

Original Research

Status of Forensic Odontology in Odisha

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ABSTRACT:

Forensic Odontology has its root dating back to 49 A.D. Dental imaging techniques, new materials and new methods have advanced the profession into the modern era of dentistry. There have been many advances in DNA technology as well but forensic odontology remains a very cost-effective and rapid means of confirming the identity of deceased and criminal identification when proper dental records and dental evidence exist. **Methodology:** A questioner based survey was conducted to find out the awareness regarding forensic dentistry among several professionals. We distributed four different questionnaires among four different groups of population such as dental students, practicing dentists, FMT doctors, and police personnel and finally analyzed the data. **Results:** Practicing dentists were the most aware group followed by FMT doctors, dental students, and police personnel, workshops, and scientific articles being the primary source of knowledge for police personnel and FMT doctors respectively. Most of them think their knowledge regarding forensic odontology was not adequate and would like to attend workshops and seminars regarding the same. Most of the practicing dentists were aware of the significance of keeping dental records of their patients. Most of the FMT doctors and police personnel think that forensic dentistry will be very useful in forensic investigations and they support the claim that the government of Odisha should recruit forensic dentists in investigating teams. **Conclusion:** The status of forensic dentistry in Odisha is still in its infancy, a lot of awareness is necessary among dental professionals as well as police personnel and FMT doctors. But it is a fact that its popularity is growing rapidly among dental students and practicing dentists. Government should pay attention to the fact that the state has currently no institute that provides the forensic odontology course. Along with that it should establish forensic dentistry labs and recruit forensic dentists so that police authority can approach for investigations. There is no doubt that forensic investigations will get a boost in Odisha with the involvement of forensic odontology.

Keywords: Forensic Odontology, Forensic dentistry, Status, Odisha

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INTRODUCTION

Forensic Odontology does not need any introduction as it has been proving its importance globally in the field of forensic science for many centuries now. The term 'forensic' implies 'court of law.' Forensic Odontology has been defined as a branch of dentistry that, in the interest of justice, deals with the proper handling and examination of dental evidence and with the proper evaluation and presentation of dental findings. ^[1]It has well-established roots dating back to 49 A.D. Originally, it was not scientific and certainly not a discipline requiring advanced training. There have been many technological advances in the science

of dentistry since the 4th century. Dental imaging techniques, new materials, and methods involving dental care have advanced the profession into the modern era of dentistry. These advances offer forensic odontologists to assist the forensic team in an investigation in many ways.

A Forensic odontologist plays a vital role in (a) Identification and determination of age, race, sex of unknown human remains of a mass disaster victim including neonatal remains (b) Analysis of bitemarks in child abuse or neglect, domestic violence, and sexual abuse with bite mark evidence (c) Identification of bitemarks in other substances such as

wood, leather, and foodstuffs (d) Age estimation of unaccompanied minors, border infiltrators and human trafficking victims (e) Analysis of weapon marks using the principles of bite-mark analysis (f) Presentation of bite and weapon mark evidence in court as an expert witness (g) Assistance in building up a picture of lifestyle & diet at an archaeological site, etc.^[2]

There are many legendary cases solved by forensic dentists in history that will justify the importance of forensic odontology.

FIRST DENTAL EVIDENCE ACCEPTED BY A COURT- 1849

In Parkman-Webster case - 1849, Dr. Parkman's dentist Dr. Nathan Cooley identified Parkman's dentures, which he had made for the deceased three years earlier.^[3,4] It was the first case of this kind to be accepted by a court.^[5]

IDENTIFICATION OF ABRAHAM LINCOLN'S ASSASSIN - 1865

John Wilkes Booth, the assassin of President Lincoln was shot and killed on 26th April 1865. Wilke's body was exhumed and his family dentist, Dr. William Merrill identified Booth by his abnormal jaw and the gold restorations which he had made for the deceased a few days before the assassination.^{[6][7]}

FIRST DENTAL IDENTIFICATION IN A MASS DISASTER - 1898

On May 4th, 1897, 126 members of the Parisian aristocracy lost their lives in a fire in Paris. Dr. Ascor Amoedo has mentioned this incident as the first case of dental identification in a mass disaster.^[8]

