

Awareness about forensic dentistry among the dental students in Chennai - A Hospital based survey

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Abstract

Aim: The aim of the study was to evaluate knowledge, awareness, and practice related to forensic odontology among dental students in Chennai.

Methods: This cross-sectional study was conducted among the dental students in Chennai . To evaluate the knowledge of the participants about forensic dentistry, a self-administered questionnaire containing 10 questions pertained was made.

Results: A total of 125 participants were included in this study out of which, 75.20% were males and the remaining 24.80% were females.86.40% of the participants said that they were aware about the bite mark patterns of the teeth and the remaining 13.60% of the participants said that they were not aware about the bite mark patterns of the teeth.

Conclusion: The results show that there is an adequate level of knowledge and awareness regarding forensic odontology in all the groups investigated. Overall, the three groups also had adequate levels of good practice related to dental record keeping. However, regarding individual questions, there were some instances among the groups of inadequate levels of good practice.

Keywords: Awareness, Dental records, Forensic odontology, Innovative, Practice

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INTRODUCTION

Forensic dentistry is a challenging and fascinating area of forensics which involves the use of dental science to identify people who have died by comparing ante- and post-mortem doses(Carabott, 2013; Pandey and Hemanth, 2013; Schrader, 2018). Dental identification has been essential to detect deceased persons from 66 AD to 1849 and the first case was accepted by law(Senn and Weems, 2013). In recent times forensic dentistry has evolved into a new ray of hope for forensic medicine, but forensic medicine still is a vital and integral field in India(Savić Pavičič et al., 2021). There are few institutions offering forensic dentistry formal training and there are no employment opportunities for skilled forensic dentists who have graduated abroad(Schrader, 2018).

Forensic odontologist profoundly examines unknown human remains, identification of the victim in a mass disaster, assessment of sex from skeleton remain, age estimate of both living and dead analyses, assessment of cases of abuse such as the teens, the marital partner and the family.Forensic odontologist profoundly examines unknown human remains, identification of the victim in a mass disaster, assessment of sex from skeleton remain, age estimate of both living and dead analyses, assessment of cases of abuse such as the teens, the marital partner and the family.

Important forensic odontological applications include the identification of human remains through dental record and aid in the crime scene; suspected child or adult misuse by means of bite marks or physical injuries; age and sex identification for the live or deceased; and the presentation of forensic evidence as a court expert witness(Pandey and Hemanth, 2013; Schrader, 2018). In recent times there have been more natural and man-made disasters in India(Carabott, 2013; Pandey and Hemanth, 2013; Trengrove, 2016; Schrader, 2018). Under these conditions, victims' bodies are mutilated and not recognised, where they can

identify the vital role of dental surgeons.(Yang and Raj, 2017) (B.p. and P., 1990; Stimson and Mertz, 2002; Avon, 2004; Adams, Carabott and Evans, 2013)

Dentist should be aware of forensic dentistry, because dental identifiers provide a correct source of victim or suspect identification. There are four major areas of interest in forensic dentistry: dentistry, denture mark, cheiloscopy (lip prints study) and Rugoscopy (study of palatal rugae patterns). A systematic review of recent cross-sectional studies regarding the levels of knowledge, awareness, and practical application of forensic odontology among dentists in India revealed inadequacy and considerable variation in the practice of forensic odontology among dentists. [(Taylor and Kieser, 2016)] Our team has extensive knowledge and research experience that has translated into high quality publications (Subramanyam et al., 2018) (Ramadurai et al., 2019) (Website, no date a) (Jeevanandan and Thomas, 2018) (Princeton, Santhakumar and Prathap, 2020) (Saravanakumar et al., 2021) (Wei et al., 2021) (Gothandam et al., 2019) (Su et al., 2019) (Aldhuwayhi et al., 2021) (Sekar, Nallaswamy and Lakshmanan, 2020) (Bai et al., 2019) (Sekar et al., 2019) (Duraismy et al., 2019) (Parimelazhagan et al., 2021). This study was carried out to analyse and assess the awareness of forensic odontology among dental students in private Institution in Chennai.

