Original Research

Evaluation of tooth color matching ability of dental interns vs. dental students in Riyadh Elm University

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A R T I C L E   I N F O

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A B S T R A C T

Aim
The aim of this study is to evaluate the accuracy of matching tooth shades between female dental interns and undergraduate clinical dentistry students in Riyadh Elm University.

Materials and Methods
A total of 120 female participant were included in this study (60 undergraduate dentistry student and 60 dental interns). Participants were asked to match the shade of three porcelain crowns of maxillary central incisor using Vitapan system in daylight.Three shades (A1, A2, and B1) were selected for this purpose. Data collected were analyzed using the Statistical Package for the Social Sciences (Version 23.0, SPSS, Chicago, IL, USA).

Results
Interns are more likely to correctly select the A1 shade than undergraduate students. Undergraduate students are more likely to correctly select the A2 shade than interns. Finally, interns are more likely to correctly select the B1 shade than undergraduate students. However, the association was statistically not significant (p>0.05).

Conclusions
In our study, most identified shade by both the interns and undergraduate dental students was A2, followed by A1 and the least identified was B1. Further studies on the need and impact of color science in dental education are warranted.

INTRODUCTION

In Riyadh Elm University (REU), dental students take operative dentistry (restorative) course in the third year (level five) learning how to do the restorations in an appropriate way. They learn what rules and guidelines should be followed which will be helpful for the students in their clinical years. In certain cases, the patient would need to have high esthetics demand especially in anterior teeth. Smile (teeth and perioral tissues) is considered an expression of utmost importance in reflecting an individual's personality.[1]Cultural factors and socio-demographic factors have been also implicated with tooth color as the major factor in dental esthetics. The influence of esthetic patterns and their relation with cultural, and educational background are not investigated.[2]

The harmony between tooth color and soft tissues is considered of great significance in determining individuals' satisfaction with dental appearance.[3-4] Accurate shade matching in dentistry has become essential to an optimal dental restoration and successful dental practice.[5]Natural teeth have characteristics that make shade selection difficult. Many factors influence

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tooth color including surface texture, translucency, and the color of the surrounding environment. When light contacts an object, it may be reflected, absorbed, scattered, or transmitted.[6]Participation of patients is encouraged in decision making with regards to oral health treatment including shade selection and smile design. The selection of an artificial tooth or restoration with a proper shade has shown to influence the patient's esthetic perception positively and improve prosthesis acceptance.[2]

The first circular color diagram was designed by Sir Isaac Newton in 1666. Over the years, many variations of the basic design have been made.Clark introduced a custom shade guide in 1931 based on visual assessment of human teeth, recorded in Munsell Hue, Value and Chroma. Acknowledging the deficiencies of the available guides, Sproullin the early 70s, suggested that an ideal shade guide should consist of shade (color) tabs that are well distributed and logically arranged in color space.[7] Tooth shade matching is most frequently performed visually using dental shade guide. The first shade guide was introduced in 1956 by Vita Zahnfabrik. The most popular shade guide is - VITA Classical, Chroma scope, Vitapan 3D-Master shade guide. VITA classical shade guide consist of 16 tabs, arranged into four groups based on the hue and within the group according to increasing Chroma. Hue is categorized by letter i.e., A = Orange, B = Yellow, C = Yellow/Gray and D = Orange/Gray. Chroma and Value are categorized by numbers i.e., 1 = least chromatic and highest value, 4 = most chromatic and lowest value.[8] A very popular shade guide used by dentists, still considered by many as the "gold standard" for color is the Vitapan®Classical Shade Guide, formerly Vita Lumin (Vita Zahnfabrik).[9]

Dental bachelor program in Saudi Arabia consists of six years. In fourth year, students enter the dental clinics and start working on patients under the supervision of qualified dentists. During patient treatment some cases may need aesthetic treatment including (tooth shade matching) and this specific part vary from practitioner to another. The aim of this study is to evaluate the accuracy of matching tooth shades between female dental interns and undergraduate clinical dentistry students in REU.

