International Journal of Research in Health and Allied Sciences

Journal home page: www.ijrhas.com

Official Publication of "Society for Scientific Research and Studies" [Regd.]

ISSN: 2455-7803

Original Research

Microleakage of bulk fill composites in class II cavities

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ABSTRACT:
Aims and Objectives : Bulk Fill composites possess specific characteristics, including enhanced flowability to achieve consistent adaptation to the cavity preparation. The present study assessed microleakage of bulk fill composites. **Materials & Methods:** 45 extracted mandibular molar teeth were divided into three groups of 15 teeth each. Group I teeth were restored using SonicFill Bulk Fill composite, group II with Tetric Evo Ceram and group III with X-tra fil and evaluated for microleakage at the occlusal and cervical walls. **Results:** The mean microleakage along occlusal wall in group I, II and III had score 0 seen in 7, 2 and 2 teeth, score 1 seen in 3, 5 and 2 teeth , score 2 seen in 2, 2 and 3 teeth and score 3 seen in 3, 6 and 8 teeth respectively. Mean microleakage along cervical level in group I, II and III had score 0 seen in 2,1 and 0 teeth, score1 seen in 3,2 and 0 teeth, score 2 seen in 5,3 and 3 teeth and score 3 seen in 5, 9 and 12 teeth. The difference was significant (P< 0.05). **Conclusion:** SonicFill Bulk Fill composite showed lesser microleakage at both cervical and occlusal walls.
Key words: Sonic Bulk Fill composite, Microleakage, Occlusal wall

Received: 12 April, 2021 Accepted: 26 April, 20201

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This article may be cited as: Jasrotia A, Bhagat RK, Bhagat K, Microleakage of bulk fill composites in class II cavities. Int J Res Health Allied Sci 2021; 7(3):26-29.

INTRODUCTION

The restoration of the large class II mesial-occlusal-distal restorations with resin bonded composites materials is time consuming, in terms of placement, light-curing each increment, and the operator time required for separate etching, priming, and bonding techniques.[1,2] Despite having good physical properties, the main shortcomings of composite resin materials are polymerization shrinkage and polymerization stress resulting in internal microcracks within the bulk of the material; separation of the bonding agent from the cavity wall with resultant gap formation, marginal microleakage and the postoperative sensitivity; enamel microcracks; marginal staining; wear; discoloration; lower fracture resistance; recurrent caries; and deformation of tooth.[3] Microleakage is defined as passage of bacteria, liquids, molecules and ions through the cavity wall and restorative material, which is not clinically detectable. It is an important factor negatively affecting the durability of restorations causing tooth hyper-sensitivity, recurrent caries and pulp injury. A uniform interface between the tooth and restorative material is required to seal the margins and increase the durability of restoration.[4]

Bulk Fill composites possess specific characteristics, including enhanced flowability to achieve consistent adaptation to the cavity preparation. Elasticity and low polymerization shrinkage stress reduce microleakage, postoperative sensitivity, and

secondary caries.[5] The SonicFill combines the attributes of a low viscosity composite and a universal composite. By activating the composite with sonic energy, it is possible to fill the cavity and adapt the low viscosity material easily, and then compact and model it while the composite changes its consistency until it reaches a higher viscosity.[6] The present study assessed microleakage of bulk fill composites.

MATERIALS & METHODS

The present study consisted of 45 extracted mandibular molar teeth. Class II cavities were made on the mesial and distal surfaces of each tooth. Teeth were divided into three groups of 15 teeth each. Group I teeth were restored using SonicFill Bulk Fill composite, group II with Tetric Evo Ceram and group III with X-trafil. After storage, thermocycling and immersion in 0.6% rhodamine dye solution specimens were sectioned and evaluated for microleakage at the occlusal and cervical walls using confocal microscope.

