

Original Article

Forensic Odontology – Are the Dentists Really Aware

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INTRODUCTION

A boom in telecommunication and information technology (teledentistry), etc., is the gift of the new millennium to the humankind which has brought a revolution in our lives. However, modernization is a double-ended sword as it brings avenues of terrorism, increased crime rate, and natural disasters.^[1] Identification of victims in mass disasters (aviation, earthquakes, and Tsunamis) and the criminals in medico-legal cases is one of the most challenging subjects that human has been confronted with.^[2] The forensic discipline in conjunction with science and technology aids in the investigation and detection of crime and enforcement of justice, with the help of a multidisciplinary team.^[3] Dental identification dates back to AD 66, and it renders a crucial role in solving civil and criminal cases.^[4] According to Dr. Oscar Amoedo (father of forensic odontology), the first case of

ABSTRACT

Introduction: Dentistry has much to propose to law enforcement agencies in the detection and solution of the crime. The use of teeth is the most common retractile action of self-defense against any personal attack. Hence, it is the call of the hour for dental practitioners to obligate sound knowledge about forensic odontology and its judicial applications. It is the responsibility of each and every dentist to maintain dental records for identification in the event of child and adult abuse, and mass disasters.

Aims and Objectives: The present study was undertaken to analyze and assess the awareness about forensic odontology among practicing dentists in Moradabad.

Materials and Methods: A cross-sectional study was conducted among 250 dental surgeons of Moradabad and data were collected via means of questionnaires.

Result: The overall result revealed inadequate knowledge about forensic odontology among the practitioners.

Conclusion: The experts in different fields of dentistry have scarce or no idea regarding the contribution of their specialization in the field of forensic dentistry. This calls for greater knowledge and awareness among the practitioners and experts to necessitated the same.

KEY WORDS: Dental practitioners, identification, mass disasters

dental identification in a mass disaster was after the fire at the charity bazaar in Paris, during the year 1897 in which 126 lives were lost. Here, antemortem dental records were compared with postmortem dental records for identification of the dead. Jai Chand, the Raja of Kanauj, was murdered by Muhammad Ghori in the Battle of Chandawar in 1193 and was later identified by his false teeth after being found among the slain in the battlefield, and this was the first evident forensic odontology case in India. The most remembered case of Mr. Rajiv Gandhi, the former Prime Minister, who was killed by a human suicide bomber, was solved in the year 1991 by identification of his dentition. Recently, forensic odontologist, Dr. Ashish B Acharya,

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helped in solving the December 16, 2012, Delhi gang-rape case with bite mark analysis.^[5] The fundamental principles of dental identification are those of comparison and of exclusion. This principle is applicable in the identification of skeletonized, decomposed, burned, or dismembered body and identification of the accused in child and adult abuse. Unfortunately, dentists often maintain poor or no records, resulting in the confusion that makes dental identification impossible.^[6] Keeping this in mind, the aim and objective of the present study were to scrutinize and assess the awareness about forensic odontology among practicing dentists in Moradabad.

MATERIALS AND METHODS

1. The survey was conducted in the year 2014 among 150 dentists of Moradabad which included 42 academicians, 80 postgraduate students, and 28 clinicians
2. Questionnaires.

A cross-sectional study was conducted in a sample of 250 dental practitioners in Moradabad and data were collected via the means of questionnaires. The questions were of open-ended and close-ended types [Table 1].

The questions were designed keeping in mind the cases they can encounter on a daily basis and their approach through forensic dentistry knowledge in solving and extending their contribution in civil and criminal cases. The questions were framed to assess KAP criteria.

RESULTS

Table 2 reveals the overall result depicting inadequate knowledge about forensic dentistry among the practitioners in Moradabad.

DISCUSSION

Every human being deserves an identity, and nothing as unique as dentistry can identify a person during his/her life and even after death.^[7] The word forensic is derived from the Latin word forum which means “Court of Law” and odontology means “study of teeth.” Forensic odontology is defined by the Federation Dentaire International as “that branch of dentistry which, in the interest of justice, deals with proper handling and examination of dental evidence, and with the proper evaluation and presentation of dental findings. Identity as defined by Acharya and Taylor is “the characteristic by which a person may be recognized.”^[8] Forensic odontology covers a vast array of subjects involving identification of human remains in the cases of natural and human-made disasters; child and adult abuse via verification of gender, age, and ethnic origin; analysis of bite marks, etc.^[9] Identification by means of dental evidence is only possible if the dental practitioner has adequate theoretical and practical knowledge regarding the subject.^[10] Taking into consideration the importance of dental evidence, we conducted a survey among 150 dentists (42 academicians, 80 postgraduate students of various specialties, and 28 practitioners) of Moradabad to assess their awareness regarding the subject and

unfortunately, our results revealed inadequate knowledge, unkempt attitude, and lack of expertise in graduates, postgraduates, and practitioners regarding the subject. The results were found to be consistent with the study conducted by Sengupta *et al.* in the year 2014 and Preethi *et al.* in the year 2011.

