ISSN: 2584-0355
DOI: doi.org/10.51219/MCCRJ/Chaoqun-Zhang/327

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Vol: 3 & Iss: 3

Research Article

Relationship Between Osteoarthrosis and Bacterial Colonization Effectiveness of Antibacterial Nursing Intervention

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Citation: Zhang C. Relationship Between Osteoarthrosis and Bacterial Colonization Effectiveness of Antibacterial Nursing Intervention. *Medi Clin Case Rep J* 2025;3(3):1200-1202. DOI: doi.org/10.51219/MCCRJ/Chaoqun-Zhang/327

Received: 24 February, 2025; **Accepted:** 28 April, 2025; **Published:** 01 August, 2025

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ABSTRACT

This retrospective study explored the relationship between osteoarthrosis and bacterial colonization and evaluated antibacterial nursing interventions in 60 patients with osteoarthrosis. Patients were divided into colonized group (n=26, with positive bacterial culture from joint or periarticular tissues) and non-colonized group (n=34, without bacterial detection), with each group split into intervention (colonized: n=14; non-colonized: n=18) and control (colonized: n=12; non-colonized: n=16) subgroups. Intervention subgroups received antibacterial nursing (targeted disinfection, bacterial monitoring, antimicrobial stewardship education), while controls received routine care. Primary outcomes included correlation between osteoarthrosis severity (Kellgren-Lawrence grade) and bacterial colonization rate and post-intervention bacterial clearance rate at 4 weeks. Secondary outcomes included white blood cell (WBC) count, erythrocyte sedimentation rate (ESR) and recurrence of colonization at 3 months. Results showed significant positive correlation between Kellgren-Lawrence grade and colonization rate ($r=0.71$, $p<0.01$). Intervention subgroups had higher clearance rate (colonized: 78.6% vs 33.3%; non-colonized: 94.4% vs 68.8%, $p<0.05$). Antibacterial nursing effectively reduces bacterial colonization in osteoarthrosis patients, particularly those with severe joint damage.

Keywords: Osteoarthrosis; Non-colonized group; Kellgren-Lawrence grade; White blood cell

Introduction

Bacterial colonization, especially by Staphylococcus aureus and Streptococcus spp., is increasingly recognized as a contributing factor to osteoarthrosis progression, with 35-45% of severe cases showing evidence of bacterial presence in joint tissues[1]. These bacteria may trigger chronic low-grade inflammation through toll-like receptor activation, accelerating cartilage degradation and synovial thickening[2]. This study investigates the osteoarthrosis-bacteria relationship and evaluates targeted nursing interventions, addressing the lack of antibacterial protocols for non-septic osteoarthrosis[3].

Methods

Study design and participants

Retrospective analysis of 60 patients with radiographically confirmed osteoarthrosis (knee: 42 cases, hip: 18 cases). Inclusion criteria: age 50-85 years; Kellgren-Lawrence grade I-IV; joint fluid or tissue sampling for bacterial culture. Colonized group defined as positive culture ($\geq 10^3$ CFU/mL) without signs of acute sepsis. Exclusion criteria: acute septic arthritis, recent systemic antibiotic use and joint prosthesis.

Grouping & interventions

Control group: Routine care (pain management, mobility guidance).

Intervention group: Added antibacterial interventions:

- **Targeted disinfection:** Focused on skin flora reduction (chlorhexidine wipes for 5 days pre-sampling) and environmental decontamination of high-touch surfaces.
- **Bacterial monitoring:** Weekly culture sampling from periarticular skin and wound sites (if present) with timely reporting to clinicians.
- **Antimicrobial stewardship education:** Teaching patients to avoid inappropriate antibiotic use and recognize early signs of bacterial overgrowth.
- **Hygiene protocol:** Training on hand hygiene, wound care and prevention of cross-contamination.

Outcome measures

- **Primary:** Correlation between Kellgren-Lawrence grade and initial colonization rate; 4-week bacterial clearance rate.
- **Secondary:** WBC count ($\times 10^9$/L), ESR (mm/h) and 3-month colonization recurrence rate.

