Original Article

A SURVEY ON KNOWLEDGE AND ATTITUDE ABOUT ENDODONTIC MISHAPS AND ITS MANAGEMENT AMONG POSTGRADUATE STUDENTS

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Abstract

Introduction: Endodontic treatment includes procedures that were framed to maintain the health of pulp tissue and a periapical portion of the tooth. If the pulp is diseased or injured, the treatment is done to preserve the normal radicular tissues. This study aims to determine the knowledge, attitude, and practice about endodontic mishaps and their management among practicing dentists.
Materials and Methods: A questionnaire consisting of 13 multiple choice questions was prepared based on etiology, prevention, and management of endodontic mishaps using online software. This study was conducted online which included 101 participants who were general practitioners and specialists working in clinics. The data were collected and analyzed using SPSS software.
Results: The result shows that only 59% of surveyed dentists are aware of etiology, 58.8% were aware of prevention,and 51.6% aware of the management of endodontic mishaps that occur during the procedure. P value was not significant ($p>0.05$)
Conclusion: Dentists, being members of the health-care profession, should know about endodontic mishaps and their management which may occur during the procedure. Only 56.4% are aware of endodontic mishaps and their management according to the study.

KEYWORDS: Apical, Files, Formation, Irrigant, Management, Prevention

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INTRODUCTION:

Endodontics is the preparatory discipline during which the treatment focuses on conservative or prosthetic restoration of a tooth. Maintaining the integrity of natural dentition is important for fully functional and esthetic conditions(Mirikar, Shenoy and Mallikarjun, 2009). Endodontic treatment includes procedures that were framed to take care of the health of pulp tissue and the periapical portion of the tooth. If the pulp is diseased or injured, the treatment is completed to preserve the traditional radicular tissues. If the disease has progressed to the periradicular tissues, then the treatment is aimed toward restoring them to health(Qualtrough and Dummer, 1997). the overall purpose of the endodontic treatment is to take care of teeth duration as long as possible within the mouth. the most purpose of passage treatment is to refill or block all passage and to make a fluid-tight seal on the apical foramen of the tooth so that any possibility of a secondary infection occurrence thanks to the mouth cavity or periradicular tissue leakage into the basis canal system are often avoided(Ali *et al.*, 2014).

The necessity for correctly filling the canal seems obvious, once cleaning, shaping and disinfection are completed, yet ineffective obturation is usually a prelude to eventual endodontic failure(Bakland, 2010; Sriraman and Neelakantan, 2014). For symptoms like fistulation, swelling, pain, percussion, tenderness, discomfort during chewing, and in cases during which the apical lesion becomes larger or isn't diminishing retreatment is indicated(Bakland, 2010). The goals of nonsurgical retreatment are to get rid of materials from the basic canal space. Root canal treatment (RCT) is typically aimed to take care of or restore the health of the dental pulp and periradicular tissues. The result of the therapy depends on the operator's ability to perform the entire procedure without making any mistakes(Sriraman and Neelakantan, 2014). consistent with Ingle and Bakland, endodontic mishaps are often access related which are thanks

to treating the incorrect tooth, missed canals, damage to existing restoration, access cavity perforations, and crown fractures; instrumentation related which are thanks to ledge formation, canalis cervicis uteri perforations, mid root perforations, apical perforations, separated instruments and foreign objects, and canal blockage; and obturation related thanks to over-or under-extended passage fillings, nerve paresthesia, vertical root fractures, and other forms like post space perforation and irrigant related(Alhekeir *et al.*, 2013). Some studies demonstrate a discount within the cutting efficiency of instruments thanks to autoclaving; this might weaken the instrument as cause breakage while using inside the canal. The irrigants utilized in the passage procedure sometimes may cause allergies.

Incorrect Diagnosis- Incorrect oral resulting in incorrect diagnosis is typically thanks to an interpretation of pain, vitality test, and radiographs.
Recognition-The wrong tooth that has been treated is usually a result of the re-evaluation of a patient who continues to possess symptoms after treatment.
Correction- Treating the incorrect tooth includes appropriate treatment of both teeth i.e.; the one tooth incorrectly opened and therefore the one with the first pulpal problem.