Materials and Methods

This cross-sectional study was conducted among the dental practitioners in Chennai . To evaluate the knowledge of the participants about forensic dentistry, a self-administered questionnaire containing 10 questions pertained was made. The questionnaire was validated and later distributed using Google forms. The participation of the subjects was kept voluntary and nobody was obligated to fill the form. Questions were answered with “yes” or “no” or by marking the correct responses. Frequency analysis and percentage analysis were done with the obtained results. To assess the correlation Chi square test was done using the SPSS software version.

Results And Discussion

There were a total of 125 participants in this study out of which, 75.20% were males and the remaining 24.80% were females (Figure 1). 36% of the participants were from the undergraduate and the remaining 36% were from the post graduate (Figure 2). 93.60 % of the participants said that they do maintain dental records of the patients and the remaining 6.4% of the participants do not maintain any dental records (figure 3). 71.20% of the participants said maintaining dental records would help them to identify the deceased and the crime suspects. 4.8 % of the participants said that maintaining dental records would not help them to identify the deceased and the crime suspects and the remaining 24% of the participants said that maintaining dental records might help them to identify the deceased and the crime suspects (figure 4). 7.2% of females told that they estimate the age of an individual by examining the teeth. 15.2% of females told that they estimate the age of an individual by the physical appearance and 2.4% of females told that they estimate the age of an individual by examining the teeth as well as the physical appearance. 5.6% of male told that they estimate the age of an individual by examining the teeth. 41.6% of male told that they estimate the age of an individual by their physical appearance and 28% of male told that they estimate the age of an individual by examining the teeth as well as the physical appearance.

(figure 5). 86.40% of the participants said that they were aware about the bite mark patterns of the teeth and the remaining 13.60% of the participants said that they were not aware about the bite mark patterns of the teeth (figure 6).

6.4% of females are aware that they can present the dental evidence in the court as evidence and 18.4% of females said that the dental evidence may be presented in the court as evidence. 34.4% of males said that the dental evidence can be presented in the court as evidence and they were aware of it. 4% Of males were not aware that the dental evidence can be presented in the court as evidence and the remaining 36.8% of male said that the dental evidence can be presented in the court as evidence. (figure 7). 72.80% of the participants were aware about the sex linked gene (Amelogenin) which is associated with the dentistry and the remaining 27.20% of the participants were not aware about the sex linked gene (Amelogenin) which is associated with dentistry (figure 8). 60.80% of the participants said that forensic dentistry would help them to solve the mystery that occurred during the crime scene. 4% of the participants said that forensic dentistry would not help them to solve the mystery that occurred during the crime scene. 60.80% of the participants said that forensic dentistry would help them to solve the mystery that occurred during the crime scene and the remaining 35.20% of the participants told that maybe it would help them to solve the mystery which occurred during the crime scene (figure 9).

In our study the dental students were very much aware of forensic dentistry. They also had a thorough knowledge on the bitemarks. Participants were also aware that these dental records could be used as evidence for witnesses in the court. Majority of the dental students are having records of the dental status of the patients. In a study done among the Under graduates and

Postgraduate Students at Dow University of Health Sciences, it is said that they were much aware of forensic dentistry. Dental records may help to recognise people who have suffered crime, murderous analyses, mass victims or missings(Avon, 2004). For several reasons it is important to verify a deceased individuality. In the event of catastrophic and unforeseen actions, it is vital to close the immediate family members down. Another motive is the officially approved disposition of domains requiring a dead record. A confirmation of individuality is necessary to issue a death certificate(Preethi, Einstein and Sivapathasundharam, 2011). Due to these causes, dental identification takes primary responsibility for the detection of remaining remains when changes occur in post-mortem tissues; traumatic tissue damage occurs(Gambhir et al., 2016).

