



Knowledge Attitude and Practice of Dental Students on Shade Matching of Anterior Teeth

Dr. D. Indirapriyadarshini^{1*}, Dr. K. V. N. R. Pratap², Dr. T. Madhavi Padma³, Dr. V. Srujan Kumar⁴,
Dr. Surbhit Singh⁵

¹Student, Department of Public Health Dentistry, Mamata Dental College, Khammam, India.

²Professor and HOD, Department of Public Health Dentistry, Mamata Dental College, Khammam, India.

³Professor, Department of Public Health Dentistry, Mamata Dental College, Khammam, India.

^{4,5}Senior Lecturer, Department of Public Health Dentistry, Mamata Dental College, Khammam, India.

[Original Article](#)

*Corresponding Author: D. Indirapriyadarshini, Department of Public Health Dentistry, Mamata Dental College, Khammam, India.

E-mail: dhavathindirapriyadarshini@gmail.com

Crossref doi: <https://doi.org/10.36437/ijdrd.2025.7.1.G>

ABSTRACT

Accurate shade matching is crucial for achieving aesthetically pleasing anterior teeth restorations. It involves identifying the key factors influencing shade selection, such as tooth structure, lighting, and surrounding tissues. Various techniques, including visual, instrumental, and digital methods, can be employed to ensure accurate shade matching. Effective communication between the dentist and the patient is also vital to understanding patient expectations and ensuring satisfaction. By combining visual and instrumental techniques, involving patients in the process, and staying updated with the latest technologies, dentists can achieve natural-looking restorations that meet patient expectations. Ultimately, accurate shade matching significantly improves patient satisfaction and confidence, making it an essential aspect of anterior teeth.

Aim: To Achieve a Natural and Harmonious Smile more specifically, the goals of shade selection for anterior teeth are:

1. To match the shade of the restoration to the surrounding teeth: Ensuring a seamless blend and a natural appearance.
2. To create a harmonious balance between tooth color and surrounding tissues: Considering the color of the gums, lips, and facial skin tone.
3. To enhance the patient's smile and overall aesthetic appearance: Boosting confidence and self-esteem.
4. To ensure the restoration is virtually undetectable, Creating a restoration that looks and feels like a natural tooth.

By achieving these goals, shade selection for anterior teeth plays a critical role in delivering successful and aesthetically pleasing restorations.

Objectives

1. To accurately replicate the natural tooth color: Matching the shade, hue, and chroma of the surrounding teeth.



2. To achieve a harmonious balance between tooth color and surrounding tissues: Considering the color of the gums, lips, and facial skin tone.
3. To create a seamless blend between the restoration and adjacent teeth: Ensuring a natural appearance and minimizing visual detection.
4. To enhance the patient's smile and overall aesthetic appearance: Boosting confidence and self-esteem.
5. To ensure the restoration is virtually undetectable: Creating a restoration that looks and feels like a natural tooth.

Method: A cross-sectional survey was conducted among 213 dental students, comprising 86 males (40.4 %) and females 127 (59.6 %), including 84 final year BDS students, 73 third-year BDS students, and 56 interns. The survey included 14 questions exploring the Knowledge, attitude and practice of dental students on shade matching of anterior teeth among undergraduate dental students in Khammam city. Responses were analysed based on gender and year of study using the chi-square test, and p-value to identify the statistically significant difference.

Keywords: Anterior teeth, Aesthetic Dentistry, Shade Selection Techniques, Shade Matching.

Introduction

Shade matching of anterior teeth is a critical aspect of restorative dentistry that involves selecting the most accurate tooth shade to match the surrounding teeth. The anterior teeth, which include the incisors, canines, and premolars, are the most visible teeth in the mouth and play a significant role in determining the aesthetic appearance of the smile.

Accurate shade matching is essential to create a natural-looking restoration that blends seamlessly with the surrounding teeth. A mismatched shade can lead to an unnatural appearance, affecting the patient's self-confidence and overall satisfaction with the restoration.

With the advancements in dental materials and technologies, shade matching has become more complex and nuanced. Dentists must consider various factors, including tooth structure, lighting, and surrounding tissues, to achieve an accurate match.

In this context, shade matching of anterior teeth requires a thorough understanding of the principles of color science, dental materials, and clinical techniques. It also demands effective communication between the dentist, the laboratory technician, and the patient to ensure

that the final restoration meets the patient's expectations and aesthetic goals.

