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Survey On Incidence Of Sharp Instrument Injuries Among Dental Students

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Abstract

Introduction: Dental practitioners are at a high risk of encountering biological hazards like airborne and bloodborne pathogens, exposure to harmful chemicals and carcinogens, radiation exposure and ergonomic hazards. Among the various occupational hazards faced by healthcare workers and providers, sharp instrument injuries or needle-stick injuries are major injuries as they carry the risk of transmitting about 20 bloodborne pathogens out of which hepatitis B are most dangerous.

Aim: The aim of the study is to create awareness regarding sharp instrument injuries. Materials and Methods : This cross-sectional observational study was conducted among students of Saveetha Dental College, India. A predesigned questionnaire, which assessed knowledge and awareness about sharp instrument injury and its management, was the tool of data collection.

Results : A total of 100 students participated. On an average,90% and 10% of the students had correct and incorrect knowledge about sharp instrument injury, respectively. A total of 90% exhibited adequate levels of awareness, while 10% exhibited incorrect levels of awareness about management of needlestick injury.Chi square value= 1.723; P value= 0.750 (p>0.05, hence statistically not significant).

Conclusion : Results indicate that the students had good knowledge and adequate awareness about sharp instrument injuries.Further training on the prevention of these injuries and the consequent measures should be provided for the students. Rate of occupational injuries in various groups is undesirable compared to similar studies. Need to Promote compliance with standard precautions especially using protective eyewear, facemask and face shield.

Keywords: Bloodborne pathogens, Dental injury, Hepatitis B, Sharp instrument

INTRODUCTION

Dental practitioners are at a high risk of encountering biological hazards like airborne and bloodborne pathogens, exposure to harmful chemicals and carcinogens, radiation exposure and ergonomic hazards(1). Among the various occupational hazards faced by healthcare workers and providers, sharp instrument injuries or needle-stick injuries are major injuries asthey carry the risk of transmitting about 20 bloodborne pathogens out of which hepatitis B (HBV) are most dangerous(2). The high risk of working exposure to blood borne pathogens (includes hepatitis B, hepatitis C) by sharp instrument injuries like hand-instrument injuries , needle stick injuries among dental students , especially nursing and midwifery students is a challenging issue. Inadequate staff, lack of experience, insufficient training, duty overload and fatigue may cause occupational sharp injuries(3,4). The need of this survey indicates efficient training of dental students that encourage in preventing sharp injuries; compliance with standard precautions; preclinical (4)HBV testing, immunization and efficacy testing; reporting of injuries and follow-up with provision(5). Blood and body fluid exposure in

dental injuries is common and a lot of them are not reported. To decrease the hazards of theseexposures, infection control authorities should design for interventions especially for mentioned high-risk conditions(6).(7)

Dental surgeons, hygienists also carry a risk of acquiring these kinds of bloodborne pathogens by occupational injuries due to sharp instruments and needle-sticks. In this (8)profession, early clinical exposure to the students begins as early as in the third year of their curriculum and preclinical handling of instruments starts in the second year(9). It is estimated that approximately 600,000 to 800,000 Sharp instrument injuries occur each year among dental practitioners in INDIA(one injury every ten seconds). Nearly more than half of the injuries were not reported as dental injuries(10). The risk of pathogen transmission from infected persons through an injury with a sharp object has been estimated to be 10–30% for HBV in non-immune individuals, 5–20% for HCV, and 0.3% for HIV . Administration of pre-exposure vaccination or post-exposure prophylaxis is effective in preventing HBV and HIV infections, respectively, and is not available or not effective in preventing HCV infection(11). The incidence of sharp instrument injuries is high among students. On the other hand, some of the students exposed to these kinds of injuries do not act appropriately(12,13). Many of these injuries can be prevented by giving proper education about protective measures during administration of medications and intravenous fluids and also about the use of safe instruments rather than conventional instruments(14). Decreased rate of skin sharp injury reports is a higher danger for mainly healthcare employees and workers which can be due to the lack of awareness(3). Therefore, determining the level of exposure to these kinds of risks and planning about them can reduce their respective risk and injuries.

