

INTRODUCTION

Duration of successful restorations on primary teeth is critical in pediatric dentistry. A class II restoration will have greater success if there is reduced microleakage, among other factors. Microleakage is defined as “the clinically undetectable passage of bacteria, fluids, molecules or ions between a cavity wall and the restorative material” that can lead to “staining around the margins of restorations, post-operative sensitivity, secondary caries, restoration failure, pulpal pathology or pulpal death, partial or total loss of restoration.”¹ When using a combination of materials, microleakage may be influenced by the curing process/timing. In both primary and permanent dentition, techniques differ between practitioners on whether the flowable composite is pre-cured before placing packable composite or if both flowable and packable composite are co-cured together when placed.^{2,3} These two techniques will potentially result in a significant difference in microleakage effects and thus the ultimate success of the restoration.³ However, there is no consensus on the best process of timing for curing flowable and packable composite to prevent/minimize microleakage in class II restorations in primary teeth, and there is contradictory evidence on the best process for permanent teeth.⁴ Similar to permanent molars, increased success of class II restorations in primary molars that will outlast the lifespan of the tooth will decrease the likelihood of subsequent operative treatment that could include a replacement resin restoration, stainless steel crown, or extraction.⁵

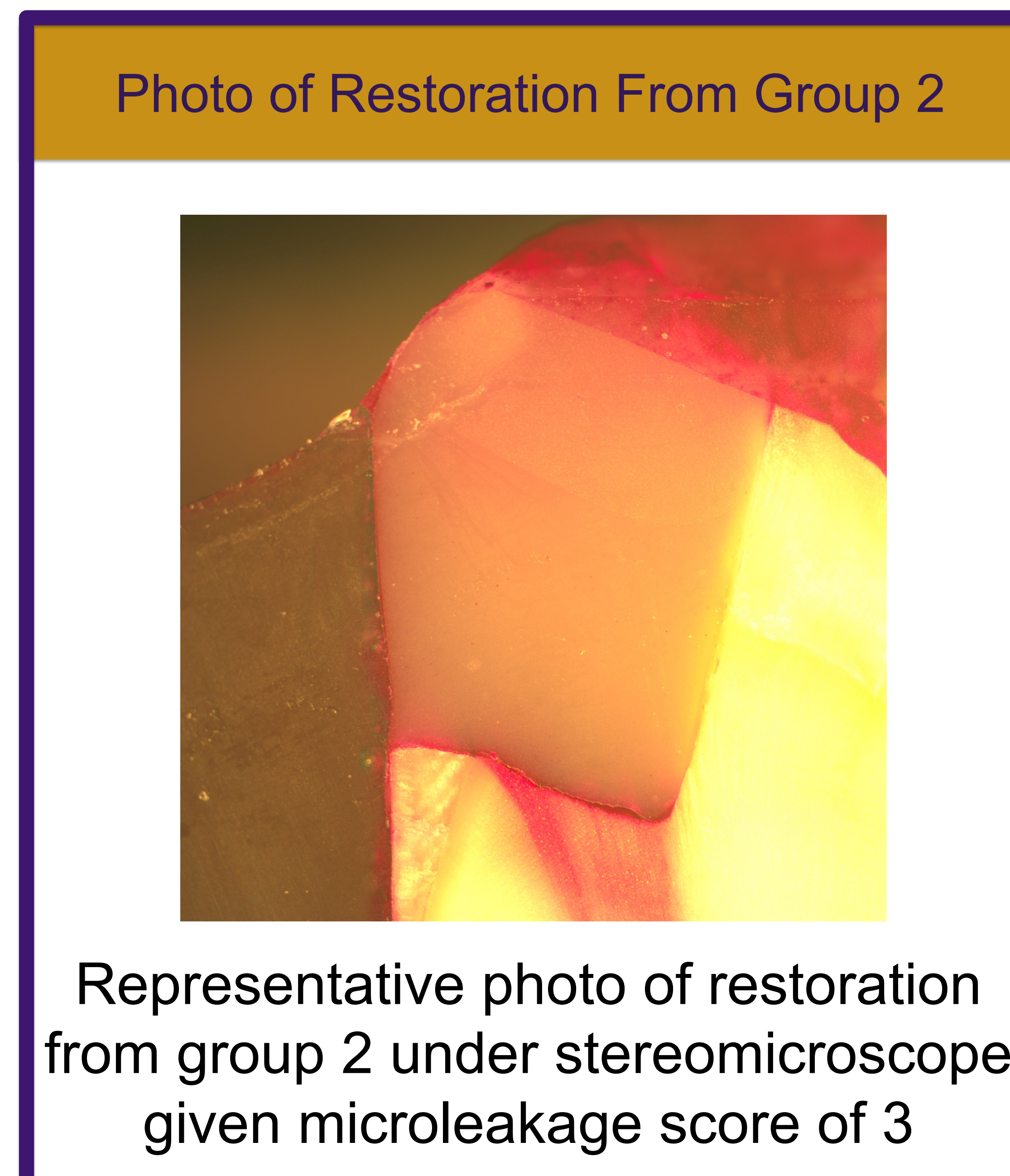
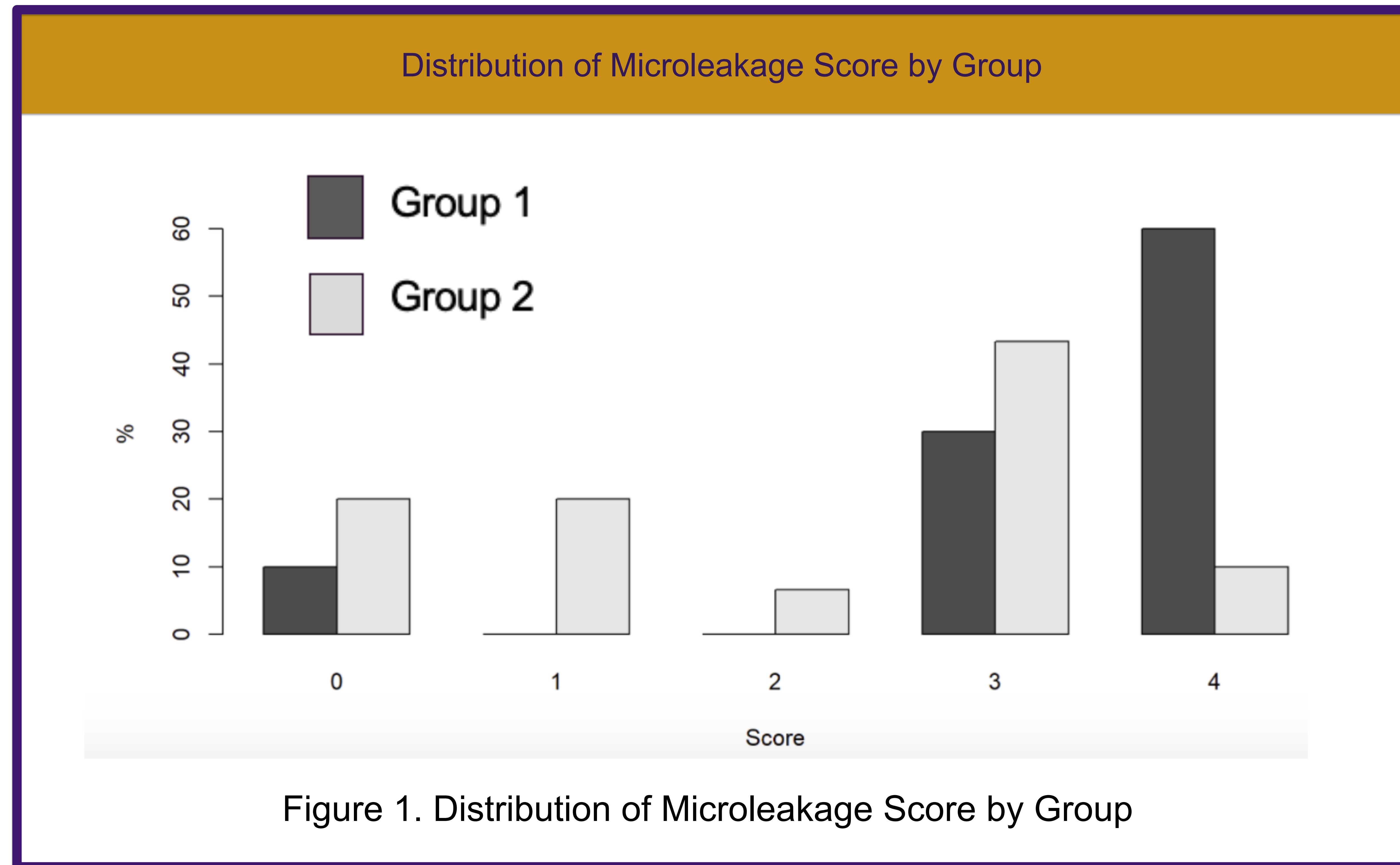
OBJECTIVE

