ORIGINAL ARTICLE

12 MONTH'S ASSESSMENT OF CLINICAL EFFICACY OF RESIN MODIFIED GLASS IONOMER CEMENT AND FLOWABLE COMPOSITES IN RESTORATION OF NON-CARIOUS CERVICAL LESIONS, A RANDOMIZED CLINICAL TRIAL

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Background: The objective of this study was to compare the clinical efficacy of Resin modified glass ionomer cement and Flowable composite in terms of retention, marginal adaptation and surface texture using United States Public Health Service criteria in non-carious cervical lesions measured over a period of one year. **Methods:** A Randomized Clinical Trial is conducted with Informed consent on 60 patients who are randomly allocated into 2 groups with at least 2 Non-Carious Cervical Lesions in each. Group 1 is used for Flowable Composite while group 2 is used for resin modified glass ionomer cement. A recall is maintained to draw conclusions between two materials in terms of occurrence of marginal adaptation, retention and surface texture, to show which material is superior to other. **Results:** Out of 30 restorations in 12 months follow up, only 19 found to be present in flowable composite group while in resin modified glass ionomer cement group, 28 are retained. Regarding margin integrity, Group 1 showed 21 intact margins whereas 23 margins were intact in group 2, while 18 and 25 showed smooth surface in flowable composite and Resin modified glass ionomer cement group respectively, on exploration. **Conclusion:** It can be concluded from our study that Resin modified glass ionomer cement is superior to Flowable composite in terms of retention (p=0.005) and surface texture (p=0.045) in restoration of non-carious cervical lesion.

Keywords: Flowable Composite; Resin Modified Glass Ionomer Cement; Non-Carious Cervical Lesions; Marginal Adaptation; Retention; Surface texture

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INTRODUCTION

Loss of tooth structure around tooth collar (cemento-enamel junction) by factors other than Caries, includes Erosion, Abfraction, Abrasion is called as NCCL (non-carious cervical lesions).[1] Such tooth loss may be in form of big wedge-shaped defects, narrow grooves or extensive dished-out lesions. A basic knowledge of the cause can support in prevention, reducing progression of already present lesions, and refining prognosis of treatment.[2,3] Modification of diet and lifestyle has led to an increase in cervical lesions in young people with a wide variety of presentations like hypersensitivity or compromised aesthetics, leading to reactionary/ reparative dentin formation which causes dentinal tubules obstruction.[3–5] This mineral deposition can affect bond between tooth structure and restorative materials as shown in dental literature.[6] Cofactors which affect the prognosis of non-carious cervical lesions include quantity/ quality of saliva, depth of cavity, effect of occlusal scheme, shape of restoration, volume of the initial lesion.[3-6]

Bond to Dentin is comparatively weak as compared to enamel. Choice of the restorative material dictates its success. Perfect tooth matching, ability to bond to tooth and ability to resist deformation forces defines a good choice of restorative material.[7] In past, Composite was used in cervical lesions owing to their improved aesthetics, adhesion & good mechanical strength. However, deficiencies such as bond degradation over time and poor sealing of margins has reduced its popularity. Therefore, flowable composites have been proposed as an alternative owing to their low modulus of elasticity to reduce problem of debonding. [8,9,10,13,16]

Good chemical bond to tooth structure and fluoride release by Glass-ionomer cements have shown a good replacement. However, compromised aesthetics, inconvenient setting time and low resistance to abrasive forces have lowered their worth for cervical lesions. Resin-modified Glass Ionomer

Cements (RMGIC) have been introduced owing to their good mechanical strength and better moisture resistance and dehydration.[7,9] In a clinical trial spread over 3 years, composite and RMGIC (resin -modified glass ionomer cement) were compared using criteria (USPHS) at 1,2 and 3 years, which showed 78.8% & 98% retention rate for Composite& Resin Modified Glass Ionomer Cements respectively. [23] Significant differences with respect to anatomic form (0.04 *p*-value), retention (0.02 *p*-value), marginal integrity (0.002 *p*-value) was found between the two groups[8], while another study showed the rates of cumulative retention loss as 4.9% for GIC and 1.6% for Composite ($p>0.05$) measured over a period of one year.[9]

This study was planned to compare the efficacy of Flowable composites and RMGIC (Resin modified Glass ionomer cement) in terms of retention, marginal adaptation and surface texture in restoration of Non-Carious Cervical Lesions.[1]

MATERIAL AND METHODS

A study was planned as a randomized controlled clinical trial at Operative Dental Department of PIMS, Islamabad for duration of 12 months from Aug 2019-2020. Sampling was done using a consecutive non-random technique with an inclusion criterion used as: presence of at least 2 NCCL in both gender (male/female) with an age range of 30–60 years having vital teeth and good oral hygiene while exclusion criteria included presence of caries and parafunctional habits. A Sample size of 60 restorations (30 for each restorative material) was used according to WHO Calculator and work of Adeleke.[23]

Ethical clearance was obtained from ethical review board committee of PIMS, Islamabad. Consent was obtained after detailed explanation of procedure followed by a detailed proforma.

Lottery method was used to randomly divide patients into two groups of 30 each having 2 NCCLs with depth of 1–2 mm. 60 restorations were placed with Cotton Roll Isolation. Flowable Composite was placed in group 1 in which tooth etching with 37% phosphoric acid was done followed by application of bonding agent and flowable composite in small increments, while RMGIC was placed in group 2 in which tooth prophylaxis was done followed by restoration and curing for 20 seconds.

