Original Article

EVALUATING SHADE MATCHING OF UNIVERSAL COMPOSITE TO NATURAL TEETH BEFORE AND AFTER BLEACHING

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ABSTRACT

The goal of our research was to analyses shade matching of Omnichroma composite to natural teeth and evaluate matching of this composite to surrounding tooth structure after bleaching. 40 extracted human natural anterior teeth were collected and class IV prepared. 20 teeth were restored using Ominchroma composite and the other 20 teeth were restored with Tetric-N-Ceram. After 24 hours single blind examiner evaluated the shade matching of both groups visually. Then bleaching using 40% hydrogen peroxide for 60 minutes was done for the Omnichroma group. Then shade matching was evaluated after 24 hours visually. 70% of the Ominchroma group were shade matching compared to 90% of the control group with no significant difference. There was 60% shade matching after bleaching of the omnichroma group with significant difference (P=0.009). Our findings suggest the potential of Omnichroma composite as a reliable choice in anterior restorations which eliminates the critical step of shade matching. There is possible mismatch of Omnichroma composite after bleaching.

Key words: Composite, Natural teeth, Bleaching, Shade matching.

Introduction

Anterior direct restorations are challenging in most of the times because such esthetic area requires proper and careful shade selection, and any minor mismatch of the shade will be noticeable. Shade selection procedure is not easy since it requires specific details regarding the time, the light and the shade tabs used during shade selection. Shades of many available composites sometimes are not matching the shades of the standard shade tabs which lead practitioners to use other methods to confirm the shades that make selection of the shade time consuming process. Many manufacturers tried to overcome such problem by providing composites that can blend with the surrounding tooth structure. Such blending effect in color science is termed as "chameleon effect" or the Von Bezold effect [1-3]. Shade mismatching may be somewhat mitigated by using dental composite, which has the benefit of color changing to blend in with the surrounding tooth structure. This will also make shade matching easier and enhance the aesthetic appeal [4]. One of these composites is Omnichroma which is manufactured in Japan by Tokuyama Dental America Inc. and launched to the market 2019. This composite has only one shade that the company claims to match the color of any tooth. The company also claims that Omnichroma match the shade of surrounding tooth structure after bleaching. There is shortage in the literature about evaluating shade matching of this material to natural teeth as well as evaluating shade match after bleaching. Therefore, it is essential to evaluate this material that could simplify the direct anterior restorations, improve esthetic and minimize the need to replace the composite after bleaching. The goal of our study was to analyses shade matching of Omnichroma composite to natural teeth as well as evaluate matching of this composite to surrounding tooth structure after bleaching.

Materials and Methods

This research was in-vitro using human natural teeth. 40 extracted anterior human natural teeth were collected, scaled then placed into numbered container contains 0.1% thymol. Any teeth with caries, fracture or restoration were excluded. All included teeth were kept moist all the time except during preparation and restoration. Preparation of class IV including half of the incisal edge distally extending to half of the middle third was done using straight fissure bur with 1mm bevel using flame diamond finishing bur. All teeth were etched using 37% phosphoric acid for 15 seconds then washed with water for 15 seconds then gently air dried. Bonding agent was applied then cured for 20 seconds. 20 teeth were restored using Omnichroma composite (Tokuyama Dental, Tokyo, Japan,) and cured using LED light for 20 seconds. The other 20 teeth were restored with Tetric-N-Ceram (Ivoclar Vivadent, Amherst, NY) as control group considering proper shade selection visually (using VITA classical shade guide) and using colorimeter then cured for 20 seconds. All teeth were finished using diamond finishing burs and Sof-Lex discs. After 24 hours single blind examiner evaluated the shade matching (as not matching and matching) of both groups visually. Then bleaching using 40% hydrogen peroxide for 60 minutes (20 minutes each cycle) was done for the Omnichroma group. Then

shade matching (as not matching or matching) was evaluated after 24 hours visually. All data were statistically analyzed using paired crosstabulation and McNemar test with a confidence interval of 95%.

Results and Discussion

Out of 20 teeth that were restored using Omnichroma composite 6 teeth were not matching (30%) while 14 teeth (70%) were matching. On the other hand, the 20 teeth of the control group showed 90% shade matching (18 teeth) and 10% (2 teeth) were not matching. No significant difference was found between the two groups (P=0.085) **(Figure 1)**.

Regarding the shade matching after bleaching for Omnichroma group, 12 teeth (60%) showed matching before and after bleaching, 4 teeth (20%) showed no matching before and after bleaching while 4 teeth (20%) were reversed (either from mismatching to matching or the opposite) with reported statistical significance (P=0.009) **(Figure 2)**.

