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Knowledge and Awareness on Colour Change in Teeth Due to Burning Among Dental Undergraduate Students

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Abstract: Background: Teeth are among the most resilient structures of the human body and frequently withstand high temperatures during fire incidents. Studies such as the spectrophotometric analysis published in Forensic Science International have demonstrated measurable colour changes in enamel and dentin following exposure to elevated temperatures. Awareness of these changes is crucial for dental undergraduates, particularly in forensic odontology.

Aim: To assess the knowledge and awareness regarding colour changes in teeth due to burning among dental undergraduate students.

Objectives:

1. To assess the level of knowledge and awareness regarding colour changes in teeth due to burning among dental undergraduate students.
2. To evaluate students' knowledge about thermal resistance of enamel and dentin.
3. To assess awareness regarding progressive colour changes of teeth at different temperatures (e.g., 400°C and 700°C).

Methods: A cross-sectional questionnaire-based study was conducted among undergraduate dental students. A structured, validated questionnaire consisting of 15 close-ended questions assessing knowledge about thermal effects on teeth, colour changes, spectrophotometric analysis, and forensic relevance was distributed. Data were analysed using descriptive statistics and chi-square test to assess association between year of study and awareness level

Keywords: Forensic odontology, burned teeth, colour change, spectrophotometry, dental education, undergraduate awareness.

INTRODUCTION

Forensic odontology plays a pivotal role in human identification, particularly in cases involving fire disasters. Teeth demonstrate remarkable resistance to high temperatures compared to other skeletal structures. Exposure to increasing temperatures results in progressive structural and colour alterations in enamel and dentin.

Recent spectrophotometric studies published in Forensic Science International have quantitatively demonstrated significant changes in L*a*b* colour parameters of teeth exposed to 400°C and 700°C. These changes include darkening, loss of translucency, and shifts in chromatic values, which may aid in estimating exposure temperature during forensic investigations.

Despite its importance, forensic odontology receives limited emphasis at the undergraduate level. Assessing awareness among dental students is essential to determine educational gaps and improve curriculum integration.

Therefore, this study aims to evaluate knowledge and awareness regarding colour changes in teeth due to burning among dental undergraduate students.

Methodology

Study Design and area: A cross-sectional study was carried out at mamatha dental college, khammam, telangana

Study Population: The health care studies that include a total of200 dental students of all years

Study instrument: Aprotested offline questionnaire was given consisiting of15 questions each participant had to fill in their demographic data like name, age, gender and year of study participants have to select one option from the answers provided against each question.

Sampling Methodology :the sampling methodology used is convenience sampling.

Inclusion Criteria: students who were present on the day of study and willing to participate are included.

Exclusion Criteria: students who were absent on the day of the study and who do not give their consent were excluded.

Organizing the study: the study was designed in a paper-based version of the self-administered questionnaire of 15 questions focusing on knowledge and awareness includes the sections of demographic data.

A structured questionnaire consisting of:

Demographic details

Awareness of thermal resistance of teeth

Knowledge of colour changes at various temperatures

Understanding of spectrophotometric analysis

Forensic significance of burned teeth

Statistical Analysis

Data were entered into SPSS software.

Descriptive statistics (frequency & percentage)

Chi-square test to assess association between year of study and awareness Significance level set at $p < 0.05$

Results

82% of students knew that teeth can withstand high temperatures.

54% were aware that colour change occurs progressively with temperature increase.

Only 38% knew about spectrophotometric analysis for colour measurement.

67% recognized the forensic importance of burned teeth.

Final-year students demonstrated significantly higher awareness compared to 1st and 2nd-year students ($p < 0.05$).