Methods

This study was conducted in REU clinics in Alnamuthajiya and Almunseya campuses.The study was approved by the Institutional Review Board of REU which is a private university. A total of 120 female participant were included in this study (60 undergraduate dentistry student and 60 dental interns). Participants were asked to sign an informed consent before participation.Participants were asked to match the shade of three porcelain crowns of maxillary central incisor using Vitapan system in daylight.Three shades (A1, A2, and B1) were selected for this purpose.Data collected were analyzed using the Statistical Package for the Social Sciences (Version 23.0, SPSS, Chicago, IL, USA). Descriptive analysis were performed to present the overview of the findings. Fisher's Exact was conducted to determine the associations between the categorical variables. All p-values ≤0.05 were considered statistically significant.

Results

Half (50%, n=30) of the interns and 43.3% (n=20) of undergraduate students had the ability to match A1 shade correctly (Figure 1). On the other hand, 81.7% (n=49) undergraduate students and 78.3% (n=47) interns had the ability to correctly match A2 shade (Figure 2). The ability to match B1 shade correctly was 48.3% (n=29)
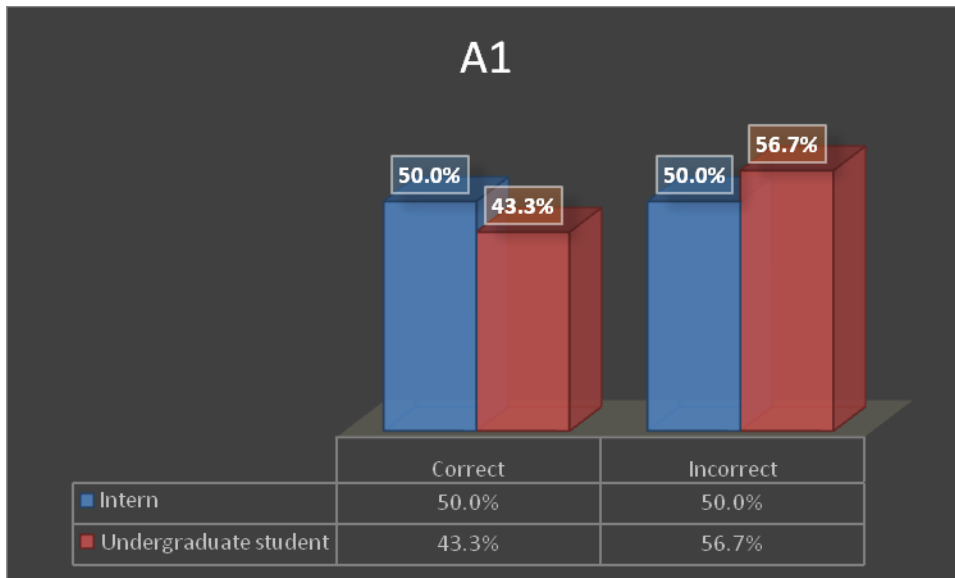
65

Figure and Tables

Figures

	Correct	Incorrect
■ Intern	50.0%	50.0%
■ Undergraduate student	43.3%	56.7%

Figure 1. Comparison of matching A1 shade between interns and undergraduate students