ADOLF HITLER – 1945

Hitler committed suicide with his wife Eva Braun on April 30th, 1945 in Berlin but his fate was still a mystery till 1968. His dentist Dr. Hugo Blaschke confirmed his identity after matching his skull fragments, lower jaw bone pieces, upper jaw with a nine-unit bridge, and his antemortem dental records, his custom-made anterior bridge, and periodontal problems.^[9]

IDENTIFICATION OF JOHN F. KENNEDY'S ASSASSIN – 1963

On 24th November 1963 Lee Harvey Oswald, the assassin of President John F. Kennedy was fatally shot by Jack Ruby and subsequently buried. 14 years later, Michael Eddowes, claimed that the body buried in Oswald's grave was that of a Russian spy. To ascertain the truth, Lee Harvey Oswald's body was

exhumed; his identity was confirmed by antemortem dental records on 4th October 1981.^[10]

SADDAM'S SONS - 2003

Saddam Hussein's sons were killed by the US military on July 22, 2003, in Baghdad. As the result of numerous missile attacks, the bodies were badly burned. Both of his sons, Uday and Qusay Hussein were identified from their dental records.^[11]

THE FIRST CASE OF DENTAL IDENTIFICATION IN INDIA -1191

M. Raja Jayachandra Rathore's body was recognized by his false anterior teeth who died on the battlefield. It is the first case of identification using dentition from India.^[12]

NIRBHAYA CASE: DELHI GANG-RAPE – 2013

In the Nirbhaya Delhi gang-rape case – 2013, Dr. Ashit B Acharya, analyzed the numerous bite marks on the victim's corpse and the dental models of the accused and postulated that two of the bite marks were identical with two suspects. This evidence was approved by the court on May 6th, 2013.^[13]

THE FIRST CASE WAS SOLVED BY A FORENSIC DENTIST IN MUMBAI-2015

Dr. Hemalata Pandey, the only forensic dentist in the state of Maharashtra, helped the Mumbai police to secure a conviction for a rapist way before the DNA reports came, by matching the bite marks found on the 28-year-old female victim from Powai.^[14]

On the other hand, Odisha, the eastern Indian state on the Bay of Bengal is the most vulnerable state of India towards natural calamities like floods, droughts, and cyclones.^[15] It also stands 16th in India according to crime rates in the year 2018^[16] & 7th according to crimes against women.^[17] Surprisingly we couldn't find a single legal case solved by a forensic odontologist in Odisha. Odisha has the worst conviction rate in the country.^[18] We realized forensic dentistry has a whole different story to tell when it comes to Odisha. We researched to reveal the status of forensic odontology in Odisha and discussed the results in this article.

METHODOLOGY

A questioner based survey was conducted to find out the awareness about forensic odontology among crime branch Police personnel, Forensic Medicine Doctors, Dental students, and Practicing Dentists in urban and semi-urban cities of Odisha. Four different types of questionnaires were prepared for each category of people as suitable. [Table 1, 2, 3, 4].

Table 1: Questionnaire for the Dental students; BDS & MDS

QUESTIONNAIRE FOR DENTAL STUDENTS

1. **Have you ever heard of the term "Forensic Odontology"?** (Yes/No)
2. **If Yes, where have you heard about it?**
 - (a) Books
 - (b) Internet
 - (c) Scientific article or journal
 - (d) Lectures
 - (e) Workshop
 - (f) Seminar
3. **What do you think it is all about?**
 - (a) Forensic science that deals with teeth
 - (b) Forensic science that deals with poison cases
 - (c) Forensic science that deals with Human skeletal remnants
 - (d) Forensic science that deals with determining the time of death
4. **A Forensic Dentist can do**
 - (a) Identification of deceased in mass disaster
 - (b) Bite-mark analysis
 - (c) Age determination of a person
 - (d) All of the above
5. **Do you think Forensic Odontology is important in BDS or MDS?** (Yes/No)
6. **Do your College have Forensic odontology as a part of your curriculum or course outline?** (Yes/No)
7. **Should there be a separate Dept. For Forensic Odontology?** (Yes/No)
8. **Are you aware if any other college or universities in Odisha is providing forensic odontology as a course?** (Yes/No)
9. **Are you aware that Forensic Odontology is a part of Forensic Science?** (Yes/No)
10. **Are You aware that Forensic Odontologist is a profession in dentistry?** (Yes/No)
11. **Do you know any Forensic odontologist?** (Yes/No)
12. **Are you interested to join Forensic odontology as a profession in future?** (Yes/No)
13. **Are you aware that every human being has unique bite mark pattern just like fingerprints?** (Yes/No)
14. **Do you think that your knowledge and awareness regarding Forensic Odontology is adequate?** (Yes/No)
15. **Would you like to attend a workshop or seminar regarding Forensic odontology?** (Yes/No)

