

Dental professional's perspective regarding knowledge, awareness, and attitude towards the importance of charting dental anomalies: a cross-sectional study

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KEYWORDS

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ABSTRACT

Objectives: The presence of dental anomalies could play a significant role in the identification of individuals by comparing antemortem and postmortem data. This cross-sectional study aimed to assess the level of knowledge, attitude, and awareness among dental professionals regarding the importance of charting dental anomalies and maintaining dental records.

Methodology: A self-structured questionnaire was e-mailed to dental professionals practicing in India. The responses were recorded, data tabulated, and one-way ANOVA and post hoc tests were applied for analysis. The criterion for significance was $p < .05$.

Results: A total of 406 dental professionals responded to the survey. A significant difference was observed in the mean attitude score of participants towards the importance of charting dental anomalies and maintaining dental records with regard to place of work ($p=.001$), gender ($p=.044$) and educational qualification ($p=.039$). In addition, a statistically significant difference was observed in the mean awareness score of participants with respect to place of work ($p=.033$) and gender ($p=.001$). The major barriers in maintaining dental records were lack of time, adequate knowledge, infrastructure, and financial constraints.

Conclusion: 81.3% and 69.26% study participants had very good awareness and attitude, whereas 71.2% had good knowledge regarding the importance of charting dental anomalies and maintenance of dental records; however, their inaccurate responses in anomaly identification hinted towards the need for proper dental charting and their maintenance to be taught *en masse* and made part of the BDS curriculum.

INTRODUCTION

In the current era, the rise in man-made and natural mass disasters necessitates the accurate identification of an individual's body when it is highly decomposed or intentionally dismembered.¹ Comparison of postmortem with antemortem data plays an important role in establishing an individual's identity.² Anything that shows variation from normal becomes a vital part of the identification to distinguish one person from the other.³ Dental anomalies could be defined as craniofacial abnormalities of position, function, or form of the teeth, bones, and tissues of the jaws and mouth. These anomalies may exist as variations in the normal shape, size, colour, number,

identification process. However, very few studies have assessed the knowledge and attitude of dental professionals regarding the importance of charting dental anomalies.^{4,5} Thus, this study aimed to assess the level of knowledge, attitude, and awareness among dental professionals regarding the importance of charting dental anomalies and maintaining dental records.

METHODOLOGY

This cross-sectional questionnaire-based survey was conducted among graduate and postgraduate dental professionals practicing in India. Ethical approval was obtained from the institutional ethics committee (PGIDS/BHRC/20/17). The sample size was calculated at 95% confidence level and 5% margin of error with a web-based research advisors sample size calculator, which came out to be 384. A self-structured questionnaire was sent to members of various professional groups via email to assess the knowledge, attitude, and awareness among dental professionals regarding the importance of charting dental anomalies and maintaining dental records. Responses by the participants to the questionnaire were considered as their willingness to participate in the study. The link for the survey was live for a period of five months from January-May 2021, during which 406

participants responded, with a response rate of 62.46%.

The questionnaire was divided into three sections. The first section included questions pertaining to demographics of the responding practitioner. The second section assessed the participant's knowledge regarding how to chart the dental casts. Dental anomalies on casts were fabricated with the help of ivory wax or by modification of teeth on casts, the photographs of which were further modified by Adobe Photoshop CS6 (Adobe Systems Incorporated, California, USA). Two-dimensional photographs of two maxillary and one mandibular permanent dentition casts were included in the questionnaire (Figure 1). Maxillary and mandibular casts that demonstrated the FDI tooth numbering system were also included in the Google forms prior to the dental anomaly charting section for the reference of participants. The third section comprised of questions to assess the awareness and attitude of dental professionals regarding the importance of charting dental anomalies and maintaining dental records as well as barriers encountered in maintaining them (Figure 2). A pilot study was conducted to check the validity of the questionnaire by getting the questionnaire filled by ten dental professionals.

