Color Stability of Ceramic Laminate Veneers Cemented with Light-Polymerzing and Dual-Polymerizing Luting Agent: A Systematic Review

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Abstract: *Background:* Ceramic laminate veneers (CLV) are among the most desired cosmetic treatments and the resin cements are the selective luting agents for cementation. Color change overtime of luting cements can be detected through translucent ceramic veneers. Therefore, the evaluation of Color stability cemented with resin luting agent is utmost important for aesthetic purpose. *Objective:* The objective of the present study is to evaluate the Color stability of ceramic laminate veneers cemented with light-polymerizing and dual-polymerizing luting agent. Material and *Method:* Systematic review of observational studies on color stability of CLV will be conducted. We will search the following electronic bibliographic databases: PubMed/MEDLINE, Cochrane Library, Science Direct, Willey Online Library, Google Scholar. Manual search will be carried out for similar topics in library of dental college. Only studies written in English will be included. Studies published till 1st October 2020 will be included. The searches will be re-run just before the final analyses and further studies retrieved for inclusion. The primary outcome is to evaluate the color stability of CLV luted by resin cements. Study selection will follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Guidelines (PRISMA).

Ethical issues: As it will be a systematic review, without human beings' involvement, there will be no requirement for ethical approval. Findings will be disseminated widely through peer-reviewed publication and in various media.

Prospero Trial Registration Number- CRD42020216150.

Keywords: color stability, ceramic laminate veneer, light polymerizing resin cement, dual polymerizing resin cement

Introduction: Ceramic laminate veneers (CLV) are among the most popular aesthetic dental restorations due to excellent esthetics appearance and optical properties. These are the indirect restorations performed by conservative techniques with the purpose of harmonizing the smile, restoring the adequate Color, shape and function of esthetically compromised teeth. In the long-term process, the discoloration of restoration is caused by extrinsic as well as intrinsic factors. The long-term exposure of extrinsic factors (smoking, beverage, food component) may have potential to stain restorative materials.[1]

Adherence to conservative approaches in recent years has led to the development of very thin laminate veneers with greater translucency. It also provides proper Color shade and maintaining it in the long-term challenging issues concerning these restorations.[2]

Resin cements like light polymerising and dual polymerising luting agents are indicated for bonding these restorations due to the low amount of retention of conservative preparations. However, the successful clinical treatment depends on the perfect combination of colors between the prosthesis and remaining teeth, and there are many variations involved, like the Color of the supporting tooth structure, thickness, shade and type of ceramic

and resin cement[3], in addition to these restorative material's translucency shown by the amount of reflection and scattering of light.

Now a days light polymerizing and dual polymerizing resin cements are used as luting agent for cementation of ceramic laminate veneer (CLV). The longevity of these restoration is related to the materials Color stability and partly depends on the used cementation technique.[4]

Therefore, the present systematic review is being carried out on the available literature to evaluate-the Color stability of ceramic laminate veneers cemented with light-polymerizing and dual-polymerizing luting agent

Materials and methods: Eligibility Criteria for the studies:

This systematic review will be carried out on Color stability of ceramic laminate veneers cemented with light-polymerizing and dual-polymerizing luting agent . Following will be inclusion criteria:

1. Studies regarding color stability of ceramic laminate veneer cemented with light-polymerizing and dual polymerizing luting agent
2. In-Vitro study,
3. Randomized controlled trials.

The studies that will be excluded from the present review:

1. studies which are unrelated to the present systematic review, studies not published in English
2. cross sectional study
3. retrospective studies.

Initial electronic and manual search for color stability of CLV luted by resin cements will be carried out. Search strategy consisting MeSH terms and key words will be used for extracting data by electronic and manual search in Dental Institute library, will be carried out. The current systematic review protocol is registered in Cochrane's International Prospective Register of Systematic Reviews (PROSPERO registration number is CRD42020216150) (https://www.crd.york.ac.uk/PROSPERO/#recordID=216150).

