

# **Adverse Impact of Obesity on Spine Fusion and Patient-Reported Outcomes: A Systematic Review and Meta-Analysis**

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**INTRODUCTION:** Obesity, a growing global public health concern, has been linked to medical and surgical complications in orthopedics and traumatology. Existing evidence on the association of obesity and spinal surgery is inconsistent, highlighting the need for a pooled meta-analysis. Given the prevalence of obesity and the importance of optimizing outcomes, a detailed analysis of these factors is crucial in the context of evolving healthcare models. This study aimed to assess the impact of obesity on the incidence of spinal nonunion, patient-reported outcome measures (PROMs), and costs.

**METHODS:** A systematic search was conducted following PRISMA guidelines across PubMed, EMBASE, Scopus, and the Cochrane Library. Studies comparing obesity versus non-obesity in patients undergoing spinal fusion surgeries were included. Odds ratios (OR) were calculated for dichotomous variables, and mean differences (MD) or standard mean differences (SMD) were calculated for continuous variables. Meta-analysis was performed using Cochrane RevMan version 5.4 software, with random effects applied in the presence of heterogeneity.

**RESULTS:** Thirty-four studies with a pool of 433993 patients were included. Obesity (BMI $\geq$ 30) was significantly associated with a higher nonunion frequency (OR 2.10, 95%CI 1.23 to 3.60,  $p<0.01$ ). The ODI was significantly worse in the obesity group (MD 5.45, 95% CI 3.28 to 7.63,  $p<0.001$ ). Greater pain was measured by the VAS back pain and VAS leg pain scales for lumbar surgery patients with obesity: (MD 0.95, 95% CI 0.17 to 1.73,  $p<0.05$ ) and (MD 0.94, 95% CI 0.68 to 1.20,  $p<0.001$ ), respectively. The SF-36 showed significantly worse outcomes in patients with obesity (SMD -0.46, 95% CI -0.82 to -0.09,  $p=0.01$ ). Hospitalization costs were significantly higher in patients with obesity (SMD -0.09, 95% CI -0.12 to -0.07,  $p<0.001$ ). Patients with obesity also had a significant increase in the cost per Quality-Adjusted Life-Year (QALY, SMD -1.49, 95% CI -1.74 to -1.24,  $p<0.001$ ).

**DISCUSSION AND CONCLUSION:** This meta-analysis suggests obesity is significantly associated with higher nonunion rates, poorer PROMs including ODI, VAS, and SF-36 scores, increased hospitalization costs and higher cost per QALY following spinal fusion, confirming obesity as a significant factor impairing surgical outcomes.