

KNOWLEDGE, AWARENESS AND PERCEPTION OF DIRECT COMPOSITE METHOD AND SANDWICHED METHOD OF RESTORATION OF CLASS V CERVICAL LESIONS AMONG DENTAL STUDENTS- A SURVEY.

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ABSTRACT:

AIM: The aim of this study is to evaluate the knowledge awareness and perception of Dental students about sandwiched technique and direct composite technique of restoration in class V cervical lesions

BACKGROUND: Class V lesions are lesions that occur at the cervical aspect of the buccal or lingual surfaces of the tooth. The sandwiched technique includes application of RMGIC and tooth coloured composite resin in cervical lesions. In recent times, composites have imposed themselves as restorative alternatives to GIC for the restoration of class V cervical lesions due to their superior esthetic properties, improved adhesive capacity due to modern dentin adhesives, and increased mechanical properties.

MATERIALS AND METHODS: The study has adopted a cross-sectional study design with a sample size of 100 dental students and interns. The participants belonged to undergraduation and postgraduation which are the clinical years of the course. All participants answered a questionnaire to determine their knowledge and awareness regarding the material of choice and technique used.

RESULT: From the survey conducted, 90% of the participants are aware about the direct composite restoration of class V cervical lesions and 67% of the participants are aware about the sandwiched technique of restoration of the lesion.

CONCLUSION: From the survey conducted, it can be concluded that awareness among dental students about sandwiched technique and RMGIC of restoring class V cervical lesion is low. Hence, awareness and practice must be enhanced on sandwich technique of restoring deep class V cervical lesions.

KEYWORDS: Abrasion, aesthetics, composite, GIC, polymerization, PMCR

INTRODUCTION:

Class V lesions are lesions that occur at the cervical aspect of the buccal or lingual surfaces of the tooth. Generally, based on the etiology, a class V lesion is can be broadly classified into Carious and Non-Carious lesions. The non-carious cervical lesions can further be classified into abrasion, erosion and abfraction and erosion. (1)

Major difficulties faced in restoring Class V lesions, is tooth isolation. It can be attributed to its anatomical and morphological characteristics, that is the cervical region which create certain limitations in isolation, that is placement of the rubber dam and clamp. (2) Proper isolation is very difficult, when lesions extend proximally or under the gingiva. Another difficulty in restoring class V lesions is access, which is also limited, causing problems related to insertion of the restorative material which can lead to the material being excess or deficient.(3,4)

Yet another difficulty can be seen in eliminating or reducing gap formation on the gingival wall. Many other restorative techniques for class V lesions have been adopted to reduce the polymerization shrinkages and to achieve a seal that is marginal adaptation in class V cavities (5). As the bond strength of enamel is comparatively greater than the bond strength of dentin, the aim of the restoration should be to decrease the leakage of material into the dentinal margins. This can be achieved by incremental placement of material in the cavity, in multiple layers, starting with the occlusal wall of cavity preparation.

Self-cured glass ionomer cements (GIC) has been in use for a longer period of time and also has a wide range of clinical applications in class V cervical lesions., A disadvantage of conventional GIC's are, they are comparatively unaesthetic and they also have a poor mechanical strength than the composite resin. (6) To overcome the disadvantages of GIC, resin-modified GIC has been developed. In resin modified GIC, the addition of light-curing resin components, and in some systems, additional self-curing resin components, has led to a higher resistance to early moisture contact and contamination of saliva, better mechanical characteristics, and equal fluoride release.(7,8)

Resin modified glass ionomers have the capacity to bond chemically to the tooth structure. Also, the elastic modulus of RMGIs can offset the fatigue stress caused by tensile forces that are transferred to the cervical part of the tooth due to mastication and malocclusion. (9) The fluoride releasing property of GIC has made them popular in the past years. (10) RMGIC's, comparatively release fluoride to a lesser extent than conventional glass ionomers. Release of fluoride from various RMGIs during the first 24 h reaches a maximum of 5–35 µg/cm² depending on the storage environment. Daily fluoride release begins from 8 ppm to 15 ppm on the 1st day, decreases to 1–2 ppm on the 7th day, and stabilizes in 10 days to 3 weeks. (11)

The sandwiched technique includes application of RMGIC and tooth coloured composite resin in cervical lesions. Sandwiched technique can be of two types; open sandwich technique and closed sandwich technique. In open sandwich technique, the axial wall is formed by the underlying material and in closed sandwich technique, the underlying material does not contact with the oral environment. Mostly, sandwich technique is indicated in cases where one or two margins are in dentin, as like in cervical lesions or in class II composite restorations.