Key Characteristics: shade selection for anterior teeth is characterized as:

- 1. Color:** The shade selection should accurately match the color of the surrounding teeth, considering hue, saturation, and lightness.
- 2. Translucency:** Anterior teeth are semi-translucent, allowing light to pass through. The selected shade should mimic this translucency.
- 3. Value:** The shade selection should match the value (lightness or darkness) of the surrounding teeth.
- 4. Chroma:** The chroma (color intensity) of the selected shade should match the surrounding teeth.
- 5. Texture:** The texture of the selected shade should match the surrounding teeth, considering the presence of mamelons, perikymata, or other surface characteristics.
- 6. Luminosity:** The selected shade should have a similar luminosity (brightness) to the surrounding teeth.
- 7. Individuality:** Each patient's teeth are unique, and the selected shade should reflect this individuality.
- 8. Harmony:** The selected shade should create a harmonious balance with the surrounding teeth, gums, and facial tissues.

Methodology

A) Study design and area: A cross sectional study was carried out at tertiary care teaching hospital Khammam.

B) Study population: The health care students, including those of III year, IV year and Interns who responded to the offline paper print questionnaire survey.

C) Study Instrument: A self-administered questionnaire was designed based on knowledge attitude and awareness on brainstorming technique had total 14 questions .Each participant has to fill their demographic data like Name, age, and year of study. Participant has to select one option from the answers provided against questions. The questions were based on knowledge attitude, and awareness among undergraduate dental students.

D) Pilot study: A pilot study was conducted on a group of students to assess the validity and reliability of study.

E) Sampling Method: The sampling method used is the convenience method.

F) Inclusion criteria: The students who were interested in the study and who are willing to participate.

G) Exclusion criteria: Students who are not willing to participate are excluded.

Organizing the study: The study was designed in a paper-based version of the self-administered questionnaire of 14 questions focusing on knowledge, attitude, and practice Includes the sections of demographic data: Name, Age, Sex, and Year of study demographic information and asked to answer all questions by selecting one option from the provided answers.

Statistical analysis: Data from the filled questionnaire was conducted in a tabular form in an Excel worksheet and evaluated for analysis. The analysis was performed by SSPS version 29.

Results

A total of 213 students took part in this, with females (59.6%) and males of (40.4%). The Age of the participants ranged from 19-25 years. In this study, females were more likely to demonstrate shade matching of teeth than males. Significantly, Interns (26.3%) Final BDS (39.4%) III BDS (34.3%).

Distribution and comparison of responses based on gender:

Item	Response	Males		Females		Chi-Square value	P value
		n	%	n	%		
Q1	1	50	41.3	71	58.7	5.782	0.006*
	2	6	27.2	16	72.7		
	3	24	32.8	49	67.2		
	4	6	85.7	1	14.3		
Q2	1	8	32	17	68	2.750	0.432
	2	6	33.3	12	66.7		
	3	6	60	4	40		
	4	66	41.2	94	58.8		
Q3	1	57	40.7	83	59.3	1.920	0.589
	2	7	29.2	17	70.8		
	3	16	47.1	18	52.9		
	4	6	42.9	8	57.1		
Q4	1	6	33.3	12	66.7	0.697	0.874
	2	8	36.4	14	63.6		
	3	9	39.1	14	60.9		

	4	63	42	87	58		
Q5	1	1	12.5	7	87.5	2.930	0.402
	2	8	47.1	9	52.9		
	3	6	40	9	60		
	4	71	41	102	59		
Q6	1	81	42.6	109	57.4	3.720	0.05*
	2	4	21.7	15	78.3		
	3	1	25.0	3	75.0		
	4	0	0	0	0		
Q7	1	74	40	111	60	1.489	0.475
	2	13	40.7	16	59.3		
Q8	1	8	33.3	16	66.7	3.980	0.409
	2	2	16.7	10	83.3		
	3	13	46.4	15	53.6		
	4	11	40.7	16	59.3		
Q9	1	80	41.2	114	58.8	0.671	0.413
	2	4	31.6	10	68.4		
	3	0	0	3	100		
	4	2	100	0	0		
Q10	1	5	25	15	75	7.241	0.065
	2	73	42.9	97	57.1		
	3	9	53.8	15	46.2		
Q11	1	8	53.3	7	46.7	2.655	0.448
	2	8	36.4	14	63.6		
	3	9	30	21	70		
	4	61	41.8	85	58.2		
Q12	1	2	18.2	9	81.8	6.418	0.093
	2	69	45.1	84	54.9		
	3	16	25.8	34	74.2		
Q13	1	62	42.8	83	57.2	2.311	0.510
	2	6	26.1	17	73.9		
	3	11	39.3	17	60.7		
	4	7	41.2	10	58.8		
Q14	1	6	37.5	0	62.5	0.221	0.974
	2	5	38.5	8	61.5		
	3	7	36.8	12	63.2		
	4	6	41.2	97	58.8		

