Comparative Enamel Remineralization Using SDF, Fluoride Varnish, and Curodont Repair™

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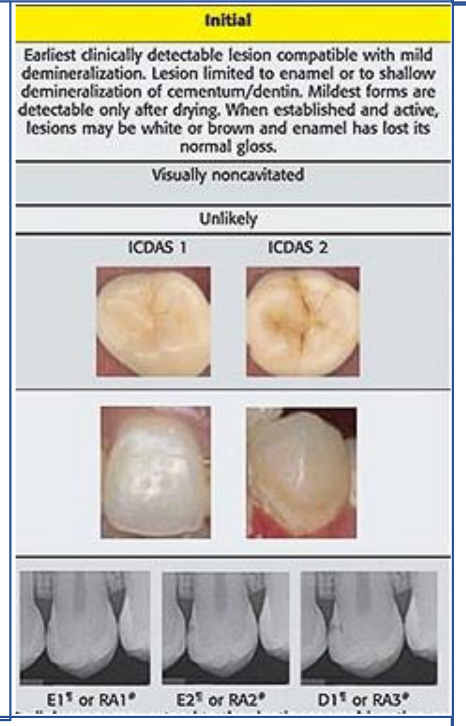
BACKGROUND

- Dental caries is one of the most common chronic diseases in the world, with a prevalence of up to 90%. It is a complex, yet dynamic process characterized by the balance between demineralization and remineralization.
- Without intervention, caries progression can result in cavitation, pulpal involvement, and the need for advanced restorative or surgical care.
- Traditionally, restorative procedures, such as dental fillings and crowns, were recommended to remove decay.
- However, there has been a shift towards minimally invasive dentistry to preserve tooth structure and promote remineralization.



OBJECTIVES

To compare the remineralization efficacy of 38% silver diamine fluoride, 5% sodium fluoride varnish, and Curodont™ Repair on incipient enamel carious lesions in permanent teeth.