Table I Distribution of teeth

Groups	Group I	Group II	Group III
Material	SonicFill Bulk Fill composite	Tetric Evo Ceram	X-tra fil
Number	15	15	15

Scoring Critreia:

0 - No dye penetration,
1 - Dye penetration into half extension,
2 - Dye penetration more than half
3 - Dye penetration into the pulpal wall. Results were assessed statistically with level of significance below 0.05.

Table II Microleakage at occlusal level

Score	Group I	Group II	Group III	P value
0	7	2	2	0.05
1	3	5	2	
2	2	2	3	
3	3	6	8	

Table II shows that mean microleakage along occlusal wall in group I, II and III had score 0 seen in 7, 2 and 2, score 1 seen in 3, 5 and 2, score 2 seen in 2, 2 and 3 and score 3 seen in 3, 6 and 8 teeth respectively. The difference was significant (P< 0.05).

Graph I Microleakage at occlusal level

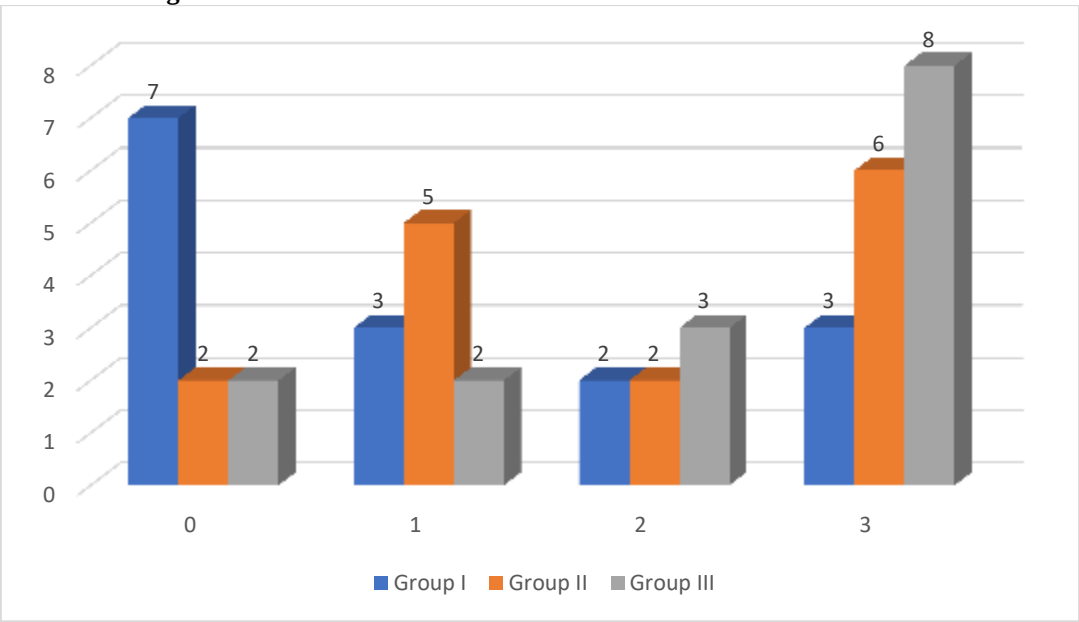
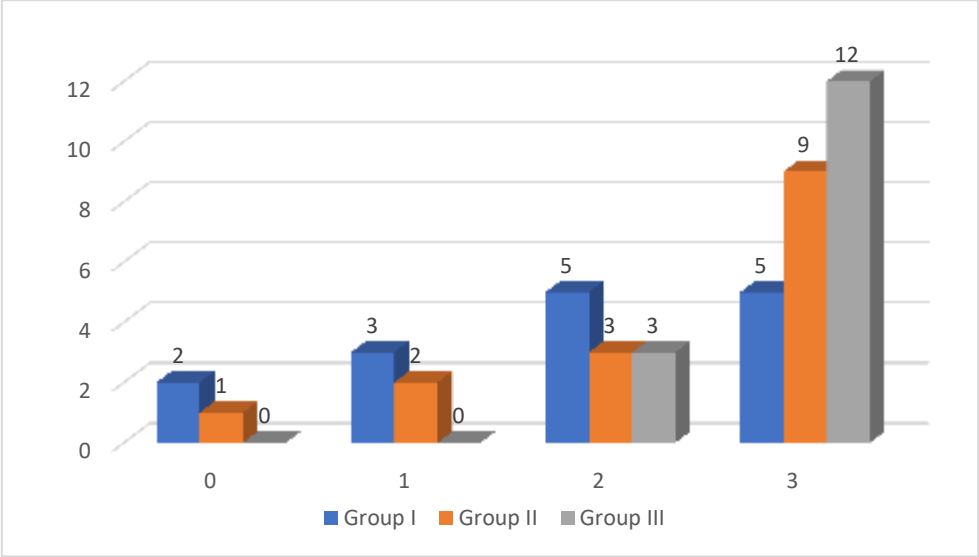