Dental substantiation comparison is one of the most consistent and unfailing methods because the teeth can bear intense temperature changes and can withstand decay(Rudraswamy et al., 2017). The conditions of a person's teeth vary however, and the information of decayed, missing and filled teeth can be evaluated and compared with each other in any instance. Dental records comparison (ante-mortem with post- mortem) Three categories include the teeth, periodontal tissue and anatomical characteristics for detection are included(Rudraswamy et al., 2017; Mehrotra et al., 2019). Dental tissue and dental restorations are resistant in nature, which makes them the most suitable source of DNA, owing to changes caused by environmental extremes, such as temperature and decomposition, to help recognise a person(Sheasby and MacDonald, 2001).

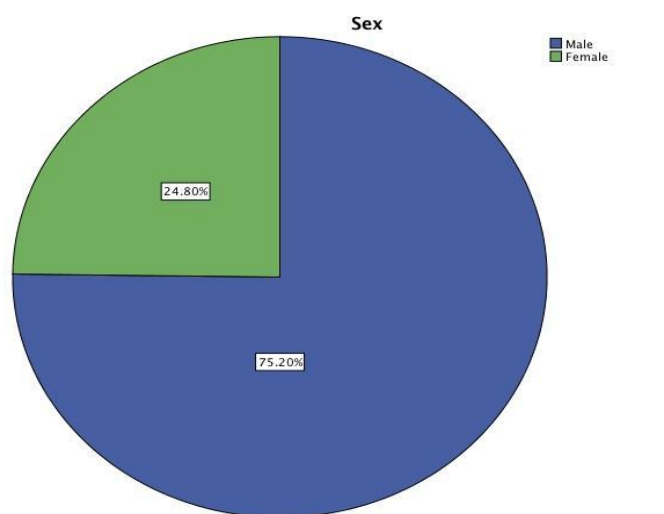


Figure 1: represents the gender distribution among the study participants. Blue represents male and green represents female. 75.20% were males and the remaining 24.80% were females.

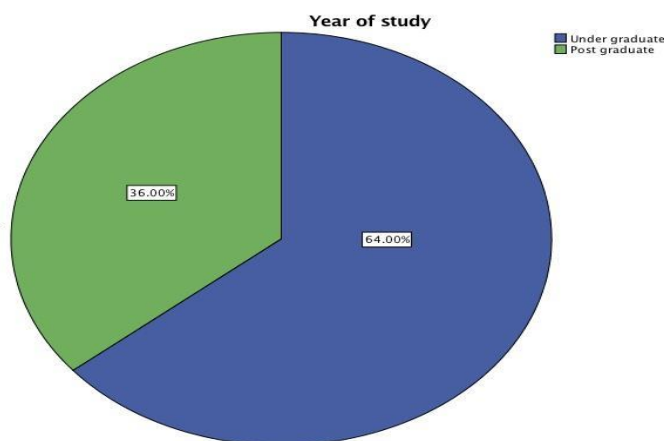


Figure 2: represents the year of study of the participants. Blue represents undergraduate students and green represents postgraduate students. A majority of the participants were undergraduates (64%) and the remaining 36% were postgraduate students.

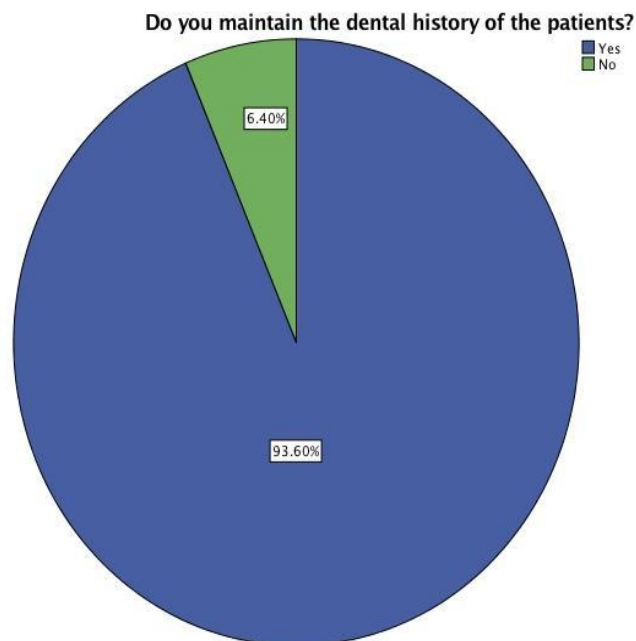


Figure 3: represents the percentage of participants who maintain the patient record history. Blue represents yes and green represents no. 93.60 % of the participants said that they do maintain dental records of the patients and the remaining 6.4% of the participants do not maintain any dental records.