Missed Canal Some canals aren't easily accessible or readily apparent from the chamber.6 Recognition- Missed canal occurs during or after treatment. During treatment, an instrument or filling material could also be noticed to be aside from exactly centered within the root, indicating that another canal is present(Leprince and Van Nieuwenhuysen, 2020).Correction for this is Retreatment is acceptable and will be attempted before recommending surgical correction.

Access cavity perforations one of the irreversible complications of endodontics is perforation into the furcation area while gaining access to the pulp chamber of the tooth(Garg and Garg, 2014).This can be Recognized If the access cavity perforation is above the periodontal attachment, the primary sign of the presence of an accidental perforation will often be the presence of leakage: either saliva into the cavity or hypochlorite out into the mouth, at which era the patient will notice the unpleasant taste.Correction for this is Several materials are recommended for perforation repairs like a cavity, amalgam, lime paste, super ethoxy-benzoic acid (EBA), glass ionomer cement, gutta-percha, tricalcium phosphate, or hemostatic agents like gel foam and mineral trioxide aggregate (MTA) which has shown convincing leads to apical cavity perforations.

Apical perforations Perforations within the apical segment of the basis canal could also be the result of the file negotiating a curved canal or not establishing accurate working length and instrumenting beyond the apical confines. A paper point when inserted to the apex, will confirm a suspected apical perforation(Gudac *et al.*, 2020). An apical perforation should be suspected if the patient suddenly complains of pain during treatment if the tactile resistance of the confines of the canal space is lost. A paper point inserted into the apex will confirm a suspected apical perforation.Effort to repair apical perforations could also be to aim to renegotiate the apical canal segment or to think about the perforation site because the new apical opening then decides what treatment the untreated apical root segment would require.

Crown Fractures The tooth may have a preexistent infarction that becomes a real fracture when the patient chews on the tooth weakened additionally by an access preparation. Such fracture is typically recognized by direct observation(Tonini, 2017).Crown fractures usually need to be treated by extraction unless the fracture is of a "chisel type" during which only the cusp or a part of the crown is involved; in such cases, the loose segment are often removed, and treatment completed.

Separated Instruments Limited flexibility and strength of intracanal instruments combined with improper use may end in an intracanal instrument separation.Removal of small size file with a blunt tip from a canal and subsequent loss of patency to the first length are the most clues for the presence of a separated instrument.The optimal correction of instrument fracture or the presence of other foreign objects during a canal is to get rid of the obstruction. Ultrasonic fine instruments have proven best in loosening and "flushing out" broken fragments. Using microscopy and special fine diamond tips a tunnel is often created around the separated instrument, which may then be vibrated and dislodged.

Canal Blockage can occur during the method of canal enlargement. Files are known to compact debris at the apex; even vital tissue is often compacted against the apical restriction. Suddenly, the working length is shorter because the instruments are working against the packed mass at the apex(Lambrianidis, 2006).When the confirmed working length is not any longer attained canal blockage is recognized. Evaluation radiographically will demonstrate the file isn't

reaching near the apical terminus. Canal blockage corrections are accomplished using recapitulation. Starting with the littlest file used, the quarter-turn technique employing a chelating agent is often helpful.

Over or Underextended passage Fillings passage filling material is usually inadvertently extruded beyond the apical limit of the basis canal, ending up within the periradicular bone, sinus, or mandibular canal or maybe protruding through the cortical plate.18 Inaccurately placed passage filling usually takes place when a post-treatment radiograph is examined. Underextended filling is accomplished by re-treatment.

Vertical Root Fracture A sudden crunching sound during obturation may be a clear indication for the basis fracture. This might occur during the compaction of gutta-percha. It occurs more often during lateral than vertical compaction(Uysal *et al.*, 2020).Sudden crunching sound, almost like that mentioned as crepitus within the diseased mandibular joint, accompanied with pain reaction on the part of the patient, may be a clear indicator that the basis has fractured. It is often prevented by avoiding the preparation of the canal and therefore the use of a passive, less forceful obturation technique and seating of posts.