Figure 1. Pictures of casts incorporated in the questionnaire for charting task with labelled anomalies included in the charting

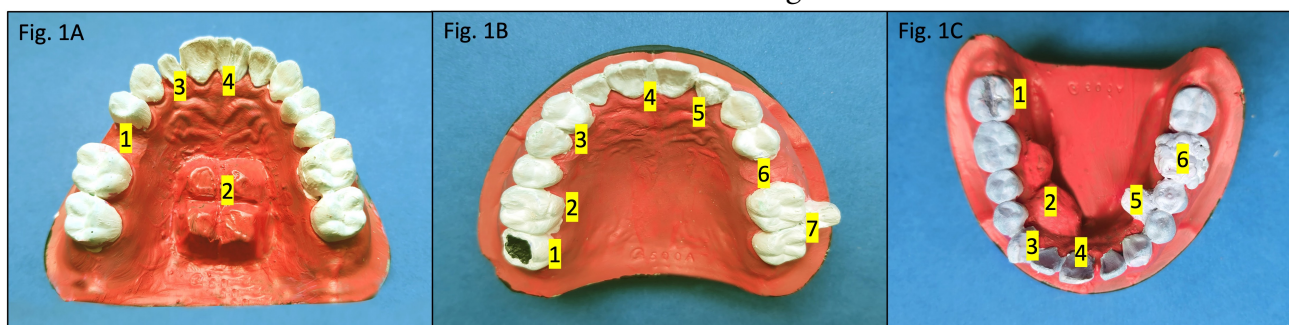


Fig 1A: 1- Missing tooth; 2-Torus Palatinus; 3-Peg Lateral; 4-Gemination

Fig 1B: 1- Grossly decayed tooth; 2-Cusp of Carabelli; 3- Transposition between canine and first premolar; 4- Mesiodens; 5-Talon's cusp; 6-Missing tooth; 7- Paramolar

Fig 1C: 1- Filling; 2- Torus mandibularis; 3- Rotated Canine; 4- Fusion between two central incisors; 5- Parapremolar; 6-Mulberry molar

Figure 2. Self-structured Questionnaire used in the study

Section 1--- Questions related to demographics of the responding practitioner

- Educational Qualification** (you can tick more than one option) a) BDS b) MDS c) PhD d) Fellowship in forensic odontology
If MDS, please specify branch a) Oral Pathology b) Oral Medicine c) Oral Surgery d) Prosthodontics e) Conservative dentistry and Endodontics f) Orthodontics g) Public Health Dentistry h) Pedodontics
- Gender** a) Male b) Female
- Associated with** (you can tick more than one option) a) Private Clinics b) Teaching Institutions c) Government Hospitals
- Working Experience** a) < 5 years b) 5-10 years c) 11-15 years d) > 15 years

Section 3- Questions to assess the awareness and attitude of dental professionals regarding the importance of charting dental anomalies and maintenance of dental records

- Dental records include** (you can tick more than one option) a) General patient information b) Chief complaint c) History of illness d) Clinical examination e) Dental chart f) Details of radiographic and any special investigation g) Diagnosis h) Treatment and Management of patient i) All j) Not Sure
- Do you record all other dental features apart from chief complaint of the patient** a) No b) Yes for every patient c) Yes for some patient
- Do you record developmental dental anomalies regularly** a) Yes b) No
- If ans to Q3 is yes, mention what all developmental dental anomalies do you came across -----
- Do you maintain patient's records** a) No b) Yes for every patient c) Yes for some patient

If answer to Q5 is yes, answer these questions


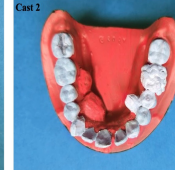
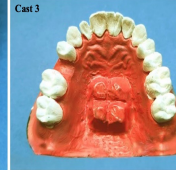
- What all records do you maintain** (you can tick more than one option) a) Dental Chart b) Study Models c) Radiographs d) Clinical photographs e) Results of special investigation f) Patients identification information g) Any Other (please mention)-----
- For how long do you maintain dental records** a) only till the end of patient's treatment b) till 6 months after end of treatment c) >6months -1year after end of treatment d) >1 year after end of treatment
- What system do you use to maintain records** a) Traditional paper charts b) Computerized filing /software system
- Who records and maintains records** a) Dental professional himself/herself b) Assistant
- Do you think it is important to record dental anomalies in dental charting** a) Yes b) No c) Not Sure
- Do you know about the significance of dental charting and maintenance of dental records in forensic odontology** a) Yes b) No c) Not Sure
- Do you know about the significance of dental charting and maintenance of dental records in medico-legal cases** a) Yes b) No c) Not Sure
- Are dental professionals in India legally obligated to maintain dental records** a) Yes b) No c) Not Sure
- According to you what are the barriers in maintaining proper dental records** (you can tick more than one option) a) Lack of time b) Lack of adequate knowledge on the importance of dental records c) Lack of infrastructure d) Financial constraints e) Other -----

