

REVIEW ANALYSIS & EVALUATION

# THE USE OF ADHESIVE SYSTEMS UNDER FISSURE SEALANTS IMPROVES THEIR RETENTION, WITH ETCH-AND-RINSE PERFORMING BETTER THAN SELF-ETCHING ADHESIVE SYSTEMS



REVIEWERS

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This systematic review and meta-analysis includes 2 aims as follows: (1) to examine the fissure sealant retention with and without an adhesive system and (2) to compare the fissure sealant retention of etch-and-rinse vs self-etching adhesive systems.

SORT SCORE			
A	B	C	NA

SORT, Strength of Recommendation Taxonomy

LEVEL OF EVIDENCE		
1	2	3

See page 11A for complete details regarding SORT and LEVEL OF EVIDENCE grading system

ARTICLE TITLE AND BIBLIOGRAPHIC INFORMATION

*Adhesive systems under fissure sealants: yes or no?: A systematic review and meta-analysis. Bagherian A, Shirazi AS, Sadeghi R. J Am Dent Assoc 2016;147(6):446-56.*

SOURCE OF FUNDING

*The authors reported that no external funding sources directly supported this study*

TYPE OF STUDY/DESIGN

*Systematic review with meta-analysis of data*

SUMMARY

**Selection Criteria**

Three investigators reviewed PubMed via MEDLINE, Ovid MEDLINE, Scopus, Cochrane, and the Web of Science for articles written in any language and with no initial date limit and until November 1, 2015 (1 article published in 2016 was added). Initially 1882 nonduplicated articles were identified from the database searches. Inclusion criteria were randomized and quasi-randomized controlled trials that had at least a 6-month follow-up, with sufficient and accurate sample sizes by groups, and reported an adequate amount of data to be analyzed. Two independent reviewers evaluated masked articles. Any discrepancies were resolved with consensus with the help of a third person when needed. Finally, 12 papers were eligible for full-text review.

**Key Study Factor**

The key intervention factor was the use of phosphoric acid. To assess the effect of using an adhesive system in the retention of sealants (aim 1), studies comparing sealant retention with/without adhesive system were evaluated. To assess the effect of using an etch-and-rinse/self-etching adhesive system in the retention of sealants (aim 2), studies comparing them were used. For aim 1, only studies using phosphoric acid were included. For aim 2, the self-etched studies included did not involve pre-etching. All sealants were placed in permanent molar teeth; for the first part, it was mostly in first molar teeth and in premolar, second molar, and lateral incisor teeth, and for the second part, all were done in permanent molar and premolar teeth. The follow-up times for the first aim ranged from 1 to 5 years and for the second aim between 6 months and 4 years.

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## Main Outcome Measure

The main outcome was the success rate of fissure sealants with and without the addition of an adhesive system over a 6-month to 5-year period.

## Main Results

Twelve publications of 9 and 4 randomized controlled trials were identified for the aim 1 and aim 2, respectively. The 9 studies for aim 1 comprised a sealants' pooled sample size of 3973 and overall follow-up rate of 70.21%. Similarly, corresponding figures from 4 studies for aim 2 were 869 and 85.23%.

Of the 9 and 4 studies for the aim 1 and aim 2, 5 and 3, respectively, were used in the related meta-analyses.

The analysis conducted by the authors with the Jadad qualitative scale showed that all 12 included trials attained at least positive responses, so these studies were seen as providing good evidence.

A significant positive effect of the adhesive was reported in 4 of the 9 studies ( $P < .0005$ -  $P < .05$ ) with 1- to 4-year follow-ups, whereas 4 studies reported insignificant results ( $P$  value  $> .05$ ) with 1- to 5-year follow-ups. Only 1 study compared different follow-up times and reported a significant positive effect of the adhesive up to 3-year follow-up, but there was no significant effect after 4 and 5 years of follow-up.

All 4 studies included in the systematic review for aim 2 reported better retention with the "etch-and-rinse" adhesive than with the "self-etch adhesive" ( $P < .001$ - $P < .05$ ).