After 24 hours finishing was done with diamond points followed by Polishing with Soflex disks Afterward, patients were instructed to use a soft brush.

6–12 months recall was planned. Evaluation was done using an explorer and mirror. Conclusions were made at 12 months' interval to check frequency of marginal integrity, retention and surface texture in both groups (flowable composite/ RMGIC).

Data analysis was done using SPSS 16. Marginal integrity, retention and surface texture were measured in form of percentage. Statistical analysis was done with Chi-square test and a comparison was made between group 1 and 2 in terms of outcome (marginal integrity, retention and surface texture)

RESULTS

Out of 30 restorations in Group 1 (RC), 19 were retained while 11 were lost over a period of 12 months whereas out of 30 restorations in Group 2 (RMGIC), 28 were retained while 2 were lost. A Significant *p*-value was found for retention ($p=0.005$) between the two groups as shown in Table-1. Regarding marginal integrity, 21 had intact margins whereas 23 had intact margins in group 1 & 2 respectively when examined after 12 months. An Insignificant *p*-value for marginal adaptation was found ($p=0.55$) between the two groups as shown in Table-2. For surface texture measurement, Group1 & 2 showed 18 & 25 restorations with smooth surface restorations out of 30 on exploration. A significant *p*-value for surface texture ($p=0.045$) was found between the two groups as shown in Table-3.

Table-1: Cross-tabulation regarding retention among two groups (n=60)

		Retention		Total	*p*-value
		Present	Absent		
Group	Group 1 (Composite)	19	11	30	0.005
	Group 2 (RMGIC)	28	2	30	
Total		47	13	60	

Table-2: Cross-tabulation regarding marginal adaptation among two groups (n=60)

		Marginal adaptation		Total	*p*-value
		Present	Absent		
Group	Group 1(Composite)	21	9	30	0.559
	Group 2(RMGIC)	23	7	30	
Total		44	16	60	

Table-3: Cross-tabulation for surface texture (n=60)

		Surface texture		Total	*p*-value
		Present	Absent		
Group	Group 1 (Composite)	18	12	30	0.045
	Group 2 (RMGIC)	25	5	30	
Total		43	17	60	

DISCUSSION

A comparison was made between RMGIC and Flowable composite regarding clinical parameters like retention, marginal integrity and surface texture in NCCL. For this purpose, a study was planned in Operative Dental Department of PIMS, Islamabad.

Sixty patients were categorized in 2 groups after using exclusion/inclusion criteria and sampling was done using consecutive non-random technique. Resin Modified Glass Ionomer Cements were not completely lost. However, presence of 87% restorations at the end of year is unacceptable.[9] 12% restorations showed partial loss along cervical third that might be due to deformation and cyclic flexure at cervical area following loading of teeth leading to tensile stress and loss of material as shown by Grippo *et al*.[16,17]

In present study, significant association (p=0.005) was found comparing clinical parameters (retention, surface texture) of RMGIC / Flowable composite.93% restorations showed retention in RMGIC Group which lies within the range of international studies. While, only 63% restorations in Flowable Composite group showed retention. Marginal adaptation in Flowable Composite Group was 70% while RMGIC Group showed 76.6%. Surface texture in Flowable Composite Group was 60% and 83% in RMGIC Group. Significant association was found for retention in both groups using Chi-square test.

Grippo *et al* used an enamel bevel to increase retention.[16] Conferring to a recent article evaluation of resin composite placed on cervical area showed diverse results. 51–100% retention rates in 3 years while 5 years showed 100% result in presence of an enamel bevel.[10] Long-term studies are needed for better understanding.

Clinical evaluation of NCCL is essential as they act as assessor for clinical performance of dental adhesives and most importantly for an evolving important health issue; as a greater number of elder retain their teeth as they age. It is known that aetiology of NCCL depends on a number of factors along with patient's risk factor which varies widely thus affecting clinical performance of restorative materials.[11,12] The parameters measured in this study include objective and subjective, i.e., retention and surface texture, marginal adaptation respectively. Loss of retention is most obvious sign of restoration failure and most reliable diagnostic criteria which has least sign of being biased. While outcome variables such as surface texture and marginal adaptation can be changed as being measured by different examiners. But their failures cannot be regarded as primary failures though they deserve attention along with other factors which should be kept in mind like hard tissue characteristics, cavity size. Additional methods can be devised to increase retention like bevelling of enamel margins, roughening the surface, use of rubber dam, adhesive application and variability in application technique.,[21,22,23]

CONCLUSION

This study concluded a better quality of RMGIC, which was generally accepted. Few restorations of flowable composite were considered non-acceptable, that could be due to a number of factors. However, on an average, statistically significant difference was found between the materials in terms of retention and surface texture whereas insignificant difference was found between the materials in terms of marginal adaptation. The results need to be evaluated for a long period (5 years).

Conflict of interest: No conflict of interest was found in this study.

AUTHOR'S CONTRIBUTION

AS: Designed the article, data analysis and interpretation. final approval for submission of article TR: Helped in data analysis and data interpretation. BI: data analysis n critical review ZA: Performed the critical review and give final approval for submission of article A: Data analysis, critical review FNK: Critical review

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