If answer to above question is other, please mention them -----



- Do you think more knowledge should be provided on the importance of proper dental charting and maintaining dental records in bachelor's curriculum** a) Yes b) No
- Are you willing to attend training programme on importance of recording and maintaining dental records** a) Yes b) No

Section 2--- Task of charting the casts

This section includes photographs of cast for charting.
 This section includes 3 casts.
 FDI tooth notation system is being used in the survey for charting. Images of maxillary and mandibular cast representing FDI notation for each tooth is given for reference.

FDI tooth notation system for reference

Tooth no.	Cast 1				Cast 2				Cast 3						
	Sound	Decayed	Filled	Missing	Anomalous	Sound	Decayed	Filled	Missing	Anomalous	Sound	Decayed	Filled	Missing	Anomalous
18	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If your answer to any tooth is anomalous please mention tooth no. and respective anomaly or any other finding for cast 1

If your answer to any tooth is anomalous please mention tooth no. and respective anomaly or any other finding for cast 2

If your answer to any tooth is anomalous please mention tooth no. and respective anomaly or any other finding for cast 3

Each correct answer was awarded one, and the wrong was awarded zero marks. For questions that included, not sure as a third option, average marks were awarded when required. Based on the scores obtained by the participants, knowledge, awareness, and attitude were graded as poor (0-25%), fair (26-50%), good (51-75%) and very good (76-100%).⁶

The responses obtained were tabulated, and the percentage frequency distribution for responses to each question was computed. The data obtained were subjected to statistical analysis. Parametric data was expressed as mean and standard deviation (SD). One-way ANOVA and post hoc test (Tukey HSD) were used for analysis. The criterion for significance was $p < .05$.

RESULTS

In the present study, four hundred and six participants responded to the survey, the demographic details of whom are depicted in Table 1.

Among females, the mean knowledge, awareness and attitude score±SD were 36.59±5.40, 10.28±2.07 and 4.17±1.00 respectively while in males it was 36.42±4.60, 9.45±2.58 and 3.93±1.30 respectively. A significant difference was observed in the mean awareness ($p=.001$) and attitude ($p=.044$) between males and females; however, the mean knowledge score was not significant ($p=.757$).

With regard to place of work, a significant difference was observed in mean attitude ($p=.001$) and awareness ($p=.033$), however no difference was observed in the mean knowledge score ($p=.061$) of participants (Table 2). The post hoc test for

multiple comparisons revealed that the mean awareness score was significantly different ($p=.018$) among participants working in teaching institutions alone and working in both teaching institutions and private clinics. The mean attitude score of dental professionals working in both teaching institutions and government hospitals was significantly different than those working in private clinics ($p=.028$), both teaching institutions and private clinics ($p=.031$) and teaching institutions alone ($p=.001$).

With respect to educational qualification, a significant difference was observed in the mean attitude score ($p=.039$) of participants, whereas no significant difference was observed in the mean knowledge ($p=.216$) and awareness ($p=.447$) (Table 3). The post hoc test revealed a significant difference between mean attitude score of BDS and MDS participants ($p=.033$).

No significant difference was observed in the mean knowledge ($p=.148$), awareness ($p=.411$) and attitude ($p=.219$) score of participants with respect to work experience (Table 4).

With regard to the specialties of the MDS participants, no significant difference was observed in the mean knowledge ($p=.081$) and awareness score ($p=.686$), however, a significant difference was found in the mean attitude score ($p < .001$) of participants. The post hoc test revealed a significant difference between the mean attitude score of participants from the Conservative dentistry and Endodontics branch versus Orthodontics ($p=.015$), Pedodontics ($p=.001$) and Prosthodontics ($p=.029$).