An effective and multifaceted management plan should be prepared for prevention and(13)management of sharp instrument injuries in dental practitioners(15). After an occupational exposure, the dentist should be counseled about the degree of risk associated with the type of exposure: sharp instrument injuries pose a greater risk than splashes, and those from a hollow-bore are a greater risk than from a solid needle. All patients should be considered to have potentially high risk of infection; also, recommended precautionary measures should be followed at all times(16). Dental practice shows an occupational hazard for sharp instrument injuries and transmission of serious infections(17). Dental practitioners are generally considered as a higher risk because they undertake exposure to new techniques(18). Despite the post exposure prophylactic measures for HBV and HIV, where small proportions of these exposures are reported(19). Many British studies estimate that unreported sharp injuries may be ten times more frequent than the reported cases. Previously, our team had conducted numerous studies which included others (20). Our team has extensive knowledge and research experience that has translate into high quality publications(1,2,7,10,14,16,19,21–25),(26–30).(31)(32)(33).

The aim of the study is to create awareness regarding sharp instrument injuries among dental practitioners.

MATERIALS AND MATERIALS

A cross-sectional observational study was conducted among the dental college students of India. A total of 100 students were randomly sampled and who voluntarily participated in the study; the subjects were fully informed about the design and purpose of the study. All the students in the class were numbered serially and a stratified random sampling method was conducted. A written informed consent was obtained from each participant and anonymity of the participants were maintained throughout the study. Data were collected based on apre-tested structured questionnaire distributed among the students in the classroom who were asked to fill the questionnaire. The questionnaire included a full range of response options designed to identify the practitioner's knowledge, awareness, and compliance with universal precautions in the health sector. Minor changes were done to the final instrument. Thequestionnaire consisted of 10 questions to

assess the knowledge and awareness towards sharpinstrument injury. Output variables can be risk factors, treatment techniques, dental students.The sampling method used here is a convenient sampling method. Method of representation of data is Pie chart, Bar Diagram. Statistical tests used are Descriptive statistics. Independent variables can be Age, Gender, Risk factors, treatment techniques, advanced sharp instruments. Dependent variables can be awareness, interaction, knowledge, attitude, perceptions. 37% of male reported that the instrument can be contaminated when it contacts the blood or body fluids of a patient.

RESULTS

In the current study the questionnaire was circulated on the basis of knowledge, attitude and practice. The data is collected and statistically analysed. 38% of the participants were female and 62% of the participants were male. Majority of participants (59%) agreed with the statement's knowledge about the reporting system of sharp instrument injury (Figure 1). 59% of the participants agreed that knowledge about proper blood, body fluid waste disposal (Figure 2). 70% of participants experienced that after the injury the practice to milk out more blood is not recommended by CDC. Majority of participants (68%) agreed with the statementthat after the injury the affected area should be rinsed and washed thoroughly with soap and water (Figure 3). 62% of participants agreed that dental instrument injury may lead tosignificant stress and anxiety for the affected injured person (Figure 4). 66% of participants are aware that currently no vaccine exists to prevent hepatitis C infection and hepatitis B infection (Figure 5). 63% of participants felt that HBV can survive for up to one week under optimal conditions, and has been detected in discarded needles. 68% of participants agreed that the risk of infection is extremely low. 22% of females reported that dental instrument injury may lead to significant stress and anxiety for the affected injured person., whereas 38%of male reported that healthcare professionals are at the highest risk for sharp instrument injuries (Figure 7). 37% of male reported that the instrument can be contaminated when it contacts the blood or body fluids of a patient (Figure 8).

