

Effect of Light Cure on Silver Diamine Fluoride Treatment on Dentinal Hardness in Young Permanent Teeth

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Background

Silver diamine fluoride (SDF) can halt the progression of the carious lesion and has been used as an interim treatment for uncooperative, young, challenging, and special health care needs patients. Few studies have investigated the effects of light curing on dentinal hardness. **The purpose of this study is to compare dentine microhardness of SDF treatment with and without light curing (LC) on non-carious teeth.**

- Null hypotheses:
1. There is no difference of microhardness of demineralized dentin after SDF treatment.
 2. There is no effect of light curing on dentin microhardness after SDF treatment.

Materials and Methods

- 10 intact extracted young human natural permanent teeth
- Teeth were embedment using cylindrical molds and epoxy resin



Figure 1. Experimental work flow

- Section teeth using diamond blade and section machine IsoMet 5000 Linear Precision Saw
- Polish using Buehler EcoMet 250/AutoMet 250 polisher
- Test the Vickers microhardness at baseline, demineralization, and SDF treatment in five different spots of each specimen using a microhardness tester: Buehler Micromet2003.
- Demineralize teeth in 0.1M lactic acid solution with pH = 4.7 in a 37 Celsius incubator for 24 hours
- Apply the treatment in two groups. Group A: one application of SDF, Group B: SDF with light curing (SDF + LC)
- Store the specimens in artificial saliva with pH 7.4 before microhardness testing

Data collection and analysis:

Statistical analysis was performed with JMP Pro 16.0 using two way ANOVA with repeated measurement method (alpha=0.05).