In recent times, composites have imposed themselves as restorative alternatives to GIC for the restoration of class V cervical lesions due to their superior esthetic properties, improved adhesive capacity due to modern dentin adhesives, and increased mechanical properties. Disadvantages of composite restorations in cervical areas have been associated with stress generation on the tooth restoration interface, as a result of polymerization shrinkage, and tensile stress caused by oblique occlusal loading. To overcome the problem of debonding due to polymerization shrinkage, flowable composites was been developed as an alternative to composite resins, due to their low-elasticity module. (12)

Another restorative material, the Compomers, are found to be more hydrophilic than composites and they also exhibit fluoride releasing property.(13) They are elastic, suggesting better performance in stress bearing cervical areas. Despite these properties, compomers was found to have a lower performance rate when compared with other stiffer composites in recent clinical trials. However, microfilled composites have similar elasticity and excellent esthetic properties.(14,15) A comparative analysis in the recent clinical studies did not reveal significantly different retention rates between compomers and composites, but clinical parameters such as mechanical properties, marginal integrity, color and surface texture were found to be inferior to those of composites and to rapidly deteriorate.(16,17)

Hence, this survey was conducted to evaluate the knowledge and awareness among dental students regarding the material of choice, technique being used and the advantages and disadvantages of the materials.

MATERIALS AND METHODS:

The study has taken a cross-sectional study design with a sample size of 100 dental students. The students belonged to undergraduate and postgraduate levels.

All the participants had to answer a questionnaire to analyze their knowledge and awareness regarding the material of choice and technique used. A well-structured questionnaire was designed and developed on the basis of thorough literature review. It included various sections, such as, age, gender, level of education, awareness on both materials, its advantage, disadvantage and technique used.

QUESTIONNAIRE:

1. Are you aware of the methods of restoring class V cervical lesions? Yes/NO.
2. Are you aware of sandwiched method of restoring class V cervical lesions? Yes/No
3. If yes, what are the steps in the restoration?
4. Are you aware of direct composite method of restoring class V cervical lesion? Yes/No
5. If yes, what are the steps in the restoration?
6. What type of restoration provides better strength? A) direct composite B) Sandwiched technique

7. What are the advantages of using composite restoration? A) aesthetic property B) adhesiveness C) improved mechanical property D) all of the above
8. What are the advantages of RM-GIC? A) marginal adaptation B) retention C) Prevents sensitivity D) all of the above E) none of the above
9. Do you think conventional GIC's have poorer mechanical properties than the RMGIC? Yes/No
10. What is the advantage of using RMGIC inspite of conventional GIC in sandwich technique? A) better bonding with the composite B) less micro leakage C) better strength
11. In which case do you prefer to use RMGIC? A) superficial lesion B) lesion involving 1/3rd of dentin C) lesion involving 2/3rd of dentin D) lesion close to the pulp
12. In which case do you prefer to use direct composite? A) superficial lesion B) aesthetic concern C) lesion involving a part of dentin D) all of the above
13. Do you think direct composite restoration has a drawback of polymerization shrinkage leading to stress on the tooth restoration interface? Yes/ No
14. Which of the following has the most polymerization shrinkage property? A) flowable composite B) conventional composite C) compomer
15. What is the reason for the failure of class V cervical lesions? A) poor adhesive property of the material B) poor flexural strength of the material C) micro-leakage D) closeness to the crevicular fluid

RESULTS:

From the survey conducted, 90% of the participants are aware about the direct composite restoration of class V cervical lesions and 67% of the participants are aware about the sandwiched technique of restoration of the lesion. About 53% of the students find flowable composite as an alternative restorative material to restore the lesion and about 61% say better bonding of RMGIC with composite to be an advantage of RMGIC that is used in the sandwiched technique of restoration of class V cervical lesions. About 86% of the students find composite restoration to have polymerization shrinkage that leads to stress on the tooth restoration interface and 46% of them find conventional composite to have the most polymerization shrinkage. Regarding the reason for the failure of restoration of class V cervical lesion, 28% of opted for poor flexural strength and micro leakage.