It's relatively uncommon but shouldn't be overlooked. Two actions may cause tissue emphysema to happen: a blast of air to dry a canal, and exhaust air from a high speed drill directed toward the tissue and not evacuated to the rear of the handpiece during apical surgery.Our team has extensive knowledge and research experience that has translate into high quality publications (Sathivel *et al.*, 2008; Panda *et al.*, 2014; Govindaraju, Neelakantan and Gutmann, 2017; Johnson *et al.*, 2020; Saraswathi *et al.*, 2020) (Kumar *et al.*, 2006; Devi and Gnanavel, 2014; Varghese *et al.*, 2015; Sivamurthy and Sundari, 2016; Chen *et al.*, 2019).Aim of the study is to assess the knowledge and attitude about endodontic mishaps and its management among postgraduate students

MATERIALS AND METHODS

An online survey was conducted among 101 post-graduate (Figure 1) to evaluate their knowledge and attitude about endodontic mishaps and their management among post-graduate students. A convenience sample was taken and the questionnaire was distributed on an online platform. This online questionnaire survey consisted of 13 questions that were distributed to the study population through google forms. Among those questions prepared in the questionnaire, questions involved knowledge and attitude-based questions. The questionnaire was assessed by experts in the field for validity and reliability. The same was assessed by conducting a pilot survey in a smaller sample size. Some salient points covered in the questionnaire included questions about materials recommended for perforation repair, preventing the mishap of treating the wrong tooth, the reason for ledge formation, common mishaps that occur during access cavity preparation, management of sodium hypochlorite accident, preventing the errors during obturation, prevention of perforation, methods of locating perforations, commonly encountered an endodontic mishap, identification of ledge formation, a common cause of canal blockage. The questionnaire validity checking was done in a standard manner. Descriptive statistics were done, percentages and frequencies were calculated and to test the difference among variables chi-square test was done with a p-value <.05 considered statistically significant.

Data Analytics Data was entered into a spreadsheet using Excel version 16.37 (Microsoft Corp, Redmond, Wash). The data tabulation in Excel was according to S.no, education qualification, knowledge and attitude about endodontic mishap. The data which was collected was analyzed using Statistical Package for Social sciences (SPSS) software, version 1.0.0.1347 64 bit (IBM Corp., NY, USA). The data were assessed by being subjected to descriptive analysis with the help of frequencies, percentages, means. The data was represented by the means of bar graphs. A Chi-square test was used and results were correlated and associated. The ethical approval was obtained from the institutional ethical committee (ethical approval number:SDC/SIHEC/2020/DIASDATA/0619-0320).