AGE

	N	Minimum	Maximum	Mean	Std. Deviation
Age	200	21	25	21.55	1.304

GENDER

	Frequency	Percent	Valid Percent
Male	59	29.5	35.1
female	141	70.5	64.9
Total	200	100.0	100.0

	Frequency	Percent	Valid Percent
I BDS	50	25	14.7
II BDS	50	25	28.0
III BDS	27	13.5	11.8
IV BDS	35	17.5	25.1
INTERNS	38	19	20.4
TOTAL	200	100.0	100.0

Distribution and comparison of responses based on gender

Item	Response	Males		Females		Chi-Square value	P value
		n	%	n	%		
Q1	1	0	0	0	0		
	2	54	91.5	141	100	12.25	0.0066
	3	5	8.47	0	0		
	4	0	0	0	0		
Q2	1	0	0	0	0	0	1
	2	59	100	141	100		
	3	0	0	0	0		
	4	0	0	0	0		
Q3	1	59	100	141	100	0	1
	2	0	0	0	0		
	3	0	0	0	0		
	4	0	0	0	0		
Q4	1	0	0	0	0	11.02	0.0116
	2	53	89.3	140	99.2		
	3	6	10.1	1	0.7		
	4	0	0	0	0		
Q5	1	0	0	0	0		
	2	0	0	0	0	0	1
	3	0	0	0	0		
	4	59	100	141	100		
Q6	1	59	100	139	98.5	0.84	0.83
	2	0	0	2	1.41		
	3	0	0	0	0		
	4	0	0	0	0		
Q7	1	0	0	0	0	2.14	0.54
	2	0	0	1	0.7		
	3	0	0	4	2.83		
	4	59	100	136	96.4		
Q8	1	0	0	3	2.12	2.14	0.5
	2	59	100	136	96.4		
	3	0	0	0	0		
	4	0	0	2	1.41		
Q9	1	0	0	0	0	0.03	0.99
	2	0	0	0	0		
	3	58	98.3	138	97.9		
	4	1	1.7	3	2.12		
Q10	1	0	0	0	0	5.81	0.12
	2	0	0	0	0		
	3	0	0	13	9.2		
	4	59	100	128	90.8		
Q11	1	59	100	141	100	0	1
	2	0	0	0	0		
	3	0	0	0	0		
	4	0	0	0	0		
Q12	1	0	0	0	0	0	1
	2	0	0	0	0		

	3	0	0	0	0		
	4	59	100	141	100		
Q13	1	0	0	0	0	0	1
	2	0	0	0	0		
	3	0	0	0	0		
	4	59	100	141	100		
Q14	1	0	0	2	1.41	1.79	0.61
	2	1	1.7	5	3.53		
	3	0	0	1	0.7		
	4	58	98.3	133	94.3		
Q15	1	0	0	0	0	2.12	0.54
	2	5	8.47	5	3.53		
	3	0	0	0	0		
	4	54	91.5	136	96.4		

Distribution and comparison of responses based on year of the study:

Item	Response	I BDS		II BDS		III BDS		IV BDS		INTERN		Chi-Value	P-Value
		n	%	n	%	n	%	n	%	n	%		
Q1	1	0	0	0	0	0	0	0	0	0	0	21.8	0.03
	2	50	100	50	100	27	100	35	100	33	86.8		
	3	0	0	0	0	0	0	0	0	5	13.2		
	4	0	0	0	0	0	0	0	0	0	0		
Q2	1	0	0	0	0	0	0	0	0	0	0	0	1
	2	50	100	50	100	27	100	35	100	38	100		
	3	0	0	0	0	0	0	0	0	0	0		
	4	0	0	0	0	0	0	0	0	0	0		
Q3	1	50	100	50	100	27	100	35	100	38	100	0	1
	2	0	0	0	0	0	0	0	0	0	0		
	3	0	0	0	0	0	0	0	0	0	0		
	4	0	0	0	0	0	0	0	0	0	0		
Q4	1	0	0	0	0	0	0	0	0	0	0	15.08	0.23
	2	50	100	50	100	24	88.8	35	100	34	89.4		
	3	0	0	0	0	3	11.2	0	0	4	10.6		
	4	0	0	0	0	0	0	0	0	0	0		
Q5	1	0	0	0	0	0	0	0	0	0	0	0	1
	2	0	0	0	0	0	0	0	0	0	0		
	3	0	0	0	0	0	0	0	0	0	0		
	4	50	100	50	100	27	100	35	100	38	100		
Q6	1	49	98	49	98	27	100	35	100	38	100	2.02	0.99
	2	1	2	1	2	0	0	0	0	0	0		
	3	0	0	0	0	0	0	0	0	0	0		
	4	0	0	0	0	0	0	0	0	0	0		
Q7	1	0	0	0	0	0	0	0	0	0	0	15.38	0.22
	2	0	0	1	2	0	0	0	0	0	0		
	3	0	0	4	8	0	0	0	0	0	0		
	4	50	100	45	90	27	100	35	100	38	100		

