

Knowledge, Attitude and Practice of Forensic Odontology among Dental Students: A Cross-Sectional Survey

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ABSTRACT

Background: Forensic odontology (FO) is central to medicolegal identification, bite-mark interpretation, cheiloscopy and dental record use in disaster victim identification (DVI). Undergraduate dentists must be aware of FO principles because good antemortem records and basic forensic knowledge are essential for legal medicine and public safety.

Aim: To assess knowledge, attitude and practice (KAP) regarding FO among dental students at a single institution and to evaluate associations between year-of-study and FO knowledge.

Methods: A cross-sectional online survey (Google Forms) based on the project protocol was completed by 235 students (convenience sample of respondents who received the link). The questionnaire asked 13 items: familiarity with FO, teeth as a DNA source, FO's role in identification, bite-mark importance, cheiloscopy (lip-print term), sources of FO information, curricular inclusion, career interest, and related items. Descriptive statistics (counts, percentages) and inferential testing (Pearson χ^2) were performed; for χ^2 , responses were dichotomized as "Yes" versus "Non-Yes" (No / Don't know / Other). Significance was set at $\alpha = 0.05$.

Results: Of 235 respondents, 211 (89.8%) reported familiarity with FO. Teeth as a DNA source was acknowledged by 187 (79.6%), FO's role in identification by 203 (86.4%), and bite-mark significance by 204 (86.8%). Cheiloscopy (correct term for lip-prints) was correctly chosen by 120 (51.1%); 49 (20.9%) said "I don't know" and 49 (20.9%) chose incorrect options. Year-of-study was significantly associated with several knowledge items: familiarity with FO ($\chi^2 = 20.707$, $df = 5$, $p = 0.0009$), teeth as DNA ($\chi^2 = 15.514$, $df = 5$, $p = 0.0084$), FO role in identification ($\chi^2 = 23.888$, $df = 5$, $p = 0.0002$) and bite-mark awareness ($\chi^2 = 25.611$, $df = 5$, $p = 0.0001$). Students reported the internet and lectures as main information sources.

Conclusions: General awareness of FO was high, but specific technical knowledge (e.g., cheiloscopy) was weaker. Year-of-study was associated with better knowledge, suggesting curricular exposure improves FO understanding. We recommend integrating mandatory FO modules, hands-on workshops (cheiloscopy, record-keeping, DVI basics) and routine emphasis on dental record quality to strengthen forensic readiness.

Keywords: bite-mark, cheiloscopy, dental education, dental records, DNA, forensic odontology.

INTRODUCTION

Forensic odontology applies dental science to legal questions — human identification, bite-mark analysis, cheiloscopy (lip-prints), rugoscopy and dental age estimation — and includes the ethical, legal and practical responsibilities of maintaining antemortem dental records for potential medico-legal use [1-3]. Teeth and restorations often survive conditions that degrade other tissues and therefore serve as robust sources for DVI and DNA recovery [1,4]. At the same time, several forensic

subfields (notably bite-mark comparison) have come under critical scrutiny and require careful, evidence-based practice and standardized protocols [5-7].

Because dentists routinely create and maintain records, undergraduate dental education has a responsibility to ensure graduates understand FO fundamentals: when to preserve records, how to document injuries, basic methods for dental age estimation and the medico-legal steps needed when encountering forensic cases [2-4,8]. International KAP (knowledge, attitude, practice) surveys over the past decade show a consistent pattern: broad awareness of FO, but gaps in specific knowledge (lip-print terminology, palatal rugae, practical record-keeping) and limited formal training in many programs [2,9-12]. These gaps matter: modern DVI increasingly depends on accurate antemortem dental records, radiographic archives and digital data (radiographs/3-D scans) [4,13].

MATERIALS AND METHODS

Study design and participants

A cross-sectional online survey was administered to dental students at the School of Dental Sciences (protocol and consent documents are in Rutuja Bhosale.docx). The Google Forms questionnaire (13 multiple-choice items) covered demographics (gender, year of study) and FO knowledge/attitude/practice items (see protocol annex). Participation was voluntary and anonymous. The study followed the protocol’s ethical statements.

