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Research Paper

Investigation of Antibiotic Resistance Patterns in *Escherichia coli* and *Staphylococcus aureus* Isolated from Traditional Cheeses in Jolfa County

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Extended Abstract

Introduction

Cheese, particularly traditional varieties, is a staple in many regions, including western Iran. Traditional cheeses are often produced using raw, unpasteurized milk and prepared in less controlled environments. While these cheeses are prized for their unique taste and cultural significance, they can also pose significant health risks due to contamination by pathogenic microorganisms such as *Escherichia coli* and *Staphylococcus aureus*. These bacteria can lead to serious gastrointestinal diseases and other health issues. Despite the popularity of traditional cheese, limited studies have explored the microbial safety of these products in certain areas, such as Jolfa County, Iran. This study aimed to investigate the prevalence of *E. coli* and *S. aureus* in traditional cheeses from this region and analyze their antibiotic resistance patterns to assess public health risks and highlight the need for improved safety measures.

Methods

In this descriptive-cross sectional study, 60 samples of traditional cheese were randomly collected from shops across Jolfa County, Iran between March and August 2024. These samples were tested for the presence of *S. aureus* and *E. coli* following national food safety standards using several microbiological media, including Giolitti-Cantoni broth, Baird-Parker

agar, blood agar, and Mueller-Hinton agar. Biochemical and diagnostic tests were applied for bacterial species confirmation. The antibiotic resistance profiles of the isolates were assessed using the disk diffusion method with six antibiotics: amikacin, azithromycin, cefixime, ciprofloxacin, ceftriaxone, and ceftazidime. The results were statistically analyzed using SPSS software, and T-tests were performed for comparisons.

Results and Discussion

The study found that all 60 traditional cheese samples were contaminated with both *S. aureus* and *E. coli*. The antibiotic resistance pattern showed that *S. aureus* isolates were most sensitive to amikacin (66.67%) but exhibited high resistance to cefixime (75%), followed by ceftriaxone and ceftazidime (51.67% each). In contrast, *E. coli* isolates demonstrated complete sensitivity (100%) to amikacin, with notable resistance to azithromycin (25%) and moderate resistance to ceftriaxone and ciprofloxacin (28.34% each). The statistical analysis revealed that *E. coli* isolates were significantly more sensitive to the tested antibiotics compared to *S. aureus*, which showed higher resistance to most antibiotics. The results of this study highlight a critical issue in the microbial safety of traditional cheeses produced in Jolfa County. The widespread contamination of both *S. aureus* and *E. coli* indicates poor hygiene practices during cheese production, handling, and storage. The high resistance of *S. aureus* to multiple antibiotics, including cefixime, suggests that these bacteria have developed mechanisms to evade common treatments, raising concerns about the public health implications of consuming contaminated cheese. Similarly, although *E. coli* was highly sensitive to amikacin, its resistance to azithromycin and other antibiotics indicates the potential for future resistance issues. These findings are consistent with studies in other regions, where contamination with *S. aureus* and *E. coli* has been linked to unsanitary production conditions and the use of unpasteurized milk. The presence of antibiotic-resistant bacteria in food products is a growing concern, as it complicates treatment options for infected individuals and may contribute to the spread of resistant strains within communities. The poor microbial quality of traditional cheeses in Jolfa underscores the need for improved food safety measures, including better hygiene practices, proper pasteurization of milk, and more rigorous monitoring of antibiotic use in food production.

Conclusion

This study confirms that traditional cheeses produced in Jolfa County are frequently contaminated with *S. aureus* and *E. coli*, with both pathogens showing concerning levels of antibiotic resistance. The findings highlight the urgent need for awareness campaigns on food safety, better hygienic practices in cheese production, and stricter controls on the use of antibiotics in agriculture and food production. These measures are essential to protect public health and prevent the spread of foodborne illnesses and antimicrobial resistance. Further studies and monitoring are recommended to better understand the extent of microbial contamination in traditional food products and to develop effective strategies for improving food safety in local production environments.

Keywords: *Staphylococcus aureus*, *Escherichia coli*, Antibiotic Resistance, Traditional Cheese, Jolfa

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