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

# INPLASY

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# How efficient are 3D-Printed Bone substitutes in Maxillofacial Reconstruction

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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.

INPLASY registration number: INPLASY202550015

**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 9 May 2025 and was last updated on 9 May 2025.

### INTRODUCTION

R eview question / Objective To evaluate the clinical efficacy of 3D-printed bone substitutes versus traditional grafting in maxillofacial reconstruction.

**Rationale** 3D printing offers personalized solutions but lacks comprehensive meta-analytic validation. Traditional methods face limitations like donor site morbidity.

**Condition being studied** Maxillofacial/craniofacial defects from trauma, tumors, congenital anomalies, or infections requiring reconstruction.

#### **METHODS**

**Search strategy** Systematic search of PubMed, Scopus, Cochrane Library using terms 3D printing, bone substitutes, and maxillofacial surgery, targeting RCTs and cohort studies. **Participant or population** Patients undergoing maxillofacial/craniofacial reconstruction.

Intervention 3D-printed bone substitutes.

Comparator Traditional substitutes.

**Study designs to be included** RCTs and cohort studies with comparative designs.

**Eligibility criteria** English studies on humans; excluded animal studies, reviews, and non-comparative designs.

**Information sources** PubMed, Scopus, Cochrane Library, Web of Science, Elsevier.

**Main outcome(s)** Bone regeneration volume, surgical precision, operative duration.

Additional outcome(s) Cost-effectiveness, complications, intraoperative metrics, and implant success.

**Data management** PRISMA-guided extraction into Excel by two reviewers; disputes resolved by a third.

**Quality assessment / Risk of bias analysis** RoB2 for RCTs, ROBINS-I for cohort studies; visualized via Robvis.

**Strategy of data synthesis** Meta-analysis done by using SMD/MD; heterogeneity assessed.

Subgroup analysis Stratified by study design.

**Sensitivity analysis** Trim-and-Fill for publication bias; exclusion of high-bias studies.

Language restriction Only articles published in English.

Country(ies) involved Saudi Arabia, India.

Other relevant information Publication bias assessed via Begg's/Egger's tests.

**Keywords** 3D-printed bone substitute, maxillofacial reconstruction, bone regeneration, surgical deviation, meta-analysis.

**Dissemination plans** Article to be published in Peer-reviewed journals, conference presentations, and clinical guideline integration.

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

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