

# Preoperative Use of GLP-1 Receptor Agonists and Postoperative Outcomes in Patients Undergoing Arthroplasty: A Systematic Review With Exploratory Meta-analysis

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## ABSTRACT

**Introduction:** Arthroplasty is a common procedure in older adults with multiple comorbidities. Glucagon-like peptide-1 (GLP-1) receptor agonists are used to treat diabetes mellitus and obesity. Their preoperative use may influence postoperative outcomes in patients undergoing different types of arthroplasty, although the available evidence is inconsistent. **Objective:** To evaluate the association between preoperative use of GLP-1 receptor agonists and postoperative complications in patients undergoing arthroplasty. **Materials and Methods:** A systematic review was conducted in accordance with the PRISMA 2020 guidelines, with artificial intelligence support to optimize the search strategy for PubMed, Scopus, and Web of Science. Studies of patients undergoing hip, knee, or shoulder arthroplasty who had received GLP-1 receptor agonists preoperatively were included if they reported data on postoperative complications and hospital readmission within 90 days. An exploratory meta-analysis was performed using a random-effects model, with results expressed as odds ratios (ORs), 95% confidence intervals (CIs), and p-values. Heterogeneity was assessed using the  $I^2$  statistic. **Results:** Four observational studies were analyzed. Preoperative use of GLP-1 receptor agonists was associated with lower odds of surgical site infection (OR, 0.48; 95% CI, 0.35–0.66;  $p < 0.001$ ;  $I^2 = 0\%$ ). The analysis of hospital readmission showed high heterogeneity ( $I^2 = 86\%$ ). **Conclusions:** Preoperative use of GLP-1 receptor agonists was associated with lower odds of postoperative infection in patients undergoing arthroplasty. However, given the small number of observational studies and the heterogeneity among arthroplasty types, these findings should be interpreted with caution and considered hypothesis-generating.

**Keywords:** GLP-1 receptor agonist; arthroplasty; systematic review.

**Level of Evidence:** III

**Uso preoperatorio de agonistas del receptor del GLP-1 y resultados posoperatorios en pacientes sometidos a artroplastia: revisión sistemática con metanálisis exploratorio**

## RESUMEN

**Introducción:** La artroplastia es un procedimiento frecuente en adultos mayores con múltiples comorbilidades. Los agonistas del receptor del péptido similar al glucagón tipo 1 (GLP-1) se utilizan para tratar la diabetes mellitus y la obesidad. Su administración antes de la cirugía podría influir en los resultados posoperatorios de pacientes sometidos a distintas artroplastias, aunque la evidencia disponible es inconsistente. **Objetivo:** Evaluar la asociación entre uso preoperatorio de agonistas del GLP-1 y complicaciones posoperatorias en pacientes sometidos a una artroplastia. **Materiales y Métodos:** Se realizó una revisión sistemática siguiendo la guía PRISMA 2020, con apoyo de la inteligencia artificial para optimizar la búsqueda en PubMed, Scopus y Web of Science. Se incluyeron estudios de pacientes sometidos a una artroplastia de cadera, rodilla u hombro que habían recibido agonistas del GLP-1 y tuvieron complicaciones posoperatorias y un reingreso hospitalario dentro de los 90 días. Se realizó un análisis exploratorio mediante *odds ratio* (OR), IC95%, valor  $p$  e  $I^2$  con un modelo de efectos aleatorios. **Resultados:** Se analizaron cuatro estudios observacionales. La administración preoperatoria de agonistas del GLP-1 se asoció con menor OR de infección del sitio quirúrgico (OR 0,48; IC95% 0,35-0,66;  $p < 0,001$ ;  $I^2 = 0\%$ ). El reingreso hospitalario obtuvo una elevada heterogeneidad ( $I^2 = 86\%$ ).

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**Conclusiones:** El uso preoperatorio de agonistas del GLP-1 se asoció con menor OR de infección posoperatoria en pacientes sometidos a una artroplastia. Sin embargo, los pocos estudios observacionales y la heterogeneidad entre artroplastias obligan a interpretar los hallazgos con cautela, considerándolos generadores de hipótesis.

