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INFECTIOUS ENDOCARDITIS IN PATIENTS AT PELTIER HOSPITAL IN DJIBOUTI

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Abstract

Bacterial endocarditis remains a serious tropical disease. Bacterial endocarditis is predisposed by the presence of a lesion on the intracardiac surface upon which blood borne pathogens adhere, damage the endothelium and colonize causing vegetation on the valves. Majority of patients have a history of either, indwelling catheters or devices, recent dental procedures and or infections, prosthetic heart valves, intravenous drug abuse and or immuno-suppression. Hemodialysis, chronic intravenous access and immuno-suppression have been identified as major risk factors. Transthoracic echocardiography and blood cultures obtained aseptically prior to empirical therapy forms the cornerstone of bacterial endocarditis diagnosis by applying the modified Duke's Criteria for infectious endocarditis diagnosis.

Medical records of 350 inpatients with a median age of 58 years (± 2) years and admitted between June 2019 to August, 2021 were reviewed and 98 (28 %) satisfied the study inclusion criteria. 47 (48 %) of the participants had positive blood cultures. The major causative organisms of infectious endocarditis were *Staphylococcus epidermidis* (32 %), *Staphylococcus aureus* (28 %), *Streptococcus viridans* (21 %), *Enterococcus faecalis* (17 %) and *Pseudomonas aeruginosa* (2 %). All the cases with a possible infectious endocarditis diagnosis had an underlying cardiopathy. Methicillin resistance was observed with *Staphylococcus epidermidis* (14 %), and *Staphylococcus aureus* (29 %) isolates. *Streptococcus viridans* and *Enterococcus faecalis* isolates were penicillin resistant. Gentamicin, rifampicin, fosfomycin and vancomycin were the drugs of choice for managing infectious endocarditis and antimicrobial stewardship is necessary to safeguard their effectiveness in the future.

Keywords: *Infectious endocarditis, heart valve abscess, valve prosthesis, bacteremia, antibiotic treatment.*

Introduction

Bacterial endocarditis remains a serious tropical disease, with a cumulative incidence of 5.67 per 1000 admissions and mortality rate of 18.4 % **[1]**. Bacterial endocarditis is predisposed by the presence of a lesion on the intracardiac surface upon which blood borne pathogens adhere, damage the endothelium and colonize causing vegetation on the valves **[2-4]**. Majority of patients have a history of either, indwelling catheters or devices, recent dental procedures and or infections, prosthetic heart valves, intravenous drug abuse and or immuno-suppression **[5-7]**. Hemodialysis, chronic intravenous access and immuno-suppression have been identified as major risk factors. Bacterial endocarditis may lead to pericarditis, heart failure due to valvular regurgitation, or obstruction due to large vegetation, glomerulonephritis, pulmonary embolism and lung infarction **[8-12]**. Transthoracic echocardiography and blood cultures obtained aseptically prior to empirical therapy forms the cornerstone of bacterial endocarditis diagnosis by applying the modified Duke's Criteria for infectious endocarditis diagnosis **[1, 13-15]**.

The objective of this retrospective study was to determine the bacteriological profile and antimicrobial susceptibility patterns of bacteria isolated from patients diagnosed with infectious endocarditis at Peltier Hospital, Djibouti.

Materials and Methods

Medical records of 350 inpatients with a median age of 58 years (± 2) years and admitted at Peltier Hospital, Djibouti between June 2019 to August, 2021 were reviewed and 98 (28 %) satisfied the study inclusion criteria for the retrospective study.

Serial blood culture sets were drawn aseptically into Oxoid Signal Blood Culture System Medium, from Thermofischer Scientific Oxoid signal Blood Culture System, prior to administration of empirical therapy, incubated at 37 °C incubator and examined for microbial growth for ten consecutive days. Positive blood cultures were sub-cultured into MacConkey agar, Mueller-Hinton blood agar, Chocolate agar and Mueller-Hinton blood agar for sensitivity testing and incubated at 37 °C incubator with Blood agar and Chocolate agar under microaerophilic conditions. Negative blood cultures where further incubated for 30 days and sub-cultured at day 14, 21 and 28 to rule out presence of slow-growing bacteria.