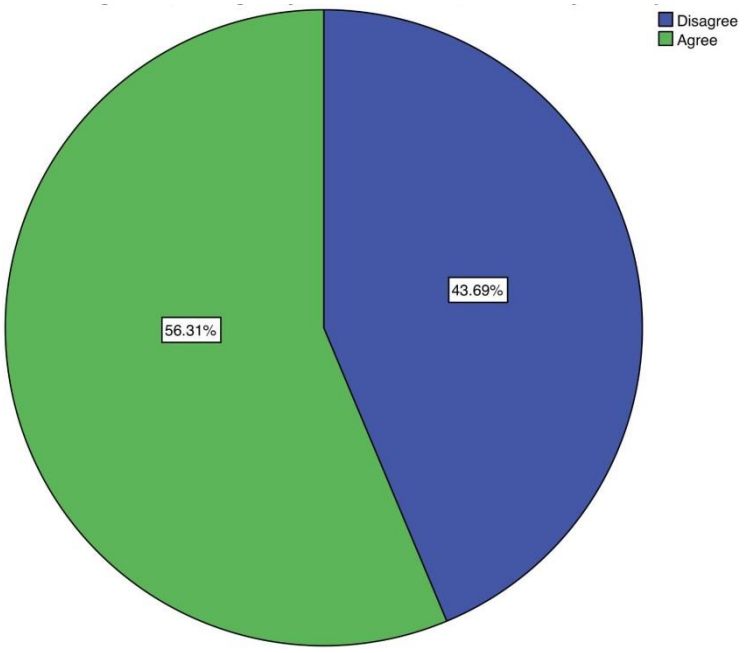

Figure 1:

Pie chart showing percentage distribution of responses for proper knowledge about the risk for sharp instrument injuries. 44%- Disagree (blue); 56% - Agree (green). Majority of participants (56%) agreed with the statement's knowledge about healthcare professionals atthe highest risk for sharp instrument injuries are surgeons, emergency room workers, laboratory room professionals.

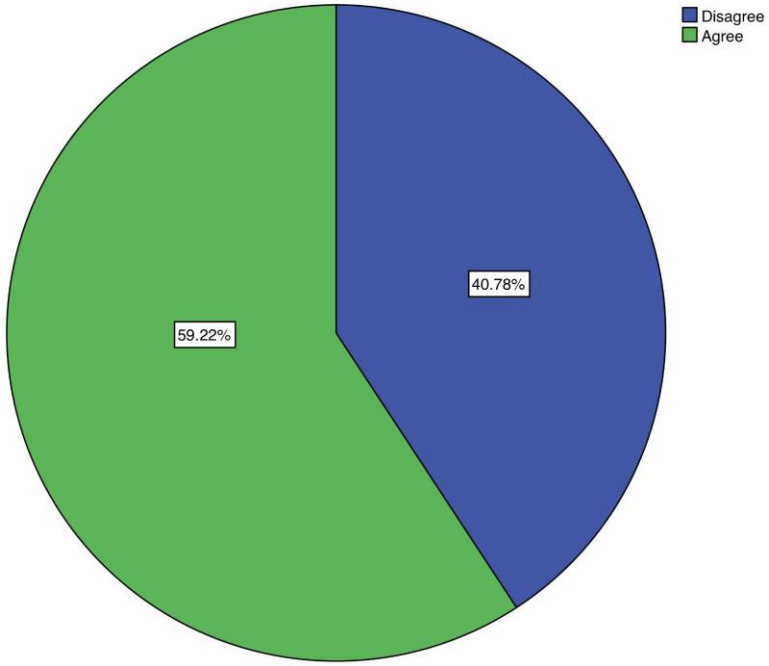

Figure 2:

Pie chart showing percentage distribution of responses for proper knowledge about blood, body fluid waste disposal. 41%- Disagree (blue); 59% - Agree (green). Majority of participants (59%) agreed with the statement's knowledge about proper blood, body fluid waste disposal.