RESULTS

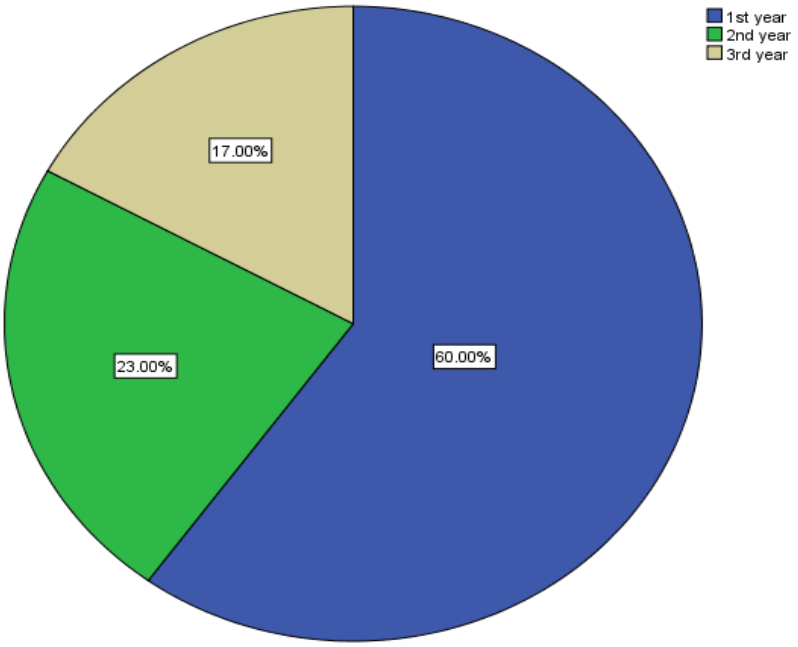


FIGURE 1-This pie chart represents the percentage distribution of the year of study of the respondents. Blue color represents 1st-year students, green color represents 2nd-year students and peach color represents 3rd-year students. Most of the participants were 1st years(60%), followed by second years(23%), followed by third years(17%).

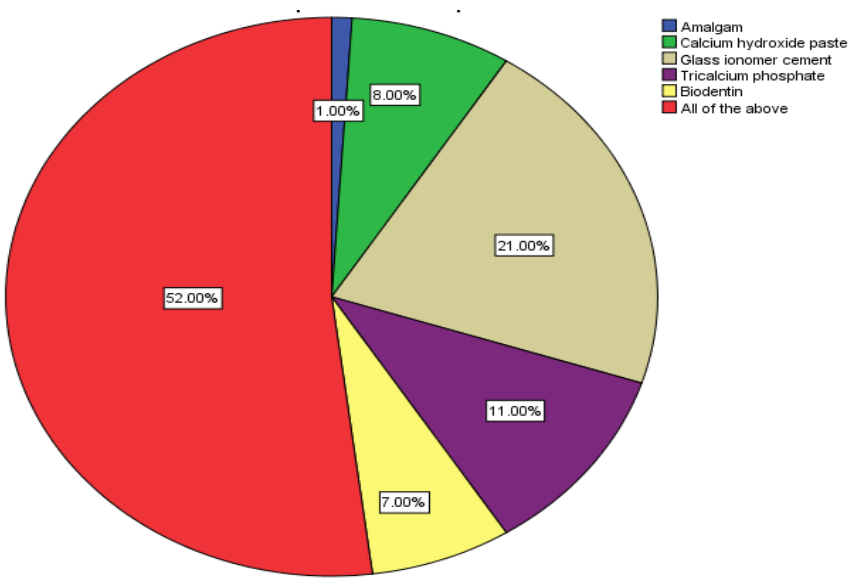


Figure 2:This pie chart represents the percentage of material recommended for perforation repair. Colour blue represents amalgam, green represents calcium hydroxide cement, peach represents glass ionomer cement, violet color represents tricalcium phosphate, yellow color represents biodentin and orange represents all of the above. The majority of the respondents choose material recommended for perforation repair as all of the above(52%), followed by only glass ionomer cement(21%), followed by tricalcium phosphate(11%), followed by calcium hydroxide cement (8%), followed by biodentin(7%) and followed by amalgam(1%)