P≤0.05 is statistically significant

Item	Response	III BDS		IV BDS		INTERN		Chi-Value	P-Value
		n	%	n	%	n	%		
Q1	1	54	35.4	64	40.9	33	23.8	4.545	0.05*
	2	9	28.1	10	31.2	13	40.6		
	3	7	30.4	8	34.7	8	34.7		
	4	3		2		2			
Q2	1	6	24	10	40	9	36	28.554	0.0001*
	2	3	16.7	4	22.2	11	61.1		
	3	2	20	1	10	7	70		
	4	62	38.8	69	43.1	29	18.1		
Q3	1	55	39.3	58	41.4	27	19.3	21.445	0.002*
	2	4	16.7	6	25	14	58.3		
	3	12	35.3	12	35.3	10	29.4		
	4	1	7.1	8	57.1	5	35.7		
Q4	1	5	27.8	7	38.9	6	33.3	27.128	0.0001*
	2	2	9.1	6	27.3	14	63.6		
	3	7	30.4	6	26.1	10	43.5		
	4	59	39.3	65	43.3	26	17.3		
Q5	1	3	37.5	3	37.5	2	25	12.714	0.048*
	2	5	29.4	5	29.4	7	41.2		
	3	2	13.3	4	26.7	9	60		
	4	63	36.4	72	41.6	38	22		
Q6	1	66	34.7	77	40.5	47	24.7	2.257	0.323
	2	7	30.4	7	30.4	9	39.1		
	3	2	40.0	1	20.0	2	40.0		
	4	0	0	0	0	0	0		
Q7	1	64	34.6	74	40	47	25.4	2.712	0.607
	2	9	29.6	10	37	9	33.3		
Q8	1	9	37.5	10	41.7	5	20.8	34.979	0.001*
	2	1	8.3	2	16.7	9	75		
	3	7	25	6	21.4	15	53.6		
	4	14	51.9	8	29.6	5	18.5		
Q9	1	70	36.1	80	41.2	44	22.7	14.651	0.001*
	2	3	15.8	4	21.1	12	63.2		
	3	2	50.0	1	25.0	1	25.0		
	4	1	50.0	0	0	1	50.0		
Q10	1	7	35	7	35	6	30	12.306	0.055
	2	63	37.1	69	40.6	38	22.4		
	3	3	7.7	8	46.2	12	46.2		
Q11	1	6	40	5	33.3	4	26.7	33.408	0.0001*
	2	3	13.6	3	13.6	16	72.7		
	3	7	23.3	12	40	11	36.7		
	4	57	39	64	43.8	25	17.1		
Q12	1	1	9.1	4	36.4	6	54.5	14.996	0.020*

	2	59	38.6	63	41.2	31	20.3		
	3	13	25.8	17	41.9	19	32.3		
Q13	1	54	37.2	59	40.7	32	22.1	14.977	0.020*
	2	5	21.7	8	34.8	10	43.5		
	3	6	21.4	9	32.1	13	46.4		
	4	8	47.1	8	47.1	1	5.9		
Q14	1	3	18.8	7	43.8	6	37.5	17.924	0.006*
	2	3	23.1	1	7.7	9	69.2		
	3	8	42.1	9	47.4	2	10.5		
	4	59	35.8	67	40.6	39	23.6		

P<0.05 is statistically sign.

Discussion

Distribution and comparison of responses based on year of study

Importance of Shade Selection

Shade selection is a critical aspect of restorative dentistry, particularly for anterior teeth. Accurate shade matching ensures a natural-looking restoration that blends seamlessly with the surrounding teeth, enhancing the patient's smile and overall aesthetic appearance.

