

Original Article

Awareness of Forensic Odontology among General Dental Practitioners in Pune - A Cross-sectional Study

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ABSTRACT:

Aim and Objective: The aim of the study is to analyze the knowledge, attitude and approach of forensic odontology among dental practitioners in Pune. **Materials and Methods:** A cross-sectional study was conducted in a sample of 300 dental practitioners in Pune and data was collected by means of a questionnaire. The questionnaire consists of 13 relevant questions with demographic and clinical data was recorded. **Results:** Thirty % of the dental practitioners did not maintain dental records in their clinic/workplace and out of the 70 % that maintained records, Fifty seven % of dental practitioners were maintaining dental records for less than equal to two years and twenty four percent maintaining dental records for about three to six years. Nineteen % of dental practitioners were maintaining dental records for more than six years. Fifty seven % of dental practitioners used hand written records and twenty four percent keep their records in computer whereas nineteen % maintain them in both formats. Sixty one % of the dental practitioners were not aware of child abuse and the actions to be taken. Dental age and gender estimation was not known to 72% of the dental practitioners. Accuracy and sensitivity in identifying an individual by DNA was known to 65%, whereas 5 % of dental practitioners were in favor of visual examination. About 72% of the dental practitioners did not know the significance of bite mark patterns of the teeth. 65 % of the practitioners don't know that they can testify as an expert witness in court of law while 83 % of the practitioners lacked formal training in collecting, evaluating and presenting dental evidence. **Conclusion:** Our study revealed inadequate knowledge, poor attitude and lack of practice pertaining to record keeping or clinical knowledge of forensic odontology prevailing among the dental practitioners in Pune.

Keywords: Awareness, Dental Practitioners, Forensic Odontology, Knowledge, Pune and Study

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INTRODUCTION

Forensic is derived from the Latin word forum, which means "court of law". Odontology refers to study of teeth. Forensic odontology, therefore, has been defined by the Federation Dentaire International (FDI) as that branch of dentistry which, in the interest of justice, deals with the proper handling and examination of dental evidence, and with the proper evaluation and preservation of dental findings.¹ Forensic

dentistry is a challenging and fascinating branch of forensic science that involves the application of dental sciences in the identification of deceased individuals through the comparison of ante- and post-mortem records. From AD 66 till date, dental identification has proved vital in identifying deceased individuals, the first case being accepted by the law in the year 1849.² Recently, forensic odontology has evolved as a new ray of hope in assisting forensic

medicine, but, this vital and integral field of forensic medicine is still in a state of infancy in India.³ The important applications of forensic odontology include identification of human remains through dental records and assisting at the scene of crime; in cases of suspected child or adult abuse through bite marks or physical injuries; determination of age and gender of the living or deceased and to testify as an expert witness in the court to present forensic dental evidence. The various materials used in identification of human remains are the personal belongings like pieces of clothing, jewelry, fingerprints from blood grouping and dentition. The entity of forensic dentistry comprises four major areas of interest: Dental identification, Bite mark, Cheiloscopy (study of lip prints) and rugoscopy (study of palatal rugae patterns). Sialo-chemistry or the detection of chemicals in saliva as a tool in forensic odontology is also being used increasingly. The question always arises as to whether the dental practitioners should know about forensic odontology, the reason being that dental identification provides an accurate source of identification of the victim or the suspect. In recent times, natural and man-made disasters are occurring more frequently in India with increasing crime like gang rape and child abuse. Under these conditions, the bodies of the victims become mutilated beyond recognition, where the vital role of dental surgeons comes into picture in the identification of such individuals. Keeping this as the background, this study was undertaken to analyze and assess the awareness about forensic odontology among the dental practitioners in Pune.

MATERIALS:

1. General dental practitioners in Pune
2. Data collection

The questionnaire was designed for general dental practitioners, who in their day-to-day life might be encountering cases of forensic interest.

METHOD:

A cross-sectional study was conducted among 300 general dental practitioners in Pune. Data was collected in a personalized manner by means of the questionnaire.

The questions were framed to assess the - knowledge, attitude and practice. Information was obtained on the following matters:

1. Knowledge about the significance of dental records, identification of child abuse, dental age estimation, identification of an individual, bite marks and as a witness in the court.
2. Practices about maintenance of dental records and attitude of the practitioner towards maintenance of dental records and towards child abuse.