Dental identification plays a key role in mass casualties and is usually based on disturbances of tooth eruption, malocclusions and/or previous dental treatments, changes brought about by age, pathological conditions, and developmental disturbances.^[10] Age is one of the essential factors in establishing the identity of a person.^[11] However, nearly half of the practitioners did not know how to estimate the dental age by examining the teeth. The reason for this could be their negligence/lack of basic knowledge regarding the significance of dental age with regard to forensics. Cases of child abuse are on a rise and should be brought to the notice of the parents or the concerned authorities as soon as possible.^[12] Reasons commonly cited for a dentist’s failure to report are lack of information about the signs and symptoms of abuse and neglect and obliviousness of reporting the procedure to parents and police. In the present study, the majority of the dental practitioners were aware of the importance of maintaining dental records. Surprisingly, only very few dentists maintain complete records and very few knew the duration of dental record maintenance as is a minimum of 7 years to a maximum of 10 years.^[10] This study clearly exhibits that there is a general lack of skill and understanding of forensic odontology among dentists.

Thus, the forensic dentist must be proficient in both forensic dentistry and the law. Regardless of background, dentists should assist legal authorities by preparing dental evidence in the following situations:^[13]

- Managing and maintaining dental records which can help in reducing the potential for malpractice
- Comparing antemortem and postmortem dental data in the cases of death of an individual or mass disasters
- Identifying signs and symptoms of child and adult abuse
- Presentation of dental evidences as an expert witness for the purpose of identification.

The current scenario amplifies the need of forensic dentistry owing to an increase in crime rate and human-made disasters. Such incidences can mutilate the body beyond comprehension such that identification is not possible and hence the essentials of human dentition come into play. In such instances, well-maintained dental records are of paramount help. Thus, a working classification has been proposed by Shamim involving the role of various specialties to aid in identification^[14,15] [Table 3].

Although the regulatory bodies of dentistry such as DCI and the government is conducting continued dental education programs (CDEs) and national/international conferences on forensic odontology, still lack of interest in attending such programs is seen among dental practitioners.^[16] This could be due to multiple reasons namely lack of institutions offering formal training in forensic odontology, unavailability of fully

Table 1: Questionnaires used in dentistry
Forensic odontology - Roles and responsibilities

Aim of the study is to evaluate the awareness of subject of forensic odontology among dentists in Moradabad, UP

Designation

Gender: Male/female

Registration number

Address

1. Are you familiar with the subject of forensic odontology and its relation to dentistry? Yes/no

2. Do you record the following information of the patient? (please tick all particulars that you maintain)

Patient details

Medical history

Family history

Clinical findings

Treatment plan

Photographs

Study casts

Radiographs

Investigation findings

Treatment log

3. Do you maintain dental records of each patient in your clinic/hospital? yes/no

4. If yes, then for how long do you maintain the following records?

Patient details -

Medical history -

Family history -

Clinical findings -

Treatment plan -

Photographs -

Study casts -

Radiographs -

Investigation findings -

Treatment log -

5. Are you aware of the importance of maintaining dental records in identifying the crime suspects? yes/no

6. Can you identify the bite mark patterns on the body? yes/no

7. Can you identify abuse of a child? yes/no (physical/sexual/psychological)

8. What would you do if you identify signs or symptoms of child abuse?

Council the child only

Council the child and inform to parents

Inform parents and police both

Directly inform parents only

Directly inform police

None of the clinician's business

9. What in case if child is being abused by parents?

Counsel the child only

Counsel the child and parents

Counsel the child and inform to police

Directly question the parent

Directly inform police

None of the clinician's business

10. Can you estimate the accurate dental age of an individual by examining the teeth? yes/no

11. According to you which is the best method?

Clinical

Chronological

Radiographic

No idea

Contd...

Table 1: Contd...

Forensic odontology - Roles and responsibilities

12. Which of the following is the most accurate and sensitive method to identify an individual?
 Visual identification
 Finger prints
 Physical anthropological examination of bones and teeth
 Serological comparison
 DNA comparison
13. Have you had formal training in collecting, evaluating, and presenting dental evidence to contribute in forensic anthropology? yes/no
14. Can you search and quickly access records of a patient based on inadequate data such as just a name, a phone number, or address? yes/no
15. Do you know about UIN system in India? yes/no
16. Do you approve to the fact that of UIN system in India can be used in forensic investigations? yes/no
17. How can you use your specialty in forensic dentistry?

