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Comparison of Skills and Knowledge Related to Prosthetic Tooth Shade Selection among Dental Practitioners in Third world Country.

Junaid Iqbal[1], Shifa Shahid[2] and Mansoor MM[3]*

[1]*Muhammad Junaid Iqbal, BDS, RDS, Registrar, SirSyed Medical and Dental College, Karachi, Pakistan*

[2]*Shifa Shahid, BDS, RDS, Research Assistant in Aga Khan University, Karachi, Pakistan*

[3]*Muhammad Mansoor Majeed, BDS, RDS, Post graduate Trainee, Dow University of Health Sciences, Karachi, Pakistan*

***Corresponding Author:** Dr. Muhammad Mansoor Majeed, BDS, RDS, Post graduate Trainee, Dow University of Health Sciences, Karachi, Pakistan.

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Abstract

A pleasant aesthetics is one of the most demanding requirements of Dentistry. Since many years, tooth color matching in prosthetic tooth replacements is relied on shade tab, with different hues and Chroma. Despite the simplicity of visual method, it has problems in accuracy and reproducibility. To overcome this problem, there are electronic devices which provide more accurate result without human error. However their use in general practice is nearly impossible.

The purpose of this study is to assess the knowledge and accuracy of dental practitioners regarding tooth shade selection. For evaluation, a questionnaire was distributed among the subjects. An exercise test was also conducted to check the skills of each participant, using a shade tab. In addition; color blindness was also checked through Ishihara test. Several factors affect the process of shade matching, namely light, background color, condition of the tooth, second opinion etc. In the current study it shows that postgraduate trainees are the most skillful in this procedure because of their interest in continuing education and grooming. Better dental aesthetics can be achieved by using both visual and instrumental method. Practitioner should be in the present mind of state and should follow all the requirements which can lead to the optimal results.

Keywords: *Shade selection; Tooth color; Knowledge and Practice; Dentist third world; Shade guide; Spectrophotometer; Colorimeter; Vitapan*

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Introduction

Over the years patients have become more aesthetically conscious about the appearance of their teeth and smile. [1] A person perceives his smile to have a major impact on his personal and social life, a smile also happens to be one of the major facial features that other people tend to notice. Therefore for a patient, achieving a well-proportioned, aesthetically pleasing smile determines the success for any treatment that the dentist offers. [2] Because of these challenges, accurate shade matching is now an essential part in the treatment

process; besides restoring the major functional needs of the patient. [1] The process uses both visual and instrumental methods although due to the ease of cost and availability, the visual method is more preferred. Commercial shade tabs like Vita Classic, Vita 3d Master ETC. are common examples of visual shade selection. [1]

In spite of its relative simplicity, the visual method has its own set of disadvantages. Appropriate lighting, chair positioning and basic knowledge of the standard shade protocols are essential to ensure accuracy. [1,3] In addition, reduced visual perception in the form of color blindness can also interfere with precise shade selection. Color vision deficiency is said to be either acquired or inherited and individuals have difficulty in distinguishing certain shades. [3,4]

Using traditional shade guides for matching shade to the natural dentition may prove to be a challenge for dental personnel who suffer from color blindness and prone them to make errors during the procedure.

Materials and Methodology

This study was performed to assess the knowledge and accuracy of dental practitioners regarding tooth shade selection on the basis of their chair side knowledge and skills. A conveniently selected sample of 251 dentists including final year students, house officers, postgraduate trainees, general dental Practitioners and consultants practicing in a government teaching hospital, Dow University of Health Science and in private setups, were asked to participate in this study. They were provided with a questionnaire and two practical exercises. The survey was conducted from 9 am to 2 pm, between the months of July 2016 to November 2016. The questionnaire was taken from a similar research conducted in Glasgow Dental School [37]. And was improvised as per our study design. The questions were designed, to evaluate academic and scientific knowledge about dental aesthetics and tooth shade selection protocols of the participants.

The second part of the study was a shade matching test where two Vitapan Classical shade tabs were used, 4 shades, A2, B2, A3, B3 were randomly extracted from one tab, their identification numbers were masked by tape and were then color coded, each shade allotted a different color code. Subjects viewed shade tabs (approximately 10 mm high) at a 30 cm distance, in order to follow the guidelines for two-degree CIE standard observers. [5] The subjects were then asked to match the masked shade with the corresponding Vita shade guide.

