

THE EFFECT OF SILVER DIAMINE FLUORIDE PRETREATMENT WITH DIFFERENT TIME INTERVALS ON THE SHEAR BOND STRENGTH OF UNIVERSAL ADHESIVE TO DENTIN OF PRIMARY TEETH (IN VITRO STUDY)

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INTRODUCTION

Silver diamine fluoride (SDF) is a caries arresting material that eludes need for drill and fill (1). SDF Nevertheless, results in staining and can't provide esthetic and functional requirements, making final restoration indispensable(2). SDF jeopardizes shear bond strength (SBS) of dental adhesives(3). The current study aims to eliminate this negative influence by separating the pretreatment and final restoration with a 1 week time interval.

METHODOLOGY

66 extracted sound primary teeth were randomly allocated into three groups according to SDF pretreatment.

Group I: assigned for immediate final restoration application after pretreatment. Group II: assigned for one week time lapse after 38% SDF pretreatment. Group III (control group): Was assigned for final restoration application without pretreatment. Each main group was subdivided into two groups according to the adhesive technique used: Subgroup A: received composite resin using total etch technique. Subgroup B: received composite resin using self-etch technique.

Composite was applied to flattened buccal dentine surface. SBS test was done using Universal Testing Machine. Mode of failure was assessed using stereomicroscope.

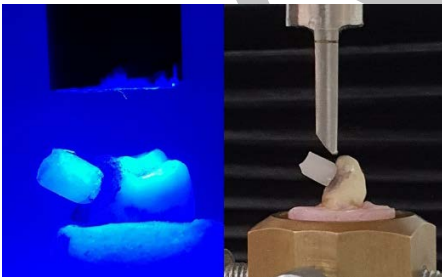


Figure (1): Composite was bonded to flattened dentin of teeth of all groups then SBS was assessed using universal testing machine in Mpa

RESULTS AND DISCUSSION

SBS significantly deteriorated when composite was applied immediately after SDF ($P < 0.001$). Figure 2. Hybrid layer requires dry acidic media. SDF is a highly alkaline solution ($pH = 10$) and its reaction results in silver phosphate layer which obstructs the tubules and disturbs resin impregnation. When final restoration was bonded 1 week after pretreatment, there was no significant difference in SBS between group II and group III ($P = 0.76$). Figure 2. This is due to the deeper penetration of silver ions during the time interval leading to longer resin tags. There was a significant

difference in SBS between the two subgroups in group I ($P = 0.03$). Figure 2. Self-etch depends on the monomer in universal adhesive ($pH = 2.5$) which is much weaker than 37% phosphoric acid ($pH = 0.1-0.4$). They are more prone to get buffered by SDF.

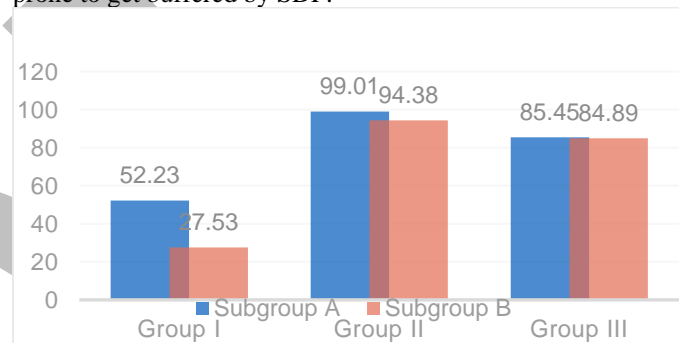


Figure (2): SBS in the three study groups using total etch and self etch techniques

Regarding failure mode, no significant differences in the type of failure at the composite resin level was observed between the study groups (p -value > 0.05). Table 1.

Subgroup	Failure type	Group I	Group II	Group III	X ² P value
		N (%)			
Total etch	Adhesive	7 (63.6%)	2 (18.2%)	7 (63.6%)	P _{Mc} : 0.10
	Cohesive	2 (18.2%)	2 (18.2%)	0 (0%)	
	Mixed	2 (18.2%)	7 (63.6%)	4 (36.4%)	
Self etch	Adhesive	3 (27.3%)	3 (27.3%)	5 (45.5%)	P _{Mc} : 0.29
	Cohesive	2 (18.2%)	4 (36.4%)	0 (0%)	
	Mixed	6 (54.5%)	4 (36.4%)	6 (54.5%)	

Table (1): Failure mode in the six subgroups.

CONCLUSION

SDF Application to primary dentin immediately before composite adversely affects SBS. Therefore, SDF pretreatment one week before composite is recommended to minimize the risk of bonding failure. Self-etch technique can be used in this situation without any deterioration of SBS.

REFERENCES

- Crystal YO, Niederman R. Evidence-Based Dentistry Update on Silver Diamine Fluoride. Dental clinics of North America. 2019;63(1):45-68.
- Lou YL, Botelho MG, Darvell BW. Reaction of silver diamine fluoride with hydroxyapatite and protein. Journal of dentistry. 2011;39(9):612-8.
- Fröhlich TT, Botton G, Rocha RO. Bonding of Glass-Ionomer Cement and Adhesives to Silver Diamine Fluoride-treated Dentin: An Updated Systematic Review and Meta-Analysis. The journal of adhesive dentistry. 2022;24(1):29-38.