### International Platform of Registered Systematic Review and Meta-analysis Protocols

# INPLASY

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## Nanotechnology in dental implants: Impact of nanoceramics on osseointegration: A systematic review

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#### ADMINISTRATIVE INFORMATION

**Support -** King Khalid University.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 30 April 2025 and was last updated on 30 April 2025.

#### INTRODUCTION

Review question / Objective To assess how nano-ceramic coatings enhance dental implant performance and its clinical outcomes.

**Rationale** Nanoscale modifications aim to address common dental implant challenges, such as bacterial infections and slow bone healing.

**Condition being studied** Osseointegration rates, antimicrobial activity, biocompatibility, bone-implant contact, and mechanical stability of nano-coated implants.

#### **METHODS**

**Search strategy** Databases: PubMed, ScienceDirect, Scopus, Cochrane Library, Google Scholar. **Participant or population** The population included lab-based studies and clinical trials testing nano-coated titanium dental implants.

**Intervention** Implants treated with nanoceramics (silver, graphene oxide) applied through methods such as spin coating or immersion.

Comparator Non-coated titanium implants.

**Study designs to be included** In vitro studies, RCTs, cohort studies, and clinical trials published in English.

**Eligibility criteria** Included: Research on nanocoated implants with relevant outcomes. Excluded: Non-English articles, insufficient data.

**Information sources** Electronic databases like PubMed, ScienceDirect, Scopus, Cochrane Library, Google Scholar. Main outcome(s) Primary outcomes like Enhanced osseointegration, antimicrobial efficacy, biocompatibility, and implant stability.

Additional outcome(s) Secondary measures like Bone-to-implant contact, mechanical strength, and cellular proliferation.

**Data management** Data extracted into Excel sheet; duplicates removed via EndNote X9 software.

**Quality assessment / Risk of bias analysis** Used QUIN tool rated studies as medium risk of bias.

**Strategy of data synthesis** Qualitative synthesis (narrative summary); meta-analysis excluded due to data heterogeneity.

**Subgroup analysis** Subgroup comparisons were not performed owing to methodological diversity.

Sensitivity analysis Not reported in the included studies.

Language restriction Only studies published in English included.

Country(ies) involved Saudi Arabia, India.

**Other relevant information** PRISMA guidelines followed. Recommendations emphasize extended human trials.

**Keywords** Nano-ceramics, osseointegration, antimicrobial, bone-implant contact, biocompatibility.

**Dissemination plans** Results will inform dental implant advancements and be published academically.

#### **Contributions of each author**

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