**Palabras clave:** Agonista del receptor GLP-1; artroplastia, revisión sistemática.

**Nivel de Evidencia:** III

## INTRODUCTION

Arthroplasty is more commonly performed in older adults. Garabano et al. report that, of approximately 80% of hip fractures, 77% require hip arthroplasty. They also note that patients in this group are older than 70 years and have multiple comorbidities, including diabetes, hypertension, obesity, and heart failure.<sup>1</sup> Glucagon-like peptide-1 receptor agonists (GLP-1 agonists) have changed the management of these conditions. These drugs have improved the clinical status of this patient population, and several studies have begun to examine the effects of their preoperative use in patients undergoing hip, knee, or shoulder arthroplasty.

Some studies suggest that GLP-1 agonists reduce infectious complications and hospital readmissions.<sup>2,4</sup> However, the findings are inconsistent. Recent studies of shoulder arthroplasty have reported rudimentary findings, such as no significant differences or even an increase in certain perioperative complications.<sup>5,6</sup>

This study therefore aimed to analyze the available evidence on the association between preoperative GLP-1 agonist use and postoperative complications in patients undergoing arthroplasty.

## MATERIALS AND METHODS

A systematic review of the medical literature was conducted in accordance with the PRISMA 2020 guidelines, with artificial intelligence (ChatGPT 5.2G) used as a supporting tool to optimize the search strategy. These tools helped identify additional terms. The authors then reviewed, adjusted, and validated the resulting search strategies before implementing them in the databases. The authors also performed study selection, data extraction, and critical appraisal of the evidence.

The literature search was conducted in several databases, including PubMed, Scopus, and Web of Science. The authors reviewed the articles and included human studies evaluating patients who underwent total hip, knee, or shoulder arthroplasty and had received GLP-1 agonists before surgery.

The inclusion criteria were observational studies in humans, patients undergoing hip, knee, or shoulder arthroplasty, preoperative GLP-1 agonist use, availability of postoperative complication data, and a control group. Control groups comprised patients who underwent the same type of arthroplasty but had not received GLP-1 agonists preoperatively. In the included studies, group comparability was addressed using strategies specific to each database, mainly matching or adjustment for clinical variables such as diabetes, obesity, comorbidities, and baseline risk. However, these adjustments were not fully consistent across studies.

The outcomes analyzed were surgical site infection or periprosthetic infection as reported in the included studies, and hospital readmission within 90 days after surgery. These outcomes were selected because they were the clinical outcomes most consistently available across the included studies and were relevant to arthroplasty. Other complications reported in individual studies were excluded from the primary meta-analysis because they were not consistently available, event definitions differed, or comparable data were lacking. A systematic review was conducted using random-effects models. Between-study heterogeneity was assessed using the  $I^2$  statistic. Results are expressed as odds ratios (ORs) with 95% confidence intervals (95% CIs) and p values.

## RESULTS

Four observational studies evaluating patients undergoing hip, knee, or shoulder arthroplasty were included (Figure 1). The studies examined different populations undergoing total hip arthroplasty, total knee arthroplasty, or shoulder arthroplasty. Control groups comprised patients who had not received GLP-1 agonists within each study, with adjustment or matching procedures specific to each database. This variability limits direct comparisons between studies and warrants interpreting the pooled analysis as exploratory.