	Correct	Incorrect
■ Intern	78.3%	21.7%
■ Undergraduate student	81.7%	18.3%
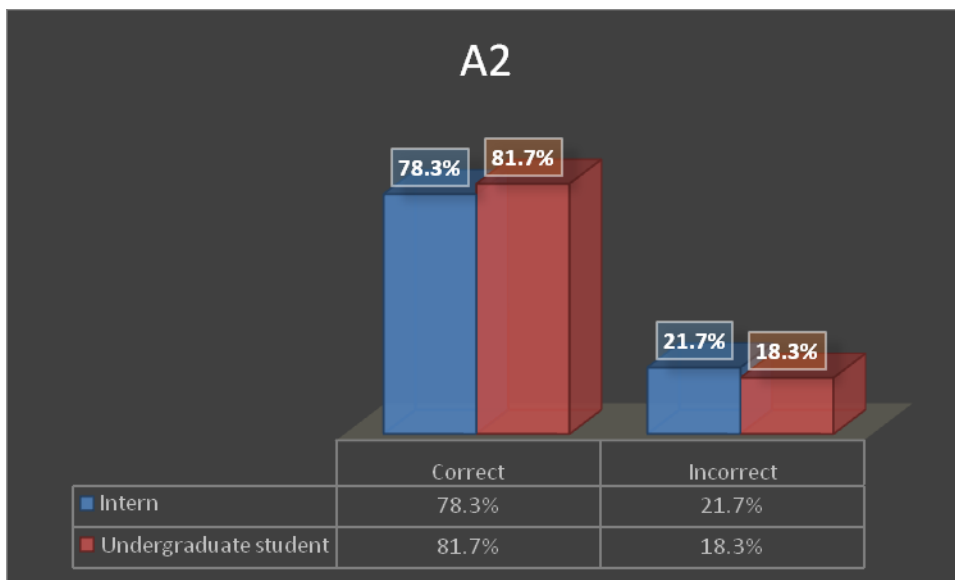
Figure 2. Comparison of matching A2 shade between interns and undergraduate students

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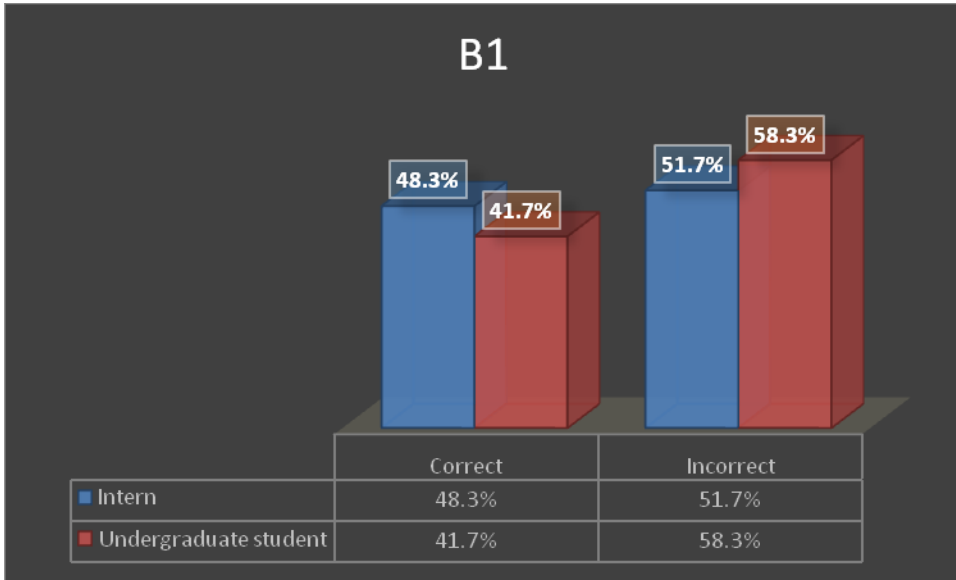
Figure 3. Comparison of matching B1 shade between interns and undergraduate students

