Too Thin to Win? The Obesity Paradox in PJI Risk After TKA/THA

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INTRODUCTION: While obesity is a known risk factor for periprosthetic joint infection (PJI), emerging evidence suggests a non-linear association, where both low and high body mass index (BMI) may confer increased risk. This study investigates the presence of a U-shaped relationship between BMI and PJI following primary total hip and knee arthroplasty.

METHODS: We retrospectively reviewed 42,181 patients who underwent primary total hip or knee arthroplasty between 2014–2024 at a single tertiary academic center. Patients were stratified into four BMI categories: underweight (<20 kg/m²), normal-weight (20–29.9), obese (30–34.9), and morbidly obese (≥35). The primary outcome was PJI within one year, defined using MSIS criteria. Multivariate logistic regression was used to adjust for age, sex, diabetes, smoking status, Charlson Comorbidity Index (CCI), and procedure type (THA vs TKA). A restricted cubic spline model was constructed to evaluate non-linearity in the BMI–PJI relationship.

RESULTS:

The overall PJI rate was 0.87%. PJI incidence by BMI group was:

- Underweight (<20): 1.5%
- Normal-weight (20–29.9): 0.6%
- Obese (30–34.9): 0.9%
- Morbidly obese (≥35): 1.3%

After adjustment, both underweight (OR: 2.5, 95% CI: 1.3–4.8, $p = 0.005$) and morbidly obese patients (OR: 2.2, 95% CI: 1.5–3.3, $p < 0.001$) had significantly increased odds of PJI compared to the normal-weight group. The spline model confirmed a U-shaped association, with the lowest predicted risk between BMI 25–28.

DISCUSSION AND CONCLUSION: Both low and high BMI are independently associated with increased PJI risk following total hip and knee arthroplasty. These findings challenge the linear risk assumption and support targeted preoperative optimization at both ends of the BMI spectrum.