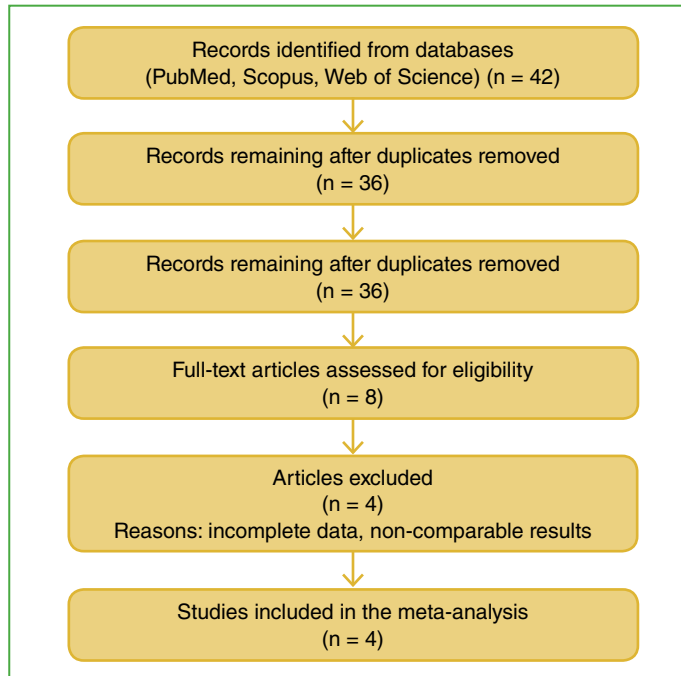


**Figure 1.** PRISMA flow diagram showing the identification, selection, and inclusion of studies.

The analysis showed an association between preoperative GLP-1 agonist use and lower odds of surgical site infection compared with the control group, with a pooled OR of 0.48 (95% CI 0.35–0.66;  $p < 0.001$ ) using a random-effects model. Statistical heterogeneity was low ( $I^2 = 0\%$ ). This finding should not be interpreted as an absolute reduction in incidence or as evidence of causality (Figure 2).

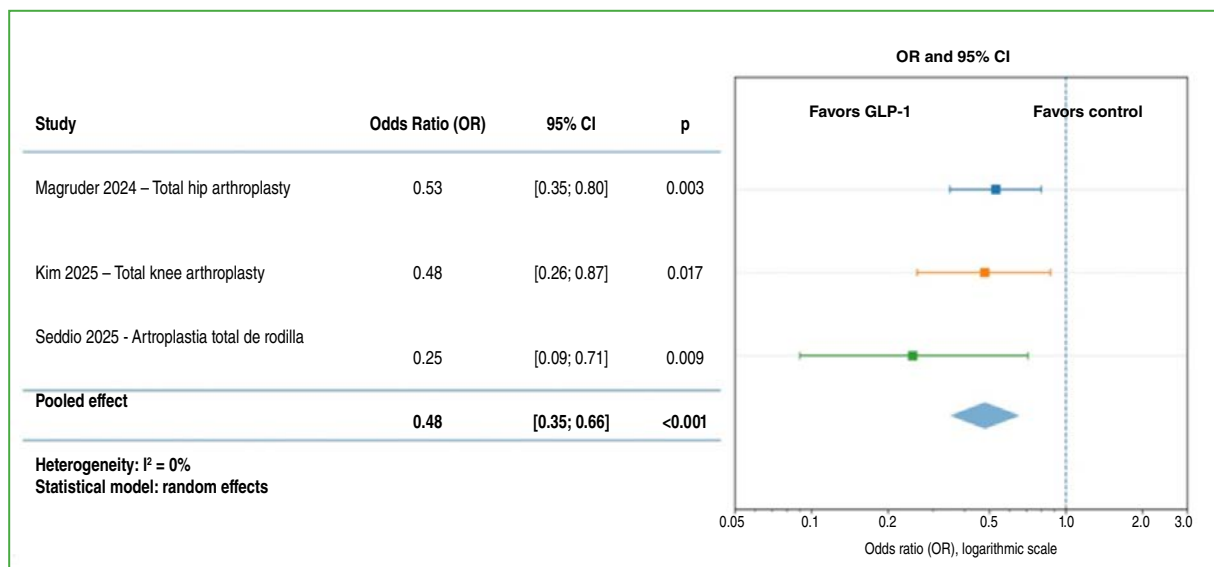


**Figure 2.** Forest plot of the association between preoperative GLP-1 receptor agonist use and postoperative infectious complications in patients undergoing arthroplasty. Squares represent individual study estimates, and the diamond represents the pooled effect.

For hospital readmission within 90 days after surgery, heterogeneity between studies was high ( $I^2 = 86\%$ ). Studies of hip and knee arthroplasty reported lower odds of hospital readmission among patients treated with GLP-1 agonists, whereas studies of shoulder arthroplasty yielded more variable findings, including unfavorable results in one study. Under the random-effects model, the pooled effect estimate was an OR of 0.92 (95% CI 0.61–1.38;  $p = 0.68$ ), which does not provide conclusive evidence of a reduction in 90-day hospital readmission (Figure 3).

