Is there a reliable color measurement device for laboratory composite resin samples?
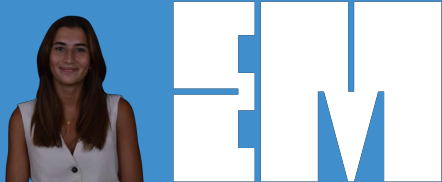# Laboratory comparison study of 3 options

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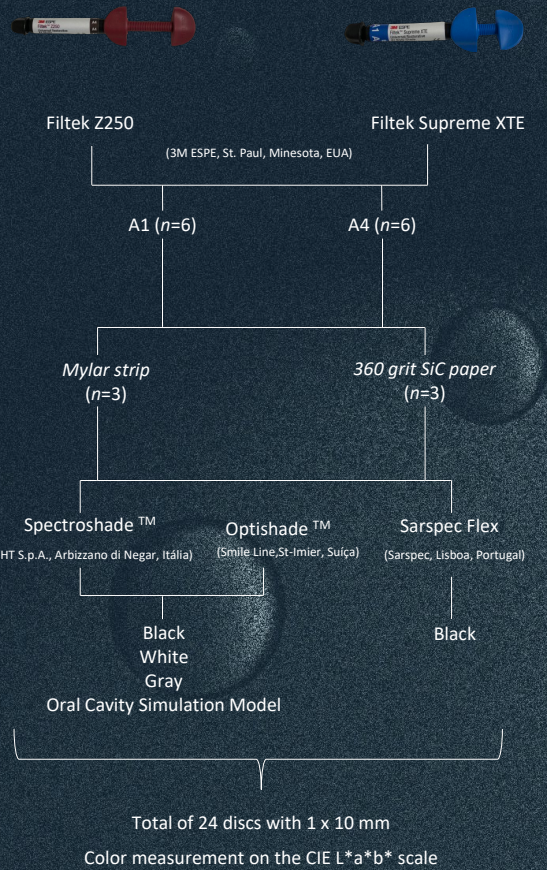
INTRODUCTION

The increasing aesthetic demands of patients and the unresolved subjectivity of shade measurement in dentistry make shade research relevant and urgent [1].

Despite recent material advances, there is no gold standard consensus regarding digital shade measurement devices in the clinical or pre-clinical context. It is therefore important to find out which device works best on laboratory samples [2].

AIMS

To evaluate and compare the effectiveness of colour measurement using three different devices;

To analyse the influence of the type of composite resin (RC), shade, surface finishing method and background used.

MATERIALS AND METHODS

Filtek Z250   Filtek Supreme XTE

(3M ESPE, St. Paul, Minesota, EUA)

A1 (n=6)   A4 (n=6)

Mylar strip   360 grit SiC paper
(n=3)   (n=3)

Spectroshade ™   Optishade ™   Sarspec Flex
(MHT S.p.A., Arbizzano di Negar, Itália)   (Smile Line,St-Imier, Suíça)   (Sarspec, Lisboa, Portugal)

Black   Black
White
Gray
Oral Cavity Simulation Model

Total of 24 discs with 1 x 10 mm
Color measurement on the CIE L*a*b* scale

RESULTS & DISCUSSION

Comparison of devices (Spectroshade Micro ™ vs. Optishade ™ vs. Sarspec Flex)

Significant differences between the commercial and experimental devices among paired samples (same RC, color, polish and black background) in all parameters ($p<0.001$). There were no differences in b* between commercial devices ($p=0.36$).

Color matching was better with Optishade™ which was the most accurate in this study.

Variables inherent to RC

Significant differences were observed in the characteristics of the RC in the commercial devices ($p<0.001$) for 'type' and 'colour'. In the 'type of RC' variable, the L* parameter did not vary in the Spectroshade ™ (a* and b*) and Optishade ™ (b*) devices. These differences are attributed to variations in material particles and refractive indices [3]. In contrast, the experimental device only showed differences in colour. The least chromatic resin (A1) had the highest luminosity (L*), while A4 stood out for its higher hue (a*) and chroma (b*), correlating with its higher number in the Vita Classical Shade Guide [4].

There were no statistically significant differences ($p>0.05$) between the devices in the "polish" variable. Although roughness influences the gloss of restorations, the study did not find the colour discrepancy in RC previously described in the literature [5].
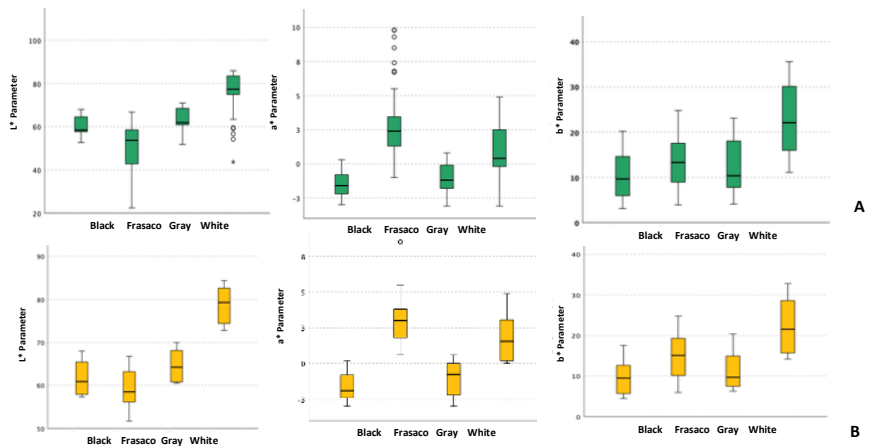
Box Plot graphs by color parameter for each background tested: (A) Spectroshade ™, (B) Optishade ™

There is great variability in the reliability and accuracy of these measuring devices, which was reflected in this study, with significant differences between the commercial devices and the experimental device. The black background showed the least variation in data, which can be explained by its representation of the oral cavity, while the white background showed the greatest variation, similar to previous studies [6].

CONCLUSIONS

- Black background was the most reliable in the study;
- The variables inherent to RC showed an influence on color measurement;
- In disagreement with the literature, the surface finishing method did not affect the results of this study;
- More studies are needed to standardize color measurement in laboratory RC samples.

REFERENCES

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