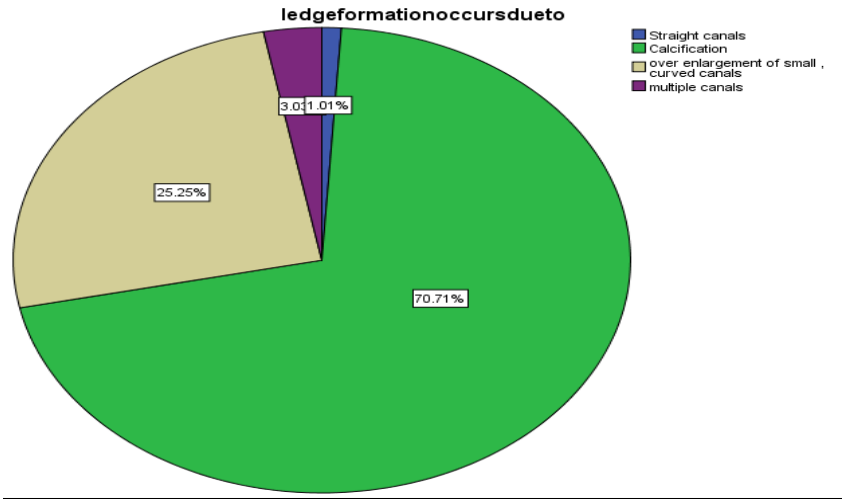


Figure 3:This pie chart represents the percentage distribution of the cause of ledge formation. Colour blue represents straight canals, green represents calcification, peach represents the enlargement of small, curved canals and violet represents multiple canals. Majority of the respondents choose ledge formation occurs due to calcification(70.7%),followed by over enlargement of small,curved canals(25.2%),followed by multiple canals(3.03%) and straight canal(1.01%).

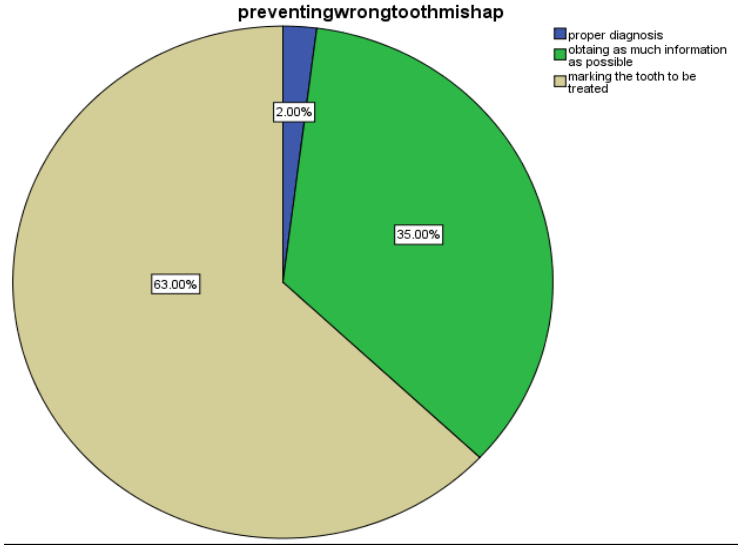


Figure 4:This pie chart represents the method of preventing the treatment of the wrong tooth. Colour blue represents proper diagnosis, green represents obtaining as much information as possible and peach represents marking the tooth to be treated. The majority of the respondents choose their method to prevent the treatment of the wrong tooth as marking the tooth to be treated(63%), followed by obtaining as much information as possible(35%), and followed by proper diagnosis (2%).

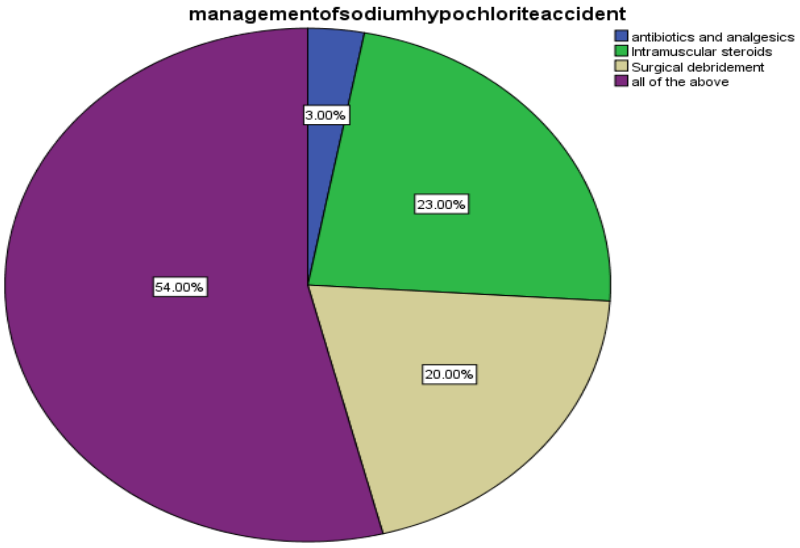


Figure 5:This pie chart represents the management of sodium hypochlorite accidents. Colour blue represents antibiotics and analgesics, green represents intramuscular steroids, peach represents surgical debridement and violet represents all of the above. The majority of the respondents choose antibiotics and analgesics (54%), followed by intramuscular steroids (23%), then surgical debridement (20%), and antibiotics and analgesics(3%).