Table 2: Questionnaire for FMT Doctors

QUESTIONNAIRES FOR FMT DOCTORS

1. Have you ever heard the word "Forensic Odontology"? (Yes/No)
2. If Yes, where have you heard this from?
 - (a) Book
 - (b) Internet
 - (c) Scientific article or journal
 - (d) Lecture
 - (e) Workshop
 - (f) Seminars
3. Are you aware that forensic odontology is a part of forensic science? (Yes/No)
4. What do you think Forensic odontology is?
 - (a) Forensic science that deals with teeth
 - (b) Forensic science that deals with poison cases
 - (c) Forensic science that deals with human skeletal remain
 - (d) Forensic science that deals with determination of time of death
5. A Forensic Dentist can do
 - (a) Identification of deceased in mass disaster
 - (b) Bite-mark analysis
 - (c) Age determination of a person
 - (d) All of the above
6. How many Autopsies have you performed?
 - (a) Less than 100
 - (b) 100 to 300
 - (c) 300 to 500
 - (d) More than 500
7. Have you ever heard of Oral Autopsy? (Yes/No)
8. Have you ever performed Oral Autopsy? (Yes/No)
9. Do you know any forensic dentist in Odisha? (Yes/No)
10. Have you ever been a part of any case where a Forensic Dentist had played an important role in it? (Yes/No)
11. Are you aware of the fact that Dental tissues are the last thing to be destroyed by cremation or burial? (yes/No)
12. Are you aware of the fact that every human being has unique bite mark pattern just like fingerprints? (Yes/No)
13. Do you think your knowledge and awareness regarding forensic dentistry is adequate? (Yes/No)
14. Would you like to attend a workshop or a seminar regarding Forensic Dentistry? (Yes/No)
15. Do you think that Forensic Dentistry is useful in Forensic Science? (Yes/No)
16. Do you think Govt. Of Odisha or Odisha Police should hire Forensic Dentists for investigation purpose? (Yes/No)

Table 3: Questionnaire for Practicing Dentists

QUESTIONNAIRES FOR DENTAL PRACTITIONERS

1. Have you ever heard of the term "forensic Odontology"? (Yes/No)
2. Where have you heard this from?
 - (a) Book
 - (b) Internet
 - (c) Scientific article or journal
 - (d) Lecture
 - (e) Workshop
 - (f) Seminars
3. What do you think it is?
 - (a) Forensic science that deals with teeth
 - (b) Forensic science that deals with poison cases
 - (c) Forensic science that deals with human skeletal remaining
 - (d) Forensic science that deals with determining the time of death
4. A Forensic Dentist can do
 - (a) Identification of deceased in mass disaster
 - (b) Bite-mark analysis
 - (c) Age determination of a person
 - (d) All of the above
5. Are you aware that forensic odontology is a part of forensic science? (Yes/No)
6. Do you think Forensic Odontology is useful in forensic science? (Yes/No)
7. Are you aware that every human being has unique rouge and bite mark pattern? (Yes/No)
8. Are you aware of the significance of keeping dental records of the patients? (Yes/No)
9. Do you maintain dental records of your patients? (Yes/No)
10. If Yes, how long do you keep dental records of your patients?
 - (a) Less than 1 year
 - (b) 1-3 year
 - (c) 3-5 years
 - (d) More then 5 years
11. Do you have any formal training in forensic dentistry? (Yes/No)
12. If Yes, have you ever been a part of any Forensic Team? (Yes/No)
13. Have you ever solved any case as a Forensic Odontologist? (Yes/No)
14. Are you aware that you can testify dental records as evidences in a court of law? (Yes/No)
15. Have you ever been called by any authority or court to provide any dental evidence? (Yes/No)
16. If No, are you interested to be a part of Forensic Team as Forensic Odontologist in future? (Yes/No)
17. Do you think Your knowledge and awareness regarding Forensic odontology is adequate? (Yes/No)
18. Do you want to attend workshop or seminars regarding Forensic Odontology? (Yes/No)

