

# More than Just Fractures: Does Rickets Carry an Increased Risk of Osteomyelitis and Septic Arthritis?

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**INTRODUCTION:** Rickets, a pediatric condition resulting in defective bone mineralization and deformities, has seen a resurgence in recent years. Children with rickets are prone to fractures and skeletal deformities due to their impaired bone development and remodeling. While prior studies have linked trauma to musculoskeletal infections in general, the prevalence of septic arthritis and osteomyelitis in rickets patients remains unexplored. Limited case studies have reported the coexistence of rickets and bone and joint infections. Thus, this study aimed to investigate the prevalence of septic arthritis and osteomyelitis in rickets patients compared to a control group, hypothesizing an increased prevalence in rickets patients.

**METHODS:** We performed a retrospective cohort study utilizing the TriNetX Analytics Network, a federated health research network that aggregates deidentified electronic health record data from over 92 million patients across the United States. We queried pediatric patients with rickets, based on International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) encounter diagnoses, additionally analyzing a subgroup without a history of orthopaedic procedures to control for surgical site infections. Patients in these groups with any ICD-10-CM encounter diagnoses of osteomyelitis or septic arthritis were reported. We also established control cohorts to compare the prevalence in patients without rickets. Relative risks were calculated using the Koopman asymptotic score.

**RESULTS:** Of 7,112 pediatric patients with rickets, 95 (1.34%, 95% Confidence Interval (CI): 1.07%-1.60%) had a history of osteomyelitis and 34 (0.48%, 95% CI: 0.32%-0.64%) had a history of septic arthritis. In comparison, of the 14,984,013 patients without rickets, 14,199 (0.10%, 95% CI: 0.09%-0.10%) had a diagnosis of osteomyelitis and 6,925 (0.05%, 95% CI: 0.05%-0.05%) had a diagnosis of septic arthritis. The overall relative risk for osteomyelitis in pediatric patients with rickets was 14.10 (95% CI: 11.54-17.22), while the relative risk for septic arthritis was 10.30 (95% CI: 7.34-14.21). An increased risk for osteomyelitis and septic arthritis was still present even in the rickets subgroup without prior musculoskeletal surgery (relative risk 11.31 and 8.31, respectively).

**DISCUSSION AND CONCLUSION:** Pediatric patients with rickets have over 10 times higher relative risks for developing osteomyelitis and septic arthritis compared to those without rickets. This is the first study to explore musculoskeletal infections in rickets patients, highlighting the importance of clinicians being vigilant about these conditions. Further research should determine if modifications to diagnostic criteria are needed due to the significantly elevated relative risk.

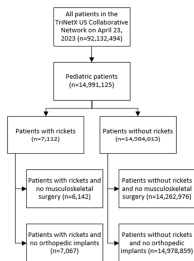


Figure 1. Strobe flow diagram for patient inclusion.

Table 1. Prevalence and relative risk of an osteomyelitis ICD-10-CM encounter diagnosis in patients with at least one rickets ICD-10-CM encounter diagnosis.

Population	Total Patients	Patients with Osteomyelitis Diagnosis	Proportion with Osteomyelitis Diagnosis (%) (95% CI)	Relative Risk (95% CI)
Patients with rickets	7,112	95	1.34 (1.07-1.60)	14.10 (11.54 to 17.22)
Patients without rickets	14,984,013	14,199	0.10 (0.09-0.10)	Reference
Patients with rickets and without musculoskeletal surgery	6,142	43	0.70 (0.49-0.90)	11.31 (8.39 to 15.24)
Patients without rickets and musculoskeletal surgery	14,262,976	8,832	0.06 (0.05-0.08)	Reference
Patients with rickets and without orthopedic implant	7,067	14	0.20 (0.09-0.30)	35.88 (21.17 to 60.82)
Patients without rickets and orthopedic implant	14,978,859	827	0.01 (0.01-0.01)	Reference

CI=confidence interval

Table 2. Prevalence and relative risk of a septic arthritis ICD-10-CM encounter diagnosis in patients with at least one rickets ICD-10-CM encounter diagnosis.

Population	Total Patients	Patients with Septic Arthritis Diagnosis	Proportion with Septic Arthritis Diagnosis (%) (95% CI)	Relative Risk (95% CI)
Patients with rickets	7,112	34	0.48 (0.32-0.64)	10.30 (7.34 to 14.21)
Patients without rickets	14,984,013	6,925	0.05 (0.05-0.05)	Reference
Patients with rickets and without musculoskeletal surgery	6,142	12	0.20 (0.09-0.31)	8.31 (4.72 to 14.64)
Patients without rickets and musculoskeletal surgery	14,262,976	3,353	0.24 (0.23-0.24)	Reference
Patients with rickets and without orthopedic implant	7,067	34	0.48 (0.32-0.64)	10.48 (7.49 to 14.67)
Patients without rickets and orthopedic implant	14,978,859	6,876	0.05 (0.05-0.05)	Reference

CI=confidence interval