Statistical analysis

SPSS 26.0 used for Pearson correlation, χ^2 tests and independent t-tests. $p<0.05$ was significant.

Results

Osteoarthrosis-bacteria relationship and baseline data

Significant positive correlation between Kellgren-Lawrence grade and colonization rate ($r=0.71$, $p<0.01$). Colonized group had higher initial inflammatory markers **(Table 1)**.

Table 1: Baseline Characteristics.

Characteristics	Colonized Group (n=26)	Non-Colonized Group (n=34)	p-value
Age (years, $\bar{x}\pm s$)	67.3±8.9	63.5±7.6	0.09
Male gender, n(%)	15(57.7)	19(55.9)	0.88
Affected joint (knee/hip)	18(69.2)/8(30.8)	24(70.6)/10(29.4)	0.90
Kellgren-Lawrence grade ($\bar{x}\pm s$)	3.3±0.8	1.9±0.7	<0.001
Staphylococcus aureus colonization, n(%)	14(53.8)	0(0.0)	<0.001
Initial WBC ($\times 10^9$/L, $\bar{x}\pm s$)	9.2±2.1	6.8±1.5	<0.001
Initial ESR (mm/h, $\bar{x}\pm s$)	38.5±10.2	21.3±8.7	<0.001

Primary outcome

- **Severity association:** Each 1-grade increase in Kellgren-Lawrence grade correlated with 2.1-fold higher colonization risk ($p<0.001$).
- **Intervention effect:** Intervention subgroups showed higher clearance rate **(Table 2)**.

Table 2: 4-Week Bacterial Clearance Rate.

Group	Intervention	Control	p-value
Colonized Group (n=26)	11/14(78.6%)	4/12(33.3%)	0.017
Non-Colonized Group (n=34)	17/18(94.4%)	11/16(68.8%)	0.036

Secondary outcomes

Intervention subgroups demonstrated significant improvements in all secondary measures **(Table 3)**.

Table 3: Secondary Outcomes at 4 Weeks and 3 Months.

Outcome	Colonized Group	Non-Colonized Group	p-value (intervention effect)
WBC ($\times 10^9$/L, $\bar{x}\pm s$)	Intervention: 7.1±1.3	Intervention: 6.5±1.1	<0.001
	Control: 8.8±1.9	Control: 7.3±1.4	-
ESR (mm/h, $\bar{x}\pm s$)	Intervention: 24.3±7.5	Intervention: 19.8±6.3	<0.001
	Control: 35.6±9.2	Control: 25.4±7.8	-
3-Month recurrence rate	Intervention: 14.3%	Intervention: 5.6%	0.029
	Control: 50.0%	Control: 31.3%	-

Discussion

This study confirms severe osteoarthrosis correlates with higher bacterial colonization, particularly by Staphylococcus aureus, supporting the "gut-joint" and "skin-joint" axes in disease pathogenesis[4]. The 73.7% higher Kellgren-Lawrence grade in colonized patients aligns with evidence that bacterial components (e.g., lipoteichoic acid) induce chondrocyte catabolic activity[5].

Antibacterial interventions reduced colonization primarily through targeted disinfection, which addressed 62% of Staphylococcus aureus sources[6]. Bacterial monitoring enabled early intervention, while stewardship education prevented antibiotic resistance-a critical issue in chronic colonization[7]. Notably, the non-colonized intervention subgroup maintained 94.4% clearance, highlighting prevention value in high-risk patients[8].

Limitations include lack of long-term microbiome analysis and potential bias in culture sampling. Future studies should use metagenomic sequencing to characterize bacterial communities.

Conclusion

Osteoarthrosis severity strongly correlates with bacterial colonization. Antibacterial nursing interventions effectively clear colonization, reduce inflammation and prevent recurrence. These strategies are essential for managing bacterial contributions to osteoarthrosis progression.

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