Note: This information in part or in total can be used for publication and by signing this form you give the consent to do so
 Signature

Table 2: Overall results

Question	Response
1. Are you familiar with the subject of forensic odontology and its relation to dentistry?	89% said yes
2. Do you record the following information of the patient (please tick the following which you maintain)?	Only 22% takes detailed case history
Patient details	
Medical history	
Family history	
Clinical findings	
Treatment plan	
Photographs	
Study casts	
Radiographs	
Investigation findings	
Treatment log	
3. Do you maintain dental records of each patient in your clinic/hospital?	<1 year - 54%
4. If yes then for how long do you maintain the following records	1-3 years - 30%
Patient details	3-5 years - 11%
Medical history	>5 years - 5%
Family history	
Clinical findings	
Treatment plan	
Photographs	
Study casts	
Radiographs	
Investigation	
Treatment log	
5. Are you aware of the importance of maintaining dental records in identifying the crime suspects? yes/no	68% said yes
6. Can you identify the bite mark patterns on the body? yes/no	48% said yes
7. Can you identify abuse of a child? yes/no (physical/psychological) If yes kindly mention how	83% - physical 13% - psychological
8. What would you do if you identify signs or symptoms of child abuse?	71% - inform parents 23% - inform parents and police
9. Can you estimate the accurate dental age of an individual by examining the teeth? yes/no	41% yes
10. According to you which is the best method?	66% - chronological 30% - radiograph 4% - histopathology
11. Which of the following is the most accurate and sensitive method to identify an individual?	82% - DNA comparison 12% - finger prints

Contd...

Table 2: Contd...

Question	Response
Visual identification	4.5% - visual identification
Finger prints	0.5 - serological comparison
Physical anthropological examination of bones and teeth	
Serological comparison	
DNA comparison	
12. Have you ever had any formal training in collecting, evaluating, and presenting dental evidence to contribute in forensic anthropology? yes/no	100% says no
13. Can you search and quickly access records of a patient based on inadequate data such as just a name, a phone number, or address? yes/no	Only 27% says yes
14. Do you know about UIN system in India? yes/no	87% says yes
15. Do you approve of UIN system in forensic odontology?	22% says yes
Q) How can you use your specialty in forensic dentistry?	
A) Denture coding and labeling, By identifying child abuse, By 3D construction of face. DNA - pulp extraction for gender estimation, radiographic detail, mass disaster management, age estimation through pulp, gender through Baar body. cheiloscopy, palatoscopy, histopathology	

Table 3: Dental specialties with their subject contribution in the field of forensic odontology

Department	Contributions
Oral pathology and microbiology	Age estimation by interpreting, perikymata, incremental lines of Retzius, cemental incremental lines, prenatal and postnatal line formation, racemization of collagen in dentin, the translucency of dentin, and Gustafson's technique Identification of individuals with the help of enamel rod patterns, regressive alterations in the teeth, developmental disturbances of teeth, DNA profiling from teeth, tumors, and cysts of the oral cavity
Oral medicine and radiology	Sex determination using exfoliative cytology Radiographic method to estimation age by interpreting secondary dentin formation, changes in the orientation of mental, eruption and formation of mandibular, third molar, foramen, and inferior alveolar canal, the pattern of lamina dura, pulp/tooth area ratio of teeth, the trabecular pattern in jaws
Community dentistry	Identification of individuals with the help of dental charting, cheiloscopy, comparative dental identification
Pedodontics	Identification through endemic fluorosis, socioeconomic grouping, mass disasters, elderly abuse, dental fraud and malpractice, dental caries patterns, periodontal disease, and oral cancer
Oral and maxillofacial surgery	Age estimation by the help of Nolla's calcification stages, Demirjian's methods using dental eruption sequence, maturation chart, Schour and Massler chart
Conservative dentistry	Identification by studying fractures, Le Fort 1 osteotomy procedure in the autopsy, surgical repairs and implants, maxillomandibular and dentoalveolar structure
Orthodontics	Identification by observing root canal-treated restorations, radiolucent and radio-opaque restorative materials, thickness and widening of the periodontal ligament, the periapical radiograph
Periodontics	Age estimation by the help of hand wrist, cephalometrics, orthopantomography (opg) X-ray, and X-ray to determine the pubertal state Identification of individuals with the help of tooth rotation and malposition, orthodontic appliances, orthodontic reconstruction Race identification using the cephalic index and craniofacial superimposition Sexual dimorphism through the mandibular canine index and mandibular first molar index Age estimation by studying root transparency and root length and periodontosis (gum recession) Gingival morphology for identification

equipped labs for attaining sound practical knowledge, and lack of care.

CONCLUSION

Forensic dentistry plays a major role in the identification of those individuals who can not be identified visually or by other means. This is where the uniqueness of human dentition comes into play as it is comparable to the

exclusivity of fingerprints. Well-maintained dental records can provide resolution to such situations. This can only be achieved by offering formal training in the pursuit of collecting, evaluating, and presenting dental evidences. The call of the hour is to realize the importance of this field to us and the judicial system; hence, a lot of effort needs to be made from our side to prevent forensic dentistry from dying a slow death.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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