Table III Microleakage at cervical level

Score	Group I	Group II	Group III	P value
0	2	1	0	0.02
1	3	2	0	
2	5	3	3	
3	5	9	12	

Table III, graph II shows that at cervical level score 0 was seen in 2, 1 in group I and II respectively, score 1 in 3, 2 and 0, score 2 in 5, 3 and 3 and score 3 in 5, 9 and 12 teeth respectively. The difference was significant (P< 0.05).

Graph II Microleakage at cervical level



DISCUSSION

Composite resins are the most commonly used direct restorative materials for restoration of dental cavities, coronal fractures, tooth wear and congenital defects of teeth due to excellent esthetic properties.[7] However, polymerization shrinkage and its related stress are among the drawbacks of composite resins[8]. Stress due to polymerization shrinkage causes microcracks in composite and results in debonding of material from the cavity walls and subsequent formation of micro-gaps, marginal microleakage and postoperative tooth hypersensitivity.[9] It is necessary to overcome the polymerization shrinkage stress of composites in order to obtain adequate marginal integrity and increase the durability of composite restorations.[10] The present study assessed microleakage of bulk fill composites.

Swapna et al[11] evaluated and compared microleakage at the occlusal wall and cervical wall in Class II cavities restored with one Sonic fill bulk fill composite and two conventional bulk fill composites. Thirty freshly extracted teeth were divided into three groups of 10 teeth each. Standardized Class II cavities were made on the mesial and distal surfaces of each tooth and restored using Sonic fill bulk fill composite and two conventional bulk fill composites, Tetric Evo Ceram, and X-tra fil. After storage, thermocycling and immersion in 0.6% rhodamine dye solution specimens were sectioned and evaluated for microleakage at the occlusal and cervical walls using confocal microscope. The results demonstrated that in the occlusal wall and cervical wall, Sonic fill bulk fill composite, showed significantly less marginal microleakage than the other groups.

Mosharrafian et al[12] compared the microleakage of two bulk fill and one conventional composite in class II restorations of 60 primary posterior teeth which were randomly divided into three groups. Standard class II cavities were prepared in teeth and restored with 3M bulk fill composite in group 1, SonicFill bulk fill composite in group 2 and Z250 conventional composite in group 3. Single Bond 2 bonding agent was used in all cavities. The teeth were then thermocycled and immersed in 1M silver nitrate solution. The teeth were then mesiodistally sectioned and evaluated under a stereomicroscope at×10 magnification. Dye penetration depth was recorded in microns. The mean dye penetration depth in the gingival margins was 543±523µm, 343±290µm and 597±590µm for 3M bulk fill, SonicFill and Z250 conventional composite, respectively. These values were 214±93µm, 302±127µm and 199±145µm in the occlusal margins, respectively. The three groups were not significantly different in terms of occlusal or

gingival microleakage (P>0.05), but gingival margins showed significantly higher microleakage than occlusal margins in all three groups (P<0.05).

CONCLUSION

Authors found that Sonic Bulk Fill composite showed lesser microleakage at both cervical and occlusal walls.

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