



TOOTH COLOR MATCHING WITH INTRAORAL SCANNER

Author, *Julija Zarkova Atanasova*, Co-authors *Katerina Zlatanovska, Natasha Longurova, Sanja Naskova, Sandra Atanasova, Ljubica Proseva, Ana Petroska*
Faculty of Medical Sciences, Goce Delcev University, Stip, North Macedonia

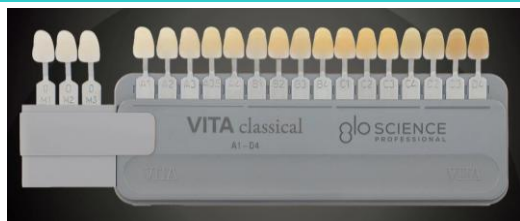


INTRODUCTION

Traditional methods of shade selection in dentistry have been criticized for their precision and subjectivity. Intraoral scanners have emerged as a promising alternative, offering digital precision in capturing tooth color. This study aims to assess the precision of the 3SHAPE TRIOS 3 intraoral scanner in matching tooth..

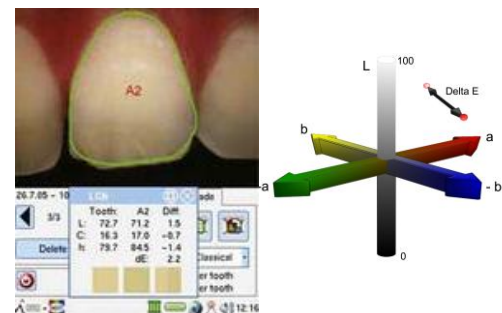
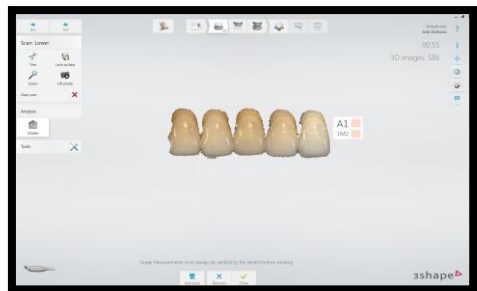
MATERIALS AND METHODS

Each shade tab, from a new VITAClassical Shade Guide, was scanned 10 times using the TRIOS 3 IOS to ensure repeatability and consistency in color capture. The colors of the scanned shade tabs were analyzed using the CIE Lab system. The color differences between the scanned values and VITA shade values were calculated using the ΔE formula. The data were analyzed employing descriptive statistics and ANOVA to assess mean differences and overall precision.



The data for the L, a, b values were taken from the software of the spectrophotometer (SpectroShade) in order to perform the calculations.

$$\Delta E^*_{ab} = \sqrt{\Delta L^{*2} + \Delta a^{*2} + \Delta b^{*2}}$$
$$\Delta E_{result} = \Delta E_{shade\ tab} - \Delta E_{ios}$$



RESULTS

The mean ΔE values and percentages are shown in the following table 1. ANOVA results indicated significant differences among mean color differences for various shades ($p < 0.05$). Post hoc tests(Tukey HSD) revealed that the scanned colors for A1 and B1 were statistically more accurate compared to darker shades such as D4.

| Shade | ΔE | Percentage (%) |
|-------|------------|----------------|
| A1 | 1.23 | 93.7% |
| A2 | 1.45 | 92.9% |
| A3 | 1.67 | 91.5% |
| A3.5 | 1.70 | 91.2% |
| A4 | 1.95 | 89.8% |
| B1 | 1.10 | 95.1% |
| B2 | 1.40 | 92.3% |
| B3 | 1.55 | 91.0% |
| B4 | 1.85 | 90.0% |
| C1 | 1.50 | 92.5% |
| C2 | 1.75 | 90.6% |
| C3 | 1.90 | 89.0% |
| C4 | 2.15 | 87.5% |
| D2 | 1.80 | 90.5% |
| D3 | 2.00 | 89.0% |
| D4 | 2.10 | 88.0% |



CONCLUSIONS

The precision of this intraoral scanner in tooth color matching demonstrates high levels of accuracy and the findings support the use of digital scanning technology in this process. The mean ΔE values suggest that the scanner is particularly effective for lighter shades, while performance decreases slightly for darker shades. There is a need for future intraoral scanners to display data in the CIE L*a*b* color space and to incorporate a wider range of shade guides.