In the first meta-analysis (aim 1), the use of adhesive systems showed a positive effect on fissure sealants (odds ratio: 3.294; 95% confidence interval [CI]: 1.292-8.401;  $P = .013$ ) with a risk difference of 0.180 (95% CI: 0.067-0.292;  $P = .002$ ).

The second meta-analysis (aim 2) showed the superiority of using etch-and-rinse vs self-etching adhesives in the fissure sealant procedure (odds ratio = 14.569; 95% CI: 2.616-81.131;  $P = .002$ ) with a risk difference of 0.516 (95% CI: 0.269-0.763;  $P = .000$ ).

## Conclusions

The analyses illustrate that (1) the use of adhesive systems beneath fissure sealants can increase the retention of fissure sealants and (2) adhesive systems used with fissure sealant etch-and-rinse systems are superior to self-etch systems with respect to retention values.

## COMMENTARY AND ANALYSIS

This article draws together data from randomized and quasi-randomized studies looking at the retention effect

of using an adhesive beneath sealants and comparing the retention of etch-and-rinse vs self-etching adhesive systems. The systematic review examined data from 9 studies for the first aim and 4 studies for the second aim using sealant retention as the outcome, and the correspondent 2 independent meta-analyses 5 and 3 studies with same outcome. The systematic review clearly indicates that using an adhesive system beneath sealants is associated with more positive outcomes in terms of retention than not using an adhesive system. However, the results of the included studies are not consistent as 4 of 9 studies show no effect, and a subset of 1 study shows negative effects. The related meta-analysis shows a significant positive effect on retention rates with consequent benefits in preventing caries lesions. The clinical relevance of this result leads to the statement that sealants should be used with an adhesive system beneath to increase their retention rate. These results have a high-impact clinical applicability and are in the same line of the current understanding of the caries process.<sup>1</sup> Recently, the International Caries Classification and Management System was derived from the International Caries Detection and Assessment System,<sup>2,3</sup> providing best clinical practices for caries detection, assessment, and management of cavitated as well as noncavitated caries lesions. The International Caries Classification and Management System guide states that caries lesions can be prevented using a patient-based caries risk strategy. When patients are classified as having a high new/progressing caries lesions' likelihood, it is considered wise to preventively seal sound fossae fissure system (on occlusal and buccal surfaces).<sup>3,4</sup> On the other hand, the best clinical practice caries treatment decision for an initial active caries lesion<sup>3</sup> or the International Caries Detection and Assessment System 1-2 active lesion<sup>5</sup> on fossae and fissures is nonoperative caries management, such as sealants.<sup>3,4</sup> These lesions correspond to caries lesions at a noncavitated stage that are likely progressing as the enamel demineralization phases prevail over the enamel remineralization phases,<sup>1</sup> with initial caries lesions characterized as being in plaque-stagnation areas, more likely rough than smooth to gentle probing and more likely white than brown in color.<sup>3,4,6</sup> In addition, initial active caries lesions on approximal surfaces have shown a caries control benefit after being sealed—involving an adhesive system beneath the sealant.<sup>7</sup>

The hydrophilic (HEMA) and hydrophobic (bisGma, UDMA) characteristics of adhesives and their low viscosity allow them to penetrate better than other resin systems due to capillarity to the enamel prisms, improving the sealing technique.<sup>8</sup>

The determination of the etch-and-rinse adhesive system showing higher sealant retention over the self-etching

system was achieved both with the overall positive outcomes in the systematic review (4 studies) and the significant positive effect on the sealant retention rates of the meta-analysis. There is a high clinical relevance of this issue as it has been stated that using an etch-and-rinse adhesive system is more time-consuming than the alternative, but the higher sealant retention rate of this adhesive system used before applying sealant should prevail. The micromechanical bonding to enamel of adhesive systems is enhanced due to a higher extent and depth of the etching pattern, increasing the retention rate of sealants.<sup>9</sup>

Taking into consideration the limitations of this investigation in number and heterogeneity of studies, it makes a key contribution to evidence-based dentistry because it supports the current caries best clinical practices. Individual clinicians and public health decision makers in this area welcome this. It is clear that further clinical high-quality studies are desirable to obtain higher quality in meta-analyses.

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