Awareness, attitude and application of dental students and practitioners on shade matching of anterior teeth in central India.

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Abstract
The aim of this awareness, attitude and application survey was to study the level of awareness among the dental students and practitioners in central India, towards shade selection of the anterior teeth. This research was performed in central India in September 2021. A survey was done among 280 participants, among whom questionnaire was handed out to fill accordingly. The outcome demonstrates that cosmetic considerations were the primary factor of anterior restorations. The majority of experts agree that light source is crucial to shade matching and selection since it might interfere with the process. The colour and look of teeth are a complicated phenomena influenced by several variables. Therefore, the dentist should consider every possible circumstance that might affect shade selection in order to get a desirable aesthetic result.

Keywords: Shade matching, Shade selection, Aesthetic, Anterior teeth, Awareness, Attitude, Dental practice.

Introduction

In modern dentistry, replicating the colour of a natural tooth with an artificial substitute remains a difficult task.[1,2] Restorative dentistry's success is still mostly depending on the patient's ability to function as well as aesthetic outcomes. To create a decent aesthetic, the four main principles must be followed. Location, geometry, texture, and colour are all needed variables.[3] A excellent cosmetic restoration that integrates in with the original dentition requires careful shade selection. Despite colour isn't extremely crucial to the physiologic progress of a restorative materials, it does play a significant role in patient compliance.[4] Understanding the concept of colour is vital in achieving good aesthetics, and colour distribution is absolutely essential for matching dental shades.[5] As a result, even for experienced dental professionals, choosing a chair side shade is now a crucial element in the patient's entire care.[6] Hue, chroma, and value, which are three dimensions, combine to create colour.[7] The term "hue" describes qualities that may be identified by colour terms like "red," "yellow," "green," "blue," or "purple.". Intensity or saturation of a colour, such as bright, dark, or royal blue, is measured by chroma. A color's value is a description of its relative brightness.[8,9] Hereditary, iatrogenic, physiologic, chemical, contagious, and environmental variables can all affect tooth colour.[7,10,11,12] The aim of this Awareness,

attitude, and Application survey is to study the level of knowledge among the dental students and dental practitioners toward shade matching of anterior teeth in central India. The colour and aesthetic appeal of teeth are a complex concept influenced by numerous factors. As a result, in order to achieve a good aesthetic outcome, the dentist should consider alternative entities that influence colour preference.

Materials and methods

This cross-sectional survey, which included interns, postgraduates, and practitioners, was performed in September 2021. Response was obtained from 280 participants. All the responses were recorded on individual survey forms for each practitioner.

Practice survey questionnaire:

1. Which of the above, in your perspective, is crucial throughout shade selection?
    A. Awareness
    B. Abilities
    C. Talent
    D. Individual Observer

2. Which of these would you believe has the most influence on hue selection?
    A. Hue
    B. Chroma
    C. Value
    D. Translucency

3. Which of the following variables has the greatest influence on colour perception:
    A. The source of light.
    B. Environment
    C. Tooth including, patterns and effects.
    D. Receiver (eye)

4. What would be the best duration for colour selection?
    A. less than 5 seconds**.**
    B. 5-10 seconds
    C. 10-15 seconds

D.15-20 seconds

5. Do you believe that choosing a colour at the start of a consultation is preferable to doing it later?
A. Yes   B. No

6. Do you believe that the patient's age, sex, and gender have a significant impact on the choice of shade?
A. Yes   B. No

7. Which age range, in your opinion, is more preoccupied with aesthetics?
A. Young Males
B. Young Female
C. Adult Male
D. Adult Female

8. What is, in your perspective, the most typical patient problem related to anterior tooth restoration?
A. Esthetics correction
B. Fractured tooth
C. Dental caries
D. Failed restoration

9.Which method do you prefer during shade selection.
A. Visual (manual)
B. Instrumental (mechanical)
C. Combination of both
D. Any of above

10. If manually observed, under what type of light would you do shade selection?
A. Dental Light
B. Fluorescent light
C. Natural daylight
D. Any of above

11. What method of isolation do you choose while doing shade matching for anterior restoration?
A. Rubber Dam Isolation
B. Cotton rolls and Absorbent wafers
C. Teflon Tape

D. Evacuator system & saliva ejector

12. What colour do you utilise the most frequently in your work?
A. A1
B. A2
C. B1
D. B2

13. Do you consider patients attire subdued during shade selection?
 A. Always
 B. Sometimes
 C. Never
 D. Not Known

14. The surroundings of the Clinical setup should be in which scale for accurate shade selection?
 A. Grey
 B. Black
 C. White
 D. Yellow

