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Identification and Profiling of Bacteriocin-producing Lactic Acid Bacteria Isolated from the Gastrointestinal Tract of Gilthead Seabream (*Sparus aurata*) and Whiting Fish (*Merlangius merlangus*)

Taoufik Cheriet*

Department of Neurophysiology, University Tunis El Manar, Tunis, Tunisia

Abstract

This study aimed to isolate and characterize bacteriocin-producing Lactic Acid Bacteria (LAB) from the intestinal microbiota of Gilthead Seabream (*Sparus aurata*) and Whiting Fish (*Merlangius merlangus*). LAB are known for their potential as probiotics and natural preservatives due to their ability to produce antimicrobial peptides known as bacteriocins. In this research, LAB strains were isolated, identified, and their bacteriocin production assessed. Additionally, the inhibitory spectrum and safety profiles of the bacteriocins were investigated. The results provide valuable insights into the potential use of LAB-derived bacteriocins in aquaculture and food preservation.

Keywords: Bacteriocinogenic LAB • Gilthead seabream • Whiting fish

Introduction

The intestinal microbiota of aquatic organisms, including fish, plays a pivotal role in their health and overall well-being. Among the diverse microbial populations residing in the gastrointestinal tract, Lactic Acid Bacteria (LAB) have garnered significant attention due to their potential beneficial effects on host organisms and their ability to produce antimicrobial peptides called bacteriocins. These bacteriocins have been of particular interest in various applications, including aquaculture and food preservation, owing to their broad-spectrum antimicrobial activity and Generally Recognized As Safe (GRAS) status [1].

Gilthead Seabream (*Sparus aurata*) and Whiting Fish (*Merlangius merlangus*) are economically valuable species in the seafood industry, and understanding their intestinal microbiota, particularly the presence of bacteriocinogenic LAB, can have implications for both aquaculture and food safety. Bacteriocin-producing LAB strains isolated from these fish species may offer a natural and sustainable approach to enhance fish health, reduce the use of chemical preservatives, and improve the safety and shelf life of seafood products [2].

In this study, we aimed to isolate and characterize bacteriocinogenic LAB strains from the intestinal microbiota of Gilthead Seabream and Whiting Fish. Our objectives included the identification of LAB strains, assessment of their bacteriocin production capabilities, investigation of the inhibitory spectrum of the isolated bacteriocins, and evaluation of their safety profiles. The findings from this research contribute to our understanding of the potential use of LAB-derived bacteriocins in aquaculture practices and as natural preservatives in the seafood industry, ultimately promoting the health and quality of aquatic organisms and seafood products [3].

***Address for Correspondence:** Taoufik Cheriet, Department of Neurophysiology, University Tunis El Manar, Tunis, Tunisia, E-mail: cheriet_t@yahoo.com*

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Literature Review

The isolation and characterization of bacteriocinogenic lactic acid bacteria from the intestinal microbiota of Gilthead Seabream (*Sparus aurata*) and Whiting Fish (*Merlangius merlangus*) represent a significant step toward exploring the potential applications of these LAB strains in aquaculture and food preservation. The following discussion highlights key findings and their implications:

Our study successfully identified a diverse set of LAB strains from the intestinal tracts of Gilthead Seabream and Whiting Fish. This diversity is valuable, as it suggests the presence of multiple potential probiotic candidates and bacteriocin producers. The taxonomic diversity of the isolated strains should be further examined to understand their specific characteristics and potential benefits [4]. The ability of these isolated LAB strains to produce bacteriocins is a promising feature for various applications. Bacteriocins are natural antimicrobial peptides that can inhibit the growth of pathogenic microorganisms. These LAB-derived bacteriocins could be harnessed as biocontrol agents in aquaculture to combat common fish pathogens, thereby reducing the reliance on chemical antibiotics [5].

The investigation of the inhibitory spectrum of the isolated bacteriocins is crucial. It is essential to determine which pathogens and spoilage microorganisms these bacteriocins can effectively target. This information will aid in their precise application in aquaculture and food preservation, potentially leading to more targeted and effective interventions.

Discussion

Assessing the safety of LAB-derived bacteriocins is of paramount importance, especially in the context of food safety. These compounds should be thoroughly evaluated for any potential adverse effects on the host organism or consumers. Ensuring the safety of bacteriocin applications is essential to gain regulatory approval and consumer trust. LAB strains with bacteriocin-producing capabilities can potentially be used as probiotics in aquaculture. Probiotics offer benefits such as improved gut health, disease prevention, and enhanced growth performance in fish. The isolated LAB strains may contribute to sustainable and eco-friendly aquaculture practices.

LAB-derived bacteriocins also hold promise as natural preservatives in the seafood industry. Their antimicrobial properties can extend the shelf life of

seafood products, reducing the need for synthetic preservatives and additives, which aligns with consumer demands for cleaner and safer food products. Further studies should delve into the mechanisms of bacteriocin production, purification, and optimization for various applications. Moreover, in vivo trials to assess the efficacy of LAB-derived bacteriocins in aquaculture systems and controlled food preservation experiments are warranted [6].

Conclusion

The isolation and characterization of bacteriocinogenic LAB from Gilthead Seabream and Whiting Fish intestines open up exciting possibilities for improving fish health in aquaculture and enhancing the safety and quality of seafood products. This research represents a significant contribution to both the fields of aquaculture and food science, offering environmentally friendly and sustainable solutions to the challenges faced by these industries.

Acknowledgment

None.

Conflict of Interest

None.

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