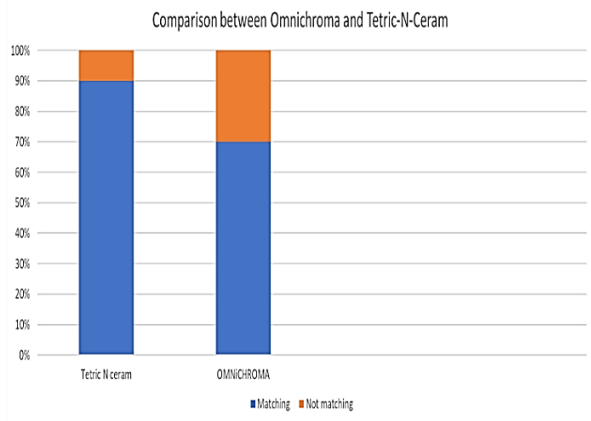

Figure 1. Comparison between Omnichroma and tetric0

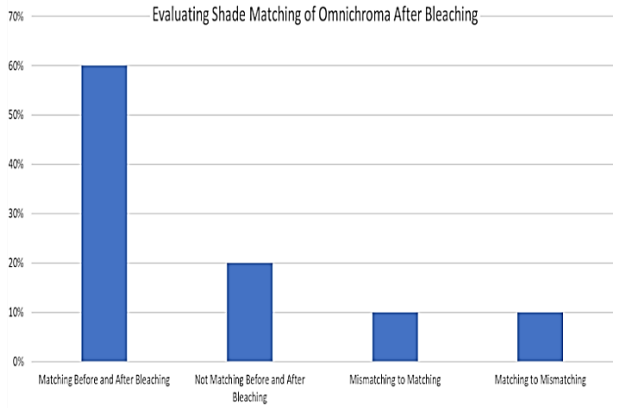

Figure 2. Evaluating shade matching of Omnichroma after bleaching

The aim of our study was to evaluate shade matching of Omnichroma composite to natural teeth before and after bleaching. Based on our results, there was no significant difference between the control group (Tetric-N-Ceram) with proper shade selection and Omnichroma group with single shade which suggest efficiency of Omnichroma composite for shade matching through the blending effect. When dental materials are viewed in touch, there is less of a color difference than when they are viewed individually. This phenomenon is known as the "blending effect" in dentistry. It describes how dental materials change color to match the surrounding tooth structure [5]. The blending effect helps the clinicians because it minimizes the shade mismatch between restorative material and the tooth structure. Paravina *et al*, found that the blending effect in dentistry depends on the material and the shade, increasing with more translucency and decreasing with bigger size of the restoration [6].

Our finding is in agreement with Sanchez *et al*., who found Omnichroma having the best color adjustment potential compared to the other tested composites on denture teeth[6]. Also, Chen *et al*., showed that Omnichroma matching better than the other tested composites [7]. While this result disagree with De Abreu *et al*., who reported Omnichroma having the higher color difference than the other tested composites on denture teeth [8]. Lyer *et al*, reported Omnichroma matching better with lighter shades [9]. In our study, most of the used natural teeth has lighter shades this can explain the better shade matching of Omnichroma composite to lighter shades teeth. On the other hand, statistical significant difference was found for the Omnichroma group before and after bleaching. This suggest the possible mismatch that might occurs after bleaching.

According to the manufacturer, there is no pigment in Omnichroma composite while its color properties depend on a smart chromatic technology for controlling the optical properties of the composite. This approach led to manufacturing resin composite that reflects a specific wavelength inside the tooth color space [10, 11]. Omnichroma composite composed of 260nm spherical filler (68% by volume) of silicon dioxide and zirconium dioxide, using Sol-Gel method for synthesizing uniformly sized fillers. According to the manufacturer, the refractive index of the Omnichroma tends to be higher after polymerization. Also, the translucency of Omnichroma increases after curing which achieves more natural appearance.

The primary constraint on our research is the limited sample size, which arises from the challenge of locating healthy removed anterior teeth. Additionally, there aren't many darker shade teeth. Future study considering the use of Omnichroma composite on patients is recommended.

Conclusion

Our findings suggest the potential of Omnichroma composite as a reliable choice in anterior restorations which eliminates the critical step of shade matching. There is

possible mismatch of Omnichroma composite after bleaching.

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Conflict of interest: None

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Ethics statement: Ethical approval was obtained from the research ethics committee at King Khalid University, Saudi Arabia. Application number: (IRB/KKUCOD/ETH/2020-21/015).

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