Table 4: Questionnaire for Police Personnel

QUESTIONNAIRES FOR CBI/POLICE PERSONNEL

1. Have you ever heard the word "Forensic Odontology"? (Yes/No)
2. If Yes, where have you heard this from?
 - (a) Book
 - (b) Internet
 - (c) Scientific article or journal
 - (d) Lecture
 - (e) Workshop
 - (f) Seminars
3. Are you aware that forensic odontology is a part of forensic science? (Yes/No)
4. What do you think Forensic odontology is?
 - (a) Forensic science that deals with teeth
 - (b) Forensic science that deals with poison cases
 - (c) Forensic science that deals with human skeletal remain
 - (d) Forensic science that deals with determination of time of death
5. A Forensic Dentist can do
 - (a) Identification of deceased in mass disaster
 - (b) Bite-mark analysis
 - (c) Age determination of a person
 - (d) All of the above
6. How many crime scenes have you visited?
 - (a) Less than 100
 - (b) 100 to 300
 - (c) 300 to 500
 - (d) More than 500
7. Other than police personnel, who else in your team are allowed to enter a crime scene?
 - (a) Police personnel only
 - (b) Photographers
 - (c) Forensic scientist
 - (d) Forensic Odontologist
 - (e) All of the above
8. Who collects the evidence in your investigation team?
 - (a) Police personnel
 - (b) Photographer
 - (c) Forensic scientist
 - (d) Forensic Dentist
 - (e) All of the above
9. Do you know any forensic dentist in Odisha? (Yes/No)
10. Do you have any forensic dentists in your investigation team? (Yes/No)
11. Have you ever been a part of any case where a Forensic Dentist had played an important role in it? (Yes/No)
12. Are you aware of the fact that every human being has unique bite mark pattern just like fingerprints? (Yes/No)
13. Do you think your knowledge and awareness regarding forensic dentistry is adequate? (Yes/No)
14. Would you like to attend a workshop or a seminar regarding Forensic Dentistry? (Yes/No)
15. Do you think that Forensic Dentistry is useful in Forensic Science? (Yes/No)
16. Do you think Govt. Of Odisha or Odisha Police should hire Forensic Dentists for investigation purpose? (Yes/No)

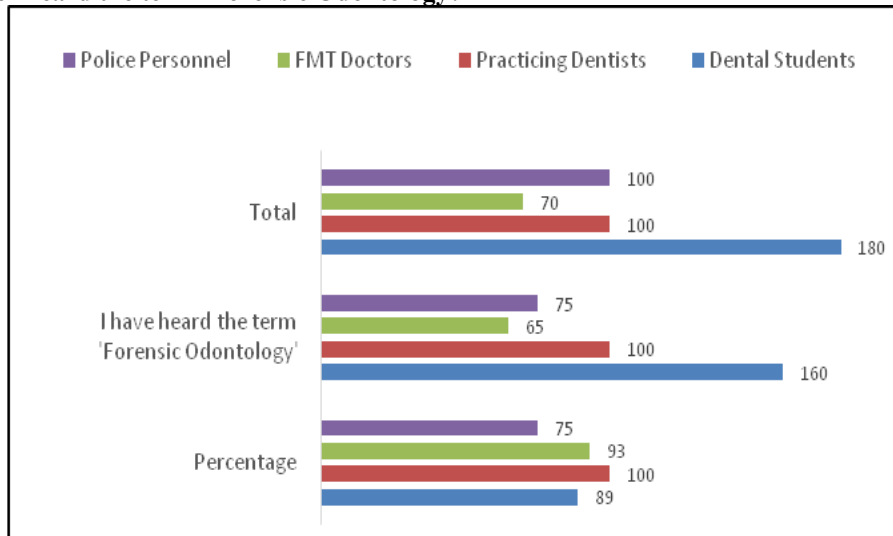
500 Questionnaires were distributed among them physically to those who were accessible and digitally using social media to those who were inaccessible. We also enquired about the number of practicing forensic dentists and the number of colleges and universities teaching Forensic Odontology in Odisha.

