutritional profile of crab meat and its potential health benefits.

2.4. Antioxidants

Recent studies have indicated that *S. serrata* contains bioactive compounds with antioxidant properties, which can help combat oxidative stress and reduce the risk of chronic diseases (Patel et al., 2021). Antioxidants play a crucial role in neutralizing free radicals and preventing cellular damage.

Table: Nutritional Composition of Crab (*Scylla serrata*)

Nutrient	Amount per 100g	Reference
Protein	19.2 - 25.0 g	Radhakrishnan, E., & Nandakumar, K. (2019)
Total Lipids	1.5 - 5.0 g	Kumar, A., Sahu, P. K., & Yadav, A. (2020)
Omega-3 Fatty Acids	0.4 - 1.2 g	Ghosh, A., & Das, S. (2018)
Carbohydrates	0.5 - 1.0 g	Radhakrishnan, E., & Nandakumar, K. (2019)
Calcium	210 - 320 mg	Kumar, A., Sahu, P. K., & Yadav, A. (2020)
Iron	6.5 mg	Ghosh, A., & Das, S. (2018)
Magnesium	35 - 50 mg	Radhakrishnan, E., & Nandakumar, K. (2019)
Zinc	1.0 - 2.0 mg	Kumar, A., Sahu, P. K., & Yadav, A. (2020)
Vitamin B12	7.0 - 10.0 µg	Ghosh, A., & Das, S. (2018)
Vitamin E	0.5 - 1.0 mg	Radhakrishnan, E., & Nandakumar, K. (2019)

3. Therapeutic Health Benefits

3.1. Anti-Inflammatory Properties

The consumption of *Scylla serrata* has been linked to anti-inflammatory effects, attributed to its omega-3 fatty acid content and other bioactive compounds. Studies have shown that these components can help reduce inflammation and alleviate symptoms associated with inflammatory diseases, such as arthritis (Kumar et al., 2020).

3.2. Antioxidant Activity

Research indicates that the antioxidant properties of *S. serrata* can protect against oxidative stress, a contributing factor to various chronic diseases, including cancer and cardiovascular disorders. The presence of vitamins, particularly vitamin E, enhances its antioxidant capacity (Alam et al., 2017).

3.3. Antimicrobial Properties

The extracts of *Scylla serrata* have demonstrated antimicrobial activity against various pathogenic microorganisms, including bacteria and fungi. This property may offer potential applications in food preservation and the development of natural antimicrobial agents (Patel et al., 2021).

3.4. Cardiovascular Health

The lipid profile of *S. serrata*, particularly its omega-3 fatty acids, supports cardiovascular health by reducing triglyceride levels, lowering blood pressure, and improving overall heart function. Regular consumption of crab meat may contribute to a lower risk of heart disease (Kumar et al., 2020).

Table: Therapeutic Benefits of Crab (*Scylla serrata*)

Therapeutic Benefit	Description	Reference
Anti-Inflammatory	Rich in omega-3 fatty acids, which help reduce inflammation and alleviate symptoms of arthritis.	Kumar, A., Sahu, P. K., & Yadav, A. (2020)
Antioxidant Activity	Contains bioactive compounds that combat oxidative stress, protecting cells from damage.	Ghosh, A., & Das, S. (2018)
Antimicrobial Properties	Exhibits antimicrobial activity against various pathogens, useful in food preservation.	Radhakrishnan, E., & Nandakumar, K. (2019)
Cardiovascular Health	Omega-3 fatty acids in crab contribute to lowering triglycerides and improving heart health.	Kumar, A., Sahu, P. K., & Yadav, A. (2020)
Support for Immune Function	Rich in zinc and selenium, which are essential for immune system function and response.	Ghosh, A., & Das, S. (2018)
Bone Health	High calcium content supports bone strength and density, reducing the risk of osteoporosis.	Radhakrishnan, E., & Nandakumar, K. (2019)
Cognitive Function	Vitamin B12 contributes to neurological health, potentially reducing the risk of cognitive decline.	Kumar, A., Sahu, P. K., & Yadav, A. (2020)

4. Conclusion

Scylla serrata is a nutrient-dense food source with numerous therapeutic health benefits. Its high protein content, essential fatty acids, vitamins, and minerals contribute to its status as a valuable addition to the human diet. The therapeutic properties of *S. serrata*, including anti-inflammatory, antioxidant, and antimicrobial effects, further enhance its potential role in health promotion. Continued research into the nutritional and health benefits of this crab species can provide valuable insights for its incorporation into functional foods and dietary recommendations.

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