A Comparative Evaluation of ESBL Production and Carbapenem Resistance in UTIs before and during COVID-19

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Background:
The COVID-19 pandemic has heightened the urgency to address antibiotic resistance, particularly ESBL and carbapenem-resistant UTIs. Our study seeks to assess the pandemic's effect on the prevalence of these resistances, comparing data from before and during COVID-19. By identifying trends in resistance patterns, we aim to enhance antibiotic stewardship and inform healthcare policies. Understanding the pandemic's impact on ESBL and carbapenem resistance is vital for guiding clinical practices and public health initiatives in tackling antibiotic resistance.

Methods:
This retrospective study, conducted at King Fahad Medical City in Riyadh, Saudi Arabia, analyzed positive urine cultures from January 2018 to December 2022 to assess the prevalence of antibiotic resistance among UTIs. Using WHO-recommended semiquantitative culturing methods on CLED and blood agar, bacterial isolates were identified via the BD Phoenix system and antimicrobial susceptibility was assessed following CLSI guidelines. ESBL detection employed the Double-Disc Synergy Test. Data analysis involved SPSS for statistical evaluation, utilizing chi-square and t-tests for categorical and continuous variables, respectively, and logistic regression to explore associations between variables and antibiotic resistance, with significance set at $p<0.05$.

Results:
A total of 9697 participants had their urine samples for analysis, the majority of which revealed E. coli growth (64.7%) followed by Klebsiella pneumoniae growth (22.9%) and Pseudomonas aeruginosa growth (11.0%). The COVID-19 pandemic revealed a decline in both bacterial species amidst the COVID-19 pandemic. In particular, E. coli demonstrated a 1.9% reduction in ESBL production, whereas K. pneumoniae demonstrated a decrease of 6.0% in the same parameter. In particular, E. coli demonstrated a 1.2% reduction in Carbapenem resistance, K. pneumoniae demonstrated a decrease of 10.7%, and P. aeruginosa demonstrated a decrease of 7.9% in the same parameter.

Conclusion:
The study reveals a significant decline in ESBL production and carbapenem resistance in key pathogens such as E. coli, K. pneumoniae, and P. aeruginosa during the COVID-19 pandemic. This trend may reflect altered antibiotic use and healthcare practices. These findings stress the need for continuous antimicrobial resistance monitoring and highlight the critical role of updated antibiotic stewardship and healthcare policies in addressing resistance, particularly during health crises.

Keywords:
COVID-19; ESBL; carbapenem resistance; antimicrobial resistance; urinary tract infection