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Faculty of Medicine and Health Science

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Graduation Project Research



**Frequency of Microbial Isolates and Pattern of Antimicrobial Resistance in
Patients with End-Stage Renal Disease: A Cross- sectional study from
Palestine**

Submitted By

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English Abstract

Background: Infections are the second leading cause of hospitalization and the second most common cause of death in patients with end-stage renal disease (ESRD). This study aims to describe the clinical characteristics of patients with bloodstream infections, to determine the microbial profiles of these infections, and to ascertain the antibiotic resistance patterns of the causative pathogens.

Methods: A descriptive retrospective cross-sectional study was conducted at An-Najah National University Hospital from January 2019 to December 2020. Clinical and demographic data of ESRD patients with positive blood cultures were collected from the hospital information system. Data regarding the bacterial isolates and their antimicrobial resistance were collected from the microbiology lab. Data were entered and analyzed using version 21 of the Statistical Package for Social Sciences program (SPSS).

Results: A total of 111 cases of bloodstream infections (BSIs) occurred during the study period, with an incidence rate of 1.5 infections per 100 patient-months, and a male: female ratio of 1.8:1. The mean age $\pm$ SD of study participants was 58.15 $\pm$ 16.6, ranging from 18-88 years. 59.5% patients had diabetes mellitus and 89.2% had hypertension. These patients had been on hemodialysis for the median (IQR) duration of 747 (360, 1825) days. Among these patients, 62.2% had already had a previous BSI in the past. From these BSIs, 118 microorganisms were isolated. 99 (83.89%) isolates were gram positive and 19 (16.1%) were gram negative. No fungal infections were found during the study period. Among the gram-positive isolates, coagulase-negative staphylococci (CoNS) (88, 74.57%) were predominant. As for the gram-negative isolates, the most frequent were both *Escherichia coli* (*E. coli*) and *Stenotrophomonas maltophilia*, with 5 (4.23%) positive cultures each. Among the isolates of *E. coli*, two were Extended-Spectrum Beta-Lactamase producing (ESBL) *Escherichia coli* (1.69%). No statistically significant relationship was found between the type of vascular access and the type of microorganism ($p = 0.812$.) The most frequently used empiric antibiotics were a combination of vancomycin and gentamicin in 27% cases, followed by vancomycin alone in 24.3% of cases. As for culture-guided antibiotics, vancomycin was the most frequently used (39, 35.1%), followed by a combination of vancomycin and gentamicin (23, 20.7%). Among the isolated CoNS, 96.5% were resistant to benzylpenicillin, while none were resistant to vancomycin. As for the isolates of *Stenotrophomonas maltophilia*, 75% were resistant to ceftazidime, and 20% were resistant to TMP/SMX, while all isolates were sensitive to cefepime. As for *E. coli*, two isolates were found to be ESBL-*E. coli*, while three isolates were not. 89 (75.4%) bacterial isolates were found to be multidrug-resistant organisms (MDRO), 85 (85.85%) gram-positive bacteria and 4 (21%) gram-negative bacteria. Upon comparison of patients according to the type of vascular access, 66 (75%) infections with MDRO were found among patients with CVCs, while 22 (25%) were found among patients with AVFs or AVGs. However, no statistically significant relationship was found between the type of vascular access and infection with MDRO ($p = 0.523$).

Conclusions:

BSIs remain a significant complication among hemodialysis patients in Palestine, especially among patients with CVCs, and are associated with significant morbidity, mortality, and cost. The emergence of multidrug-resistant organisms, especially MRSA and ESBL-producing bacteria, is making the management of these infections even more challenging. MDRO cause a remarkably high proportion of infections in our patients. The results of this study support the empiric use of vancomycin and gentamicin to treat these infections. It is vital that health care providers prevent these infections via instituting and adhering to infection control policies in hemodialysis centers and providing proper antibiotic therapy of limited use and duration when necessary to avoid breeding resistance. Additionally, although the limited sample size in our study prevented denoting statistical significance to this point, existing evidence strongly supports the use of AV access rather than CVCs whenever possible