The majority of participants in our study had good knowledge (289), followed by very good (110) and fair (7) knowledge, while none had poor knowledge. 330 (81.3%) participants had very good awareness followed by good (36), fair (30), and poor

(10) awareness. 281 (69.2%) participants had very good attitude followed by good (82), fair (30), and poor (13) towards charting dental anomalies and maintenance of proper dental records.

Table 1. Demographic details of the study participants

Variables		Frequency N(%)
Gender	Males	121(29.8%)
	Females	285 (70.2%)
	Total	406(100%)
Educational Qualification	BDS	73(18.0%)
	MDS	326(80.3%)
	PhD	3(0.7%)
	BDS/MDS with fellowship in forensic odontology	4 (1.0%)
	Total	406 (100%)
Place of work	Teaching Institutions	195(48.0%)
	Private Clinics	77(19.0%)
	Both Private Clinics and Teaching Institutions	45 (11.1%)
	Government Hospitals	70 (17.2%)
	Both Teaching Institutions and Government Hospitals	19 (4.7%)
	Total	406 (100%)
Working Experience	< 5years	227(55.9%)
	5-10 years	102 (25.1%)
	11-15 years	40(9.9%)
	> 15 years	37(9.1%)
	Total	406 (100%)
Speciality of MDS	Conservative dentistry and Endodontics	33 (9.93%)
	Periodontics	41 (12.35%)
	Oral Pathology	47 (14.16%)
	Pedodontics	30 (9.04%)
	Oral Medicine	25 (7.53%)
	Prosthodontics	66 (19.88%)
	Public Health Dentistry	23 (6.93%)
	Oral Surgery	28 (8.43%)
	Orthodontics	39 (11.75%)

N-Number of Subjects

Table 2. Association of Knowledge, Awareness, Attitude score with place of work

Place of Work		N	Mean ± SD	Range		F-value	p-value
				Minimum	Maximum		
Knowledge Score	Teaching Institutions	195	36.43 ± 5.04	23.5	53.0	2.271	.061
	Private Clinics	77	36.62 ± 4.90	18.5	47.0		
	Both Private Clinics and Teaching Institutions	45	36.61 ± 4.27	28.5	45.5		
	Government Hospitals	70	35.82 ± 5.57	14.0	46.5		
	Both Teaching Institutions and Government Hospital	19	39.79 ± 7.10	27.0	53.0		
	Total	406	36.54 ± 5.17	14.0	53.0		
Awareness Score	Teaching Institutions	195	10.27 ± 2.00	1.5	12.0	2.650	.033 (S)
	Private Clinics	77	9.81 ± 2.42	3.0	12.0		
	Both Private Clinics and Teaching Institutions	45	9.12 ± 2.79	1.5	12.0		
	Government Hospitals	70	10.16 ± 2.19	1.5	12.0		
	Both Teaching Institutions and Government Hospitals	19	10.18 ± 2.66	1.5	12.0		
	Total	406	10.03 ± 2.26	1.5	12.0		
Attitude Score	Teaching Institutions	195	4.27 ± .97	0.0	5.0	5.019	.001 (S)
	Private Clinics	77	4.05 ± 1.07	0.0	5.0		
	Both Private Clinics and Teaching Institutions	45	4.10 ± 1.26	0.0	5.0		
	Government Hospitals	70	3.88 ± 1.24	0.0	5.0		
	Both Teaching Institutions and Government Hospitals	19	3.24 ± 1.19	0.0	5.0		
	Total	406	4.10 ± 1.10	0.0	5.0		

ANOVA

N-Number of Subjects, S-Significant, SD-Standard Deviation

Table 3. Association of Knowledge, Awareness, Attitude score with place of work

Educational Qualification		N	Mean ± SD	Range		F-value	p-value
				Minimum	Maximum		
Knowledge Score	BDS	73	35.41 ± 4.96	18.5	46.0	1.492	.216
	MDS	326	36.80 ± 5.20	14.0	53.0		
	PhD	3	37.17 ± 5.20	33.0	43.0		
	BDS/MDS with fellowship in forensic odontology	4	35.63 ± 5.81	27.5	40.5		
	Total	406	36.54 ± 5.17	14.0	53.0		