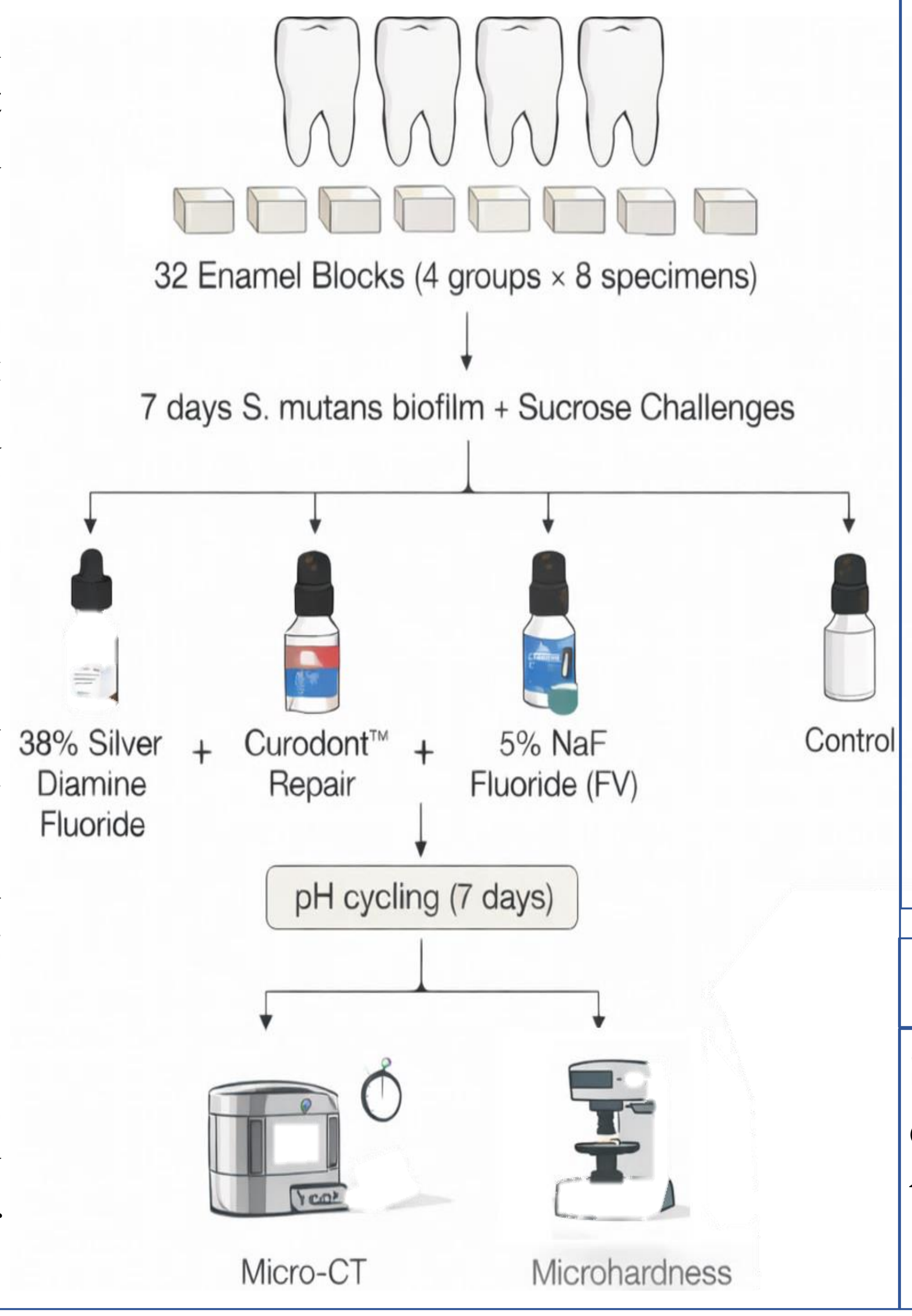
MATERIALS & METHODS

Specimen Preparation: Thirty-two enamel blocks with standardized 3x3mm treatment windows were prepared from eight sound human permanent teeth.

Test Groups: Four test groups (n = 8/group) were used including SDF, FV, Curodont™ Repair, and a negative control (sound enamel). pH cycling was completed for 7 days (30 minutes of demineralization and 10 mins of remineralization per cycle).

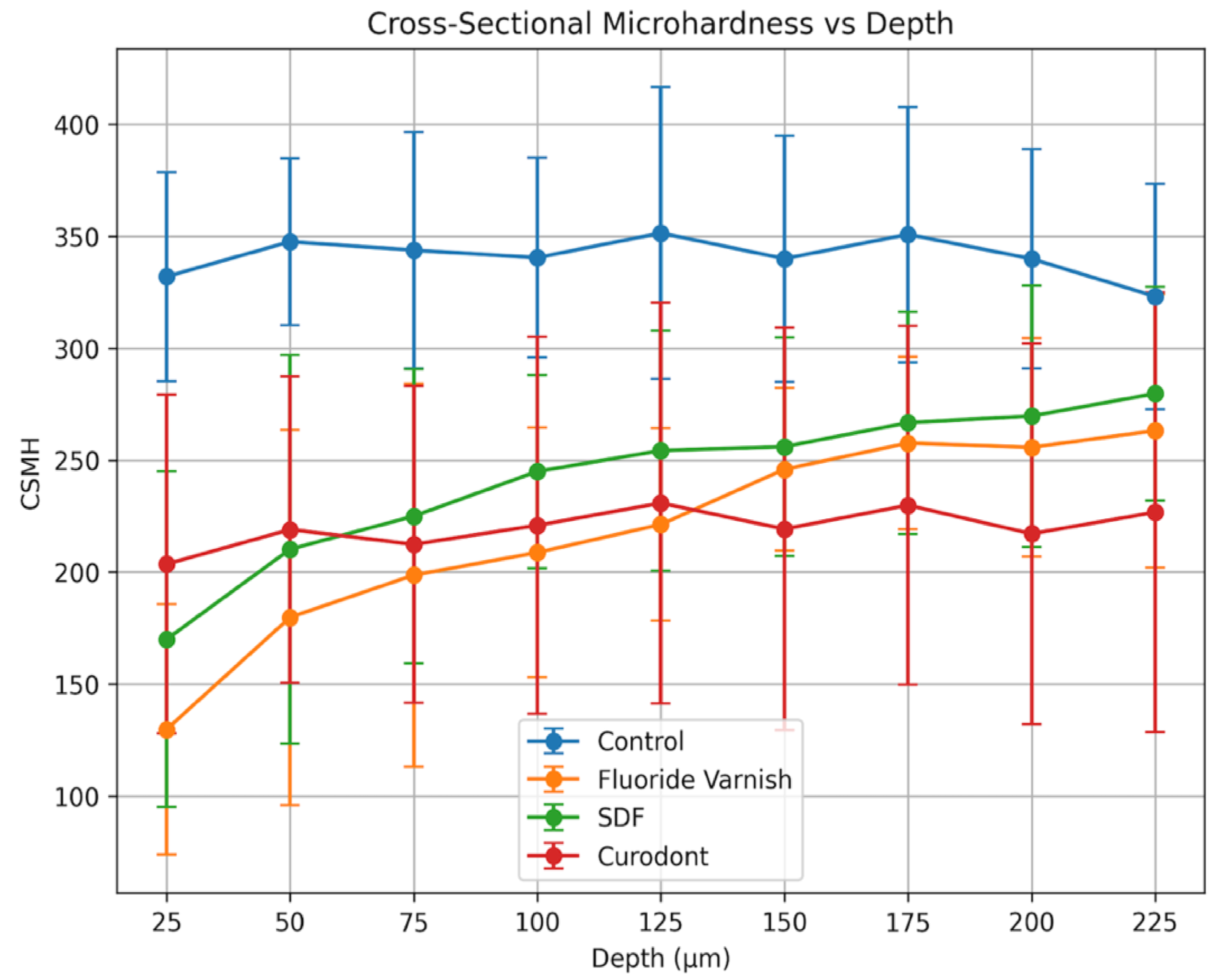
Specimen Evaluation: Cross-sectional microhardness (Knoop) was measured for all specimens at incremental depths (25–225 µm) for mechanical properties. Lesion depth and mineral density were evaluated using micro-CT (n=6).