Principles of Shade Selection

- 1. Color:** The shade selection should accurately match the color of the surrounding teeth, considering hue, saturation, and lightness.
- 2. Translucency:** Anterior teeth are semi-translucent, allowing light to pass through. The selected shade should mimic this translucency.
- 3. Value:** The shade selection should match the value (lightness or darkness) of the surrounding teeth.
- 4. Chroma:** The chroma (color intensity) of the selected shade should match the surrounding teeth.

Methods of Shade Selection

- 1. Visual Shade Matching:** Using the human eye to match the shade of the restoration to the surrounding teeth.
- 2. Instrumental Shade Matching:** Utilizing digital instruments, such as spectrophotometers or colorimeters, to measure the shade of the teeth.

3. Digital Shade Matching: Using digital software and cameras to capture and analyze the tooth shade.

Factors Influencing Shade Selection

- 1. Tooth Structure:** The color and translucency of the tooth enamel and dentin.
- 2. Lighting Conditions:** Different lighting conditions can affect the perceived shade.
- 3. Surrounding Tissues:** The color and texture of the gums, lips, and facial skin tone.
- 4. Patient Preferences:** Patient expectations, personality, and lifestyle.

Challenges in Shade Selection

- 1. Variability in Tooth Color:** Teeth can exhibit significant color variations.
- 2. Limited Shade Options:** Commercial shade guides may not provide an exact match.
- 3. Lighting and Environmental Factors:** Changes in lighting and environmental conditions.

Best Practices for Shade Selection

1. Use a Combination of Visual and Instrumental Shade Matching Techniques.
2. Involve the Patient in the Shade Selection Process.
3. Consider the Tooth's Translucency and Texture.
4. Document the Shade Selection Process.

Conclusion

The findings of this study highlight the need for targeted educational interventions to enhance the knowledge and awareness of shade selection of

anterior teeth among undergraduate dental students. This can be achieved through the incorporation of shade matching of anterior teeth-related topics in the dental curriculum, conducting workshops and seminars, and providing access to reliable sources of information.

Shade selection for anterior teeth is a complex and multifaceted process that requires careful consideration of various factors, including tooth structure, lighting conditions, surrounding tissues, and patient preferences. Accurate shade matching is crucial for achieving a natural-looking restoration that enhances the patient's smile and overall aesthetic appearance.

References

1. Vichi A, Ferrari M, Davidson CL. Influence of ceramic and cement thickness on the masking of various types of opaque posts. *J Prosthet Dent* 2000;83:412-7. doi: [https://doi.org/10.1016/s0022-3913\(00\)70035-7](https://doi.org/10.1016/s0022-3913(00)70035-7)
2. Li Q, Yu H, Wang YN. Spectrophotometric evaluation of the optical influence of core build-up composites on all-ceramic materials. *Dent Mater* 2009;25:158-65. doi: <https://doi.org/10.1016/j.dental.2008.05.008>
3. Azer SS, Rosenstiel SF, Seghi RR, Johnston WM. Effect of substrate shades on the color of ceramic laminate veneers. *J Prosthet Dent* 2011;106:179-83. doi: [https://doi.org/10.1016/s0022-3913\(11\)60117-0](https://doi.org/10.1016/s0022-3913(11)60117-0)
4. Bergen SF. Color in esthetics. *N Y State Dent J* 1985;51:470-1. O'Brien WJ, Hemmendinger H, Boenke KM, Linger JB, Groh CL. Color distribution of three regions of extracted human teeth. *Dent Mater* 1997;13:179-85. doi: [https://doi.org/10.1016/s0109-5641\(97\)80121-2](https://doi.org/10.1016/s0109-5641(97)80121-2)
5. Magne P, Holz J. Stratification of composite restorations: Systematic and durable replication of natural aesthetics. *Pract Periodontics Aesthet Dent* 1996;8:61-8. doi: [https://doi.org/10.1016/s0109-5641\(97\)80121-2](https://doi.org/10.1016/s0109-5641(97)80121-2)

How to cite this Article: D. Indirapriyadarshini, K. V. N. R. Pratap, T. Madhavi Padma, V. Srujan Kumar, Surbhit Singh; *Knowledge Attitude and Practice of Dental Students on Shade Matching of Anterior Teeth*; *Int. J. Drug Res. Dental Sci.*, 2025; 7(1): 95-101, doi: <https://doi.org/10.36437/ijdrd.2025.7.1.G>

Source of Support: Nil, **Conflict of Interest:** Nil.

Received: 05-1-2025 **Revised:** 11-3-2025 **Accepted:** 14-3-2025