Awareness Score	BDS	73	9.75 ± 2.43	1.5	12.0	.888	.447
	MDS	326	10.09 ± 2.24	1.5	12.0		
	PhD	3	9.50 ± 2.18	7	11.0		
	BDS/MDS with fellowship in forensic odontology	4	11.25 ± .29	11.0	11.5		
	Total	406	10.03 ± 2.26	1.5	12.0		
Attitude Score	BDS	73	3.78 ± 1.27	0.0	5.0	2.812	.039(S)
	MDS	326	4.17 ± 1.05	0.0	5.0		
	PhD	3	3.50 ± 2.18	1.0	5.0		
	BDS/MDS with fellowship in forensic odontology	4	4.25 ± .500	4.0	5.0		
	Total	406	4.10 ± 1.10	0.0	5.0		

ANOVA

N-Number of Subjects, S-Significant, SD- Standard Deviation

Table 4. Association of Knowledge, Awareness, Attitude score with place of work

Work Experience	N	Mean ± SD	Range		F-Value	p-value	
			Minimum	Maximum			
Knowledge Score	<5years	227	36.10± 4.91	18.5	47.0	1.791	.148
	5-10 years	102	36.95± 5.71	14.0	53.0		
	11-15 years	40	37.98± 4.54	29.5	48.0		
	>15 years	37	36.53± 5.65	26.0	53.0		
	Total	406	36.54± 5.17	14.0	53.0		
Awareness Score	<5years	227	10.07 ± 2.17	1.5	12.0	.961	.411
	5-10 years	102	9.77 ± 2.61	1.5	12.0		
	11-15 years	40	10.46 ± 1.95	4.0	12.0		
	>15 years	37	10.08 ± 2.10	2.0	12.0		
	Total	406	10.03 ± 2.26	1.5	12.0		
Attitude Score	<5years	227	4.14 ± 1.09	0.0	5.0	1.482	.219
	5-10 years	102	3.93± 1.23	0.0	5.0		
	11-15 years	40	4.31 ± .81	2.0	5.0		
	>15 years	37	4.01 ± 1.06	1.0	5.0		
	Total	406	4.10 ± 1.10	0.0	5.0		

ANOVA

N-Number of Subjects, SD-Standard Deviation

DISCUSSION

Dental charting, information on dental anomalies and proper record maintenance plays a key role in determining an individual's identity by comparing ante and post mortem records.⁷ A task of dental charting was included in the study to assess the knowledge of participants regarding dental anomalies. Decayed 17 was recognised by 300 participants, whereas filled 47 was correctly acknowledged by only 138 participants. The third molar was missing bilaterally in all casts; however, 58.74% of participants incorrectly reported it as sound, decayed, filled or anomalous. In addition, 31.16% of the participants wrongly charted missing 25 and 15 as sound, decayed, filled, and anomalous. A higher wrong response rate by the participants may be attributed to the lack of attention by the dental professionals during the charting process.

Paramolar and parapremolar were correctly identified and named by 102 and 26 participants, respectively. However, 14 and 93 participants labelled them as supernumerary tooth. Specific terminologies, if used routinely, would be more helpful for accurate identification and comparison of records in the future. Mesiodens between teeth 11 and 21 was identified by thirteen participants only whereas twenty-one and six participants reported it as filling and fusion, respectively. The identification of mesiodens by a fewer participants could be attributed to the presence of only occlusal view of the cast in the questionnaire.

The most common anomalies of shape identified were gemination (62) followed by talons cusp (20) and fusion (18). Twenty-three participants identified fusion as macrodontia. In the study by JayaKumar et al.⁵, the talons cusp on 32 and 41 teeth was identified by 5.9% and 9.9% participants respectively. The lower identification of anomalies of shape in our study could be either due to lack of attention and ignorance of the participants, or the two-dimensional pictorial representation of the casts. A prominent cusp of Carabelli was evident on maxillary first molar in one of our casts, which was not reported during charting by any participant. The cusp of Carabelli has forensic, ethnic and anthropological importance because its prevalence varies among different population.⁸

Rotation of 43 was identified by eleven (2.71%) participants only, whereas transposition between 13 and 14 was identified by sixty (14.78%)

participants. In the study by JayaKumar et al.⁵, rotated 32, 35, and 42 were reported by 6.9%, 36.6% and 46.5% of participants, respectively, whereas transposition was accurately identified by 5.9% of participants.