RESULTS

We received 470 responses out of which 20 inappropriate or partially filled responses were rejected. Rest 450 responses were from 180 Dental Students, 100 Practicing Dentists, 70 FMT Doctors, and 100 Police Personnel.

First, we asked a few common questions to all the 4 groups such as, do they have ever heard the word “Forensic Odontology” and we summarized the result we got in [Graph 1].

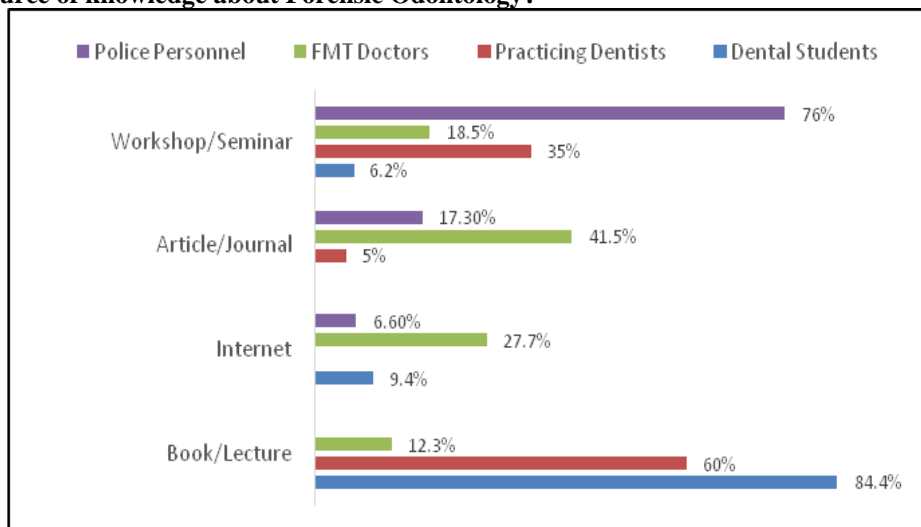
Graph 1: Ever heard the term ‘Forensic Odontology?’



It was analyzed that around 89% of dental students, 100% of practicing dentists, 93% of FMT doctors, and only 75% of Police personnel were familiar with the term Forensic Odontology. Practicing Dentists being the most aware and police personnel being the lowest aware group.

When we enquired about the source of their knowledge, we got a very diverse response which is illustrated in [Graph 2].

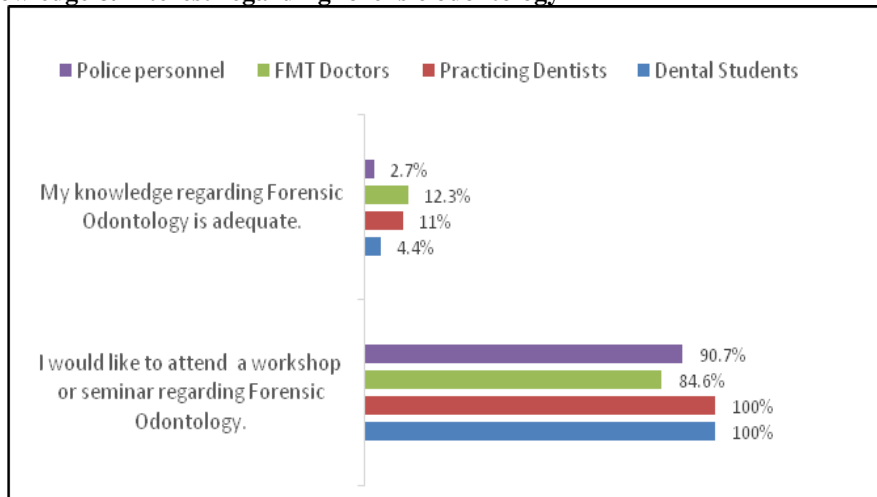
Graph 2:Source of knowledge about Forensic Odontology?