Statistical Analysis: One-way ANOVA was used to analyze data (α=0.05), with Tukey post-hoc tests for pairwise comparisons for CSMH.



RESULTS

Mean and Standard Deviation of Enamel Microhardness Across Depths by Treatment Group



Zone-based Mean Microhardness Across Treatment Groups

	Control	FV	SDF	Curodont	
Superficial (25–50 µm)	339.77 ± 17.32	154.80 ± 50.54	190.11 ± 66.89	211.30 ± 67.31	Curodont > SDF> FV
Lesion Body (75–150 µm)	343.89 ± 17.49	218.65 ± 40.09	245.06 ± 40.96	220.85 ± 78.96	SDF > Curodont ≈ FV
Deep (175–225 µm)	337.95 ± 29.31	258.84 ± 32.11	272.05 ± 44.86	224.58 ± 87.41	SDF > FV > Curodont

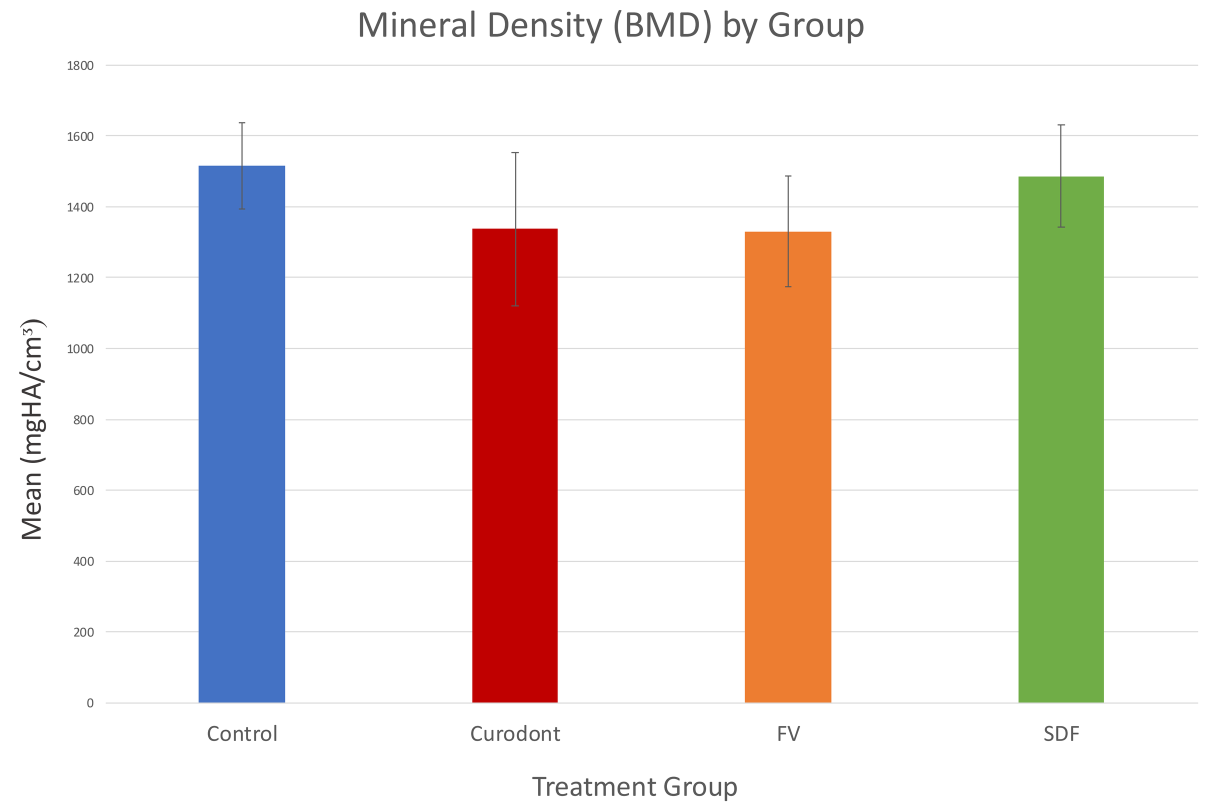
Pairwise Comparisons Among Treatment Groups for CSMH