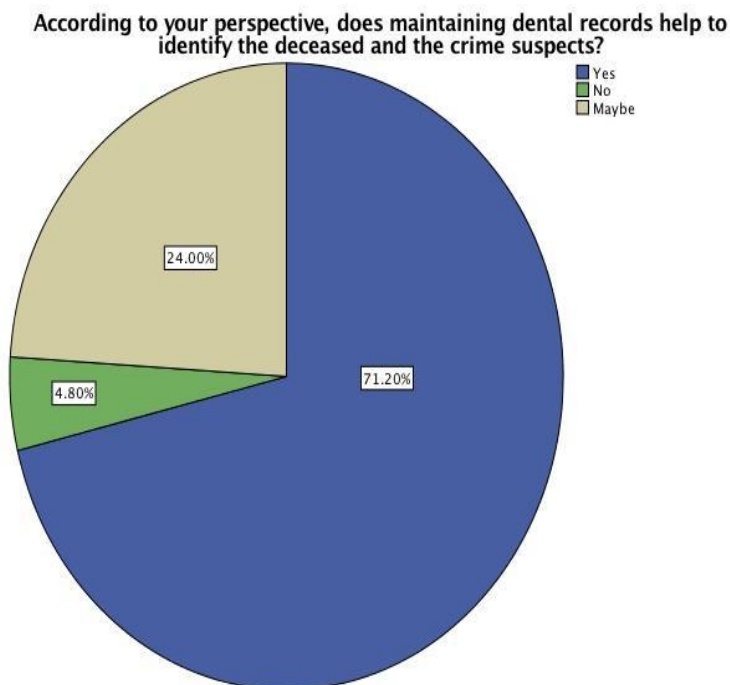


Figure 4: represents percentage of participants' dental records. Blue represents yes, green represents no, grey represents maybe. 71.20% of the participants said maintaining dental records would help them to identify the deceased and the crime suspects. 4.8 % of the participants said that maintaining dental records would not help them to identify the deceased and the crime suspects and the remaining 24% of the participants said that maintaining dental records might help them to identify the deceased and the crime suspects.

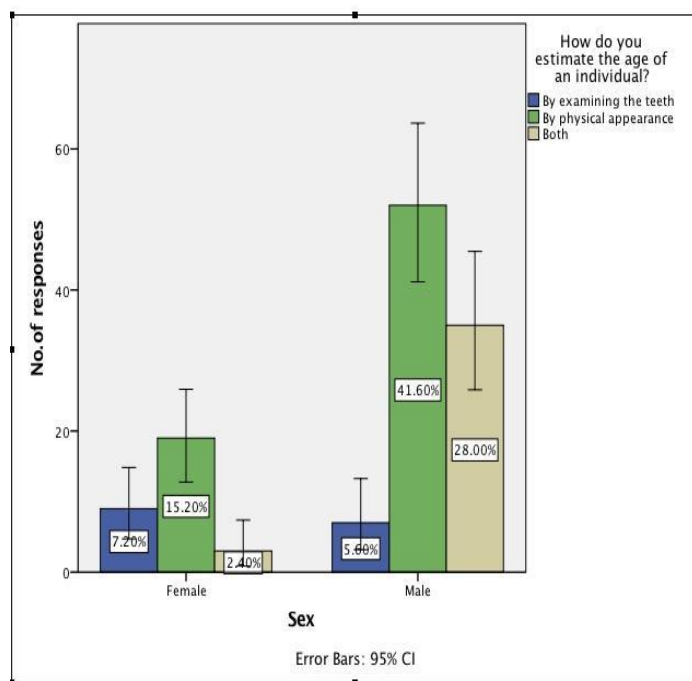


Figure 5: represents estimation of the age. Blue represents by examining the teeth, green represents by physical appearance and grey represents both. 7.2% of females told that they estimate the age of an individual by examining the teeth. 15.2% of female told that they estimate the age of an individual by the physical appearance and 2.4% of female told that the estimate the age of an individual by examining the teeth as well as the physical appearance. 5.6% of male told that they estimate the age of an individual by examining the teeth. 41.6% of male told that they estimate the age of an individual by their physical appearance and 28% of male told that they estimate the age of an individual by examining the teeth as well as the physical appearance.