DISCUSSION:

From the present survey, it is evident that 90% of the participants are aware of composite restoration in class V cervical lesion and 67% are aware of sandwiched technique of restoration. Regarding the strength, 55% of the participants have opted for direct composite technique. 56% of the students find composite to have the advantage of superior aesthetic property, adhesiveness and mechanical property. About 61% find RMGIC to have the advantage of marginal adaptation, retention and prevents sensitivity. Regarding the advantage of RMGIC over the conventional GIC's, 61% of the participants have opted for better bonding of RMGIC with the composite. About 43% say that they would use RMGIC in cases that involves 2/3rd of the dentin and 47% of the participants have opted that they would use direct composite restoration in superficial lesion, for aesthetic concern and lesion that involves a part of dentin. About 86% of the students find composite restoration to have polymerization shrinkage that leads to stress on the tooth restoration interface and 46% of them find conventional composite to have the most polymerization shrinkage. Regarding the reason for the failure of restoration of class V cervical lesion, 28% of opted for poor flexural strength and micro leakage. 53% of the survey population find flowable composite as an alternative material for restoring class V cervical lesions.

According to Hussainy et al, high rates of restoration loss were associated with flowable composite which is in contrary to the present study which states that more than half of the survey population finds flowable composite as an alternative material for restoring the lesion. From the study conducted by Hussainy et al, it is seen that clinically RMGIC showed an overall better performance than the other materials and RMGIC had superior performance compared to flowable composite and polyacid-modified resin composite (PMCR) in regarding marginal adaptation and marginal discoloration.(1)

From the study conducted by Brackett et al, it was seen that there was a comparative analysis between the clinical performance of a polyacid-modified resin composite and a resin-modified glass-ionomer restorative material over two years. The study was carried out in Thirty-four pairs of restorations of Compoglass and Fuji II LC that was placed in caries-free cervical erosion/abfraction lesions which didn't require tooth preparation. The restorations were clinically evaluated at baseline, 6, 12, 18 and 24 months using modified Ryge/USPHS criteria. The results showed a higher incidence of failure of the restorative material in regards with the polyacid-modified resin composite ($p < 0.05$). (12)

According to Brackett et al in his study, which evaluated the clinical performance and appearance of a resin-modified glass ionomer and a resin composite over one year. This study was carried out in Thirty-seven pairs of restorations of Fuji II LC and Z250/Single. The restorative materials were placed in non carious cervical erosion/abfraction lesions which didn't require tooth preparation. The restorations that were placed were clinically evaluated at baseline and 6 and 12 months, using modified Ryge/USPHS criteria. The results showed no significant difference ($p > 0.05$) in regards with the performance of both materials, although retention of the Z250 restorations was below the minimum specified in the ADA Acceptance Program for Dentin and Enamel Adhesives(18) which is in contrary to the present study.

A study by Neo et al, which included One hundred fifty-nine noncarious cervical lesions that were restored with glass-ionomer cement, resin composite used with a dentinal bonding agent, or the laminate (sandwich) restoration, which combines both these materials. These restorations were evaluated at baseline, 1 year, and 3 years for color match, cavosurface marginal discoloration, anatomic form, marginal adaptation, and retention. The results showed that there was a general and gradual deterioration of the restorations with time. Lesions that were restored with resin composite and a dentinal bonding agent had the greater percentage of failed restorations.(19) which was in contrary with the previous studies.

Stewardson et al's study shows that among the restorative materials, resin modified glass ionomer had the fewer rates of early failure. Whereas, the retention rates of RMGI was found to be at 91.4%, which when compared to composite resins, showed 85.3% in the same study (20) which is in accordance with the present study.

CONCLUSION:

From the survey conducted, it can be concluded that awareness among dental students about sandwiched technique and RMGIC of restoring class V cervical lesion is low. Hence, awareness and practice must be enhanced on sandwich technique of restoring deep class V cervical lesions. Also, very few studies have been conducted on the efficiency of sandwiched technique in cervical lesions which should be enhanced.

