

Introduction

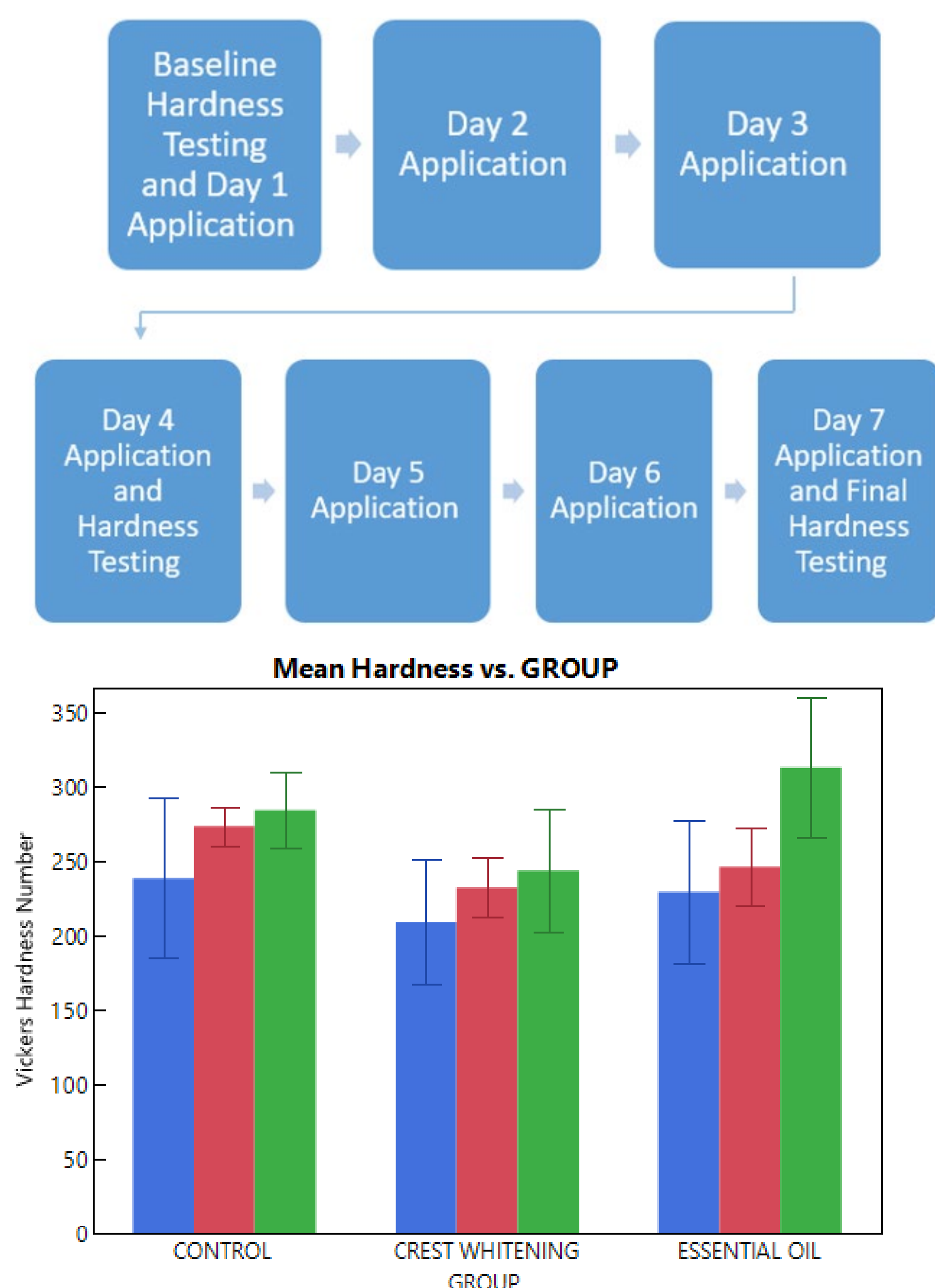
- Current products on the market utilize essential oils as whitening agents for teeth.
- Influential marketers of this product are also encouraging the direct application of orange essential oil to the tooth as a whitening aid.
- Testimonials of these products show that the general public are finding them to be useful and effective.
- We would like to determine if orange essential oil affects mechanical properties, specifically surface hardness.
- Experiment was done to test if the trend of using orange essential as a tooth whitening agent is safe.

Objective

It is a concern in clinical treatment that whitening agents might decrease the enamel hardness. The purpose of this study was to evaluate enamel microhardness after treatment with a conventional whitening product and orange essential oil.