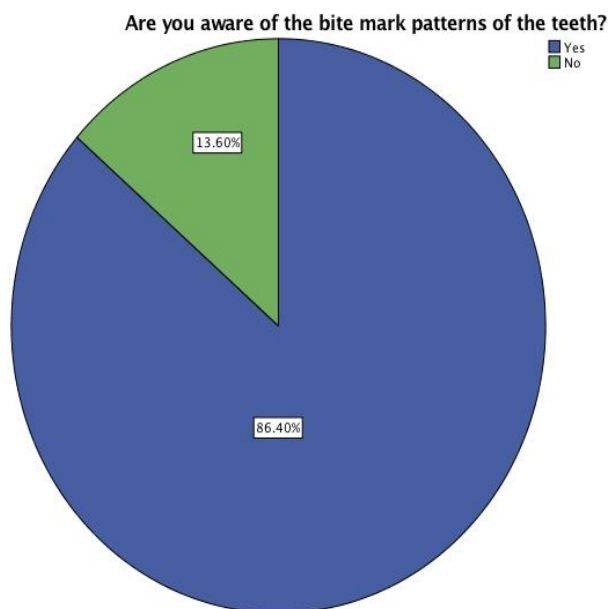


Figure 6: represents the awareness of the bite mark patterns of the teeth. Blue represents yes and green represents no. 86.40% of the participants said that they were aware about the bite mark patterns of the teeth and the remaining 13.60% of the participants said that they were not aware about the bite mark patterns of the teeth.

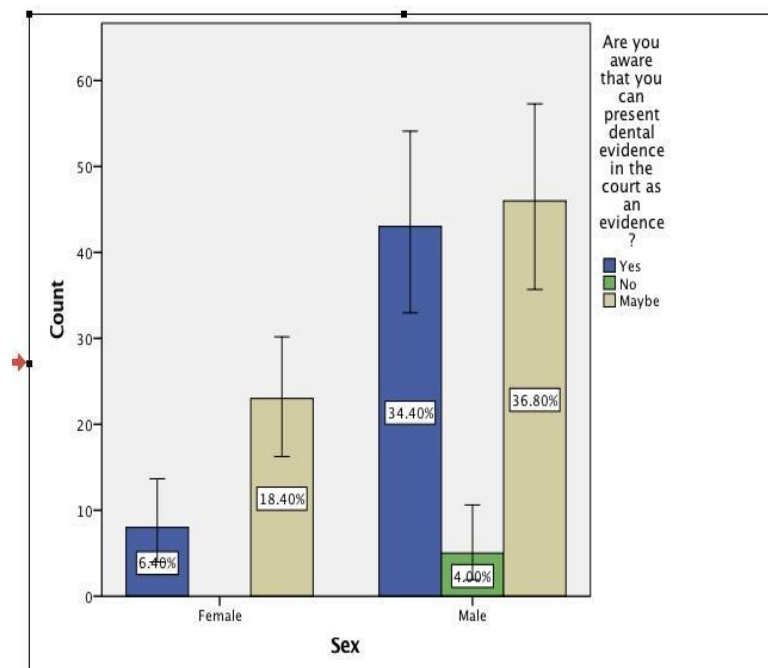


Figure 7: represents the awareness to present the dental evidence in the court as a witness. Blue represents yes, green represents no and grey presence maybe. 6.4% of females are aware that they can present the dental evidence in the court as evidence and 18.4% of females said that the dental evidence maybe can be presented in the court as evidence. 34.4% of males said that the dental evidence can be presented in the court as evidence and they were aware of it. 4% Of males were not aware that the dental evidence can be presented in the court as evidence and the remaining 36.8% of male said that the dental evidence can be presented in the court as evidence.