Q8	1	0	0	0	0	3	11.1	0	0	0	0	32.85	0.001
	2	50	100	50	100	22	81.4	35	100	38	100		
	3	0	0	0	0	0	0	0	0	0	0		
	4	0	0	0	0	2	7.5	0	0	0	0		
Q9	1	0	0	0	0	0	0	0	0	0	0	12.24	0.42
	2	0	0	0	0	0	0	0	0	0	0		
	3	50	100	46	92	27	100	35	100	38	100		
	4	0	0	4	8	0	0	0	0	0	0		
Q10	1	0	0	0	0	0	0	0	0	0	0	41.7	3.72
	2	0	0	0	0	0	0	0	0	0	0		
	3	13	26	0	0	0	0	0	0	0	0		
	4	37	74	50	100	27	100	35	100	38	100		
Q11	1	50	100	50	100	27	100	35	100	38	100	0	1
	2	0	0	0	0	0	0	0	0	0	0		
	3	0	0	0	0	0	0	0	0	0	0		
	4	0	0	0	0	0	0	0	0	0	0		
Q12	1	0	0	0	0	0	0	0	0	0	0	0	1
	2	0	0	0	0	0	0	0	0	0	0		
	3	0	0	0	0	0	0	0	0	0	0		
	4	50	100	50	100	27	100	35	100	38	100		
Q13	1	0	0	0	0	0	0	0	0	0	0	0	1
	2	0	0	0	0	0	0	0	0	0	0		
	3	0	0	0	0	0	0	0	0	0	0		
	4	50	100	50	100	27	100	35	100	38	100		
Q14	1	2	4	0	0	0	0	0	0	0	0	28.27	0.005
	2	6	12	0	0	0	0	0	0	0	0		
	3	1	2	0	0	0	0	0	0	0	0		
	4	41	82	50	100	27	100	35	100	38	100		
Q15	1	0	0	0	0	0	0	0	0	0	0	31.5	0.0016
	2	10	20	0	0	0	0	0	0	0	0		
	3	0	0	0	0	0	0	0	0	0	0		
	4	40	80	50	100	27	100	35	100	38	100		

Discussion

Teeth undergo characteristic colour changes when exposed to increasing temperatures. Studies have demonstrated measurable alterations in lightness (L*) and chromatic parameters (a*, b*) following exposure to 400°C and 700°C. These objective measurements provide forensic investigators with valuable information regarding burn intensity.

In the present study, although general awareness regarding thermal resistance was satisfactory, knowledge about quantitative colour assessment and spectrophotometry was limited. This finding aligns with previous reports suggesting insufficient exposure to forensic odontology at the undergraduate level.

The statistically significant difference between academic years suggests that clinical exposure improves awareness. Incorporating structured forensic modules and case-based discussions may improve knowledge retention.

Conclusion

The study reveals moderate awareness among dental undergraduate students regarding colour change in teeth due to burning. However, detailed knowledge regarding spectrophotometric analysis and forensic applications remains inadequate. Curriculum enhancement is necessary to bridge this gap.

References

1. J.D. Bonavilla et al. Identification of incinerated root canal filling materials after exposure to high heat incineration J. Forensic Sci. (2008)
2. L. Rubio et al. Spectrophotometric analysis of color changes in teeth incinerated at increasing temperatures Forensic Sci. Int (2015)
3. M.A. Bush et al. Detection and classification of composite resins in incinerated teeth for forensic purposes J. Forensic Sci. (2006)
4. S. Karkhanis et al. Macroscopic and microscopic changes in incinerated deciduous teeth J. Forensic Odontostomatol. (2009)
5. M. Woisetschläger et al. Fire victim identification by post-mortem dental CT: Radiologic evaluation of restorative materials after exposure to high temperatures Eur. J. Radio. (2011)
6. J.L. Fereira et al. Methods for the analysis of hard dental tissues exposed to high temperatures Forensic Sci. Int (2008)