The objective of this study was to determine the optimal timing process for light curing (pre-curing or co-curing) flowable composite under packable composite to achieve minimal microleakage in class II restorations.

METHODS

Sixty de-identified permanent molars without visible caries were stored in a diluted 1:10 bleach solution after collection. All steps were performed by a single researcher. The sixty molars were randomly divided into two groups of 30 teeth each. Each molar was prepped with a standardized class II box-only cavity preparation that measured 2mm wide buccolingually and 2mm deep pulpally. The gingival seat was placed 1mm above the CEJ. All preparations were etched with 37% phosphoric acid, rinsed and dried, and then OptiBond Solo Plus™ adhesive was applied and light-cured. DeNovo™ matrix bands were placed around each tooth. Group 1 was the co-cured group, in which a thin layer of Bisco Aeliteflo™ flowable composite was placed on the gingival floor of the box directly followed by the placement of 3M Filtek Supreme™ packable composite on top, which was then light cured altogether for 40 seconds. Group 2 was the pre-cured group, in which a thin layer of 3M Bisco Aeliteflo™ flowable composite was placed on the gingival floor of the box and light cured for 40 seconds, followed by placement of Filtek Supreme™ packable composite and light cured for 40 seconds. The matrix bands were removed and the restorations were polished with a polishing disk on slow speed. The restored molars were put through 1,000 cycles of thermocycling in water baths between 5 and 60 °C. The root apices were completely sealed with wax, and the tooth was sealed with two coats of clear nail varnish, leaving a 1mm space from the restoration margin. The tooth was soaked in basic fuchsin dye for 24 hours then allowed to dry for 48 hours. Using a slow speed diamond disc under water irrigation, the tooth was sectioned mesiodistally and examined under a stereomicroscope. Cervical microleakage was graded by a single examiner based on the degree of dye penetration and given a grade of -4 based as follows: 0=no dye penetration, 1=penetration up to ½ the gingival floor, 2=penetration more than ½ the gingival floor, 3=penetration of entire gingival floor, 4=penetration of gingival floor and into the axial wall. Statistical analysis was performed via Wilcoxon Rank-Sum Test and Fisher Exact Test.

RESULTS



Distribution of Microleakage Score by Group

	0	1	2	3	4
Group 1	3	0	0	9	18
Group 2	6	6	2	13	3

Table 1. Distribution of Microleakage Score by Group

CONCLUSIONS

Based on the study's results, the following conclusions can be made:

1. Pre-curing flowable composite before placement of packable composite resulted in less microleakage when compared to co-curing flowable composite and packable composite together.
2. Pre-curing flowable composite before placement of packable composite may result in a decreased incidence of marginal staining, post-op sensitivity, secondary caries, and restoration failure when compared to co-curing flowable and packable composites together in class II restorations.

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