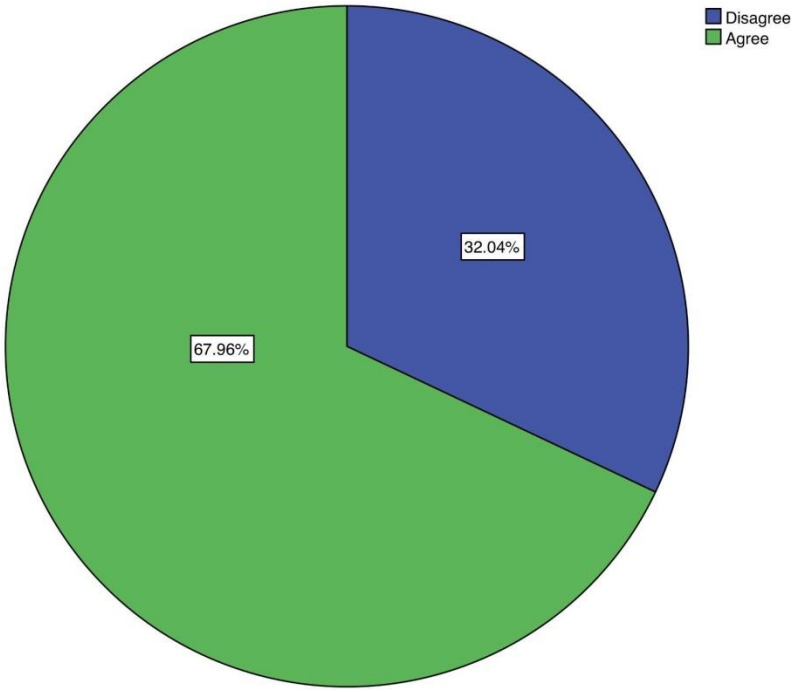

Figure 3:

Pie chart showing percentage distribution of responses for statements that after the injury the affected area should be rinsed and washed thoroughly with soap and water. 32%- Disagree (blue); 68% - Agree (green). Majority of participants (68%) agreed with the statement that after the injury the affected area should be rinsed and washed thoroughly with soap and water.

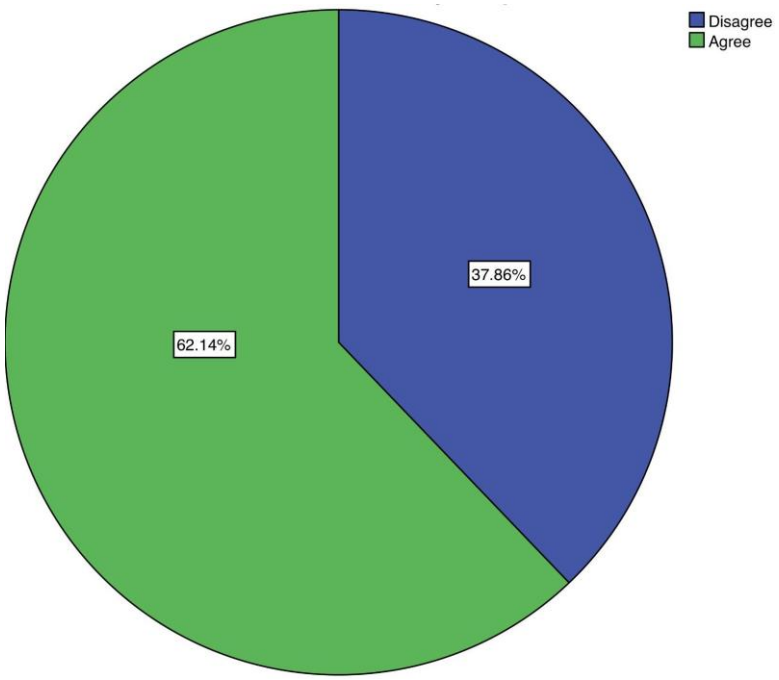

Figure 4:

Pie chart showing percentage distribution of responses for dental instrument injury may lead to significant stress and anxiety for the affected injured person. 38%- Disagree (blue); 62% - Agree (green). Majority of participants (62%) agreed that the statement's dentalinstrument injury may lead to significant stress and anxiety for the affected injured person.

