

To Evaluate The Color Matching Ability Of Dental Practitioners For Matching Two Commonly Used Light Cure Composite Materials, In Variable Thickness With Standard Vitapan Shade Guide.

Priyanka Dubey¹, Manish Agarwal², Purnima Verma³, Shraddha Pawar⁴

1. Senior Lecturer, Department of Conservative Dentistry and Endodontics, People's College Of Dental Sciences and Research Centre, Bhopal.
 2. Professor and Head Of The Department, Department of Conservative Dentistry and Endodontics, People's College Of Dental Sciences and Research Centre, Bhopal.
 3. Post-graduate student, Department Of Conservative Dentistry and Endodontics, People's College Of Dental Sciences and Research Centre, Bhopal.
 4. Post-graduate student, Department of Conservative Dentistry and Endodontics, People's College Of Dental Sciences and Research Centre, Bhopal.
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Abstract:

Background: Ocular changes are seen after the age of 40 in human beings. Therefore, ability to identify color shade and matching it becomes less as compared in their younger age. Also, in previous studies, it has been proven that females have better ability to appreciate color shade as compared to males. Hence, the purpose of this study was to evaluate the shade matching ability of dental practitioners for matching two commonly used light cure composite materials, in variable thickness with standard Vitapan shade guide after curing and polishing.

Material and method: 100 dental practitioners participated (50 males and 50 females), aged between 20 years to 39 years. They were given 6 composite shade tabs (3 tabs of charisma shades and 3 tabs of Ivoclar Vivadent) and were asked to compare their shades with standard Vitapan shade guide. They were also asked to look at a blue sheet while matching to relieve their eye fatigue.

Results: Among 100 practitioners, chi-square test showed more number of dentists in less than 30 years age group correctly identified A1 Charisma shade than other group.

Keywords: color matching, Vitapan shade guide, chi-square test, composite shade tabs.

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I. Introduction

For aesthetic dental restorations, it is essential that there is an accurate shade matching. Accurate shade matching can be performed using visual and/or instrument-based methods. While color matching instruments such as colorimeters and spectrophotometers are objectives, they are not widely used in dental practice yet.¹ Shade guides came as main tool for assessing and communicating the color of the teeth in clinical dentistry but, none of the shade guides available today cover the entire dental shade range. To improve reliability of shade selection procedures, the vitapan tooth shade system was developed. The manufacturer of this system claims that it helps to make shade matching simple, consistent and reproducible.^{2,3} In the esthetic part, anterior direct restoration of tooth should match the physical characteristics, strength and fine details. Shade match of posterior teeth is still important, but due to potential size and volume as well as stress-bearing nature, there are greater requirement for physical characteristics and strength. There are; various previous researches who states that females, postgraduates and younger dentists are much better in matching the shade of dental restorations as compared to males, undergraduates, older age dentists, respectively.⁴ In this study, we will evaluate the accuracy of dentists in shade matching of composite with vitapan shade guide.

II. Material And Methods

The subjects in the present cross-sectional, analytical descriptive study consisted of dental practitioners of Bhopal. The sample size was determined as 100 dental practitioners. In the inclusion criterion, we have included practitioners aged between 20 years to 39 years. In the exclusion criteria we have excluded practitioner aged

under 20 or over 39, unwillingness to take part in the study and affliction with color blindness as determined by Ishihara test.

STUDY DESIGN: Cross-sectional , experimental uncontrolled study.

STUDY LOCATION: Private practitioners of Bhopal.

STUDY DURATION: November 2017

SAMPLE SIZE: 100 private practitioners (50 males and 50 females)

SUBJECTS AND SELECTION METHODS: We have selected 100 private practitioners according to their age. 2 groups were made of composite i.e. Charisma and Ivoclar Vivadent to be compared with standard Vitapan Classical shade guide. Study was carried out in November 2017. Groups were divided as:

Group 1: Ivoclar Vivadent with shades A1, A2, A3.

Group 2: Charisma with shades A1, A2, A3.

INCLUSION CRITERIA:

1. 50 males and 50 females aged between 20 yrs. to 39 yrs.
2. Private dental practitioners.

EXCLUSION CRITERIA:

1. Under 20 years and above 39 years.
2. Non-practicing dentists.

III. Methodology

Steel mold was fabricated with 6 holes, each of 10mm x 4mm dimensions.



Total no of specimens: 6 specimens

3 specimens = A1, A2, A3 shade (charisma)



3 specimens = A1, A2, A3 shade (Ivoclar Vivadent)



After polymerization, specimens were grossly trimmed and polished by Shofu polishing kit. 100 observers were asked to determine the shades of the Vitapan Classical samples from 10 a.m. to 2 p.m. while sitting with his/her back towards the window. Each shade's code was covered with tape and only shade's tab will be visible.

A glass slab covered with grey colored paper is prepared and shade tabs are kept on the slab one by one.

Practitioners are asked to match the shade with the shade guide (Vitapan Classical) and meanwhile to prevent eye tiredness they were asked to look at a blue colored plate. The shades determined by the practitioners for each test shade were separately recorded for each system in the relevant questionnaires.

IV. Results

Table: showed more number of dentists in less than 30 years age group correctly identified A1 Charisma shade than other group.

Comparison of correct shade matching between different age groups for Charisma shades A1, A2 and A3.

Age groups	Correct shade matching		
	A1 n (%)	A2 n (%)	A3 n (%)
< 30 years (n = 80)	32 (40.00)	10 (12.50)	23 (28.75)
≥ 30 years (n =20)	03 (15.00)	01 (5.00)	05 (25.00)
Total (n =100)	35 (35.00)	11 (11.00)	28 (28.00)
Chi-square test	$\chi^2 = 4.396$, df = 1, P = 0.036 (<0.05), Sig.	$\chi^2 = 0.919$, df = 1, P = 0.338 (>0.05), Not sig.	$\chi^2 = 0.112$, df = 1, P = 0.738 (>0.05), Not sig.