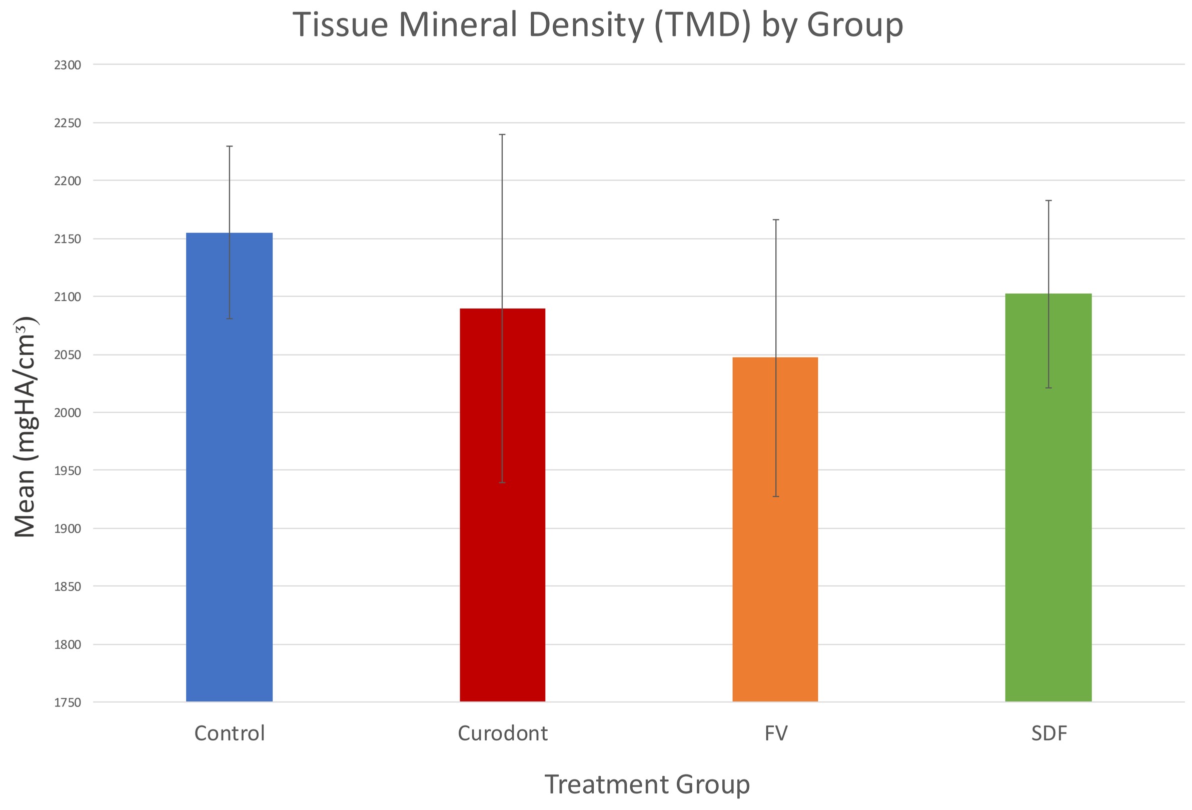
Contrast	Mean Difference	p-value
Curodont-FV	2.11	0.9997
Curodont-SDF	-21.87	0.76388
FV-SDF	-23.99	0.7097

One-way ANOVA Results for MD

Dependent Variable	F	P-value
BMD	2.128	0.129
TMD	0.971	0.426

Enamel Mineral Density by Micro-CT (n=6/group)





Depth-dependent trends: Curodont™ peaked at 125 µm (230.86 ± 89.44) before declining, whereas SDF and FV showed progressive increases in microhardness with increasing depth.

Mineral density (MD): SDF (BMD: 1486.62 ± 145.26; TMD: 2102.1 ± 80.6) achieved mineral density values closest to sound enamel (BMD: 1516.4 ± 121.5; TMD: 2155.2 ± 74.6).

Statistics: No statistically significant differences were observed among treatment groups for microhardness or mineral density ($p > 0.05$).

CONCLUSIONS

SDF, FV, and Curodont™ Repair primarily differ in the depth at which their effects occur rather than in overall mineral recovery. These findings support a lesion-specific approach to material selection, recognizing that different agents act in distinct regions within the lesion rather than uniformly throughout it.

APPROVAL

STUDY-2024-0741

REFERENCES