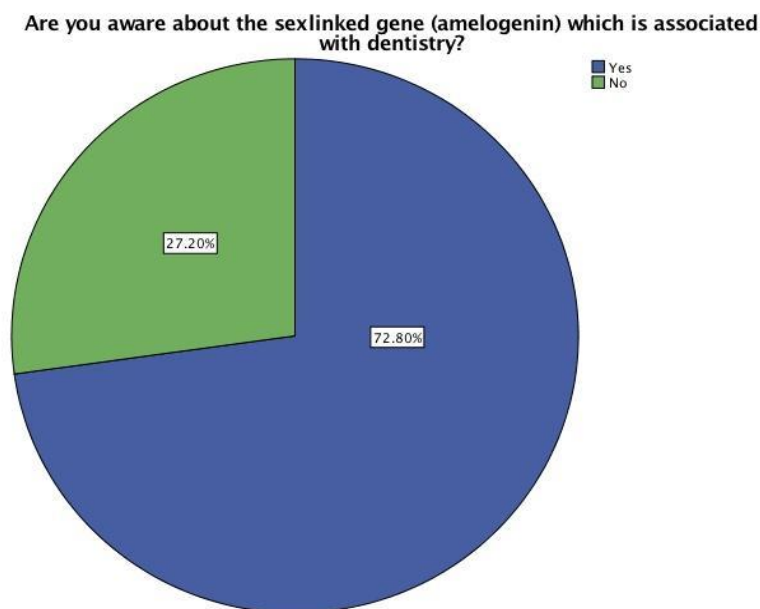


Figure 8: represents the awareness of sex linked gene. Blue represents yes and green represents no. 72.80% of the participants were aware about the sex linked gene (Amelogenin) which is associated with the dentistry and the remaining 27.20% of the participants were not aware about the sex linked gene (Amelogenin) which is associated with dentistry.

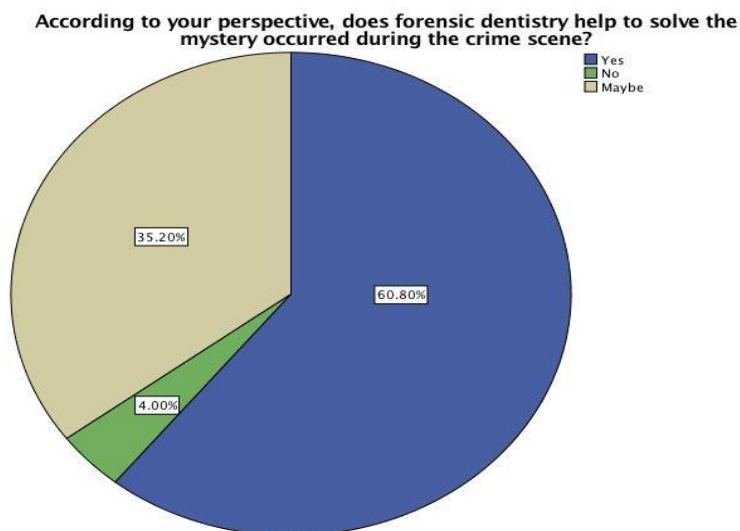


Figure 9: represents the forensic dentistry which helps to solve the mystery that occurred during the crime scene. Blue represents yes, green represents no and grey represents maybe. 60.80% of the participants said that forensic dentistry would help them to solve the mystery that occurred during the crime scene. 4% of the participants said that forensic dentistry would not help them to solve the mystery that occurred during the crime scene. 60.80% of the participants said that forensic dentistry would help them to solve the mystery that occurred during the crime scene and the remaining 35.20% of the participants told that maybe it would help them to solve the mystery which occurred during the crime scene.

Conclusion

We would like to conclude that the dental students are very much aware about forensic dentistry and also they have a thorough knowledge about it. Furthermore medical meetings and dental camps can be conducted for the dental students so that all the dental students, those who were not aware about it also will get a chance to know about it and it will create an interest in the forensic dentistry among the dental students.