RESULTS:

Thirty percent of the dental practitioners did not maintain dental records in their clinic / workplace, with only 70% of the practitioners maintaining records. Out of 70%, Fifty seven percent of dental practitioners were maintaining dental records for less than equal to two years and twenty four percent maintaining dental records for equal three to six years. Nineteen percent of dental practitioners were maintaining dental records more than six years. Fifty seven percent of dental practitioners were maintaining as hand written records and twenty four percent keep their records in computer whereas nineteen percent maintain in both formats. On statistical analysis, using Chi-Square test, the P-values obtained was 0.001%, which was statistically significant (shown in Table 1). Sixty one percent of the dental practitioners were not aware of child abuse and the actions to be taken. When statistical analysis was done for child abuse among general dental practitioners, the P-values for awareness obtained was 0.028%, for identification of symptoms was 0.001%, which was statistically significant (shown in Table 2).

Questionnaire used in the study:

1. Do you maintain dental records in your clinic? YES / NO
2. If yes, which of the following are regularly maintained?
 - a. Patient details
 - b. Medical history
 - c. Family history
 - d. Clinical findings
 - e. Treatment plan
 - f. Photographs
 - g. Dental casts
 - h. Radiographs
 - i. Investigation reports
 - j. Treatment log
3. How long is the duration of maintenance of dental records?
4. How do you store your patient records?
 - a. Hand written case paper and treatment records
 - b. Computerized records
 - c. Both
5. Are you aware of the significance of maintaining dental records in identifying the deceased and/or crime suspects? YES / NO
6. Do you think a dental surgeon can identify physical/neglective/sexual/psychological abuse of a child? YES / NO
7. What would you do if you identify signs or symptoms of child abuse?
8. How do you estimate the dental age of an individual by examining the teeth?
9. Which of the following in your opinion, is the most accurate and sensitive method to identify an individual? (alive or dead)
 - a. Visual examination
 - b. Finger prints
 - c. Physical and anthropological examination of bone and teeth
 - d. Serological examination
 - e. DNA comparison
10. Are you aware of the bite mark pattern of teeth? YES / NO
11. Have you had any formal training in collecting, evaluating and presenting dental evidence? YES / NO
12. Are you aware that you can testify as an expert witness in the court to present forensic dental evidence? YES / NO
13. How will you identify the age and gender of the deceased in the event of a mass disaster

Table 1: Shows maintenance and way of storage of dental records, awareness of crime among general practioners

Duration of Maintenance of Records	No. of Respondents	% of Respondents	p-Value
≤2 year	171	57.0	0.001
3 to 6 years	72	24.0	
>6 years	57	19.0	
Way of storage of records			0.001
Manual	147	49.0	0.001
Computerized	111	37.0	
Both	42	14.0	
Awareness for crime suspects			0.003
Yes	105	35.0	0.003
No	195	65.0	

Table 2: Shows Awareness of Symptoms of Child Abuse among general practioners

	No. of respondents	% of respondents	P-value
Can identify the child abuse			0.028
Yes	117	39.0	
No	183	61.0	
Awareness of symptoms of child abuse			0.001
Aware	102	34.0	0.001
Not Aware	198	66.0	

Table 3: Shows Ability of Estimating Dental Age and Sex

	No. of respondents	% of respondents	P-value
Estimate dental age from teeth exam			0.001
Aware	99	33.0	
Not Aware	201	67.0	
Estimate age and sex of diseased in the mass disaster			0.001
Aware	84	28.0	
Not Aware	216	72.0	

Dental age and gender estimation was not known to 72% of the dental practitioners, the P-value obtained was 0.001%, which was statistically significant. Accuracy and sensitivity in identifying an individual by DNA was known to 65% percent, whereas 5% of dental practitioners were in favor of visual examination. The P-value for identifying an individual by DNA was 0.001% and for visual examination was 0.001, which was statistically significant (shown in Table 3). About 72% of the dental practitioners did not know the significance of bite mark patterns of the teeth. The P-value obtained was 0.003%, which was statistically significant. 65 percent of the practitioners don't know that they can be testifying as an expert witness in court of law. The P-value obtained was 0.001%, which was statistically significant. 83 percent of the practitioners lacked formal training in collecting, evaluating and presenting dental evidence. The p-value obtained was 0.001%, which was statistically significant (Table 4).