The Kirby Bauer Method was used for microbial susceptibility testing. BioMerieux Analytical Profile Index panels were used for microbial identification **[16-19]**.

Two separate blood cultures positive for known endocarditis causative organisms and an observed endocardial involvement each formed a major criteria for infectious endocarditis. Fever, presence of a predisposing condition, immunological findings and/or a positive blood culture that does not meet the major criteria, each formed a minor criteria for infectious endocarditis in this study. Definitive endocarditis diagnosis was made when two major criteria or one major criteria and three minor criteria were fulfilled. Possible endocarditis diagnosis was made when one major criteria and 1-2 minor criteria were fulfilled **[1,13]**.

Results and Discussion

98 (28 %) cases had a possible infectious endocarditis diagnosis, 47 (48 %) definitive infectious endocarditis diagnosis and 26 % did not meet definitive or possible infectious endocarditis diagnostic criteria. In 64 % of cases, it was a native valve endocarditis, compared to 36 % endocarditis on prosthesis. The gender wise distribution is shown in Table 1. Among the 47 (48 %) positive cultures, there were 29 men against 18 women or a sex ratio of 1.6 M/F. The age of the patients is advanced 58 ± 2 years (average ± SD). The germs responsible for endocarditis infections are shown in Table 2.

The major causative organisms of infectious endocarditis are *Staphylococcus epidermidis* (32 %), *Staphylococcus aureus* (28 %), *Streptococcus viridans* (21 %), *Enterococcus faecalis* (17 %) and *Pseudomonas aeruginosa* (2 %). All the cases with a possible infectious endocarditis diagnosis had an underlying cardiopathy. Methicillin resistance was observed with *Staphylococcus epidermidis* (14 %), and *Staphylococcus aureus* (29 %) isolates. *Streptococcus viridans* and *Enterococcus faecalis* isolates were penicillin resistant. Gentamicin, rifampicin, fosfomycin and vancomycin were the drugs of choice for managing infectious endocarditis at

Peltier hospital, in doses adapted to renal failure. The parenteral route remains the most used to administer an anti-infectious in the hospital.

In this study, gram-positive cocci were the most common pathogens responsible for infectious endocarditis with predominance of *Staphylococcus* (60 %). The most resistant hospital germ is *Staphylococcus aureus*. The death rate was 34 %. The high mortality rate was similar in some developing countries **[20-22]**. This high rate can be explained by:

- The high levels of multidrug-resistant bacteria;
- The inadequate initial antibiotic therapy (59 %);
- Complications of infectious endocarditis lead to the development of heart failure due to valvular regurgitation, or obstruction due to large vegetation, septic shock, anemia, pericarditis, glomerulonephritis, pulmonary embolism and lung infarction.

The analysis of the factors that could explain the occurrence of an infectious endocarditis in our patients made it possible to identify as risk factors: patients immunocompromised states, diabetes, obesity, malnutrition, virulence and resistance of organisms, heart valve abscess, valve prosthesis and the delay of the introduction of antibiotic therapy **[23-24]**.

The study recommended antimicrobial stewardship through establishment of an infection control committee to reduce microbial resistance and decrease the spread of infection caused by multidrug resistant organisms.

Conclusion

Infectious endocarditis remains a serious transplant disease with high mortality. Its diagnosis is mainly based on blood cultures and cardiac ultrasound. Improving the management of infectious endocarditis relies on earlier diagnosis.

In our study, gram-positive cocci were the most common pathogens found to be responsible for endocarditis infections with predominance of *Staphylococcus* (60 %). The most resistant hospital germ was *Staphylococcus aureus*. Gentamicin, rifampicin, fosfomycin and vancomycin were the drugs of choice for managing infectious endocarditis and antimicrobial stewardship is necessary to safeguard their effectiveness in the future.

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Table 1. Gender wise distribution.

Sexe	No of prescriptions	Percentage
Males	29	62
Females	18	38
Total	47	100

Table 2. Main pathogens responsible for endocarditis infections in hospitalized patients at Peltier Hospital.

Bacteria isolated	Numbers	Percentage (%)
Staphylococcus epidermidis	15	32
Staphylococcus aureus	13	28
Streptococcus viridans	10	21
Enterococcus faecalis	8	17
Pseudomonas aeruginosa	1	2
Total	47	100