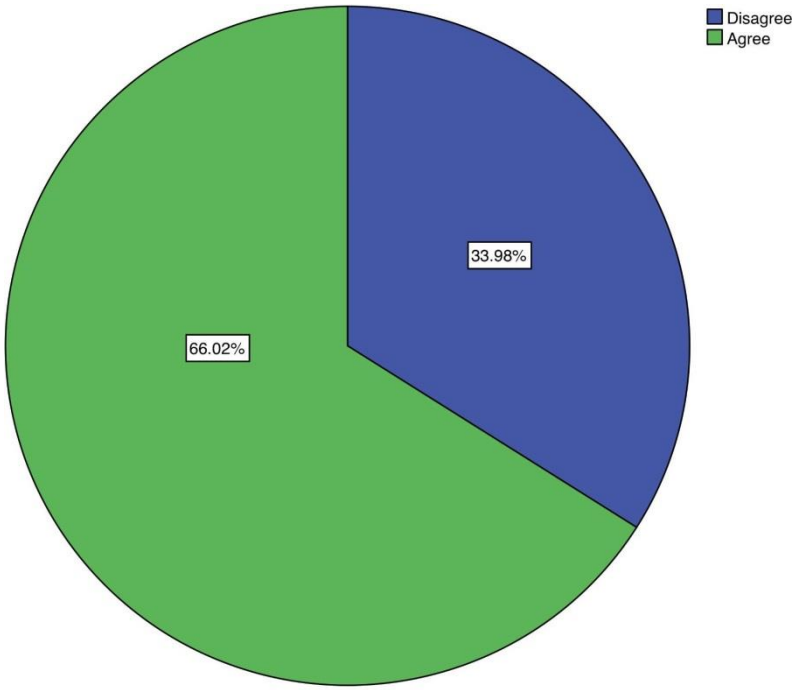

Figure 5:

Pie chart showing percentage distribution of responses for currently no vaccine exists to prevent hepatitis C infection and hepatitis B infection. 34%- Disagree (blue); 66% - Agree (green). Majority of participants (66%) agreed with the statement that currently no vaccine exists to prevent hepatitis C infection and hepatitis B infection.

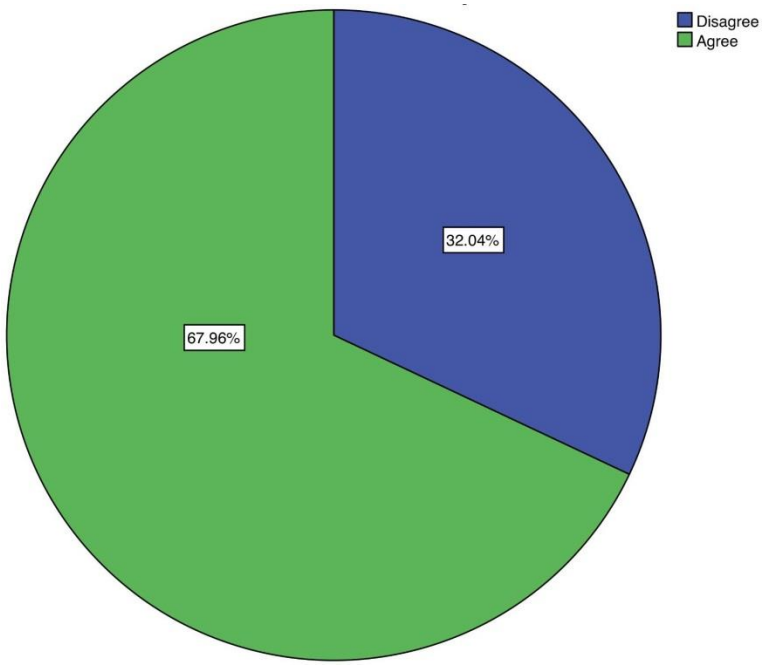

Figure 6:

Pie chart showing percentage distribution of responses for the question if anyone does tread on a needle and syringe, don't panic, the risk of infection is extremely low. 32%- Disagree (blue); 68% - Agree (green). Majority of participants (68%) agreed that if anyone does tread on a needle and syringe, don't panic, the risk of infection is extremely low.