15. Which colour balances all the sensors of retina when dentist rest his/her eyes immediately before matching?
 A. Grey scale
 B. Yellow scale
 C. Blue Scale
 D. Black Scale

16. While selecting shade; what should be the viewing working distance approx..?
 A. At Eye level
 B. Below Eye level
 C. Above Eye level
 D. None of the above

17. Which tooth is recommended for selecting appropriate hue?
 A. Maxillary canine
 B. Maxillary central incisor
 C. Mandibular canine
 D. Mandibular central incisor

18. If exact tab is not selected what did you do? You select shade tab with
A. Shade tab with lower chroma and highest hue.
B. Shade tab with high chroma and lowest hue
C. Shade tab with high chroma and high hue
D. Shade tab with low chroma and low hue

19. Do we need second opinion in shade selection
A. Always
B. Sometimes
C. Never
D. Don't know

20. What is the appropriate quantity of light needed when choosing shades?
A. 1000 lux
B. 1500 lux
C. 2000 lux
D. 2500 lux

Results

Age, sex, gender, the date of the meeting, and the patient's perspective were among the most frequently mentioned factors in the questions that were raised. Moreover, among them, 65.7% of them noted manual method of shade selection and 28.2% of them chose a combination of both the methods. Moreover, when they were asked about the common most reason they come across for doing a shade selection of anterior teeth around 87.5% told esthetics while 9.6% told fracture of anterior teeth. 89.6% of them considered young female age group is more concerned about esthetics. While 23.6% of people used as rubber dam isolation while 60% of them preferred the use of cotton rolls and absorbing points but only 3.6% of them often the use of Teflon tape. To choose the color of teeth, dental shade guides are commonly used. They are used to select shades for conservative aesthetic restorations, which are

likely the most important part.[13,14] 43.9% clinicians always feels patients attire subdued during shade selection while 35.7% of them feels on sometime it will be responsible and tooth shade matching is the most important clinical step during prosthetic treatment as well.

Establishing the ideal situation for colour perception is a challenge, and this environment does not frequently occur in a dental setting.[15] Majority of them had difficulty while doing shade selection was mainly because of Viewing shades in low-quality lighting will affect how colour is interpreted. About 94.6% prefer shade selection in natural day light and 56.4% of them preferred to do shade selection whiten 5 s while 15.7%% of them take 5–10 s and 17.9% and 10% of them took 10–15 and 15–20 s. Around 61.4 % of clinicians think surroundings of the Clinical setup should be in grey scale for accurate shade selection. While 68.1% of them process grey scale colour balances all the sensors of retina when dentist rest his/her eyes immediately before matching and 82.1 % of them thought while selecting shade; working distance should be at Eye level.

Discussion

The present study has provided information on knowledge about the principles of tooth shade selection in dental students, interns, general dentists and specialists. The current literature has highlighted areas where clinical experience for students and interns in tooth shade selection needs to be improved. The results of present survey were gathered and statistical analysis was done using chi square test and the P value was significant for the analysis. The calculated results are shown in the given table. One of the most crucial aesthetic dentistry determinants is colour, which is determined by a number of variables, including the type and intensity of the light source, the time of day and year, the

angle of incidence, and the preferences of the patient, including their preferences for clothing, age group, and gender.[16] In most cases, eye colour, skin colour, and other variables affect and complicate shade-taking matching. [17,18]

The most common of these is the age. Light is among the most crucial variables, yet it is also one that is most frequently disregarded.[19] The colours of natural teeth will also be impacted by the colour that various skin tones contribute to the skin.[20,21] Due to this, researchers[22] advise viewing the patient at eye level so that the middle region of the retina is utilised while choosing shades. Wagenaar et al[23] had already noted that the eyes' capacity for colour perception rapidly declines anytime if tooth is seen for greater than 10 seconds, and that perceived colour does not appear stable. It has been suggested that in order to solve any discrepancies caused by eye fatigue, if a shade selection is made, to obtain a second viewpoint, including the participant's judgement. [23,24,25]

The majority of research participants understood the value of patients' personal opinions and second opinions throughout the shade choosing procedure. The instrumental approach, which offers an unbiased and technically correct shade evaluation, may be used to manage the shortcomings. [26,27] Yet, sophisticated tools like colorimeters and spectrophotometers are pricey and challenging to use in a clinical context, due to which visual technique is perhaps the most often utilised for shade determination in the whole globe.[28,29,30]

