

Percutaneous Injuries Amongst Dentists of Ahmedabad City: A Questionnaire Survey

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ABSTRACT

Aims: To investigate amongst endodontists the incidence of percutaneous injuries, the circumstances associated with them, the therapeutic measures taken after the injuries and their compliance with infection control measures.

Materials and Method: Information on percutaneous injuries and infection control practices were gathered from one hundred and forty endodontists through a questionnaire form. Data was analysed using independent samples t-test. The level of significance was set at $p \leq 0.05$.

Results: Endodontic files were associated with 66% of the injuries and fingers were injured in 75% of the most recent cases. Medical assistance was sought in 36% of the most recent injuries. Endodontists, who always or usually practiced 4-handed endodontics ($p \leq 0.007$) as well as those not performing surgical endodontics ($p \leq 0.007$) reported significantly fewer injuries. In 91% of the participants, a complete hepatitis B virus vaccination was reported. Gloves, Double gloves, Long sleeve labcoat and puncture-resistant containers for disposal of sharp instruments were always used by 92.6%, 58%, 19% and 63.4% of the respondents respectively.

Conclusion: The practice of four-handed endodontics was associated with reduced number of percutaneous injuries but the performance of surgical endodontics increased their incidence. Also the endodontists showed a high level of compliance with infection control measures.

Keywords: Hazards, Injuries, Dentists.

INTRODUCTION

Occupational hazard has been defined as any risk of injury or disease peculiar to the specific occupation or place of employment that arises during normal work¹. In dentistry, these hazards comprise of contamination with biological fluids, exposure to ionizing radiation, allergic reactions, dermatitis, acoustic



and respiratory problems/irritations, burns or scalds and progressive development of acquired diseases such as musculo-skeletal disorders and ocular problems. Dentists can be exposed to biological fluids through skin and mucous membranes or through percutaneous injuries, with the latter being the most common²⁻⁵. Percutaneous injuries are inherent to the working conditions of dentists. These conditions involve close proximity to patients, use of sharp instruments under limited or indirect visual contact and frequent patient

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movement. Overall percutaneous injuries pose the greatest risk of blood borne pathogen transmission^{6,7}.

Dentists are, apparently, at a greater risk of acquiring the hepatitis B virus (HBV) infection than the general population⁸⁻¹⁰. This was more prevalent prior to the development of the HBV vaccine¹¹.

A search of the literature (PubMed and MEDLINE Database, Cochrane Library) revealed no study concerning exposure of dentists to biological fluids.

This study aims to investigate the incidence of percutaneous injuries amongst dentists of Ahmedabad city and the circumstances associated with them. The therapeutic measures taken after the injuries and their compliance with infection control measures were also analyzed.

MATERIALS AND METHODS

A survey on occupational hazards in dentistry was conducted from 1st March, 2014 to 31st May, 2014. To select dentists randomly, Ahmedabad city was divided into 5 zones (East, West, North, South and Central Zone) and a list of dentists was procured from the DCI Register. From each zone 28 dentists were randomly selected.

Data was gathered through a survey form of questionnaire, which consisted mainly of closed-ended and few open-ended questions. The first part of the questionnaire, analyzed in this study, focused on percutaneous injuries and included:

- Personal data (age, gender and dominant hand).
- Education and professional data (year of graduation, years of clinical experience, information on postgraduate studies and participation in continuing education programs as well as information on the working conditions, type of employment (private/public sector) and co-operation with a dental assistant).
- Information on the events of percutaneous injuries experienced during endodontic procedures in the past 5 years, the type of instruments associated with the injuries and the number of them accompanied by bleeding. Those dentists who reported such injuries were further asked for

details on the most recent of the injuries reported in the past 5 years and the associated circumstances including the affected body part and the subsequent handling procedures.

Information on infection control practices that is, HBV vaccination, use of personal protective equipment, hand washing and disposal of sharp instruments.

The participants were asked to express their opinion on the clarity and understanding of the questions. The questionnaire and a cover letter were mailed to 150 dentists (study population). Amongst them, seventeen endodontists refused to participate in the survey, resulting in 123 participants.

Percutaneous injury was defined as any breach in the integrity of the skin of the dentist in the dental operatory, regardless of presence or absence of bleeding¹². All the data was compiled and analyzed.