REFERENCES:

- [1] Hussainy SN, Nasim I, Thomas T, Ranjan M. Clinical performance of resin-modified glass ionomer cement, flowable composite, and polyacid-modified resin composite in noncarious cervical lesions: One-year follow-up. *Journal of conservative dentistry: JCD*. 2018 Sep;21(5):510.
- [2] HariPriya S, Ajitha P. Importance of isolation in restoring non-carious cervical lesions. *Journal of Advanced Pharmacy Education & Research* | Jul-Sep. 2017;7(3).
- [3] Perez CR. Alternative technique for class V resin composite restorations with minimum finishing/polishing procedures. *Operative Dentistry*. 2010 May;35(3):375-9.
- [4] Leclaire, C. C. , L. W. Blank , and J. W. Hargrave . 1988. Use of a two-stage composite resin fill to reduce microleakage below the cement-enamel junction. *Operative Dentistry* 13 1:20
- [5] Matis BA, Cochran M, Carlson T. Longevity of glass-ionomer restorative materials: Results of a 10-year evaluation. *Quintessence International*. 1996 Jun 1;27(6).
- [6] Kampanas NS, Antoniadou M. Glass Ionomer Cements for the Restoration of Non-Carious Cervical Lesions in the Geriatric Patient. *Journal of functional biomaterials*. 2018 Sep;9(3):42.
- [7] Hicks J, Garcia-Godoy F, Donly K, Flaitz C. Fluoride-releasing restorative materials and secondary caries. *CDA*. 2003 Mar;31(3):229-46.
- [8] Khoroushi M, Keshani F. A review of glass-ionomers: From conventional glass-ionomer to bioactive glass-ionomer. *Dental research journal*. 2013 Jul;10(4):411.
- [9] Mickenautsch S, Mount G, Yengopal V. Therapeutic effect of glass-ionomers: an overview of evidence. *Australian dental journal*. 2011 Mar;56(1):10-5.
- [10] Strassler HE, FADM F. Glass ionomers for direct-placement restorations. *Dental Economics*. 2011 Feb;14.
- [11] Sidhu S, Nicholson J. A review of glass-ionomer cements for clinical dentistry. *Journal of functional biomaterials*. 2016;7(3):16.
- [12] Brackett WW, Browning WD, Ross JA, Brackett MG. Two-year clinical performance of a polyacid-modified resin composite and a resin-modified glass-ionomer restorative material. *Operative dentistry*. 2001;26(1):12-6.
- [13] Labella R, Lambrechts P, Van Meerbeek B, Vanherle G. Polymerization shrinkage and elasticity of flowable composites and filled adhesives. *Dental materials*. 1999 Mar 1;15(2):128-37.
- [14] Folwaczny M, Loher C, Mehl A, Kunzelmann KH, Hinkel R. Tooth-colored filling materials for the restoration of cervical lesions: a 24-month follow-up study. *Operative dentistry*. 2000 Jul 1;25(4):251-8.
- [15] McCoy RB, Anderson MH, Lepe X, Johnson GH. Clinical success of class V composite resin restorations without mechanical retention. *The Journal of the American Dental Association*. 1998 May 1;129(5):593-9.
- [16] Franco EB, Benetti AR, Ishikiriama SK, Santiago SL, Lauris JR, Jorge MF, Navarro MF. 5-year clinical performance of resin composite versus resin modified glass ionomer restorative system in non-carious cervical lesions. *Operative Dentistry*. 2006 Jul;31(4):403-8.
- [17] Gladys S, Van Meerbeek B, Lambrechts P, Vanherle G. Evaluation of esthetic parameters of resin-modified glass-ionomer materials and a polyacid-modified resin composite in Class V cervical lesions. *Quintessence international*. 1999 Sep 1;30(9).
- [18] Brackett MG, Dib A, Brackett WW, Estrada BE, Reyes AA. One-year clinical performance of a resin-modified glass ionomer and a resin composite restorative material in unprepared Class V restorations. *Operative dentistry*. 2002;27(2):112-6.
- [19] Neo J, Chew CL. Direct tooth-colored materials for noncarious lesions: A 3-year clinical report. *Quintessence International*. 1996 Mar 1;27(3).
- [20] Stewardson D, Creanor S, Thornley P, Bigg T, Bromage C, Browne A, Cottam D, Dalby D, Gilmour J, Horton J, Roberts E. The survival of Class V restorations in general dental practice: part 3, five-year survival. *British dental journal*. 2012 May;212(9):E14.