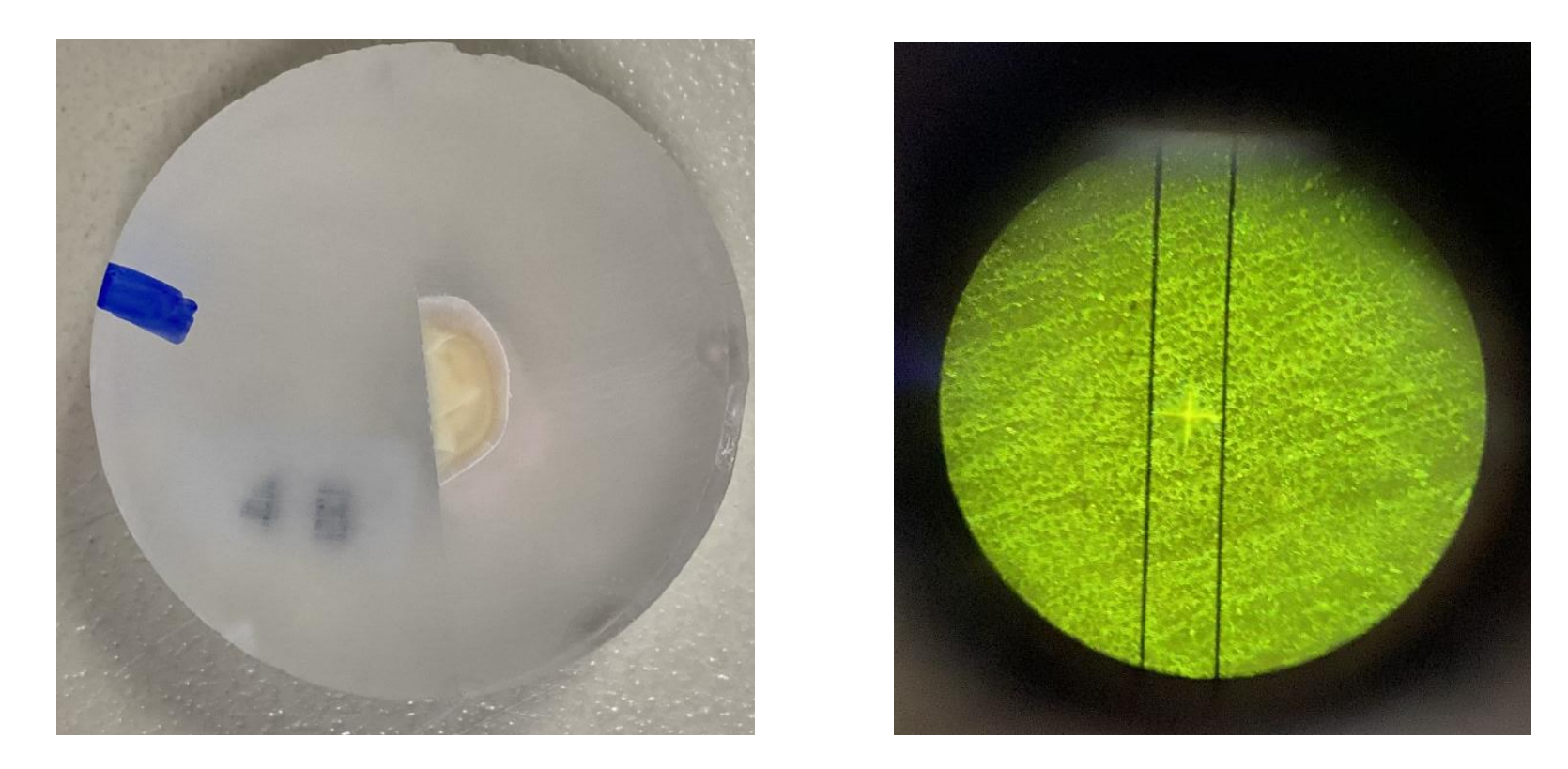


Figure 2. Dentin specimen for hardness testing

Results

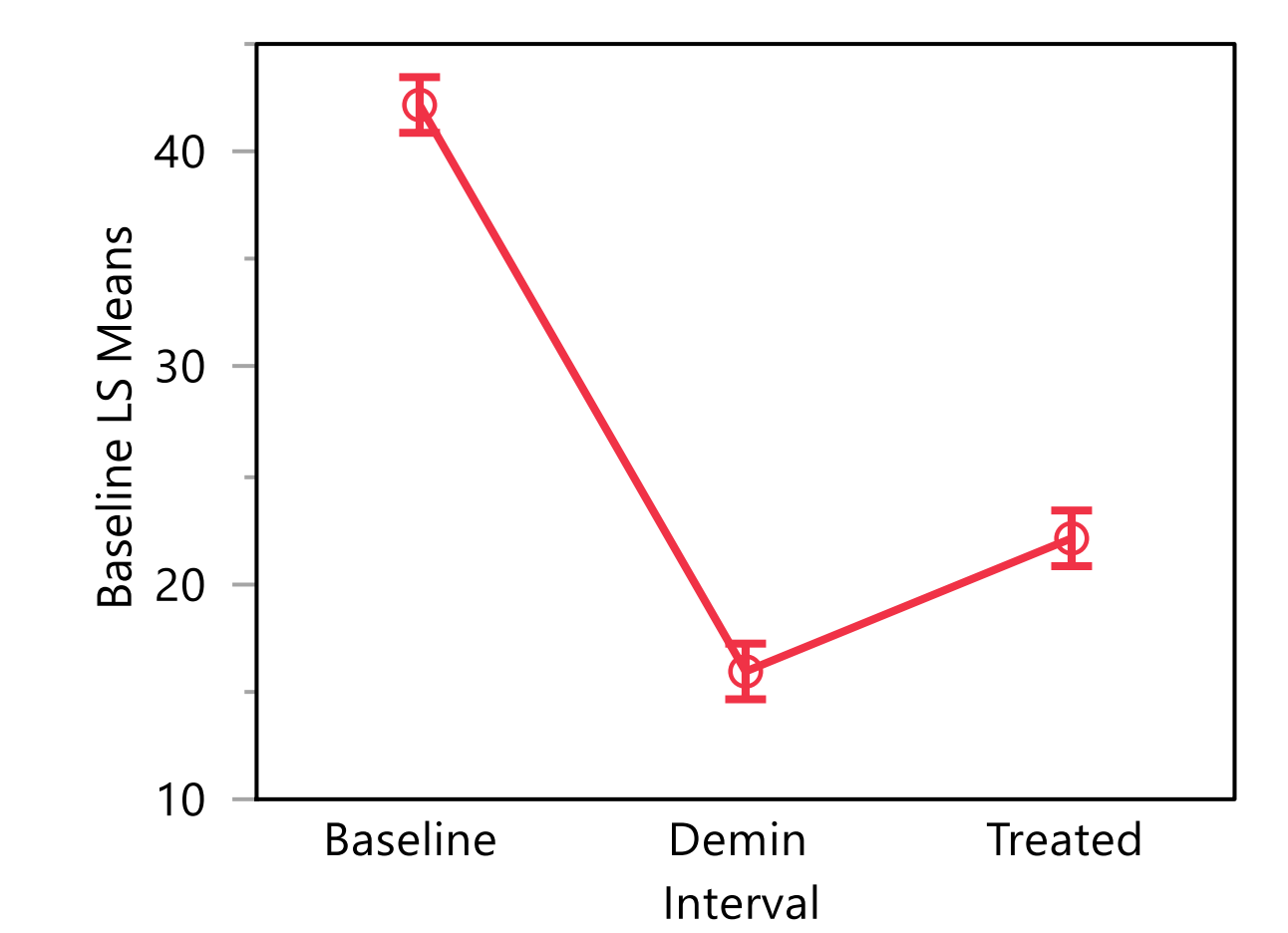


Figure 3. Least squares means plot of Vickers hardness vs. treatment interval (p < 0.0001)

