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Comparative Analysis of Allografts and Xenografts as Bone Substitute Materials In Dentistry: A Systematic Review and Meta-Analysis of Integration And Resorption Rates

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ADMINISTRATIVE INFORMATION

Support - None.

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 25 February 2025 and was last updated on 25 February 2025.

INTRODUCTION

Review question / Objective "In patients undergoing dental bone grafting procedures, do allografts differ from xenografts with regard to integration and resorption rates?"

Rationale By systematically examining and comparing these two graft materials, the study aims to clarify their relative effectiveness and provide clinicians with evidence-based guidance for selecting an optimal bone substitute in various dental applications.

Condition being studied The primary "conditions" in this research revolve around situations where patients experience alveolar bone loss (e.g., from tooth extraction, periodontal disease, or trauma) and require bone regeneration or augmentation procedures in dentistry. Specifically, the review focuses on:

- Alveolar ridge preservation (e.g., after tooth extraction)
- Sinus augmentation (for patients needing sufficient bone height in the maxilla)
- Periodontal regeneration (treating bone defects around teeth).

METHODS

Search strategy The researcher searched five major databases—Cochrane Library, PubMed, CINAHL, Medline, and Web of Science—using a set of carefully constructed queries that combined keywords and MeSH terms related to allografts, xenografts, and dental procedures (e.g., "Dental," "Ridge," "Maxillary," "Periodontal," "Socket," etc.). The search strings aimed to capture studies comparing the performance of allografts and xenografts in the context of alveolar ridge preservation, sinus augmentation, or other relevant dental bone-grafting scenarios. After retrieving records, they used Zotero to screen for duplicates and retracted articles, then applied inclusion and

exclusion criteria aligned with a modified PICO framework.

Participant or population Patients who require bone grafting procedures for dental treatments.

Intervention Allografts.

Comparator Xenografts.

Study designs to be included Randomized controlled trials (RCTs), clinical trials.

Eligibility criteria Studies published in English. Studies published as original research articles.

Information sources PubMed, Cochrane, Dimensions.ai, and Google Scholar.

Main outcome(s) Clinical Efficacy: Overall, allografts and xenografts both proved effective as bone substitutes for ridge preservation, sinus augmentation, and periodontal regeneration, supporting high implant success.

Additional outcome(s) Resorption: Both material types exhibited similar bone resorption rates over time, indicating comparable longevity in maintaining volume.

Data management Microsoft Excel (Excel 365; Microsoft Corp., Redmond, WA, USA). For export and data manipulation, Google Sheets (Alphabet Inc., Mountain View, CA, USA) were also used.

Quality assessment / Risk of bias analysis one researcher independently assessed the risk of bias of the included articles using —JBI critical appraisal tools. The potential risk of bias was categorized as low if a study provided detailed information pertaining to 70% or more of the applicable parameters.

Strategy of data synthesis review authors (AK) used the studies to help select studies and document their decisions. This was done in two stages, with the first stage consisting of a title and abstract screening of all studies against the inclusion criteria, and the second stage being a full text assessment of papers that were deemed potentially relevant based on the initial screening.

Subgroup analysis The data was compiled from a variety of articles:
• Author(s), year of publication, country, study design.
• Total number of patients/datasets.
• Training/validation datasets.
• Test datasets.
• Aim of the study.

Sensitivity analysis None.

Language restriction Articles only in English were Selected.

Country(ies) involved Saudi Arabia.

Keywords Allografts; Xenografts; Bone Substitute Materials.

Dissemination plans Data will be shared after the publication.

Contributions of each author
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