Identification of relevant studies: The present review of literature will be carried out both electronically as wells as manually. The present review will be carried out based on PRISMA guidelines. Relevant literature search will be carried out through computerized literature searches of PubMed/Medline, Cochrane Library, Science Direct, Willey Online Library, Google Scholar and manual search irrespective of the date of publication using Mesh terms. We will use following search strategy: ((((((((((((color stability[MeSH Terms]) OR (colour stability[MeSH Terms]) OR (discoloration[MeSH Terms]))) AND (ceramic veneers[MeSH Terms])OR (porcelain veneer[MeSH Terms]) OR (ceramic laminate veneer[MeSH Terms]))) AND (light polymerizing luting cement[MeSH Terms])) OR (light cure cement[MeSH Terms])) OR (light activated cement[MeSH Terms])) AND (dual polymerizing luting cement[MeSH Terms])) OR (dual cure cement[MeSH Terms])) OR (dual polymerizing cement[MeSH Terms])

Studies conducted on color stability of CLV will be filtered and abstract will be explored by two independent authors (TL and NP). Various key words that will be utilized in search strategy include-color stability, ceramic laminate veneer, light polymerizing cement, dual polymerizing cement. Various combinations of key words were made using 'and', 'or' as Boolean operators. Experts in the concerned field and authors of selected studies will also be contacted for obtaining missing or unclear data whenever deemed essential.

Selection of studies: Two authors [TL and NP] will independently identify studies that will be included in the present review. Initially, titles and abstracts of the records retrieved by the search will be assessed in order to exclude those studies that are inappropriate. Reviews will not be included though their reference lists will be searched in turn for any studies not retrieved by the electronic search. For the remaining studies, full text articles will be recovered that met the inclusion criteria. Selected studies will be

screened using STROBE checklist for observational studies.

Collection and extraction of data: This review will be done according to the guidelines set forth by Preferred Reporting Items for Systematic Reviews and Meta-Analyses [PRISMA].[5] Two of the authors [TL & NP] will be given the responsibility of extracting data from the studies. Pre-specified data will be extracted from each of the studies including the study design, sample size, biomedical waste management practices among the study subjects, awareness and knowledge regarding disposal of biomedical waste in their institution and other study characteristics. Any kind of disagreement regarding article screening and extraction will sorted out by discussion with other authors (UR and PT)

Quality assesment: The quality assessment was done by both the reviewers using the Cochrane's tool for risk of bias assessment for randomised controlled trials and Cochrane tool for risk of bias assessment of non randomised studies.

Discussion: One of the strengths of the proposed study is to apply a reproducible and transparent procedure for systematic review of the literature. In this protocol, we clearly describe the types of studies, participants, interventions and outcomes that will be included, as well as the data sources, search strategy, data extraction methods (including quality assessment) and methods of combining data. By publishing the research protocol, we reinforce the clarity of the strategy and minimize the risk of bias, namely selective outcome reporting.

The results shall provide high-level information regarding Color stability of ceramic laminate veneer cemented by light polymerizing and dual polymerizing resin cements. Potential limitations of this study include the heterogeneity of measures and outcomes evaluated which may negatively influence the statistical power in data synthesis. This review will evaluate the Color stability of CLV luted by resin cements essential for esthetic purpose.

Amendments: Any amendments to this protocol will be documented with reference to saved searches and analysis methods, which will be recorded in bibliographic databases and End Note.

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Competing Interests: None declared.

Patient consent for publication: Not required.

Referances:

1 Alkurt M, Duymus ZY. Comparison to color stability between amine with benzoyl peroxide includes resin cement and amine-reduced, amine-free, lacking of benzoyl peroxide resin cements after thermocycle. Journal of Advanced Oral Research. 2018 May;9(1-2):24-30

2 Tabatabaei MH, Matinfard F, Ahmadi E, Omrani LR, Mahounak FS. Color Stability of Ceramic Veneers Cemented with Self-Adhesive Cements after Accelerated Aging. Frontiers in dentistry. 2019 Sep;16(5):393

3 Dozic A, Kleverlaan CJ, Meegdes M, Van der Zel J, Feilzer AJ. The influence of porcelain layer thickness on the final shade of ceramic restorations. J Prosthet Dent 2003;90: 563-570.

4 Silami FD, Tonani R, Alandia-Román CC, Pires-de-Souza FD. Influence of different types of resin luting agents on color stability of ceramic laminate veneers subjected to accelerated artificial aging. Brazilian dental journal. 2016 Feb;27(1):95-100.

5 Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gotzsche PC, Ioannidis JP et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions. Explanation and elaboration. J Clin Epidemiol. 2009;62: e1-34.