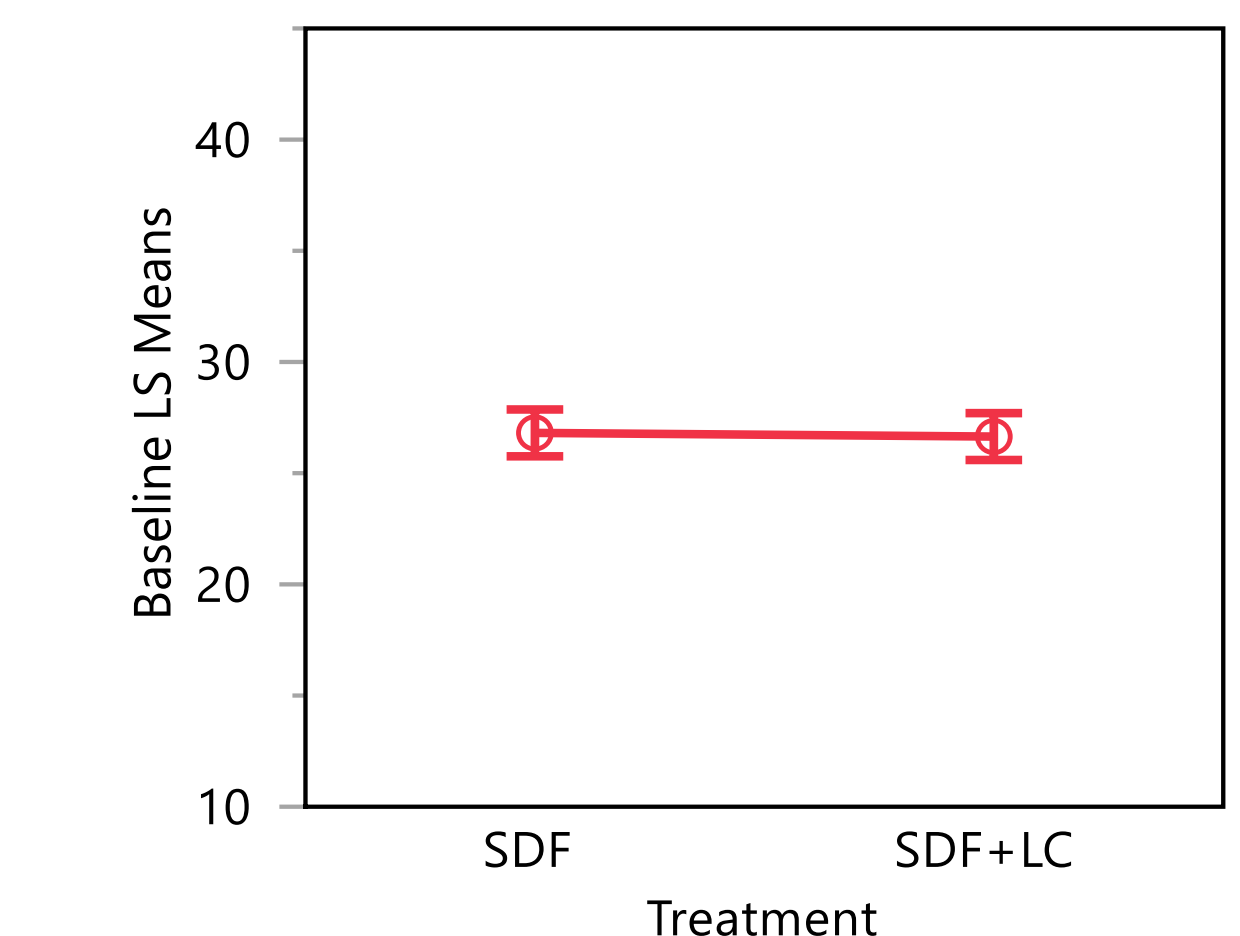


Figure 4. Least squares means plot of Vickers hardness vs. treatment (p = 0.828)

