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INPLASY

Balancing Bioactivity and Strength: A Systematic Review of Fluoride Release and Mechanical Properties of S-PRG Fillers in Dental Materials

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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 29 April 2025 and was last updated on 29 April 2025.

INTRODUCTION

Review question / Objective This study assesses fluoride release capabilities and mechanical performance of S-PRG fillers in dental restorations.

Rationale S-PRG fillers are studied to overcome limitations of conventional materials.

Condition being studied Fluoride release efficiency, mechanical strength, and wear resistance of S-PRG fillers.

METHODS

Search strategy PubMed, Scopus, ScienceDirect, Google Scholar.

Participant or population Analyzed laboratory models and a single clinical trial with dental restoration samples.

Intervention Dental materials incorporating S-PRG fillers as the bioactive component.

Comparator Non-S-PRG materials.

Study designs to be included RCTs, in vitro, cross-sectional, and observational studies.

Eligibility criteria Selected peer-reviewed studies with clear outcomes on S-PRG; excluded non-English or non-comparative research.

Information sources PubMed, Scopus, ScienceDirect, Google Scholar, and Cochrane Library.

Main outcome(s) Fluoride release rates and mechanical strength.

Additional outcome(s) Material longevity and ion re-release potential.

Data management Data Extracted to Excel, Analyzed by RevMan 5.4 software.

Quality assessment / Risk of bias analysis Used QUIN tool and Cochrane RoB-2.0 validated studies into low/medium/high risk.

Strategy of data synthesis Combined statistical pooling and descriptive synthesis due to data variability.

Subgroup analysis Compared flexural strength and diametral tensile strength (DTS) between S-PRG and controls.

Sensitivity analysis Assessment of results via heterogeneity metrics.

Language restriction Only studies published in English included.

Country(ies) involved Saudi Arabia, India.

Other relevant information High heterogeneity observed due to varied study designs and material compositions.

Keywords Bioactivity, fluoride release, flexural strength, direct tensile strength, S-PRG ionomer fillers.

Dissemination plans Results will be submitted to peer-reviewed dental biomaterials journals.

Contributions of each author

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