RESULTS

Results were classified in the following categories: Personal & Professional information. In Personal information it was found out that out of 123 participants 63% of the participants were female where as 37% were males (Figure 1a).

In this survey 32 endodontists with a clinical experience of 6 years or above participated whereas 49 endodontists had a clinical experience between 3 to 5 years (Figure 1b). The participating dentists were asked which was their dominant hand. Out of which 7.3% dentists were left handed in this survey, 93.7% dentists were right handed in this survey and None of the dentists were Ambidextrous. Owing to the small sample size of left-handed and ambidextrous endodontists, the impact of dominant hand on the incidence of percutaneous injuries were not analyzed.

There was a significant difference amongst those practicing or not fourhanded endodontics. Bonferroni correction showed that endodontists who always or usually practiced fourhanded endodontics reported significantly fewer injuries compared with those who did it rarely or never (Figure 2a).

The work load of 44 endodontists per week in hours was found to be 40 hours. Only 6 participants worked for more then 50 hours (Figure 2b).

Table 1 shows the relationship between categorical variables and the number of injuries. There was a significant association between performing surgical endodontics and the number of injuries. Endodontists who performed surgical endodontics reported more accidents compared with those who did not. Yet there was no significant difference. The highest incidence of percutaneous injury was seen due to needle stick injury (77%). Least injury was observed due to periosteal elevator (17.9%).

Table 2 shows endodontists' compliance with infection control measures. It was observed that 92.6 % participants always wore gloves while treating a patient, but the number of endodontists wearing doubles was significantly low (58.3%). There was a significant association between the use of long sleeve coats and the sum of injuries by burs/Gates-Glidden drills, ultrasonic tips and endodontic files. 98 endodontists reported washing their hands with water and soap before or after each appointment, only 25 participant washed hands with water alone (Figure 3).

Table 3 showed Amongst the participants, 99.2% reported having received the recommended three doses of the HBV vaccine and none had acquired immunity to HBV as a consequence of previous exposure. When they were asked if they had checked their immunization status or had performed a post-vaccination test, 17% of the respondents reported checking their anti-HBsAg titre in specific time intervals 83% had never taken the test.

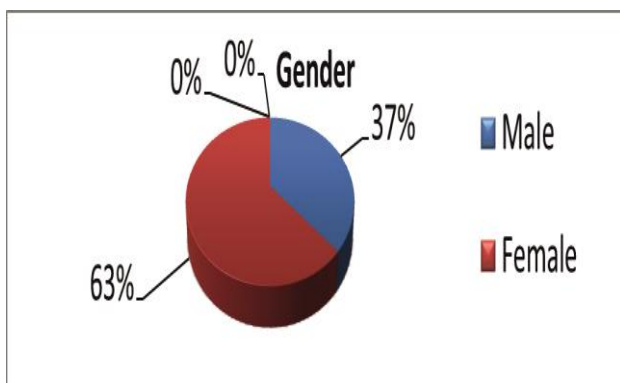


Fig 1a: Gender of participants appearing in the survey.

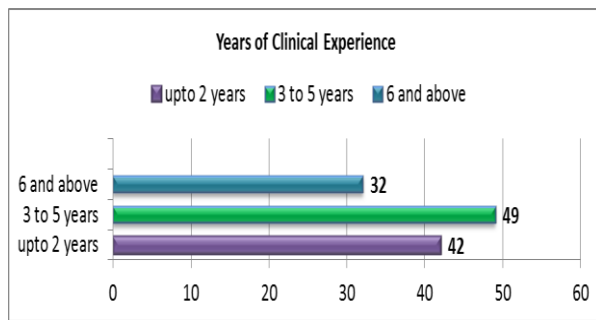


Fig 1b: Years in clinical Practice.

The dentists were asked which was their Dominant Hand.

- i) 7.3% dentists were left handed in this survey.
- ii) 93.7% dentists were right handed in this survey.
- iii) None of the dentists were Ambidextrous.