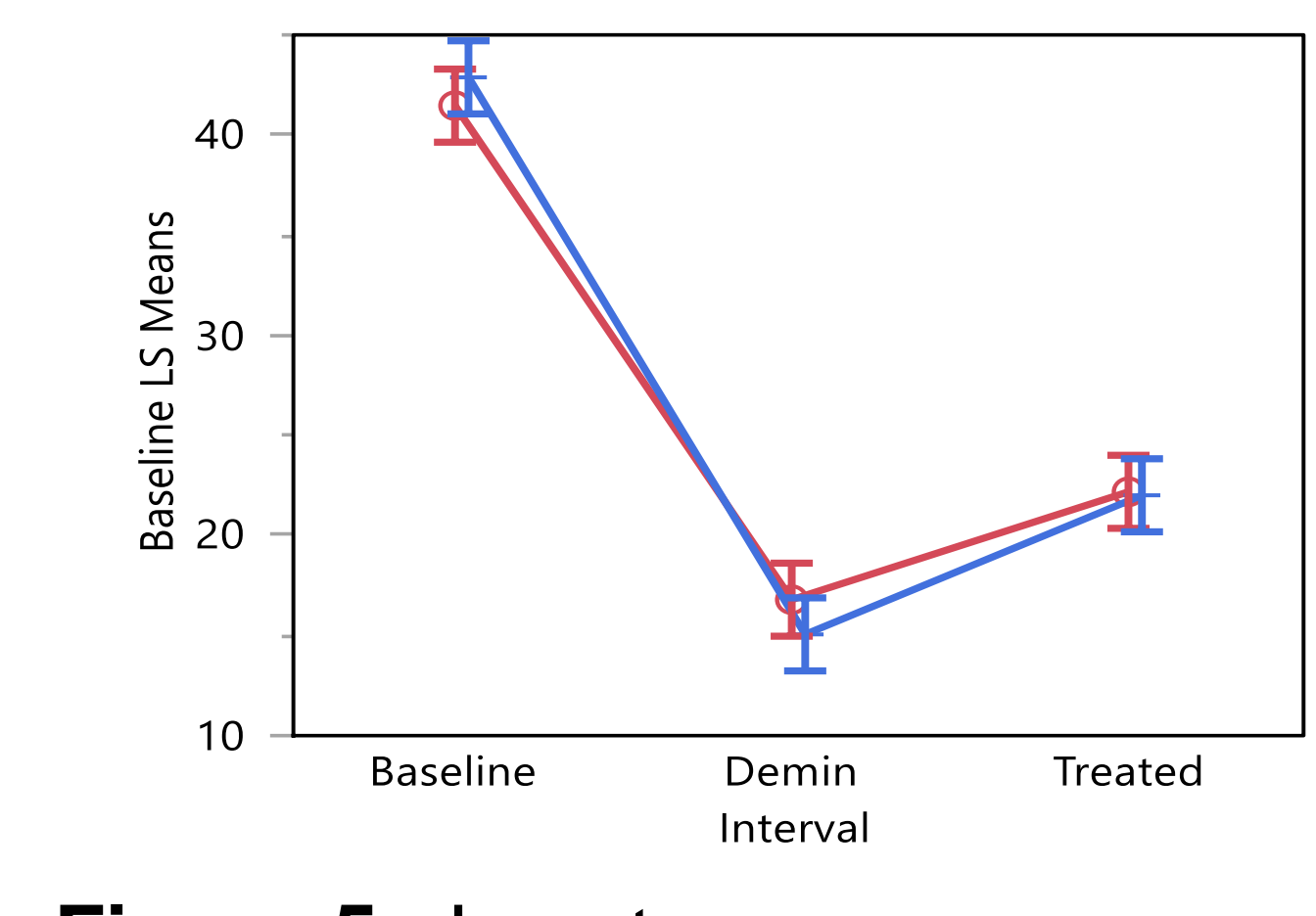


Figure 5. Least squares means plot of Vickers hardness vs. treatment and treatment interval (p = 0.238)

Table 1 Vickers microhardness affected by treatment intervals

Level	Sig. *	Vickers Microhardness
Baseline	A	42.17
Treated	B	22.09
Demin	C	15.92

* Levels not connected by same letter are significantly different.

Table 2 Vickers microhardness affected by treatment

Level	Sig*	Vickers Microhardness
SDF	A	26.81
SDF+LC	A	26.65

* Levels not connected by same letter are significantly different.

Table 3 Vickers microhardness affected by treatment x treatment interval

Level	Sig*	Vickers Microhardness
SDF+LC,Baseline	A	42.88
SDF,Baseline	A	41.46
SDF,Treated	B	22.17
SDF+LC,Treated	B	22.00
SDF,Demin	C	16.79
SDF+LC,Demin	C	15.05

* Levels not connected by same letter are significantly different.

