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ASSESSMENT OF CHALLENGES EXPERIENCED BY DENTAL STUDENTS AND GRADUATES DURING FINAL SHADE SELECTION IN FIXED PROSTHESIS.

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Abstract

Introduction: Proper shade selection is essential for both direct and indirect restoration of dentition to achieve successful aesthetic dentistry that meets patient satisfaction and has a progressive impact on a person's personality. Choosing the right shade is one of the most fascinating aspects of giving teeth their original appearance back.

Objective: The main aim of the study is to assess the challenges experienced by dental students and graduates during final shade selection in fixed prostheses.

Material and Methods: A cross-sectional study was conducted among dental students and graduates of Dow University of Health Sciences, Karachi, Pakistan after the approval of IRB. Hence, study participants completed a self-administered questionnaire to assess the challenges experienced by final-year students and graduates during final shade selection in fixed prosthesis. For their convenience, online forms were also emailed to all the participants. A digital spectrophotometer was utilized to record the color coordinates of the real colors in a clinical setting. The correlation between socio-demographic variables and students' knowledge was assessed using a Pearson correlation.

Results: A total of 317 students were enrolled in the study. The response rate of the self-administered questionnaire was 78.5%. The average age of all participants was 24.5 ± 2.4 years. Almost 168 (52%) participants informed that knowledge regarding shade selection of tooth is being taught in dental school. Approximately 43 (53%) participants informed that knowledge regarding shade selection of tooth is given by delivering sessions, 23 (28%) participants informed that clinical training is given, and only 15 (18%) informed that both clinical training and sessions are given.

Conclusion: The results of the study concluded that dental students and graduates experienced challenges in final shade selection in fixed prostheses. Hence, for this purpose teaching faculty of dental schools should emphasize the importance of teaching color selection in dental schools through various clinical trainings and sessions. Enhancing knowledge and abilities through exposure also enhances one's perception of dental aesthetics in various extensive dental situations.

Keywords: Challenges, Dental students, fixed prosthesis, tooth shade, selection

Introduction

In recent years, a person's aesthetic sense has played a significant role in defining their character, making it an essential consideration. Previously, dental therapy primarily addressed practical needs. However, with the decline in caries cases, there is now a greater emphasis on dental health and visual appeal [1]. Aesthetics has gained more importance in modern dentistry, appearing to reflect an individual's personality. In the fields of prosthodontics and traditional dentistry, achieving a unique dental appearance is still a crucial task [2]. Maintaining a natural-looking smile is now a key responsibility in the fields of conservative and prosthetic dentistry [3]. An important goal in modern dental treatment is selecting the correct shade, which greatly affects patient satisfaction in restorative dentistry [4]. The significance of color selection in cosmetic dentistry is evident from the increasing number of patients seeking aesthetic improvements. Inadequate color choices often lead to unsuccessful restoration attempts. The most challenging aspect of prosthetic dentistry is selecting the color of a missing tooth that harmonizes with the adjacent teeth and incorporates the gingival tissue (emergence profile) [5].

The primary approach for manually assessing tooth shade is to utilize a portable shade guide tab provided by various dental manufacturers [6]. However, this method is subjective due to variations in the human eye and brain perception, as well as the influence of factors such as brightness, translucency, opalescence, reflectance, and fluorescence [7]. The position, contour, texture, and color of the restoration are the four main factors that determine the best outcome for cosmetic treatments [2]. Three variables constitute shadows in general such as Hue (H), Value (V), and Chroma (C). Hue distinguishes colors from one another, chroma depicts the strength, intensity, or vividness of color and value ranges from pure black to flawless white, representing the degree of color softness [8].

Shade guides, commonly employed and provided by dental product manufacturers, are utilized to visually evaluate tooth color [9]. The perception of tooth color by the human eye can be influenced by various factors, including lighting conditions, gingival shade, and the colors of the surrounding environment [10]. Tooth color is determined by the combination of enamel and dentin layers, which interact with light through absorption, replication, diffusion, or diversion [11]. The selection of accurate hues is primarily influenced by the quality of light, as changes in lighting conditions can impact perceived color [4]. Therefore, to achieve precise and consistent color matching, it is essential to have spectral dispersion and an appropriate light source. The most commonly used method in clinical settings is typically visual shade selection using a shade guide [12]. However, this approach is considered subjective due to its dependence on factors like age, gender, observer experience, eye fatigue, and ambient lighting [13]

The light source, the object being observed, and the viewer's capabilities are all factors that affect the matching of artificial tooth shades [14]. In dentistry, three light sources are utilized for selecting shades: the highly diverse natural daylight; the dental unit's operatory light, which reflects more towards the red part of the visible spectrum compared to natural daylight; and lastly, fluorescent ceiling lights, which have different color interpretation qualities based on their specific color temperature [4]

The tooth shade selection has significant importance in cosmetic dentistry. There is still debate among researchers regarding the absence of empirical proof for comparing variances in visual shade matching. Consequently, this study aims to assess the challenges experienced by dental students and graduates during final shade selection in fixed prostheses.

Objective

The main aim of the study is to assess the challenges experienced by dental students and graduates during final shade selection in fixed prostheses.