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Conflicts of Interest

None declared

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REFERENCES

- Adams, C., Carabott, R. and Evans, S. (2013) *Forensic Odontology: An Essential Guide*. John Wiley & Sons.
- Aldhuwayhi, S. et al. (2021) 'Covid-19 Knowledge and Perceptions Among Dental Specialists: A Cross-Sectional Online Questionnaire Survey', *Risk Management and Healthcare Policy*, pp. 2851–2861. doi: 10.2147/rmhp.s306880.
- Avon, S. L. (2004) 'Forensic odontology: the roles and responsibilities of the dentist', *Journal*, 70(7), pp. 453–458.
- Bai, L. et al. (2019) 'Methylation dependent microRNA 1285-5p and sterol carrier proteins 2 in type 2 diabetes mellitus', *Artificial Cells, Nanomedicine, and Biotechnology*, pp. 3417–3422. doi: 10.1080/21691401.2019.1652625.
- B.p. and P., B. (1990) 'A colour atlas of forensic dentistry', *Forensic Science International*, p. 89. doi: 10.1016/0379-0738(90)90172-u.
- Carabott, R. (2013) 'Brief introduction to forensic odontology', *Forensic Odontology*, pp. 1–8. doi: 10.1002/9781118526125.ch1.
- Duraisamy, R. et al. (2019) 'Compatibility of Nonoriginal Abutments With Implants', *Implant Dentistry*, pp. 289–295. doi: 10.1097/id.0000000000000885.
- Gambhir, R. et al. (2016) 'Knowledge and awareness of forensic odontology among dentists in India: A systematic review', *Journal of Forensic Dental Sciences*, p. 2. doi: 10.4103/0975-1475.176954.
- Gothandam, K. et al. (2019) 'Antioxidant potential of theaflavin ameliorates the activities of key enzymes of glucose metabolism in high fat diet and streptozotocin – induced diabetic rats', *Redox Report*, pp. 41–50. doi: 10.1080/13510002.2019.1624085.
- Jeevanandan, G. and Thomas, E. (2018) 'Volumetric analysis of hand, reciprocating and rotary instrumentation techniques in primary molars using spiral computed tomography: An in vitro comparative study', *European Journal of Dentistry*, pp. 021–026. doi: 10.4103/ejd.ejd_247_17.
- Mehrotra, V. et al. (2019) 'Perception of dental practitioners in and around Kanpur city towards forensic odontology: a cross sectional study', *International Journal of Research in Medical Sciences*, p. 2732. doi: 10.18203/2320-6012.ijrms20192909.
- Pandey, A. and Hemanth, M. (2013) 'Forensic Odontology and its Applications', *Textbook of Forensic Odontology*, pp. 10–10. doi: 10.5005/jp/books/11749_2.
- Parimelazhagan, R. et al. (2021) 'Association between Tumor Prognosis Marker Visfatin and Proinflammatory Cytokines in Hypertensive Patients', *BioMed Research International*, pp. 1–7. doi: 10.1155/2021/8568926.
- Preethi, S., Einstein, A. and Sivapathasundharam, B. (2011) 'Awareness of forensic odontology among dental practitioners in Chennai: A knowledge, attitude, practice study', *Journal of Forensic Dental Sciences*, p. 63. doi: 10.4103/0975-1475.92145.
- Princeton, B., Santhakumar, P. and Prathap, L. (2020) 'Awareness on Preventive Measures taken by Health Care Professionals Attending COVID-19 Patients among Dental Students', *European Journal of Dentistry*, pp. S105–S109. doi: 10.1055/s-0040-1721296.
- Ramadurai, N. et al. (2019) 'Effectiveness of 2% Articaine as an anesthetic agent in children: randomized controlled trial', *Clinical Oral Investigations*, pp. 3543–3550. doi: 10.1007/s00784-018-2775-5.