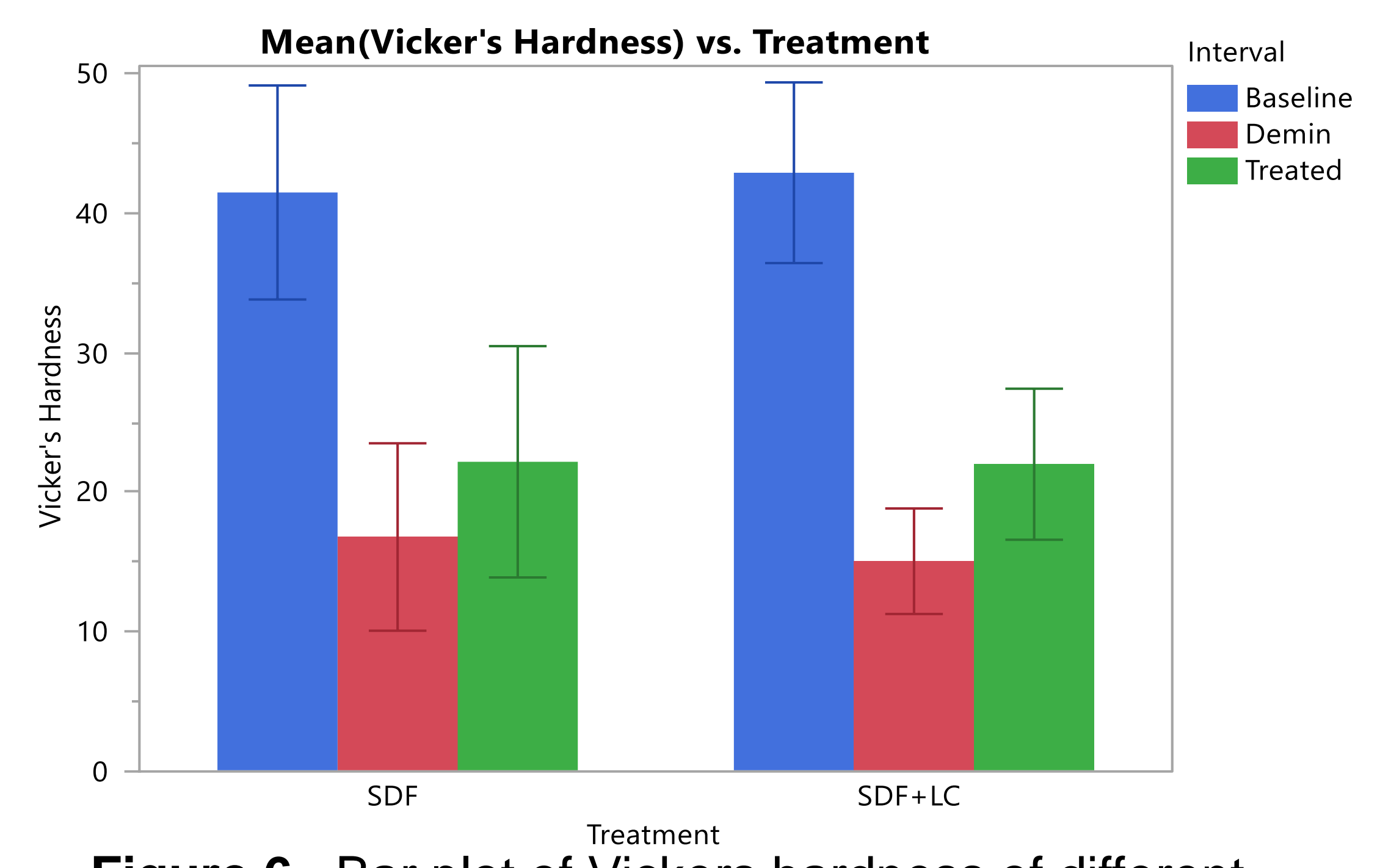


Figure 6. Bar plot of Vickers hardness of different groups of treatment and treatment interval

Table 4 Vickers microhardness of different groups of treatment and treatment interval

	Baseline			Demin			Remin		
	Mean	Std Dev	CV	Mean	Std Dev	CV	Mean	Std Dev	CV
SDF	26.81	13.03	48.58	16.79	6.71	39.97	22.17	8.28	37.35
SDF+LC	26.65	12.99	48.76	15.05	3.78	25.10	22.00	5.41	24.58

Conclusions

- Treatment by SDF and SDF+ LC show significant higher surface microhardness than demineralized dentin
- There is no significant effect of light curing treatment effect on surface microhardness than no light curing
- **Clinical implication:** Light curing after SDF application has no effect on surface microhardness of young permanent tooth