Questionnaire and variables

Key questions analyzed here: familiarity with FO; “Can teeth serve as a source of DNA?”; “Is FO effective in identifying criminals and deceased persons?”; term for lip-prints; awareness of bite-mark significance; curriculum inclusion; interest in postgraduate FO training; sources of information. Responses were coded and cleaned (gender entries normalized to Male/Female/Other).

Statistical analysis:

Analyses were performed in Python (pandas, SciPy) and results exported for display. Descriptive statistics included frequencies and percentages. For inferential tests we used Pearson’s χ^2 to assess association between year of study (categorical) and key knowledge items. For χ^2 testing responses were dichotomized: “Yes” vs “Non-Yes” (all other replies). A p-value < 0.05 was considered significant. Crosstabs, χ^2 statistics, degrees of freedom and p-values are provided. Output files (tables and figure) were saved to /mnt/data/ (paths below).

RESULTS

Table 1. Demographics

Category	Subcategory	Count	Percentage
Gender	Male	98	41.7
	Female	137	58.3
Year of Study	1st Year	18	7.7
	2nd Year	22	9.4
	3rd Year	41	17.4
	Final Year	74	31.5
	Interns	65	27.7
	Postgraduates	15	6.3

Table 2: Knowledge and attitude — descriptive results

Question	Yes Count	Yes Percentage	No or Other Count	No or Other Percentage
Familiar with Forensic Odontology	211	89.8	24	10.2
Teeth can be used as a DNA source	187	79.6	48	20.4
Forensic odontology effective for identification	203	86.4	32	13.6
Aware of bite-mark significance	204	86.8	31	13.2
Self-assessed knowledge adequate	78	33.2	157	66.8
Forensic odontology included in curriculum	69	29.4	166	70.6

Table 3: Lip-prints (cheiloscapy) question

Response	Count	Percentage
Cheiloscapy	120	51.1
I don't know	49	20.9
Incorrect answers	49	20.9
Others	16	6.8

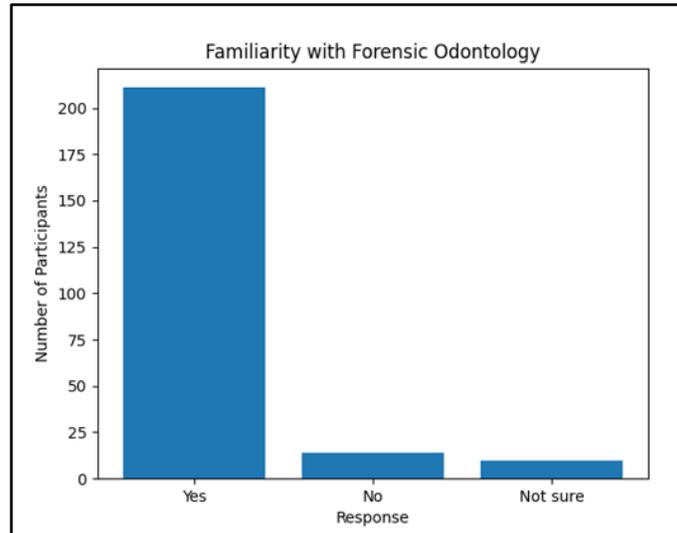


Figure 1: familiarity distribution

Table 4: Inferential (associations with year of study)

Knowledge Item	Chi-Square Value	Degrees of Freedom (df)	p-value	Inference
Familiarity with Forensic Odontology	20.707	5	0.0009	Statistically Significant
Teeth as a DNA Source	15.514	5	0.0084	
Role of Forensic Odontology in Identification	23.888	5	0.0002	
Awareness of Bite-Mark Significance	25.611	5	0.0001	

Interpretation: Advanced year students exhibited higher “Yes” rates for these knowledge items compared with early year students.