The exercise was performed under natural daylight and there was no time limitation. To reduce eye fatigue, a neutral blue card was also provided to the participants to look at for 15 seconds, during the test. The last part of the study was a color deficiency test, to check for any color deficiency in the participants involved in the study. The participants were tested by using Ishihara plates on a digital device with correct brightness level as adjusted by an eye specialist. Participant's eye should be perpendicular to the circle and approximately 75 cms away from screen. Five second were given for each plate in total of 38 plates. The test consists of a number of colored plates, called Ishihara plates; each plate contains a circle of dots appearing in randomized fashion of color and size. Ishihara plates are used to screen patients for color vision problems. They were asked to identify numbers written in plates without tallying with one another. The compiled data was analyzed by SPSS Version 16.

Results

First part of study based on knowledge and awareness of protocols. Results are as follow. Majority of the participants considered sunlight as most accurate light around 69.3%, while because of self-confidence and due to over burdening of the procedure 61.8% use white room light (Table 1).

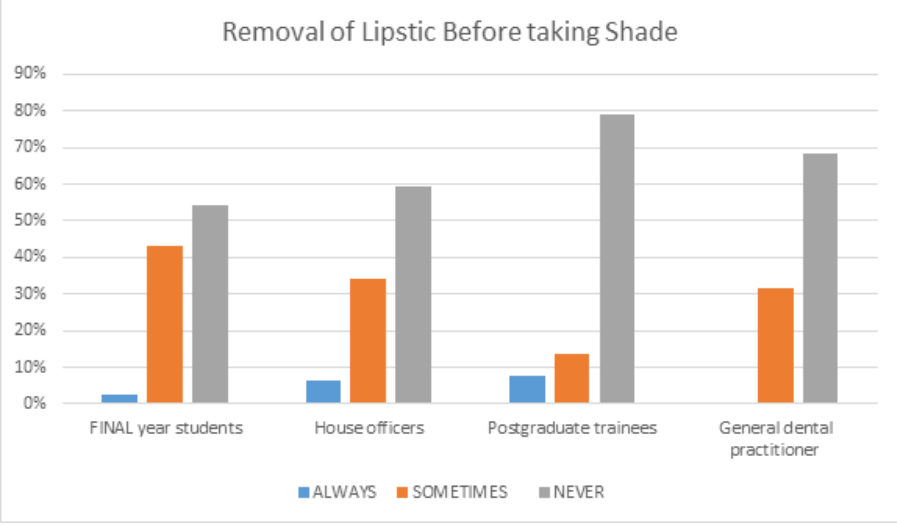
	Fluorescent	Sunlight with Proper Projection	Room White Light	Total	P value
Final year students	3 (4.4%)	23 (33.8%)	42 (61.8%)	68	0.01
House officers	1 (1.4%)	31 (41.9%)	42 (56.8%)	72	
Postgraduate Trainees	4 (6.9%)	26 (44.8%)	28 (48.3%)	58	
General Dental Practitioner	0 (0%)	6 (15.8%)	32 (84.2%)	38	
Consultants	0 (0%)	2 (15.4%)	11 (84.6%)	13	
Total	8 (3.2)	88 (35.1)	155 (61.8)	251	

Table 1: *Use of Light for Taking Shade by different groups.*

These levels are significant (P < 0.05). 45% said they do shade matching in the end of procedure while 39.4% said they do shade matching before the procedure, around half of the participants believe that second opinion is very important and more than 50% said they do change their selected shade as per patients will (Table 2). Significant percentage of the participants (96.4%) said they never take pictures for selecting shade, 57% said they sometimes consider selecting different shade on cervical and incisal part, 50% of practitioners said that color of operatory affects your shade, 65.7% of participants were aware from the significance of ABCD, 66.5% practitioners said they never ask the female patient to remove her lipstick (Figure 1) and 96% of practitioners said they always wet the tooth before selecting shade. (P < 0.05).

	Before the Procedure	In Between the Procedure	After the Procedure	P value
Final year Students	19.1%	19.1%	61.8%	0.00
House Officers	44.6%	27.0%	28.4%	
Postgraduate Trainees	69.0%	10.3%	20.7%	
General Dental Practitioner	21.1%	0%	78.9%	
Consultants	38.5 %	0%	61.5%	
Total	39.4	15.5	45.0	

Table 2: *When you do shade selection during dental treatment?*



Second part of study was a practical exercise to check the accuracy and skills of practitioners in tooth color matching, in total 74% practitioners match the shades accurately which is a good number. A3 is the most correct shade which is 78% followed by A2, B2, B3. Among the observer's postgraduate trainees have the most correct shade matching record of 89.2% followed by house officers, consultants, General Dental Practitioners (GDPs) and Final year students.

Discussion

This study is related to the perception of tooth shade its selection during dental aesthetic treatment, academic knowledge, protocol and implementation among final year students, house officers, postgraduate trainees, general dental practitioners and consultant dentists. This study is about to enhance the lacking and difficulties face among the observers.