Mulberry molar was identified by 104 participants in the present study. The peg lateral was identified by 145 participants; however, 28 reported it as microdontia. Torus palatinus and mandibularis were recognised by 207 and 185 participants, respectively, whereas 13 participants identified them as swelling or exostosis.

In the current study, 346 (85.2%) participants believed that it was important to record dental anomalies in dental charting and 298 (73.4%) affirmed that they regularly recorded developmental dental anomalies (Figure 3A and 3B). In the studies by Rahman et al.⁹ and Sarode et al.¹⁰, 90.2% and 89% of participants affirmed that they recorded common dental anomalies, respectively, whereas in a study by Tomar et al.¹¹, only 40% of the practitioners record developmental anomalies. Two hundred ninety-six (72.9%) and 83 (20.4%) dental professionals in our study reported that they recorded all other dental features apart from the chief complaint for every and some patients respectively (Figure 3C). In the study by JayaKumar et al.⁵, 88% of participants confirmed that they recorded features that were not included in the patient's chief complaint and did not require treatment. However, findings of the dental charting task contraindicate the affirmation by participants that they regularly record all features other than chief complaint and developmental anomalies, which was in corroboration with the observations by JayaKumar et al.⁵

The dental record is an official legal document owned by the dental professional that mentions all diagnostic information, history of present illness, clinical examination, treatment done, prognosis and all patient-related communications that occurred in the dental office.^{10,12} In our study, 376 participants thought that details of radiographic and any special investigation was the main component of dental records followed by dental chart (373), general patient information (370), clinical examination (361), chief complaint (357), history of illness (353), diagnosis (344) and management of patient (339). However, 15 participants were not sure about the components of the dental record.

Figure 3. Frequency of Responses to Questions



In our study, 274 (67.5%) and 104 (25.6%) participants stated that they maintained dental records for every patient and some patients, respectively, while 28(6.9%) did not maintain any records (Figure 3D) which was in accordance with Sarode et al.¹⁰ who also reported that 6% of practitioners did not maintain any dental records. In addition, 88% and 73.2% of the participants of different studies stated that they maintained dental records regularly.^{5,9} According to the participants of our study, radiograph was the most commonly maintained record (328), followed by clinical photographs (297), results of special investigations (240), study models (228), patients identification information (224), dental chart (189) and others (17). Others included treatment done, previous treatment records, consent of patient, pedigree analysis, case history, factors related to periodontal status of patient, and diagnosis. In a study by JayaKumar et al.⁵, radiographs were mostly maintained in the dental record, followed by dental charts, casts and photographs. Tomar et al.¹¹ reported that there was 100% maintenance of some records such as patient’s details, medical history, and clinical findings, whereas very few participants maintained the treatment log.

Of the 378 participants who maintained records in the present study, 242 (64.02%) used

traditional paper charts, whereas 136 (35.98%) used a computerized filing/software system to maintain the records. In a study by Astekar et al.¹³, 53% used pre-printed forms, 26% software and 21% used both software and pre-printed forms., while Sarode et al.¹⁰ reported that 11% of participants who maintained records using a computer software program, whereas 83% and 6% recorded them manually using pre-printed forms and blank pages, respectively. McAndrew et al.¹⁴ compared hand- and computer-generated methods of record keeping and observed that computer-generated notes had a higher compliance rate with the set parameters and could make defence easier and more efficient in litigation cases and clinical audits. In our study, 269 (71.2%) dental professionals-maintained records themselves, whereas 109 (28.8%) reported that assistants-maintained records for them. The importance of maintaining records by dental professionals could be emphasised as there is a higher probability of errors if records are maintained by an assistant.