- Rudraswamy, S. et al. (2017) 'Forensic odontology acquaintance among the students of a dental institution in Mysore City, India', *International Journal of Forensic Odontology*, p. 13. doi: 10.4103/ijfo.ijfo_7_17.
- Saravanakumar, K. et al. (2021) 'Chemical composition, antioxidant, and anti-diabetic activities of ethyl acetate fraction of *Stachys riederi* var. *japonica* (Miq.) in streptozotocin-induced type 2 diabetic mice', *Food and Chemical Toxicology*, p. 112374. doi: 10.1016/j.fct.2021.112374.
- Savić Pavićin, I. et al. (2021) 'Maintenance of Dental Records and Forensic Odontology Awareness: A Survey of Croatian Dentists with Implications for Dental Education', *Dental journal*, 9(4). doi: 10.3390/dj9040037.
- Schrader, B. A. (2018) 'History and Scope of Forensic Odontology', *Forensic Odontology*, pp. 19–23. doi: 10.1016/b978-0-12-805198-6.00002-5.
- Sekar, D. et al. (2019) 'Dissecting the functional role of microRNA 21 in osteosarcoma', *Cancer Gene Therapy*, pp. 179–182. doi: 10.1038/s41417-019-0092-z.
- Sekar, D., Nallaswamy, D. and Lakshmanan, G. (2020) 'Decoding the functional role of long noncoding RNAs (lncRNAs) in hypertension progression', *Hypertension Research*, pp. 724–725. doi: 10.1038/s41440-020-0430-4.
- Senn, D. R. and Weems, R. A. (2013) *Manual of Forensic Odontology*, Fifth Edition. CRC Press.
- Sheasby, D. R. and MacDonald, D. G. (2001) 'A forensic classification of distortion in human bite marks', *Forensic Science International*, pp. 75–78. doi: 10.1016/s0379-0738(01)00433-9.
- Stimson, P. G. and Mertz, C. A. (2002) *Forensic Dentistry*. CRC Press.
- Subramanyam, D. et al. (2018) 'Comparative evaluation of salivary malondialdehyde levels as a marker of lipid peroxidation in early childhood caries', *European Journal of Dentistry*, pp. 067–070. doi: 10.4103/ejd.ejd_266_17.
- Su, P. et al. (2019) 'A ginger derivative, zingerone—a phenolic compound—induces ROS-mediated apoptosis in colon cancer cells (HCT-116)', *Journal of Biochemical and Molecular Toxicology*. doi: 10.1002/jbt.22403.
- Taylor, J. and Kieser, J. (2016) *Forensic Odontology: Principles and Practice*. John Wiley & Sons.
- Trengrove, H. G. (2016) 'Forensic odontology in disaster victim identification', *Forensic Odontology*, pp. 286–335. doi: 10.1002/9781118864418.ch9.
- Website (no date a). Available at: Ramakrishnan M, Dhanalakshmi R, Subramanian EMG. Survival rate of different fixed posterior space maintainers used in Paediatric Dentistry – A systematic review [Internet]. Vol. 31, *The Saudi Dental Journal*. 2019. p. 165–72. Available from: <http://dx.doi.org/10.1016/j.sdentj.2019.02.037>.
- Website (no date b). Available at: Mathew MG, Samuel SR, Soni AJ, Roopa KB. Evaluation of adhesion of *Streptococcus mutans*, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary molars: randomized controlled trial [Internet]. Vol. 24, *Clinical Oral Investigations*. 2020. p. 3275–80. Available from: <http://dx.doi.org/10.1007/s00784-020-03204-9>.
- Wei et al. (2021) 'Amelioration of oxidative stress, inflammation and tumor promotion by Tin oxide-Sodium alginate-Polyethylene glycol-Allyl isothiocyanate nanocomposites on the 1,2-Dimethylhydrazine induced colon carcinogenesis in rats', *Arabian Journal of Chemistry*, p. 103238. doi: 10.1016/j.arabjc.2021.103238.
- Yang, J. C. and Raj, J. (2017) 'Postmortem identification in forensic odontology', *International Journal of Forensic Odontology*, p. 27. doi: 10.4103/2542-5013.205247.