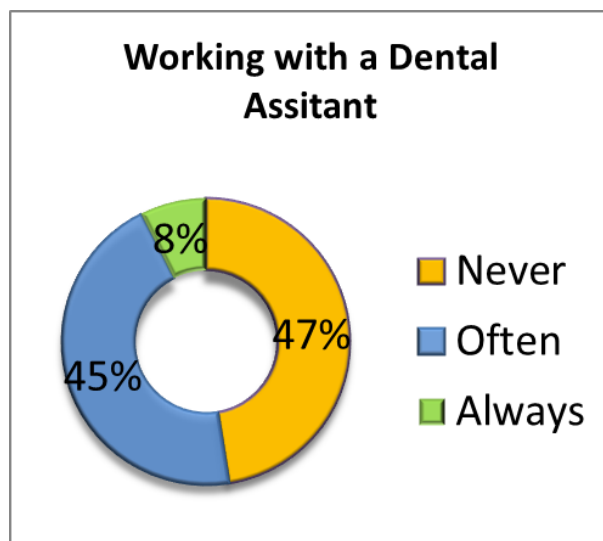


Fig 2a: Dentist updating knowledge on protection against percutaneous injuries (CDE, Articles).

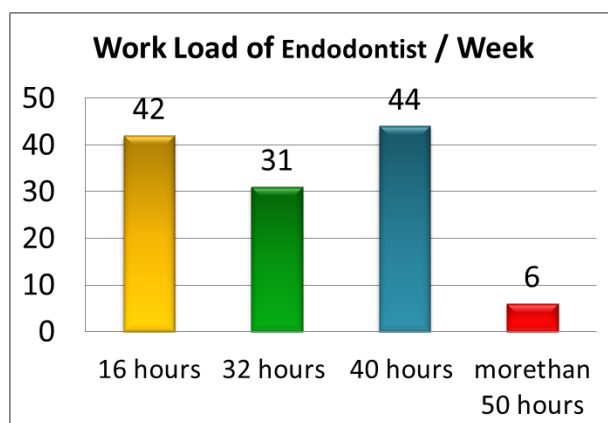


Fig 2b: Work Load of Dentist / week.

Table 1: Percutaneous Injuries Information.

Question	Positive	Negative
Dentists injured by Anesthetic needle	77%	23%
Dentists injured by Irrigation needle	65.8%	34.2%
Dentists injured by Burs or Diamond Points	60.1%	39.9%
Dentists injured by Endodontic Instruments	66.7%	33.3%
Dentists injured by Probe / Explorer	52.8%	47.2%
Dentist injured by Ultrasonic tips	23.6%	76.4%
Dentist Practicing Surgical Endodontics	30.8%	69.1%
Dentist injured by B.P. Blade	34.1%	65.9%
Dentist injured by Periosteal Elevator	17.9%	82.1%
Dentist injured by Suture Needle	36.5%	63.5%

Table 2: Measures taken for Personal Protection.

Question	Positive	Negative
Dentist using gloves while treating patients	92.6%	7.4%
Dentist using double glove technique	58.3%	41.7%
Dentist who wear Long Sleeve Labcoat	19.6%	80.4%
Dentist who dispose off sharp instruments in puncture resistant boxes	63.4%	36.6%
Dentist who reuse blades/ needles	0.9%	99.1%

Table 3: Different measures taken by Dentist immediately after percutaneous injury.

Question	Positive	Negative
Do you cover skin cuts and abrasions with water proof dressings?	63%	33%
Have you received the recommended three doses of HBV vaccine?	99.2%	0.8%
Do you check your immunization status against HBV by post vaccination test (antiHBsAg titre test)?	17%	83%
Do you reuse Blades/Needles etc?	0%	100%

DISCUSSION

The results of the present study should not be considered representative of the population as the data collection was done from a limited number

of dentists. In the present study, the instruments most frequently associated with injuries were endodontic files (67%). In previous studies amongst dentists, injuries were caused by hollow bore needles¹³⁻¹⁹ and burs²⁰⁻²⁵ were the most prevalent.