DISCUSSION

The sovereign science of forensic odontology is descended from rather inauspicious beginnings in antiquity. It is said that the first dental identification was made between 49 and 66 A D when Agrippina, the jealous wife of Roman Emperor Claudius, demanded the disembodied head of her husband's mistress, Lollia Paulina. A discolored anterior tooth or malocclusion served to confirm her identity.^{4,5} Forensic odontology is an important branch of the study of dentistry that would assist in solving cases of abuses and deaths. Greater knowledge and awareness of forensic odontology among the dental practitioners would be required in the growing field of medicine. The practice of forensic odontology has gained importance in a number of developed countries across the world but in developing countries like India, it is yet to gain full momentum. In the past

many catastrophes have left unsolved mysteries, the exact death toll in India due to cyclone hit in Chennai, in which thousands of people died was a question left unanswered. In June 2013, a multi-day cloudburst centered on the North Indian state of Uttarakhand caused devastating floods and landslides in the country's worst natural disaster with more than 5,700 people were "presumed dead" and unrecovered.⁶ This could have been made possible if there were adequate forensic odontologists for identification of the victims.

According to Khare P et al⁷, there is lack of knowledge and attitude towards the status of forensic odontology in metro and in tier 2 city in urban India. In our present study, we also found that the general dental practitioners in Pune lack knowledge regarding maintenance of dental records.

The law enforcement authorities in India usually seek the help of dental surgeons in government service rather than dental practitioners who have degrees in forensic odontology from universities outside India and who are not in government service. The outcome is that there is a dearth of qualified forensic odontologist in India, which is evident by the rare instances wherein forensic odontology has been applied successfully in solving criminal cases or to identify the deceased. One such successfully reported case is that of the assassination of the former Prime Minister of India, Mr. Rajiv Gandhi, where the forensic odontologist had played a very valuable role.^{8,10}

The importance of forensic odontology can be attributed to the ability of the dental tissues to withstand environmental assaults and still retain some of its original structure. This makes teeth an excellent and an accurate source for DNA material.⁹ Even the few practitioners who were aware of this, answered more by their knowledge that was gained through the media.

Age is one of the essential factors in establishing the identity of a person.

Estimation of the human age is a procedure adopted by anthropologists, archaeologists and forensic scientists.^{11,12} This has helped forensic odontologist to solve cases in countries abroad, and could similarly play a very important role in solving cases in India. But nearly two third of the practitioners did not know how to estimate the dental age by examining the teeth. The reasons may be ignorance/lack of basic knowledge or lack of confidence in answering this question.

All cases of child abuse, which are greatly growing in number in day-to-day life, should be detected as soon as possible. The lip prints, teeth and palatal rugae patterns can also be used as weapon, which gives appropriate information as to the identity of the victim. Analysis of bite marks is one of the major responsibilities of a forensic dentist¹³ therefore; general dental practitioners have to be alert about a variety of behavioral indicators of the patient to identify suspected child abuse. In our present study, nearly two third of the practitioners did not know how to estimate the behavior and physical pattern of child abuse.

The identification of a large number of casualties like cyclones in India, Japan radioactive nuclear explosion in mass disasters is complex and fraught with hazards, both physically and emotionally. A forensic anthropologist may be called in when human remains are found during archaeological excavation, or when badly decomposed, burned, or skeletonised remains are found by law enforcement or members of the public.¹⁴ Most of the general dental practitioners in our study were not aware of the methods to identify the age and gender of the deceased individuals.

The dental record should be maintained as consumer court evidence and for dental insurances.¹⁵ In our present study, general dental practitioners were not aware of type and duration of maintenance of dental records and being testified. Strikingly, only

very few practitioners maintain complete records and very few knew the duration of dental record maintenance as stated by the law, which is a minimum of seven years to a maximum of ten years.¹⁰

The study shows clearly that there is a general lack of practice of forensic odontology among dental practitioners in India. There are no fully equipped labs for forensic odontology in India but now days there are many institutions offering formal training in forensic odontology like in Mumbai, Karnataka and Delhi.¹⁶ Forensic odontology was not included as a part of our academic curriculum until recently.

CONCLUSION

This study, conducted among 300 dental practitioners regarding their awareness about forensic odontology, revealed inadequate knowledge, poor attitude and lack of practice prevailing among these study subjects. This study reflects the current situation of our country in the field of forensic odontology.

Forensic odontology is a still in infancy stage in India but due upcoming institutions, it can touch the sky. This condition, however, could be improved by making forensic odontology a part of our academic curriculum.

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