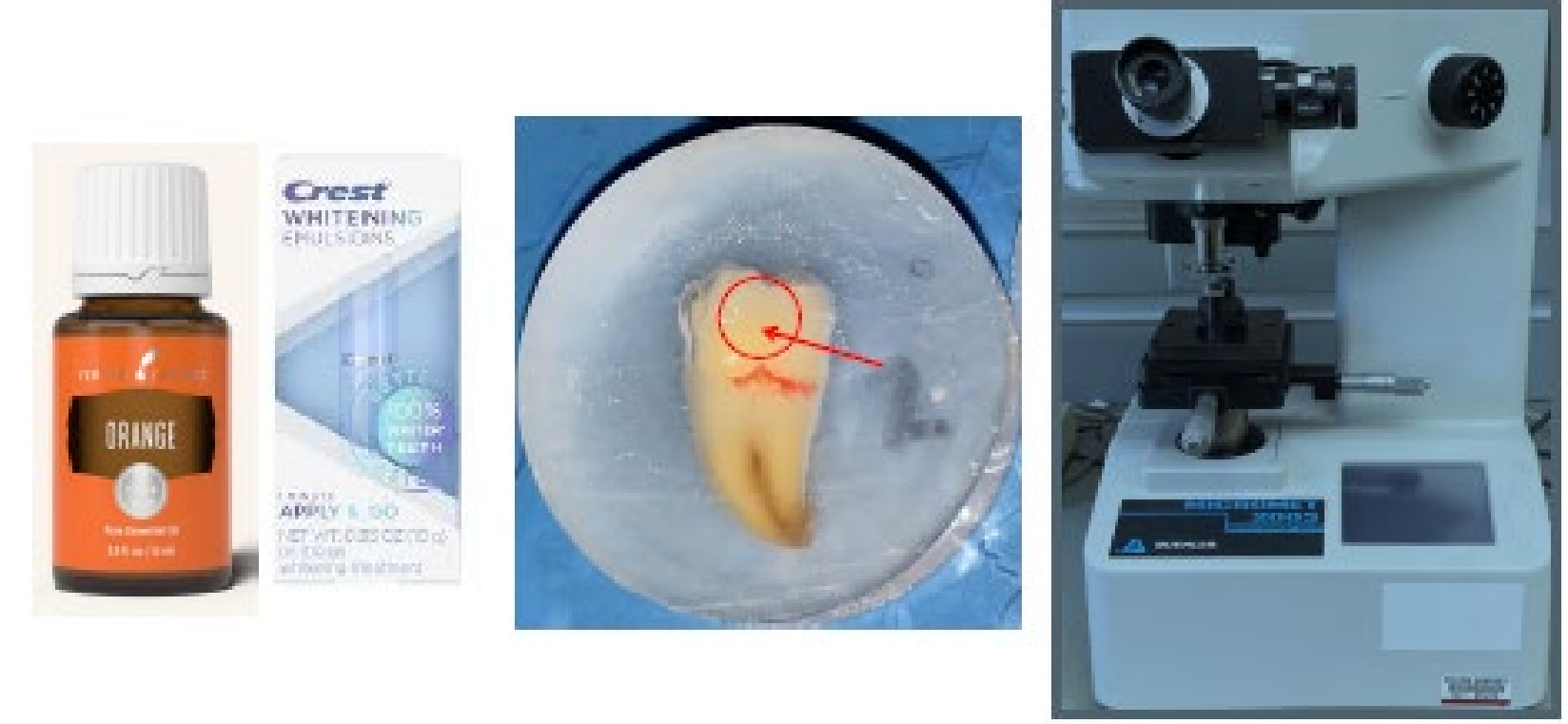
Materials and Methods

This in vitro experimental study was conducted using 18 unidentified extracted human teeth without obvious caries or restorations. Cleaned teeth were mounted in EpoxiCure2 epoxy resin and ground to expose buccal or lingual enamel surfaces, then polished down to 1 μ m. Specimens were divided randomly into three treatment groups, n=6. The first group received an application of Crest Whitening Emulsions, the second group received treatment with orange essential oil while the third control group received no treatment. Each application of either whitening product or essential oil was applied for 2 minutes everyday for 7 days and stored in artificial saliva solution. Vickers Microhardness of the enamel surface was measured before, during, and after the application period of 7 days. An indentation load of 25gf was applied for 15 seconds. The enamel microhardness among the treatment groups and interval was compared using ANOVA and Tukey tests ($\alpha=0.05$) using JMP Pro 15.



Group	Vickers Hardness Number, kgf/mm ²									
	N	Baseline			Mid-way			Final		
		Mean	Std Dev	Sig.*	Mean	Std Dev	Sig.*	Mean	Std Dev	Sig.*
CONTROL	6	238.3	53.54	Aa	273.27	13.02	Aa	283.97	25.43	ABa
CREST WHITENING	6	208.64	41.76	Aa	232.09	20.15	Ba	243.43	41.28	Ba
ESSENTIAL OIL	6	229.3	48.04	Ab	245.87	26.32	ABa	312.67	47.33	Aa

*Levels not connected by same letter are significantly different with Tukey test. Capital letters compare each column; lower case letter



Results

Statistically significant difference in enamel microhardness was found after the application of conventional whitening agent versus orange essential oil. The group treated with orange essential oil showed a significant increase in the value of enamel microhardness while there was no significant difference in either conventional whitening agent treatment group or control group.

Conclusions

According to these findings, the application of orange essential oil on enamel significantly increased enamel microhardness. Additional studies on demineralized enamel is suggested to support this conclusion.

References

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Recognition:

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