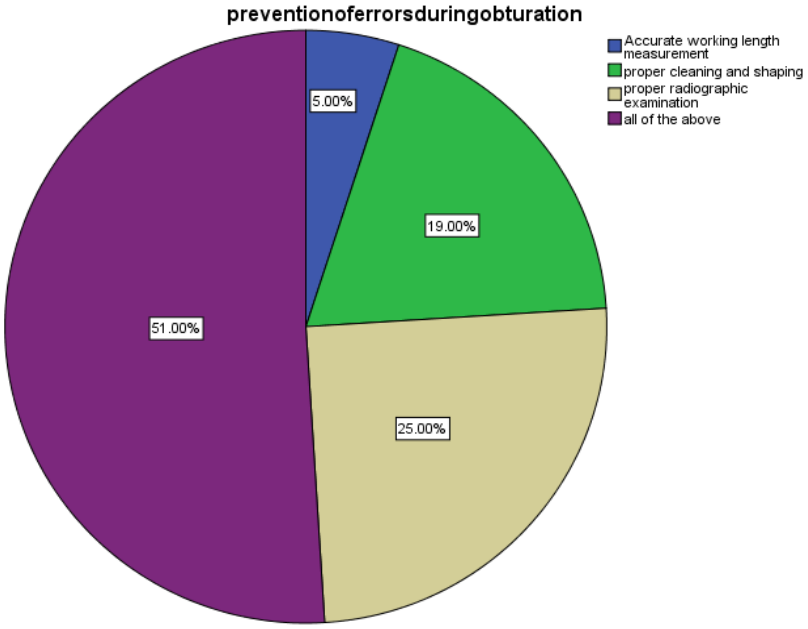
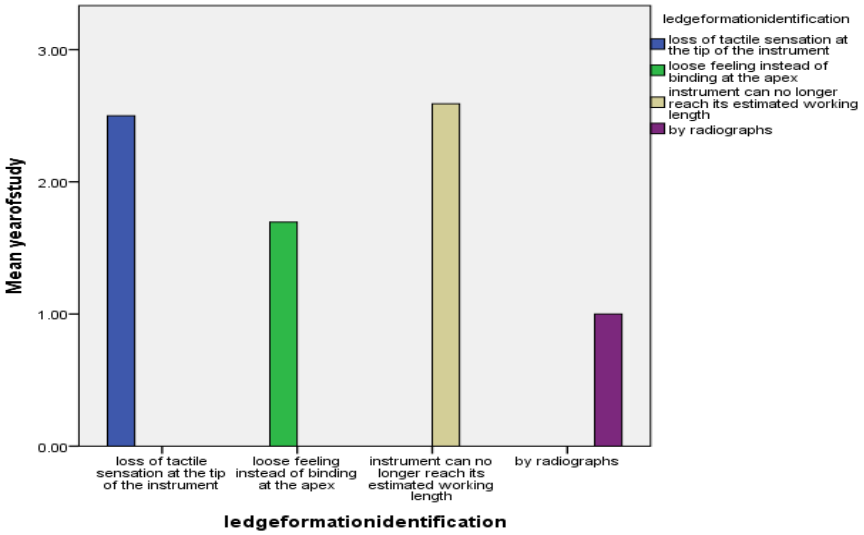


Figure 6:This pie chart represents the percentage of methods to prevent mishaps during obturation. Colour blue represents the accurate working length, the color green represents proper cleaning and shaping, color peach represents proper radiographic examination, color violet represents all of the above. The majority of the respondents choose all of the above(51%), followed by proper radiographic examination(25%), followed by proper cleaning and shaping(19%0 and followed by accurate working length(5%).