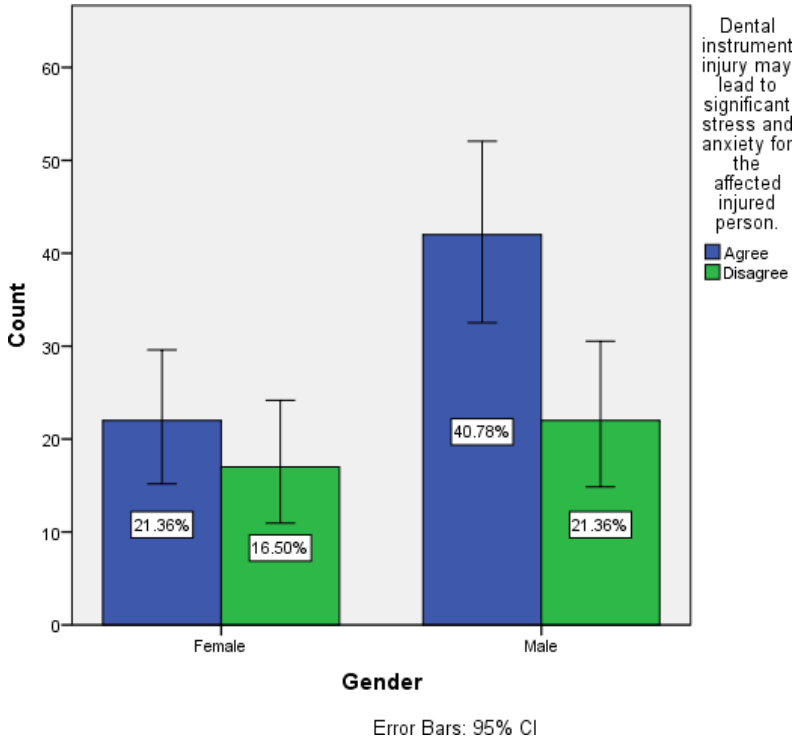

Figure 7:

Bar graph showing the association between gender (X axis) and responses to the statement dental instrument injury may lead to significant stress and anxiety for the affected injured person (Y axis- No. of participants). 22% of females reported that dental instrument injury may lead to significant stress and anxiety for the affected injured person., whereas 38% of male reported that healthcare professionals are at the highest risk for sharp instrument injuries. Majority of males (38%) and females (22%) knew that the healthcare professionals were at the highest risk for sharp instrument injuries. The analysis showed that the level of awareness among males and females was similar. Chi square value= 1.635; P value= 0.650 (p>0.05, hence statistically not significant).