It was noticed that the source of knowledge was different for different groups, Books/Lectures being the main source for students as well as dentists, whereas workshop/seminars being the main source for police personnel and most of the FMT doctors replied that articles and journals were their sources of knowledge regarding forensic odontology.

Further, most of them think that their knowledge regarding forensic odontology was inadequate and when we asked if they would like to attend a workshop or seminar regarding forensic odontology, most of them expressed their immense interest to do so. The result is illustrated in [Graph 3].

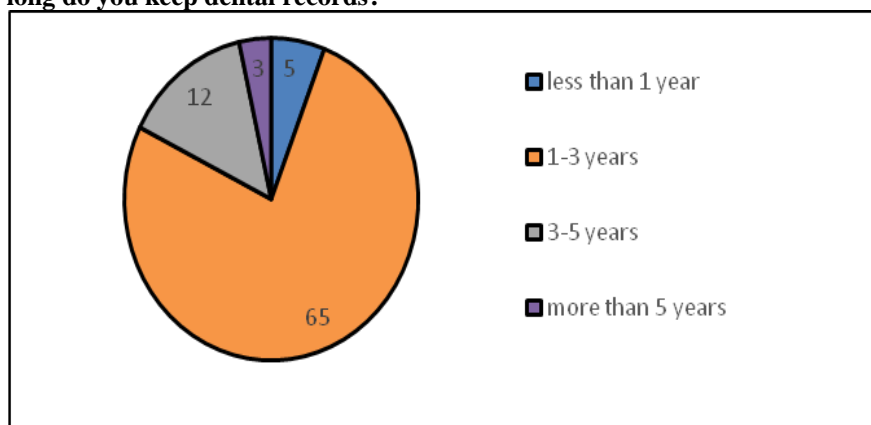
Graph 3: Knowledge & interest regarding forensic odontology



And lastly, we asked everyone if they know any forensic Odontologist in Odisha, surprisingly none replied that they know any forensic odontologist. Then we asked some special questions to every group. We asked the group of dental students whether they know any institute or university in Odisha that provides a specialized degree for forensic Odontology. No one has replied yes, which means currently there is no institute for forensic odontology as a postgraduate degree in Odisha. While 93% of the students think that, forensic dentistry is important during the undergraduate course, a huge 87% of the students are not yet aware that Forensic Dentistry can be practiced as a profession. But interestingly almost 37% of the students replied that they would like to be a forensic dentist in the future. Also, 81% of dental students suggested a separate department for forensic odontology in their college.

On the other hand, we asked the Practicing dentists if they are aware of the significance of keeping dental records of their patients and we noticed that even though 85% of the dentists keep their patients' dental records, only 70% of them are fully aware of the significance of the record for forensic investigation purpose. The durations they keep the records for are illustrated in [Graph 4].

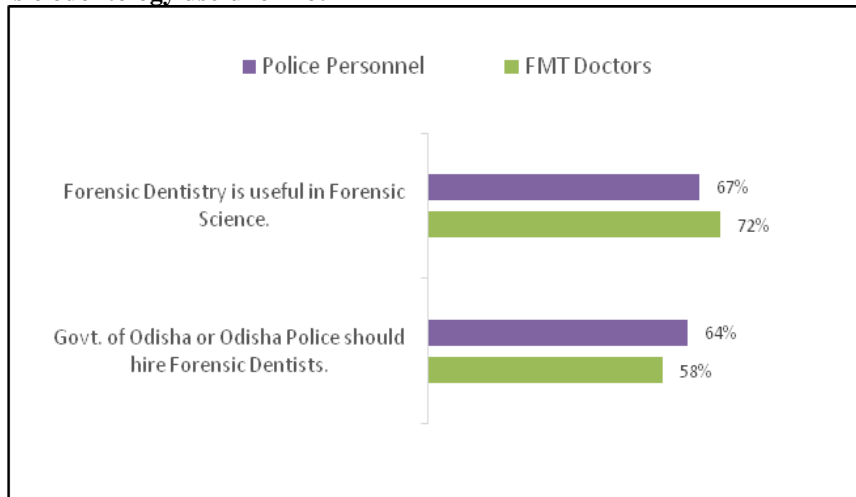
Graph 4: How long do you keep dental records?



