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The potential effect of different irrigation protocols on the tissues of the pulpo-periapical complex -a systematic review of invitro studies

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ADMINISTRATIVE INFORMATION

Support - Self.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202540068

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 21 April 2025 and was last updated on 211 April 2025.

INTRODUCTION

Review question / Objective Do different irrigation protocols or technique have any influence on the tissues of the periapical complex such as dentin, Scap etc. which are crucial for the root formation in regenerative endodontic procedure.

Rationale There is no sufficient evidence to compare and critically analyze the different irrigation protocols and their impact on the regenerative biology of the tissues in the pulpoperiapical complex. The rationale of this systematic review would be to check the influence of different irrigation protocols on the physiology of regenerative endodontics such as stem cell proliferation, migration, attachment, viability or growth factor release. This systematic review might act as a guide for further clinical trials in regenerative endodontic procedures.

Condition being studied The influence of different irrigants and irrigation protocol/techniques on the

tissues and stem cells properties like Root surface attachment, Migration, Cell proliferation, Survival and any other effects which would affect the root formation process in regenerative endodontic procedure.

METHODS

Search strategy Electronic databases like Pubmed, Scopus, Cochrane , LILACs will be searched for relevant articles. Literature search will also be done manually from references of selected articles. Two trained investigators will responsible for selecting studies for the systematic review, data extraction, and analysis process. Third reviewer will be included if there is any conflict of interests in the selection process.

Participant or population 3d Teeth model/ Dentin samples/Extracted natural teeth.

Intervention Different irrigation protocols/ techniques with/without activation.

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Comparator Conventional irrigation technique with needle-passive irrigation.

Study designs to be included Invitro study, Ex vivo study.

Eligibility criteria Inclusion criteria: In-vitro study which has exclusively studied irrigation impact on the stem cell features, Invitro study which has removed the potential confounding factors which can influence the results, Ex vivo

Study, Extracted teeth due to Periodontal and Orthodontic reasons, Dentin samples in teeth model, 3d teeth model, Studies carried out in oral environment simulating conditions

Exclusion criteria: In vivo study, Insufficient data on methodology, Case reports, Clinical trials, Review, Book chapters, Letters, Any study lacking standardized method. Ex vivo study in teeth with cracks, Calcification, Root caries, Resorption, Root canal treated teeth.

Information sources Electronic databases, manual search from literature, journals, trial registers, Grey literature, Contact with authors.

Main outcome(s) Any effect of irrigation techniques/protocol on tissues of pulp- periapical complex, stem cell properties like attachment, Proliferation, Migration etc.

Additional outcome(s) Irrigant and irrigation mostly commonly used in regenerative endodontic procedures till date.

Advantages and Disadvantages and feasibility of different irrigants, irrigation techniques used in regenerative endodontic procedures.

Irrigation technique and irrigant which is found to be most effective in terms of regenerative potential.

Data management Relevant data like Title, Aim/ objective of study, Inclusion criteria, Exclusion criteria, Keywords, Type of study, Sample size, Type of sample, Methods used, Outcome and results, Conclusion, Author, Year of study, Journal published will be collected. and tabularized for easy analysis and interpretation of the information.

Quality assessment / Risk of bias analysis Quin tool will be used to check the quality of included articles.

Strategy of data synthesis The pooled effect estimates of the results from included studies with similar outcome measures will be assessed carefully to perform a meta-analysis. Quantitative data synthesis will be performed to combine

comparable results using a software program for meta-analysis. Statistical heterogeneity between studies will be analyzed using the l² value indicating low, medium, and high heterogeneity at 25%, 50%, and 75%, respectively.

Subgroup analysis In case of heterogeneity of the results across the studies included in the Meta-Analysis, a sub group analysis will be done if indicated.

Sensitivity analysis N/A.

Language restriction There are no language restrictions.

Country(ies) involved India.

Keywords Root canal irrigants; immature permanent tooth; growth factors; Irrigation protocol; In vitro studies; Regenerative endodontics; Stem cells; Apical papilla cells.

Dissemination plans Plan to publish our findings in an indexed speciality journal.

Contributions of each author

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