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## ORIGINAL ARTICLE

# Microbiological characteristics and patterns of resistance in prosthetic joint infections in a referral hospital<sup>☆</sup>



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### KEYWORDS

Prosthetic joint;  
Infection;  
Microorganisms;  
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### Abstract

**Background:** The prosthetic joint infection is the most feared and catastrophic complication for cause severe physical damage to patients and, generates high economic costs.

**Objectives:** To describe the microbiological characteristics and to determine the resistance pattern in prosthetic joint infections in a reference hospital in Mexico.

**Material and methods:** Patients whose prosthetic devices were withdrawn due to suspicion of septic and aseptic loosening were included. Cultures were performed to identify microorganisms and susceptibility analysis.

**Results:** Of the 111 patients included, 55% were diagnosed with prosthetic joint infection, with the most frequent prosthesis being of the hip (43%). Positive cultures were obtained in 97% of the infected cases, of which 75% were monomicrobial infections. The most frequent bacterial species isolated were: *Staphylococcus epidermidis* (31%), *Enterococcus faecalis* (16%), *Staphylococcus aureus* (13%), and *Escherichia coli* (8%). The resistance patterns for the *Staphylococcus* genus were: oxacillin (79%), erythromycin (45%) and ciprofloxacin (37%). *Enterococcus faecalis* showed a high percentage of resistance to erythromycin and clindamycin (86%), and fluoroquinolones (43%). The large majority (86%) of *Escherichia coli* were extended spectrum beta-lactamases positive, in addition to having high resistance to fluoroquinolones (86%), trimethoprim/sulfamethoxazole (86%) and gentamicin (72%).

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**PALABRAS CLAVE**

Prótesis articular;  
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Resistencia  
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**Conclusion:** The microbiological characteristics found in prosthetic joint infections vary according to the hospitals. In this series, a high proportion of coagulase-negative *Staphylococci* and *Enterococcus* spp. were found, as well as a high bacterial resistance.

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### Características microbiológicas y patrones de resistencia en infecciones de prótesis articular en un hospital de referencia

#### Resumen

**Antecedentes:** La infección de prótesis articular es la complicación más temida y catastrófica, por causar severos daños físicos en los pacientes, y generar elevados costos económicos.

**Objetivos:** Describir las características microbiológicas y determinar los patrones de resistencia que se presentan en infecciones de prótesis articular en un hospital de referencia en México.

**Material y métodos:** Se incluyeron pacientes a los que se les retiró la prótesis articular por sospecha de aflojamiento aséptico y séptico. Se hizo búsqueda microbiológica y análisis de susceptibilidad.

**Resultados:** Se incluyeron 111 pacientes, el 55% se diagnosticaron con infección de prótesis articular, siendo la más frecuente la prótesis de cadera (43%). En el 97% de los casos infectados se tuvieron cultivos positivos, el 75% fueron infecciones monomicrobianas. Las especies bacterianas aisladas con mayor frecuencia fueron: *Staphylococcus epidermidis* (31%), *Enterococcus faecalis* (16%), *Staphylococcus aureus* (13%) y *Escherichia coli* (8%). El patrón de resistencia en las 2 primeras fue: oxacilina (79%), eritromicina (45%) y ciprofloxacino (37%). *Enterococcus faecalis* mostró alto porcentaje de resistencia para: eritromicina y clindamicina (86%), y fluoroquinolonas (43%). El 86% de las *Escherichia coli* tenían betalactamasas de espectro extendido, además de alta resistencia para fluoroquinolonas (86%), trimetoprim/sulfametoxazol (86%) y gentamicina (72%).

**Conclusión:** Las características microbiológicas encontradas en infecciones de prótesis articular varía de acuerdo a los centros hospitalarios; en esta serie se encontró una proporción alta de *Staphylococcus* coagulasa negativos y *Enterococcus* spp., así como una alta resistencia bacteriana.

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## Background

The implantation of prosthetic joints is a therapeutic option used to improve the mobility and quality of life of those patients who suffer from joint wear and tear<sup>1</sup>; however, in a small number of cases, fitting the prosthetic material may lead to complications which affect the patient and the surgical outcome. The most common complications associated with arthroplasties are the aseptic loosening of the joint and prosthetic joint infection (PJI), the latter being the most serious catastrophic occurrence since it usually causes irreversible physical sequelae with high economic costs, due to prolonged administration of antimicrobial treatments and constant hospital stays.<sup>2,3</sup>

In general the most common aetiological agents in prosthetic joint infections are of the genus *Staphylococcus*, the most common of which is *Staphylococcus aureus* (*S. aureus*)<sup>4</sup>; however, it has been observed that distribution changes, depending on geographical location or hospital centre. For example, Bejon et al.<sup>5</sup> described how in the

orthopaedic centre in Oxford, United Kingdom, the most frequent species were of the negative coagulase *Staphylococci*. There are therefore differences between microorganism distribution and also between the patterns of antimicrobial resistance.<sup>6,7</sup>

In Mexico up to the present day, studies published on prosthetic joint infections do not offer a detailed description of microbiological characteristics and antimicrobial resistance patterns<sup>8-10</sup> and it is thus of the utmost importance to gain knowledge of the microbial epidemiology and antimicrobial susceptibility of this type of infection to establish preventative guidelines and optimise empirical antimicrobial treatments to use in the prevention of infections related to prosthetic joints.

The aim of this study was to describe the microbiological characteristics and determine the antimicrobial resistance patterns in prosthetic joint infections which presented or had been referred to the National Rehabilitation Institute – the largest Health Department's referral hospital in Mexico – which specialises in treating musculoskeletal

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