Material and methods

A cross-sectional study was conducted among 317 dental students and graduates of Dow University of Health Sciences Karachi, Pakistan, after the approval of IRB through convenience sampling. A sample size of 317 was estimated at a 95% confidence level and a 5% margin of error. The study included final-year students and graduates who were serving in the prosthodontics department. On the contrary, undergraduates (1st, 2nd, and 3rd-year students and Final year students/house officers who are not serving in the prosthodontics department, postgraduates, and dental specialists were excluded from the study.

Data collection

A self-administered paper-based and online questionnaire, consisting of socio-demographic data and other questions related to assessing the challenges experienced by dental students and graduates during final shade selection in fixed prosthesis were asked. Before the questionnaire, a concise explanation of the study's aims and objectives was provided to all the participants. Participants were also informed that their involvement was voluntary and that their confidentiality would be safeguarded. The questions regarding the challenges in the selection of tooth shade were assessed on a five-point Likert scale. These questions measured the challenges of participants about tooth shade and their appearance.

Statistical analysis

The data was analyzed using SPSS for Windows version 23.0, and a p-value of less than 0.05 was considered statistically significant. Mean & standard deviation was calculated along with Frequency & percentage. A Pearson correlation was conducted to assess the relationship between socio-demographic variables and students' knowledge.

Results

A total of 317 students were enrolled in the study. The response rate of the self-administered questionnaire was 78.5%. The average age of all participants was 24.5 ± 2.4 years. Almost 168 (52%) participants informed that knowledge regarding shade selection of tooth is being taught in dental school. Approximately 43 (53%) participants informed that knowledge regarding shade selection of tooth is given by delivering sessions, 23 (28%) participants informed that clinical training is given, and only 15 (18%) informed that both clinical training and sessions are given.

Table 1 Socio-Demographic Characteristics of Participants and selection of Shade through which Source of knowledge

Variables	Frequency/Percentage
Age	24.5 ± 2.4 years.
Gender	
Male	158 (49%)
Female	159 (50%)
Total	317 (100%)
Have shade selection taught officially in school	
Yes	168 (52%)
No	149 (47%)
Total	317 (100%)

If shade selection is taught, which method used	
Sessions	43 (53%)
Clinical training	23 (28%)
Sessions and clinical training	15 (18%)
Total	81

Table 2 Assessment of challenges experienced by Dental students and Graduates

Variables (n=317)	Frequency/percentages
Source of light	287 (90%)
Eye fatigue	245 (77%)
Structures adjacent to the tooth	252 (71%)
Environment	232 (73%)
Surroundings	227 (71%)
The make-up of the female patients	221 (69%)
Age	291 (91%)
Gender	295 (93%)

Table 3 Association between sociodemographic variables and students' knowledge

Variables	Status of knowledge		Pearson's Chi-square test	P-value
	Poor	Good		
Gender			1.202	0.432
Male	22	11		
Female	18	17		
Total	40	28		
Students/graduates			4.312	0.123
Final year students	19	13		
Graduates	20	14		

Discussion

The study aims to assess the challenges experienced by dental students and graduates during final shade selection in fixed prostheses. The two techniques, namely the Vitapan 3D Master Shade Guide and a digital spectrophotometer, were used to determine the tooth shade. The Vitapan 3D Master Shade Guide is known for its consistency and user-friendliness, which help the participants identify their perceived shade [15]. On the other hand, the digital spectrophotometer provided standardized and accurate readings, directly detecting the actual shade from the participants' oral cavities. This eliminated human error and the influence of ambient lighting [16, 17]. The participants in the study reported that the shade of their teeth influences their appearance as well as that of others. They also agreed that their dental shade can contribute to a more youthful and radiant look which is similar to a study in Saudi Arabia, the results of the study also showed a connection between patients' self-esteem and the color of their dental prosthesis or teeth [18].

The current research suggests a correlation between dental education and socio-demographic variables. The lack of awareness is due to not providing dental education related to proper tooth alignment, shape, and color which was similar to previous research which has indicated that dental education and training improve students' ability to match tooth shades [19,20]. The students, who had two lectures per year and practiced shade selection during four-hour weekly clinical sessions in the restorative, fixed prosthodontics, and comprehensive clinical courses, had better knowledge regarding the shade selection of teeth.

One of the study's strengths was its inclusion of an equal number of male and female participants, which enhanced the reliability of the results. Additionally, the study utilized a digital spectrophotometer to ensure standardized shade readings, minimizing the impact of human variances

or eye fatigue. The main limitation of the study at the moment was the technique which was chosen as convenience sampling, as it may introduce bias. Additionally, the study was limited to the dental OPDs of Dow University of Health Sciences, Karachi, which may not represent the general population. Another limitation was the study's scope which was restricted to the population residing in Karachi Pakistan only due to which its applicability to other groups was limited. To comprehensively assess the challenges experienced by dental students and graduates during final shade selection in fixed prostheses, it is essential to include various dental schools belonging to different parts of Pakistan and conduct further research.

Conclusions

The results suggest the significance of teaching tooth color selection in dental schools in Pakistan to enhance the ability of students to match colors and their perceptions regarding aesthetic appearance as this will further avoid the challenges that are usually experienced by dental students and graduates. This can be implemented by exposing students to a range of comprehensive dental cases during clinical sessions and training along with theoretical aspects for a better understanding of dental aesthetics.

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