The significant association between the number of percutaneous injuries and the performance of surgical endodontics can be attributed to the fact that surgical procedures may favor the incidence of injuries. This is in accordance

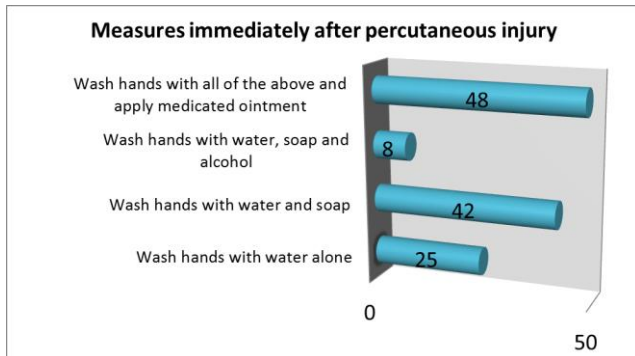


Fig 3: Showing measures immediately taken after percutaneous injury.

with earlier findings² amongst participants at the Annual Meeting of the American Dental Association in 1992, in which more oral surgeons had experienced at least one percutaneous injury compared with general dental practitioners.

Dentists who always or usually practiced four handed endodontics reported significantly fewer injuries compared with those who did it rarely or never. Other studies²⁶⁻²⁷ also revealed that dentists working with an assistant are less prone to percutaneous injuries compared with those working alone.

Patient's non-contributory medical history was the most frequently reported reason for not seeking medical assistance after percutaneous injuries. This data highlights an under estimation by the participants of how accurately self-reported medical histories may represent a patient's health status²⁸⁻²⁹.

Furthermore, many dentists were content to self-treat, because the trauma was considered minor. This finding highlights that even trained specialists underestimate the infectious potential of injuries not involving blood. In the present study, almost all dentists washed the exposed site with soap and tap water or normal saline immediately after the accident and applied an antiseptic solution. Furthermore, 43% of dentists pressed the exposed area to facilitate spontaneous bleeding. However,

there is no support for this procedure in the literature³⁰.

Only 10% of the needle stick injuries were deemed unavoidable owing to the patients' unexpected movement. The remaining 90% were thought preventable, had appropriate measures been adopted. In particular 15% of those injuries could have been avoided if the affected dentists had withdrawn their finger after palpation of the retromolar area and 46% had avoided recapping the needle or had adopted the single hand recapping technique. This technique was used by only 27% of the respondents.

Similarly, 23.6% of injuries were caused by using ultrasonic tips, 60.1% by using burs/Gates-Glidden drills and 66.7% by using endodontic files. These injuries could have been prevented by their immediate removal from their handpiece after use or through changes in handpiece delivery system design.

Vaccination is the most effective way to prevent HBV infection³¹⁻³². Optimal and long-term protection against HBV is ensured only after the third dose³³. For this reason, it was decided to record vaccinated dentists who had completed the HBV vaccination series.

Routine use of gloves reduces the amount of inoculated microbial material in cases of percutaneous injuries and, consequently, the risk of infection³⁴. Dentists reported a very high percentage of glove use (92.6%). Double gloving seems to be more efficient than single gloving in protecting from occupational exposures³⁵. In this study, most dentists (55%) rarely wore double gloves during dental procedures and only 3% were always using them regardless of the patient's medical history.

Hand washing is a basic infection control measure and is recommended between patients to enhance the degree of achieved asepsis³⁶. Hands should also be washed after touching objects likely to be contaminated by patient fluids³⁷. In this study, 78% of the dentists washed their hands before and/or after each patient. This result was in accordance with the findings of Venoresi et al (2004)³⁸ (68%) and Bellissimo-Rodrigues et al (2006) (86.7%) amongst general dental

practitioners. On the contrary, Gershon et al (1998)³⁹ and Qudeimat et al (2006)⁴⁰ indicated that the majority of dentists washed their hands more frequently and always after glove removal. Uncovered parts of the body may increase the risk of percutaneous injuries by sharp instruments.

In the present study, participants wearing long sleeve coats reported fewer injuries by burs/ultrasonic tips/Gates-Glidden drills compared with those who did not. A possible correlation between gloves, masks, disposal of sharp instruments in puncture-resistant containers, shoes that entirely covered the feet or their combination and the number of percutaneous injuries could not be investigated in this study owing to the adoption of them by the majority of the participants.

CONCLUSION

This study found that percutaneous injuries particularly with anesthetic needle sticks among dentists are still high (77%). Percutaneous injuries were found to be more in dentists performing surgical endodontics. The practice of four-handed endodontics reduces the number of percutaneous injuries. All the dentists had a high level of compliance with infection control measures.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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