Conclusion

The process of determining shade is progressively becoming more precise. It is impossible to overstate the clinical importance of shade selection in cosmetic dentistry. One of the most crucial phases in cosmetic dental restorations is determining an exact and trustworthy shade match, and it

has always been a difficult task. Since comprehensive and extensive colour instruction has long been absent from the dentistry school curriculum, dentists appear to have little experience in visual physiology or colour science. Dental schools do not provide sufficient training in colour education to dental students. These days aesthetic dentistry is becoming more popular, proper guidance and interaction are needed for optimal and more acceptable shade matching results. Based on the findings of this study, the authors believe that more emphasis should be placed on working to improve colour science knowledge and its use in cosmetic dentistry, where teeth's colour and aesthetic are multidimensional subject influenced by a variety of components. Dental schools are following older technology in terms of training to colour. There have been a number of recent technologic and material advances that offer the potential to improve color matching in prosthetics. As a result, in order to obtain a good aesthetic output, the dentist should seek alternative entities that influence shade selection.

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Tables:

Sr.no.	QUESTIONS	RESULTS	Chi square value	P value
1.	Which of the above, in your perspective, is crucial throughout shade selection?	A. 25% B. 8.2% C. 0.4% D. 66.4%	291.800	0.001*
2.	Which of these would you believe has the most influence on hue selection?	A. 60.4% B. 14.6% C. 12.5% D. 12.5%	187.029	0.001*
3.	Which of the following variables has the greatest influence on colour perception:	A. 77.1% B. 2.5% C. 13.9% D. 6.4%	413.571	0.001*
4.	What would be the best duration for colour selection?	A. 56.4% B. 15.7% C. 17.9% D. 10%	151.200	0.001*
5.	Do you believe that choosing a colour at the start of a consultation is preferable to doing it later?	A. 87.5% B. 12.5%	157.500	0.001*
6.	Do you believe that the patient's age, sex, and gender have a significant impact on the choice of shade?	A. 95.4% B. 5.6%	230.414	0.001*
7.	Which age range, in your opinion, is more preoccupied with aesthetics?	A. 1.1% B. 89.6% C. 0.7% D. 8.6%	628.429	0.001*
8.	What is, in your perspective, the most typical patient problem related to anterior tooth restoration?	A. 87.5% B. 9.6% C. 2.1% D. 0.7%	588.426	0.001*
9.	Which method do you choose during shade selection?	A. 65.7% B. 1.4% C. 28.2% D. 4.6%	295.547	0.001*
10.	If manually observed, under what type of light would you do shade selection?	A. 5.4% B. 1.4% C. 91.4%	660.029	0.001*

		D. 1.8%		
11.	What method of isolation do you prefer while doing shade matching for anterior restoration?	A. 23.6% B. 60% C. 3.6% D. 12.9%	205.371	0.001*
12.	What colour do you utilise the most frequently in your work?	A. 9.6% B. 71.1% C. 10.4% D. 8.9%	317.086	0.001*
13.	Do you consider patients attire subdued during shade selection?	A. 43.9% B. 35.4% C. 10.4% D. 10.4%	100.171	0.001*
14.	The surroundings of the Clinical setup should be in which scale for accurate shade selection?	A. 61.4% B. 8.6% C. 25.7% D. 4.3%	226.971	0.001*
15.	Which colour balances all the sensors of retina when dentist rest his/her eyes immediately before matching?	A. 68.9% B. 10.7% C. 13.9% D. 6.4%	291.343	0.001*
16.	While selecting shade; what should be the viewing working distance approx..?	A. 82.1% B. 12.1% C. 2.5% D. 3.2%	494.086	0.001*
17.	Which tooth is recommended for selecting appropriate hue?	A. 60.7% B. 35% C. 2.9% D. 1.4%	271.200	0.001*
18.	If exact tab is not selected what did you do? You select shade tab with	A. 63.9% B. 25.4% C. 2.5% D. 8.2%	258.000	0.001*
19.	Do we need second opinion in shade selection	A. 20% B. 73.6% C. 5.4% D. 1.1%	374.371	0.001*
20.	What is the appropriate quantity of light needed when choosing shades?	A. 13.2% B. 39.3% C. 44.6% D. 2.9%	136.543	0.001*