	Correct	Incorrect
Intern	48.3%	51.7%
Undergraduate student	41.7%	58.3%
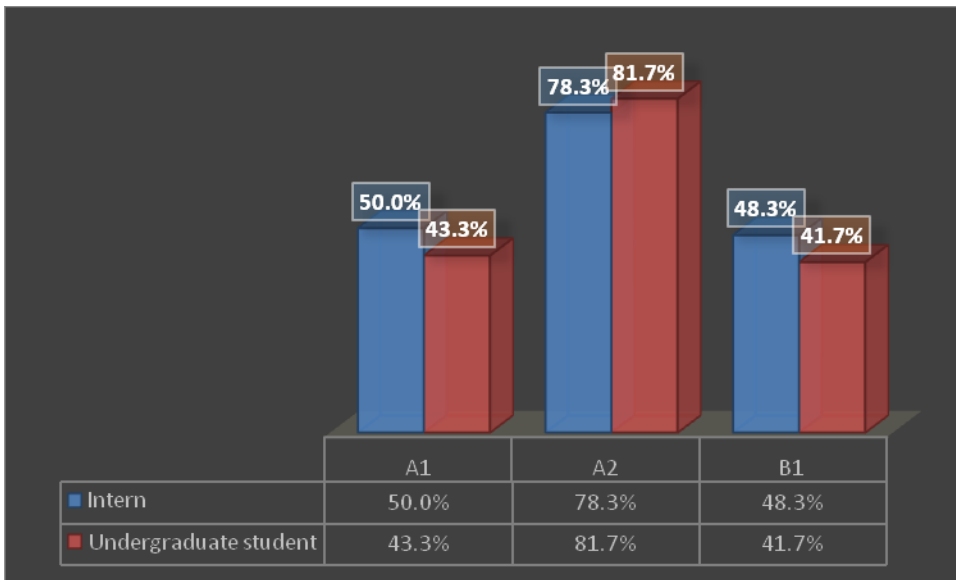
Figure 4. Comparison of correct matching of all shades between interns and undergraduate students

	A1	A2	B1
Intern	50.0%	78.3%	48.3%
Undergraduate student	43.3%	81.7%	41.7%

Tables

Table 1. Association between shade matching and group

• Shade	• Group	• Correct	• Incorrect	• p value
•	•	• n (%)	• n (%)	
• **A1**	• *Intern*	• 30 (50.0)	• 30 (50.0)	• 0.583
	• *Undergraduate student*	• 26 (43.3)	• 34 (56.7)	
• **A2**	• *Intern*	• 47 (78.3)	• 13 (21.7)	• 0.820
	• *Undergraduate student*	• 49 (81.7)	• 11 (18.3)	
• **B1**	• *Intern*	• 29 (48.3)	• 31 (51.7)	• 0.582
	• *Undergraduate student*	• 25 (41.7)	• 35 (58.3)	

and 41.7% (n=25) by interns and undergraduate students respectively (Figure 3).

Figure 4 shows comparison of correct matching of all shades between interns and undergraduate students. A2 shade was correctly matched by majority of the interns and undergraduate students, followed by A1 and B1. More interns correctly matched A1 and B2 shades than undergraduate students. However, A2 shade was correctly matched by more of undergraduate students than interns.

Table 1 shows association between shade matching and group. Two-way cross-tabulation and Fisher's exact test showed that Interns are more likely to correctly select the A1 shade than undergraduate students. Undergraduate students are more likely to correctly select the A2 shade than interns. Finally, interns are more likely to correctly select the B1 shade than undergraduate students. However, the association was statistically not significant (p>0.05).

Discussion

Social media influences the increasingly high expectations of patients in dentistry nowadays. Among all the various factors that influence ideal reproduction of tooth color, education in color science and clinical experience play a significant role in the visual color shade matching ability of a clinician.[10]The objective of this study was to compare the accuracy of shade selection between female dental interns and undergraduate dental students of REU. In our study, most identified shade by both the interns and undergraduate dental students was A2, followed by A1 and the least identified was B1.

The results of many studies have shown an association between clinical experience and ability to match tooth shades correctly and that was reflected in our study as more dental interns correctly identified the A1 and B1 shades (50% and 48.3%) in comparison to (43.3% and 41.3 %) of undergraduate dental students respectively. However, it was interesting to find that in A2 shade selection the undergraduate students did slightly better (81.7%) than interns (78.3%).

There was no enough time to collect large sample and include both gender. Hence, further studies on larger samples and compare between genders. Also recommended to fabricate different shades in the same crown (cervical, middle, and incisal). Based on the results, we would like to focus on improving the

knowledge of color. Suggested the need to enhance shade-matching ability by participating in hands-on courses, continuing education classes, and other training programs.For a good esthetic outcomes to be achieved, the dental students should consider all possible entities which influence shade selection.

Conclusion

Based on the findings of our study, we believe that further training about shade selection is needed for dentistry students at REU, especially practical training sessions of various case complexity. Further studies on the need and impact of color science in dental education are warranted.

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