Resistance to Tetracyclines in *Escherichia coli*: A Decade-Long Retrospective Cohort Study at Ardabil Imam Khomeini Hospital

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ABSTRACT

Introduction: *Escherichia coli* is a Gram-negative bacterium commonly found in the intestines of humans and animals. While most strains are harmless and crucial to gut health, some can cause serious infections. A growing public health concern regarding the antibiotic resistance of *E. coli* is on the rise. This resistance makes infections more challenging to treat, leading to more extended illnesses, increased medical costs, and higher mortality rates. The misuse and overuse of antibiotics in healthcare have accelerated this resistance. This study examined the antibiotic resistance pattern of *E. coli* against tetracycline across 10 years. By examining this data, the study aimed to address the growing challenge of antibiotic resistance and enhance public health outcomes.

Methods and Materials: Data were collected from the microbiology section of the medical laboratory at Ardabil Imam Khomeini Hospital from 2012 to 2022, specifically on *E. coli*-related cases. This extensive dataset was obtained from the health information system of the hospital, providing a comprehensive overview of *E. coli* infections over a decade. The analysis aimed to understand the trends and patterns of antibiotic resistance in *E. coli*, contributing to better treatment strategies and infection control measurements.

Results: Among 3,049 isolated cases of *E. coli* bacteria at Ardabil Imam Khomeini Hospital, 37% were male patients, and 63% were female patients. Most clinical samples collected for culture examination were urine samples, accounting for 77%, followed by blood cultures, accounting for 18.5%. The remaining samples included those from wounds, urethral swabs, cerebrospinal fluid, and other sources. The study focused on one group of antibiotics: tetracycline. Among 195 cases tested for tetracycline susceptibility, *E. coli* exhibited a resistance rate of 51.79%. With 123 cases tested for doxycycline, the resistance rate was 42.28%. Additionally, resistance rates for doxycycline-hydrochloride were found to be 57.14%.

Conclusion and Discussion: These findings highlight significant antibiotic resistance in *E. coli*. The relatively high resistance rates of this bacterium to these antibiotics are alarming, particularly for doxycycline-hydrochloride. This observation suggests an urgent need for comprehensive screening to combat antibiotic resistance. Strategies could include stricter antibiotic usage policies, enhanced infection control practices, and ongoing surveillance to monitor resistance trends. These findings underscore the importance of antimicrobial stewardship and the development of new therapeutic options to effectively manage and treat *E. coli* infections in the face of rising antibiotic resistance.