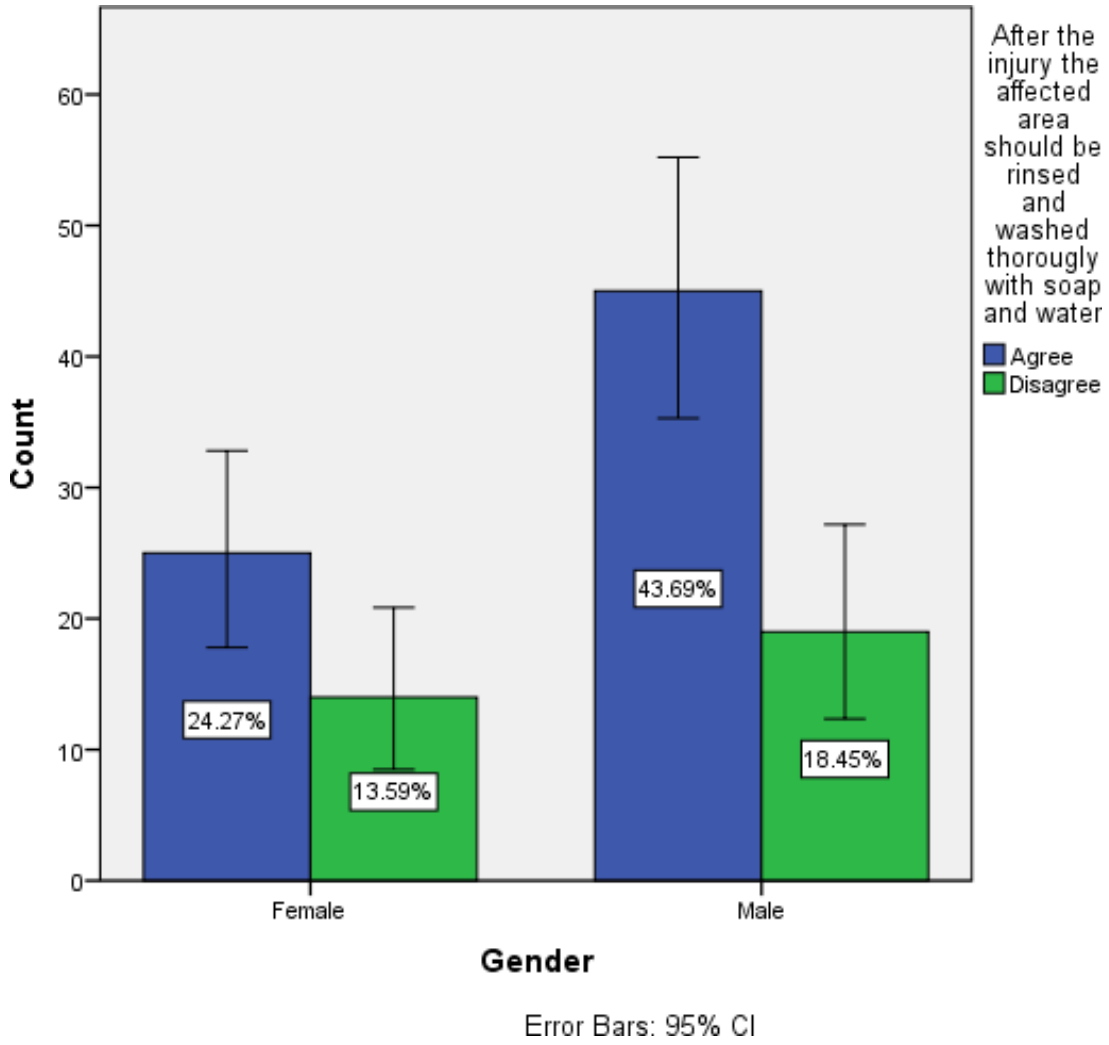

Figure 8:

Bar graph showing the association between gender (X axis) and responses for the statement that after the injury the affected area should be rinsed and washed thoroughly with soap and water (Y axis- No. of participants). 29% of females reported that the instrument can be contaminated when it contacts the blood or body., whereas only 37% of male reported thatthe instrument can be contaminated when it contacts the blood or body fluids of a patient. Majority of males (37%) and females (29%) knew that the instrument can be stated that after the injury the affected area should be rinsed and washed thoroughly with soap and water. Theanalysis showed that the level of awareness among males and females was similar. Chi squarevalue= 1.723; P value= 0.750 (p>0.05, hence statistically not significant).

DISCUSSION

Recapping dental instruments and needles, administering local anesthesia and performing scaling and polishing procedures were the most important causes of NSIs among dental students(12). The prevalence of sharp instrument injuries is high among students who can increase the risk of disease and its high risks, and thus, can increase the cost and stress among students(18,34). Injuries caused by blood-contaminated instruments can cause serious and fatal complications and can even cause hazardous occupational injuries(28). They can spread by transmitting the dangerous diseases such as hepatitis B, C and HIV. More than 10 blood borne pathogens are transmitted through sharp instruments(35). Reporting splash exposure incidents was not recognized by most of the workers, despite a high incidence of exposure to blood during dental procedures with high-speed instruments like high-speed handpieces,dental drill, etc(36). Even a small amount of splash exposure during dental procedures is an important issue of occupational safety. In this study, it focuses mainly on the splash exposures, comparing them with sharps instrument injuries, which could increase compliancewith protective eyewear(37).