ledgeformationidentification
loss of tactile sensation at the tip of the instrument
loose feeling instead of binding at the apex
instrument can no longer reach its estimated working length
by radiographs
Mean yearofstudy
3.00
2.00
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loss of tactile sensation at the tip of the instrument
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by radiographs
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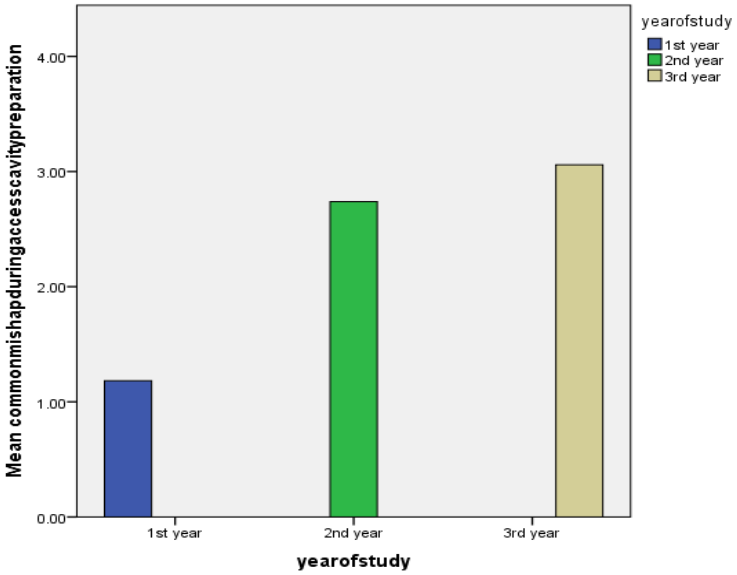
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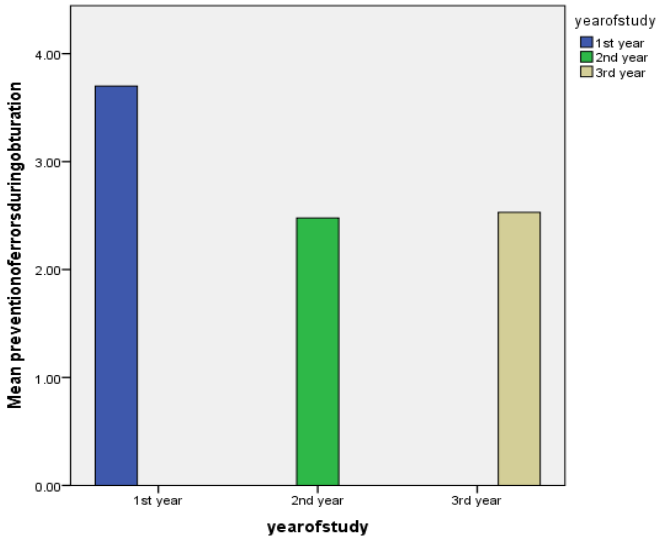
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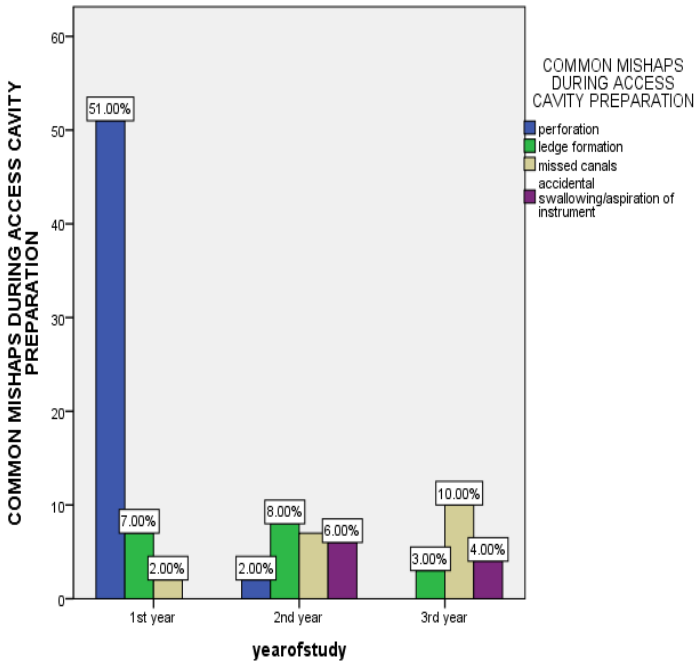