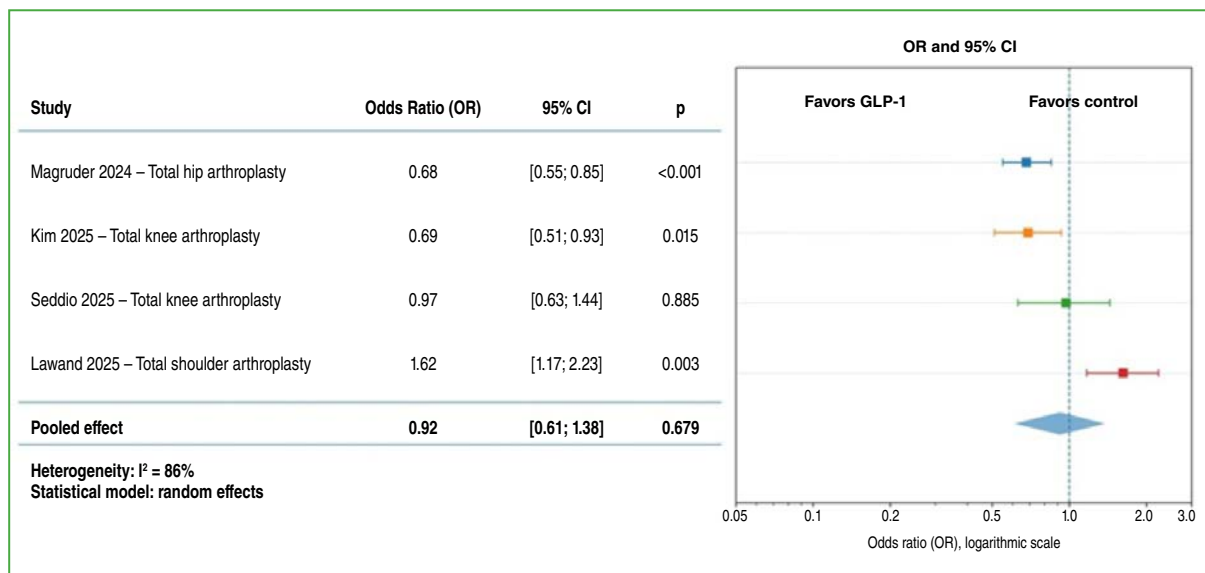


**Figure 3.** Forest plot of hospital readmission within 90 days after total hip, knee, or shoulder arthroplasty, comparing patients who received GLP-1 receptor agonists preoperatively with the control group. Each square represents an individual study's odds ratio (OR), shown with its 95% confidence interval. The diamond represents the pooled effect from the random-effects model (OR 0.92; 95% CI 0.61–1.38;  $p = 0.68$ ;  $I^2 = 86\%$ ).

## DISCUSSION

The findings of this study show that preoperative GLP-1 agonist use was associated with lower odds of post-operative infection compared with the control group. Some recent studies have reported a lower frequency of periprosthetic infection and hospital readmission in patients treated with these drugs.<sup>1</sup> Studies such as that by Kim et al. have also reported reductions in certain surgical complications among patients with obesity receiving GLP-1 agonists who underwent knee arthroplasty.<sup>2-4</sup> However, because these studies were observational, their findings do not establish a protective effect or causality.

The available evidence is not entirely consistent. Some studies of shoulder arthroplasty, including those by El-sabbagh et al. and Lawand et al., reported different findings, including a higher incidence of perioperative complications.<sup>5,6</sup> In particular, Lawand et al. reported higher odds of complications such as myocardial infarction, pneumonia, anemia, deep vein thrombosis, and 90-day readmission among patients exposed to GLP-1 agonists. These outcomes were not included in the primary analysis because they were not consistently available across all included studies and their definitions were not comparable across populations. Differences in the populations studied, surgical procedures, patients' baseline risk, and study designs may explain these discrepancies.

This study has several limitations. The small number of included studies limits the statistical power of the meta-analysis. The evidence also consisted mainly of observational database analyses, introducing the potential for residual bias and selection bias. In addition, consistent absolute risk measures were unavailable, adjusted

analyses varied across studies, there was clinical heterogeneity between hip, knee, and shoulder arthroplasty populations, and causality could not be established. The findings should therefore be considered hypothesis-generating.

## CONCLUSIONS

Preoperative GLP-1 agonist use was associated with lower odds of postoperative infection in patients undergoing arthroplasty. However, reported findings on hospital readmission differ according to the type of arthroplasty. Given the small number of available observational studies, clinical heterogeneity, and lack of consistent absolute risk measures, these findings should be interpreted cautiously and do not establish causality or support a definitive clinical recommendation.

Conflicts of interest: The authors declare no conflicts of interest.

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