There are no clear-cut guidelines or laws regarding the duration for which records must be retained but it is recommended that depending on the type of records, they should be retained for 5-15 years or more.¹² The majority of participants in our study-maintained records for

>1 year after the end of treatment (191) followed by >6 months – 1 year after the end of treatment (82), till 6 months after the end of treatment (66) and only until the end of patient's treatment (39). In Sarode et al.'s study¹⁰, 50% of participants maintained dental records for weeks to few years (2 weeks to 1.5 years) whereas 50% preserved them permanently. In the study by Preethi et al.¹⁵, 93% practitioners maintained dental records for less than seven years. In addition, 39.9% of the participants of Rahman et al.'s⁹ study was aware of the period for which dental records should be maintained.

Dental records are not only vital for forensic investigations, but are also required for court evidence, dental insurances and could be employed for teaching and research purpose.¹⁵⁻¹⁶ 302 (74.4%) and 356 (87.7%) participants knew about the significance of dental charting and maintenance of dental records in forensic odontology and medico-legal cases, respectively, (Figure 3B) which was in association with the findings of Preethi et al.¹⁵ where 17% participants did not know about the significance of dental record maintenance in identifying deceased and crime suspects. 97% participants in the study by Jayakumar et al.⁵ considered maintenance of dental records to be forensically or medico-legally important. Dental record maintenance is a legal obligation in the American and European countries, but in developing countries like India, rules are still ambiguous.⁹⁻¹⁰ Two hundred thirty-three (57.4%) participants of the present study believed that dental professionals in India are legally obligated to maintain dental records, whereas 127 (31.3%) were not sure about it (Figure 3B). However, all participants (100%) of the study by Astekar et al.¹³ believed that in India, the maintenance of records is not legally mandatory.

The majority of participants in the current study reported that lack of time (288) was the major barrier in maintaining dental records, followed by lack of adequate knowledge on the importance of dental records (208), lack of infrastructure (164), financial constraints (103) and others (19). Other factors included lack of interest, cumbersome tasks, lack of manpower, ignorance of medical practitioners, and lack of patient co-operation. Study by Al-Azri et al.¹⁷ on Australian dentists reported increased workload, lack of time, storage space, experience, refresher courses or CPD lectures and lack of computer facilities as the main barriers. With the advent of the digital

era, many barriers could be overcome as digital scans could be very useful for identification, forensic, legal, and rehabilitation purpose.¹⁸⁻¹⁹

Almost all, 380 (93.6%) participants believed that more knowledge should be provided on the importance of proper dental charting and maintaining dental records in the bachelor's curriculum and 321 (79.1%) were willing to attend a training programme on the importance of recording and maintaining dental records.

The significant difference between the mean attitude score of BDS and MDS participants in our study indicated that participants became more consistent in maintaining records during their postgraduate course as they were required to maintain records for evaluation and submission of reports during their MDS degree. Furthermore, a significant difference with regard to place of work indicated that practitioners associated with teaching institutions or government hospitals had slightly more awareness and positive attitude towards charting dental anomalies and maintaining dental records as they have to appear before court as professional experts and were more used to observing dental anomalies in institutions. However, dental professionals in private practice usually have less time and infrastructure to maintain proper records for longer periods of time.

One of the major limitations of this study was the two-dimensional picture of casts depicting the anomalies only from the occlusal view. Also, the anomalies were fabricated by modifying the casts, so the results could vary if book pictures were used instead. However, anomalies in patients do not always present with the same clinical presentation. Another limitation of this study was that most participants were associated with institutions and had MDS as their educational qualification.

CONCLUSIONS

The majority of participants in the present study had very good awareness and attitude towards the importance of charting dental anomalies and maintenance of dental records; however, their knowledge score and inaccurate findings in dental charting opposed the fact. Incorrect or partially correct dental records are not useful in forensic investigations as well as legal evidence. Our study points towards the need of training the students during their

bachelor's curriculum regarding importance of dental charting and proper maintenance of

dental records with further enhancement through various CDE programmes/workshops.