In the current study we found similarities between the postgraduate trainees and house officers. Shade selection in dental treatment is not an easy task; shade which a practitioner selects will be the hallmark of a treatment for the observers. Aesthetics has become an important aspect of dentistry. From two decades, clinicians considered aesthetics as equally important as function, structure and biology and this study as previews show that practitioners face difficulties during this delicate process. [6,7] Specialize devices like calorimeter and spectrophotometer are not available during routine dental aesthetics treatment and this is supposed to be the major cause of difficulty during this procedure and shade selection is performed by a simple shade guide though visual method under different light conditions that will lead to inaccuracies and problems. [3,8,9]

Studies suggest that such problems can be overcome by using scientific methods, instrumental techniques which lead the practitioner to most accurate results. Another consideration for visual–instrumental method is that the human eye sees the heterogeneous aspects of tooth, the variations in shade, translucency and light effects this. An instrument amalgamates these characteristics in one, homogeneous shade [10-12]

Instead of remarkable results through calorimeter, spectrophotometer and other high-tech gadgets we cannot get benefits from it because of their expense and difficulty in portability, that's why simple visual method is one the top line throughout the world. [13,14]

Sun light from north consider to be as the standard light. [6,15,16] But we cannot depend upon sunlight totally because of the change in environmental condition, therefore florescent light of CRI 90 or above is recommended for dental surgeries because of greater amount of yellow hue in the rays of incandescent bulbs and dental unit lights it's not recommended. [17-19] In the current study we observed that more than half of participants are aware about the importance of good light and its projection.

It is recommended to select the shade prior to procedure and after the procedures both along with neighboring tooth. [10,21] In our study mostly observer prefer to select shade in the end of procedure after all the caries removal or some other procedures done after wetting the tooth. [21] When the tooth get dry from air blow or by good isolation its Chroma value changes. [16,20]

Tooth surrounding color like patients lip color, female patient makeup, dental unit color, operatory wall paint along with lightning conditions influence the correct shade matching. [22,23] It is recommended to ask female patients not to apply dark lipstick or remove before tooth shade matching. But due to some formalities and dilemma of society and wearisomeness of patient dentists usually do not prefer to ask about it.

It is suggested to maintain a parallel level between eye and tooth. The line of sight should be perpendicular to the surface of tooth. Observers do practice it in their routine and they are aware of its importance. Eye get fatigue if an object like tooth viewed for more than 10 seconds and color perception changes blue color have impact to get the strength back after eye fatigue so in between shade matching exercise we provide a blue color paper to overcome this internal error. [24-27]

Further it is preferred to ask your assistant and patient them self for second opinion and observers are aware about its importance on final outcome.

Tooth shade changes gradually from cervical to incisal region According to studies light scattered from gingiva modified the cervical shade of tooth while incisal shade in dominantly affected by background and is translucent. [28,29] Therefore different shade should be selected for different parts of tooth. In our study mostly doctors do follow this requirement for better result and patient satisfaction as what they can do in a practice. [30,31]

Vitapan shade guide is consider as the standard in dental practice among Practitioner because easy to use a system follows world-wide, Some different ceramic systems are also available with their own shade guide, it is included in our study to judge that either the participants are aware about the significance of letters A,B,C,D and NUMERICLE 1,2,3,4 presented on the shade tab. alphabets represents hue, a is reddish brown, b is reddish yellow, c is gray and d is reddish gray while numerical 1,2,3,4 represents saturation and intensity of color. [32,33]

The second part of study is a practical exercise that how accurate observers are in selecting the most accurate shade. In the given four shades A2, B2, A3, B3 OUT of 251 observant 74% match the shade accurately. A3, A2 are the most corrected shade match by practitioners probably it is because shades with HUE 'A' is the most frequent shade among the population of study and it is in their routine practice, and their eyes catch it very fast. [30,34,35]

Post graduate trainees selected the most corrected shade this is because of their more interest and devotion towards their work, they are more in to learning new things and observing different perspective of aesthetics and trying to implement with their best knowledge and effort. Discussing with their fellow trainees and supervisors building more confidence in them to try new things. More opportunities to understand things through articles and video lectures about new invention boost their level of intelligence. Secondly house officers have more interaction with post graduate students so they are learning and acquiring their skills too. House job is the first stage of confidence buildup for future continuing learning.

No major difference was observed among the students of different years in the ability to match the shade. The shade tab matching task depend on knowledge and awareness of dentistry about very minute differences in color of a dental crown, results are a representation of the participant's fundamental color matching ability. The similarity in the performance of participants is not very surprising as reported in other studies. [33,36]

Conclusion

It is concluded that Most of the third world country dentist are aware of the lights, methods and techniques of shade selection and follows the basic guidelines and mostly young graduates are more precise about aesthetics and proper shade selection.

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