

Tooth Color Matching with Intraoral Scanner

Julija Zarkova Atanasova¹, Katerina Zlatanovska¹, Natasha Longurova¹, Sanja Naskova¹, Sandra Atanasova¹, Ljubica Proseva¹, Ana Petroska²

¹Dental Medicine, Faculty of Medical Sciences, Goce Delcev University, Stip, North Macedonia

²UKIM, Faculty of Dentistry, Skopje, North Macedonia

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.

Each shade tab, from a new VITA Classical 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 mean ΔE values and percentages for each shade tab were A1($\Delta E=1.23,93.7\%$) A2 ($\Delta E=1.45,92.9\%$) A3($\Delta E=1.67,91.5\%$) A3.5($\Delta E=1.70,91.2\%$) A4($\Delta E=1.95,89.8\%$) B1($\Delta E=1.10,95.1\%$) B2($\Delta E=1.40,92.3\%$) B3($\Delta E=1.55,91.0\%$) B4($\Delta E=1.85,90.0\%$) C1($\Delta E=1.50,92.5\%$) C2($\Delta E=1.75,90.6\%$) C3($\Delta E=1.90,89.0\%$) C4($\Delta E=2.15,87.5\%$) D2($\Delta E=1.80,90.5\%$) D3 ($\Delta E=2.00,89.0\%$) D4 ($\Delta E=2.10,88.0\%$). 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.

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.

Keywords: Digital Dentistry, Shade Matching, Shade Guide