REFERENCES

- Gupta S, Narwal A, Kamboj M, Sharma P, Makkar V, Raman RK. Baseline data of facial parameters in the population of Haryana: an anthropometric study. *J Forensic Dent Sci.* 2019;11(1):28-34. doi: 10.4103/jfo.jfds_12_19.
- Ehtisham M, Nissar S, Khan S, Khan R, Wani F, Jan I. Role of forensic dentistry in human identification: "Evidence that does not lie". *University Journal of Dental Sciences* 2016;2(1):66-74.
- Tinoco RLR, Martins EC, Daruge Jr. E, Daruge E, Prado FB, Caria PHF. Dental anomalies and their value in human identification: a case report. *J Forensic Odontostomatol.* 2010;28(1):39-43.
- Puri PM, Shukla SK. Developmental dental anomalies: some case reports and their potential role in forensic investigations. *International Journal of Multidisciplinary Research and Development* 2015;2(3):559-61.
- Jayakumar J, Manica S. The role of charting dental anomalies in human identification. *Forensic Science International: Reports* 2020;2:100086. doi: http://doi.org/10.1016/j.fsir.2020.100086.
- Gupta S, Devi A, Kamboj M, Hooda A, Narwal A. Knowledge, awareness and attitude of dental professionals regarding child maltreatment. *J Forensic Odontostomatol.* 2023;41(2):10-20.
- Rajshekhkar M, Mithun T, Idiculla JJ, Tennant M. Developmental anomalies of teeth and their applications in forensic odontology. *Eur J Forensic Sci.* 2016;3(2):39-49.
- Kirthiga M, Manju M, Praveen R, Umesh W. Ethnic association of cusp of Carabelli trait and shovelling trait in an Indian population. *J Clin Diagn Res.* 2016;10(3):ZC78-81. doi:10.7860/JCDR/2016/17463.7504.
- Rahman J, Routray S, Mishra SS, Mohanty I, Mohanty N, Sukla N. Knowledge, awareness and practice of forensic odontology among dental surgeons in Bhubaneswar, India. *J Unexplored Med Data* 2017;2:26-33. doi:10.20517/2572-8180.2017.01.
- Sarode GS, Sarode SC, Choudhary S, Patil S, Anand R, Vyas H. Dental records of forensic odontological importance: maintenance pattern among dental practitioners of Pune city. *J Forensic Dent Sci.* 2017;9(1):48. doi: 10.4103/jfo.jfds_1_16.
- Tomar U, Airen B, Sarkar PA, Singh H, Bishen KA. A vigilance alert for forensic odontology: preservation and maintenance of dental records in Central India. *Indian J Dent Sci* 2020;12:16-20. doi: 10.4103/IJDS.IJDS_61_19.
- Devadiga A. What's the deal with dental records for practicing dentists? Importance in general and forensic dentistry. *J Forensic Dent Sci.* 2014;6(1):9-15. doi: 10.4103/0975-1475.127764.
- Astekar M, Saawarn S, Ramesh G, Saawarn N. Maintaining dental records: are we ready for forensic needs? *J Forensic Dent Sci.* 2011;3(2):52-7. doi: 10.4103/0975-1475.92143.
- McAndrew R, Ban J, Playle R. A comparison of computer and hand-generated clinical dental notes with statutory regulations in record keeping. *Eur J Dent Educ.* 2012;16:e117-21. doi: 10.1111/j.1600-0579.2011.00684.x.
- Preethi S, Einstein A, Sivapathasundharam B. Awareness of forensic odontology among dental practitioners in Chennai: a knowledge, attitude, practice study. *J Forensic Dent Sci.* 2011;3(2):63-6. doi:10.4103/0975-1475.92145.
- Charangowda BK. Dental records-an overview. *J Forensic Dent Sci.* 2010; 2(1):5-10. doi: 10.4103/0974-2948.71050.
- Al-Azri AR, Harford J, James H. Awareness of forensic odontology among dentists in Australia: are they keeping forensically valuable dental records? *Aust Dent J.* 2016 Mar;61(1):102-8. doi: 10.1111/adj.12316.
- Simon B, Farid AA, Vag J, Freedman G. Digital scans and human identification. *Oral Health* 2021; 111(7):36-39.
- Mikolicz A, Simon B, Gáspár O, Shahbazi A, Vag J. Reproducibility of the digital palate in forensic investigations: a two-year retrospective cohort study on twins. *J Dent.* 2023;135:104562. doi: 10.1016/j.jdent.2023.104562.