Graph 1:Bar graph depicts the association between the common mishaps during access cavity preparation and year of academical study.X axis represents academical year of students and Y axis represents common mishaps during access cavity preparation.Blue colour represents perforation,green colour represents ledge formation,Peach colour represents missed canals accidental and violet colour represents aspiration of instruments.perforation was the most common endodontic mishap among 1st year students,while ledge formation was the most common endodontic mishap among 2 nd year students and missed canals accidentally was the most common endodontic mishap among 3rd year students.p value was statistically considered insignificant.

DISCUSSION

A total of 101 dentists participated in this study. Among the study, most of the respondents choose perforation(53%), (Figure 2) followed by missed canals(19%), followed by ledge formation(18%),(Figure 3) and followed by swallowing or aspiration of the instruments(10%) as the most common endodontic mishap(Graph 1). The majority of the respondents choose by radiographs(52.04%), followed by loose feeling instead of binding to the apex(23.47%), followed by the instrument can no longer reach its estimated working length(22.45%), and followed by loss of tactile sensation at the tip of the instrument(2.04%) for identification of ledge formation. Based on the survey, the dentists are aware of endodontic mishaps that are related to access cavity preparation and obturation(Figure 4), (Figure 5) (Mirikar, Shenoy and Mallikarjun, 2009; Uysal *et al.*, 2020). To remember endodontic mishaps associated with access cavity preparation and obturation(Figure 6). Most of them were reported to be unaware of endodontic mishaps that occur during instrumentation (Graph 1). Most of them were unaware of the management of endodontic mishap. This is often comparatively almost like the results obtained by a study done in Saudi Arabia by Alhekeir et al.,(Alhekeir *et al.*, 2013) which was reported to be 59.3%. However, the results are above the results obtained from a study done by Balto et al(Balto *et al.*, 2010).

In a study, a survey on soft tissue injuries was done among dental practitioners. Therein study, about 17% of the participants were reported to answer that they face soft tissue injury during passage procedure. In another study, mishaps while cleaning and shaping canals using files were evaluated with chrome steel and NiTi files. It had been reported that NiTi wires were better than chrome steel because the chrome steel files caused almost 10% of perforation among overall cases done under research. An in vitro study using scanning microscopy analysis has reported that significant cytotoxicity was observed with both commonly used cement and gutta-percha. A study has reported that over extrusion of root filling materials into periapical tissues should be avoided to extend the probability of treatment success. Another study was done on the failure of RCT thanks to procedural errors, it showed that among the entire 51 complications.Limitations of this survey are insufficient sample size for statistical measurement,lack of previous

research studies on the topic,limited access to data and time constraints.Further research and more awareness in future could reduce the mishaps among dentists.

CONCLUSION

Among the study, most of the respondents choose perforation(53%), followed by missed canals(19%), followed by ledge formation(18%), and followed by swallowing or aspiration of the instruments(10%) as the most common endodontic mishap they encountered.RCT presents a great challenge to a dental student where mishaps commonly occurred. The clinician must practice careful and judicious shaping strategies that use multiple confirmations of working length and take serious precaution against over instrumentation. We must recognize that these injuries should encourage reflection on the safe and prudent practice of endodontics that promotes safeguards. Our ethical obligation to guard patients against harm is met once we as a profession can provide advanced and complicated therapies in a safe and controlled manner with patient safety as an overriding priority.

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