In less than 30 years age group 32 (40.00%) dentists and in equal to or more than 30 years 03 (15.00%) dentists correctly identified A1 shade. **Chi-square test showed more number of dentists in less than 30 years age group correctly identified A1 Charisma shade than other group.**

.....Chi-square test showed no significant difference between age group for correct identification of A2 Charisma shade.

.....Chi-square test showed no significant difference between age group for correct identification of A3 Charisma shade.

Table 2 showed no significant difference between males and females for correct identification of Ivoclar Vivadent shades and CHARISMA shades

Age groups	Correct shade matching	
	Ivoclar n (%)	Charisma n (%)
Male (n = 120)	41 (34.17)	30 (25.00)
Female (n = 180)	55 (30.56)	44 (24.44)
Total (n =300)	96 (32.00)	74 (24.67)
Chi-square test	$\chi^2 = 0.431$, df = 1, P = 0.511 (>0.05), Not sig.	$\chi^2 = 0.012$, df = 1, P = 0.913 (>0.05), Not sig.

In overall comparison (100 A1 + 100 A2 + 100 A3 = total 300 samples), Chi-square test showed no significant difference between males and females for correct identification of Ivoclar shades.

Chi-square test showed no significant difference between males and females for correct identification of Charisma shades.

V. Discussion

According to Wear and Tear theory, organs or tissues get damaged due to overuse or abuse. That damage is not only restricted to organs, but it also involves the cellular structures also. Due to ageing, ability to repair the damaged tissues also decreases. According to published articles on ageing and ocular changes, mostly the refractive and presbyopic changes in eyes are seen after the age of 40, hence, in this study we have examined dentists aged between 20 to 39 years¹⁶. Also, many previous studies have documented that there is a big influence of gender in matching color shades. Pecho et al. have performed a study to observe the shade matching ability of males and females. They have selected 65 female participants and 35 male participants ranging in between 19 yrs. to 35yrs. of age. They have concluded that female participants were much better in matching color shade as compared with males¹⁷. Hence, in this study we have observed practitioner's shade matching ability in 2 aspects i.e. according to their age and gender.

Usually, in routine dental practice, a dentist never compare shades of composite with the shade guide. While doing aesthetic restorations practitioners directly compare the shade of composite with the shade of the tooth. Ideally, if the shades of each tooth is matching with the shade guide then it must match with corresponding shade of the composite also. Like if the A1 shade of tooth is matching with the A1 shade of Vitapan Classical shade guide then that shade must match with the A1 shade of composite. Shades of composite differ from the shades available in shade guide. Tooth shade selection has acted as the main factor in the restorative dentistry in which various factors such as light source, observed object, and observer affect color perception⁸.

As many of us are familiar, Vitapan Classical, consists of four arrangements (A1,A2,A3,A4,B1,B2,B3,B4,C1,C2,C3...D4). This shade guide used three dimensions of color i.e., Value, Chroma, and Hue to determine the shade with the consistent criteria. Although the shade guides do not fully express the natural color of teeth, they are still the main evaluation mechanisms in dentistry. In this study, 6 color shades of two different composite systems (Ivoclar Vivadent and CHARISMA) were compared with VITAPAN classical guide, by 100 dental practitioners aged between 20 years to 39years. 6 holes were made on a stainless steel mold and among them, 3 holes were poured with 3 shades of Ivoclar Vivadent and rest of the 3 by CHARISMA; and then all tabs were cured with light gun. Then these tabs were taken out of the mold and then were evaluated by 100 dental practitioners.

Bayindir et al. compared the coverage errors of three different shades and found that Vitapan 3D Master shade guide had the lowest error compared to other guides. In another study, Vita 3D-Master shade guide with the conventional guide was investigated. The results showed that restorations which were determined with the 3D-Master could be placed without any further shade corrections. However, almost 17% of restorations identified with the classical system required following shade modifications. Finally, they reported that the match of the selection shades with the 3D-Master was observed significantly better by the clinicians⁵. Hence, in this study we have chosen Vitapan shade guide as a standard shade guide for comparison.

Öngül et al. found that the ceramic crowns which were made with the Vita Tooth guide 3D-Master shade guide showed a closer color match with the natural teeth in comparison to Vitapan Classical guide. Additionally, the ΔE values and the observer's scores were determined within the range of clinical satisfactory for both investigated shade guides.⁶

Limitations of dental shade guides that incompletely represent the color range range of natural teeth is the polychromatic nature. Multiple shades within a single tooth makes shade guide useless. In such cases, most similar shade becomes priority rather than the exact polychromatic shade of teeth. But, it happens only in cases of single tooth, if there are multiple teeth in the same quadrant or arch, then any single shade which is compatible with the skin color of the patient is applicable.¹⁵

There are many more limitations like, patient's dissatisfaction, technicians and clinicians with inaccurate shade matching. Therefore, main role is played by the clinician to make patient satisfy and also to get accurate work done by the technicians and this can only be done when they are able to match the shade correctly.¹⁵

Visual perceptions of patient and clinician may also differ many a times, hence in future more studies can be done to compare the perception of the patient and clinicians.¹⁵

VI. Conclusion

As age progress many systemic diseases can occur and may affect the fundus of the eye and macule. Ability to appreciate and compare shade colors decreases with aging. Aesthetic dentistry needs perfection to enhance patient's appearance and confidence, and if a dentist fails to match shade correctly or to deliver that kind of treatment which makes patient satisfied then all efforts become negligible. By this study we have concluded that more number of dentists in less than 30 years age group correctly identified A1 Charisma shade than other group.

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