A similar study conducted previously by Shigehiro Shimoji, et al, reported that dental health-care workers come in close contact with patients and use a variety of sharp and high-speed rotating instruments(38,39). Another study by Mohamed Abdullah Jaber et al, concludes that principles of infection control training and reporting of all sharp instrument injuries continue to be emphasized throughout undergraduate dental education(40). Similarly a study conducted by JS Hussain et al, concludes that educational intervention with effective training on proper handling and disposal of sharp instruments(41). Another studydemonstrated that dental health-care workers had a low level of concern regarding splash exposures to OPIMs(31). Saliva is recognized as another potentially infectious material that blood is visible, because even when blood is not visible, it can still be present in very low quantities(42,43). Saliva can be considered as body fluids that can spread infection from one person to another through direct contact with the person(44). These lesions will mainly cover which fluids might contain different bloodborne pathogens and the way of transmission between different people(38)(45).

Higher risks of injury in the emergency department can be justified since this department is highly active, and various processes are carried out by students and trainees(25,46). Large people gathering, stress, time limitation, and the patients' critical condition can be influential in this regard(47). A significant relationship was represented between gender and the possibility of getting sharp instrument injuries(48). Males were more likely to get injuries when compared to females . The male to female ratio was 1:2; the mean age of totalrespondents was 25 years. The study found significant differences in age of male and female patients ($P<0.01$). After applying Z test for the difference between two sample proportions, a significant difference was noted between knowledge of needlestick injury for all statementsin regards to correct and incorrect (ie, $P<0.05$) . On an average, 89% were correct and 11% were incorrect for knowledge about needlestick injury(26). Despite a comprehensive educational programme and training for dental students, knowledge of inoculation injuries and associated issues remained (49)inadequate(40,49). The findings of this study confirm that dental students experience sharp instrument injuries but are not likely to report them, thus it is important that the principles of infection control training and reporting of all sharp instrument injuries continue to be emphasized throughout undergraduate dental education(18)(27).Our team has extensive knowledge and research experience that has translate into high quality publications(1,2,7,10,14,16,19,21–25),(26–30). (31) (32) (33).

The limitations for this study can be Survey fatigue, Online survey,Increase in samplesize,and Inclusion of more criteria. We are confident that our study on sharp instrument injuries has been reported to have a specificity of 70%. Although still in the very early stages of development, cell therapy is one of the biggest

hopes towards developing a cure for injuries, especially for both sharp instruments and needle sticks. Since sharp instruments cannot be replaced with any other instruments, dental practitioners should handle the sharp instruments carefully in such a way that won't cause any injuries.

In future, more concern should be given for not recapping the sharp instruments. Making available safety and also need to enhance needles in dental settings especially after every dental surgical procedure. Emphasising on the potentially infectious nature of saliva in dental procedures. Need to Promote compliance with standard precautions especially using protective eyewear, facemask and face shield. Need to Develop a standard reporting protocol in each and every dental college and setting up a management center for following the exposed personnel.

CONCLUSION

Educational interventions with effective training on proper handling and disposal of sharp instruments and post- exposure prophylaxis along with the formation of a reporting center aresome of the recommendations which can decrease the work exposure to sharp instrument injuries among the dental students. Many of these kinds of sharp instrument injuries can be prevented by proper education on protective measures during administration of medications and intravenous fluids and the use of safe instruments rather than conventional instruments. Further training on the prevention of these injuries and the consequent measures should be provided for the students. Rate of occupational injuries in various groups is undesirable compared to similar studies. Need to Promote compliance with standard precautions especially using protective eyewear, facemask and face shield. Need to Develop a standard reporting protocol in each and every dental college and setting up a management center for following the exposed personnel.

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COMPETING INTERESTS

All the Authors have declared that no competing interests exist.

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