Table 2 shows that 89.8% (n = 211) of respondents reported familiarity with forensic odontology. Figure 1 displays the distribution of familiarity responses and highlights the predominance of affirmative responses. Table 3 demonstrates that only 51.1% correctly identified ‘cheiloscapy’ as the term for lip-print study, with 41.8% either answering incorrectly or indicating they did not know a clear gap in specific technical vocabulary. Table no. 3 shows responses to “What is the term for the study of lip prints?”: Cheiloscapy 120/235 (51.1%); “I don’t know” 49 (20.9%); incorrect answers (e.g., “Lipology”) 49 (20.9%); others 16 (6.8%). This indicates roughly half the participants recognized the correct term, with a sizeable minority unsure or incorrect. Table 4 summarizes χ^2 associations: the year of study was significantly associated with familiarity ($\chi^2 = 20.707$, $p = 0.0009$), acceptance of teeth as DNA sources ($\chi^2 = 15.514$, $p = 0.0084$), recognition of FO’s role in identification ($\chi^2 = 23.888$, $p = 0.0002$) and bite-mark awareness ($\chi^2 = 25.611$, $p = 0.0001$), suggesting curricular exposure improves FO knowledge.

DISCUSSION

Principal findings

This study shows high general awareness of FO among dental students (~90%), with strong recognition of teeth as viable DNA sources (~80%) and FO's role in identification (~86%). However, specific knowledge on certain technical terms-Cheiloscopy was limited (~51% correct). Year-of-study was strongly associated with higher knowledge across several domains, consistent with the idea that clinical years and cumulative education improve FO understanding.

Comparison with recent literature (2015–2025)

Our descriptive pattern mirrors multiple international KAP studies: many report widespread general awareness but notable gaps in specific knowledge and limited formal FO training [1–4,9–12]. Giannakopoulos et al. reported high faculty awareness and moderate student awareness in Cyprus, concluding that structured curricular exposure and workshops would improve FO readiness [1]. Ajman University's 2020 survey found many final-year students lacked formal FO education and felt their knowledge inadequate, recommending including FO modules [3]. A multi-center Egyptian study (2024) similarly showed limited formal FO training with internet as the commonest knowledge source and recommended curricular integration [2]. Reviews emphasize teeth as robust DNA repositories and point to advances in DNA sampling from dental tissues and the use of radiographic and digital comparisons for DVI [4,13]. However, caution is required for bite-mark analysis: several authoritative reviews and a NIST scientific foundation review highlight serious scientific limitations and call for rigorous protocols and research before bite-mark evidence is relied upon in courts [5–7,14]. These critiques underscore the need for curricular content that teaches both utility and limitations i.e., when to collect evidence and the degree of certainty appropriate for expert testimony.

Educational implications and recommendations

1. Integrate FO content into core undergraduate curricula (lectures + assessed practical sessions). Multiple KAP studies show students request formal modules and workshops [3,9,11].
2. Deliver hands-on exercises: cheiloscopy sampling, bite-mark photography standards, dental record audits, radiograph archiving and basic dental DNA sampling protocols. Practical experience closes gaps in technical vocabulary and confidence.
3. Emphasize critical appraisal: teach students the contemporary scientific debates (e.g., reliability limits of bite-mark matching) so they can provide responsible expert testimony and avoid overstating conclusions in court [5,6].
4. Promote record keeping and digital archiving: regular, complete charts and radiographs improve DVI success and should be a metric of clinical competence [4,13].
5. Provide postgraduate options and encourage interprofessional workshops with forensic pathologists and law enforcement to foster real-world exposure [1,11].

Strengths and limitations

Strengths: direct analysis of the protocol and raw survey data; combination of descriptive and inferential statistics; integration with recent (2015–2025) literature; generation of crosstabs and figures for reporting. Limitations: single institution sample limits generalizability; convenience of online sampling and self-report responses can introduce bias; some year cohorts small (reducing power for subgroup inference); survey instrument relied on multiple-choice answers rather than objective knowledge tests, future work should validate knowledge scales and expand to multicenter samples.

CONCLUSION

Dental students in this study demonstrate high general awareness of forensic odontology but have identifiable deficits in technical knowledge (cheiloscopy) and variable curricular exposure. Year-of-study correlates with better FO knowledge, suggesting clinical exposure and education improve literacy. To build forensic readiness, institutions should integrate FO teaching, practical workshops, and emphasize meticulous recordkeeping and critical thinking about forensic evidence (especially bite-mark reliability). These steps will strengthen dentists' contributions to medicolegal investigations and disaster response.

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