65% of the dentists keep the records for 1-3 years of the period while only 3% of them keep for more than 5 years.

Our survey further revealed that 95% of the dentists have not received any type of training for forensic dentistry. Neither of them has ever been a part of any forensic team nor have they ever played a key role in solving any case. Only 10% of them are aware that they can testify to the dental records as shreds of evidence in a court of law. But interestingly 90% of them are interested to be a part of a forensic team if they get a chance.

Lastly, we asked the FMT doctors and the police personnel whether they think forensic dentistry is useful in forensic science and whether the government of Odisha or Odisha Police should hire forensic dentists for investigation purposes, we got mostly affirmative replies as a maximum of them think that forensic dentistry will be very useful in forensic science and forensic dentists should be hired by the government of Odisha or Odisha police. We summarized the results in the illustration below [Graph 5].

Graph 5: Forensic odontology useful or not

DISCUSSION

Forensic odontology is a sub-discipline of dental science that lies at the interface of dentistry and the law. Teeth are the most durable organs in the bodies of vertebrates and can therefore yield vital evidence. Dentistry has much to contribute to the detection and resolution of crime and in legal proceedings.^[18] Forensic dentistry has a major role in the identification process. Although changes in dental treatment practices are challenging the reliability and accuracy of dental identification methods, still forensic dentistry remains an important tool.^[19] So, sound knowledge and awareness about forensic odontology would be required to stay updated in this ever-changing and improvising world of medicine.

It is very welcoming that all the group of professionals we had surveyed are more or less aware of the field. Forensic magazine publishers should come forward in the support of Forensic odontology and should publish more articles emphasizing the potentials of forensic dentistry, this will increase the awareness among the FMT Doctors and police personnel. We noticed that all the four groups of populations are keen on attending seminars or workshops regarding forensic dentistry. Dental colleges should take the initiative to organize Workshops and seminars and try to reach all four groups of the population. This will not only benefit all of them in many ways but also improve the status and scope of the field tremendously. Workshops and seminars will encourage the dental students to peruse forensic dentistry as their carrier. Practicing dentists will be aware of the significance of maintaining dental records. Though very few maintain complete dental records and know about the duration of dental records maintenance as stated by the law, which is 7 to 10years.^[20] Police personnel will be aware of the significance of including forensic dentists in their investigation team, while FMT Doctors will get awareness regarding the importance of including forensic dentists to perform Oral Autopsies.

It's a matter of misfortune that currently, no institute provides Forensic Odontology courses in the state of Odisha. The government of Odisha should pay attention to the issue and should influence both the government and private universities to include such courses in their academics. Along with that government of Odisha should hire forensic dentists for its investigation agencies which will encourage the young dental aspirants to peruse forensic dentistry as their carrier and not to mention the difference it will create in the conviction rate of the state in criminal identification.

CONCLUSION

Unlike the western countries where forensic dentistry is considered a recognized branch of dentistry, in India, especially in the state of Odisha the status of the branch is still in its infancy. However, its popularity is growing among dental professionals as well as the police personnel and FMT doctors which is a very welcoming status for this highly potential branch of dentistry. Practicing dentists are becoming aware of the importance of keeping dental records of their patients which is a very noticeable development. Dental students are also showing interest to become forensic dentists by profession. Government should take initiatives to avail themselves of the course in universities.

Awareness among police personnel is also growing. We need to establish dental forensic laboratories and recruit forensic dentists so that police authority can approach the institutes and laboratories for forensic investigations. When there will be the availability of more and more qualified forensic dentists and forensic laboratories, we believe the forensic investigation will get a boost in the state of Odisha with the help of Forensic Odontology.

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