

Antimicrobial Potential of Bacteriocin from *Lactococcus lactis* RGUSCJ08 Against Uropathogens

Shaoni Ghosh

Department of Microbiology, Raiganj University, Raiganj, West Bengal, India

Dr. Pradeep Kumar Das Mahapatra

Faculty, Department of Microbiology, Raiganj University, Raiganj, West Bengal, India

Dr. (Prof) Subhas Chandra Jana

Department of Microbiology, Raiganj University, Raiganj, West Bengal, India

Amrita Samanta

Department of Microbiology, Raiganj University, Raiganj, West Bengal, India

Satya Sundar Pradhan

Department of Microbiology, Raiganj University, Raiganj, West Bengal, India

Abstract:

Introduction: Urinary tract infections caused by uropathogens pose a significant global health challenge, often leading to antimicrobial resistance. Bacteriocins from lactic acid bacteria are emerging as promising alternatives to traditional antibiotics. This study isolates and evaluates a bacteriocin producing *Lactococcus lactis* strain for its antimicrobial activity against uropathogens.

Materials and Methods: Samples from women (18–24 years) were tested via the spot-on-lawn method, where supernatants were spotted against *E.coli*, *Staphylococcus aureus*, *Streptococcus pyogenes*, *Enterococcus faecalis*, and *Klebsiella pneumoniae*. One sample showed inhibitory zones, suggesting the presence of a potential probiotic strain. The strain *Lactococcus lactis* RGUSCJ08 was identified using 16S rDNA sequencing, and used for bacteriocin production. The bacteriocin was purified through ammonium sulfate precipitation, dialysis, and FPLC. Purified bacteriocin samples were tested against uropathogens (*Escherichia coli*, *Streptococcus pyogenes*, *Enterococcus faecalis* and *Klebsiella pneumoniae*) using a spot assay to evaluate their antibacterial activity. SEM analysis was performed to observe and highlight the bacteriocin's mode of action against uropathogens.

Results: RGUSCJ08 exhibited inhibitory activity against the tested pathogens except *Escherichia coli*. Scanning electron microscopy (SEM) revealed structural damage to the target pathogens, supporting its antimicrobial efficacy.

Conclusion: The bacteriocin from *Lactococcus lactis* RGUSCJ08 shows significant potential as a natural antimicrobial agent against uropathogens. Its effectiveness and stability highlight its application in developing alternative therapies for multidrug resistant infections. Further studies on its detailed mechanism of action and therapeutic applicability are warranted.

Keywords:

Bacteriocins, probiota, uropathogens, *Lactococcus lactis*, antimicrobial activity.