

# KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING OCCUPATIONAL HAZARDS AND INFECTION CONTROL MEASURES AMONG DENTAL STUDENTS - A QUESTIONNAIRE SURVEY

<sup>1</sup>Karthiga Devi.G, <sup>2</sup>Deepika Rajendran, <sup>3</sup>Pradeep D

<sup>1</sup>*Saveetha Dental College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha University Chennai- 600077.*

<sup>2</sup>*Senior Lecturer, Department of Oral Medicine and Radiology, Saveetha Dental College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai- 600077.*

<sup>3</sup>*Department of Oral and Maxillofacial Surgery, Saveetha Dental College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-600077, Tamilnadu, India.*

<sup>1</sup>[151501066.sdc@saveetha.com](mailto:151501066.sdc@saveetha.com)

<sup>2</sup>[deepikar.sdc@saveetha.com](mailto:deepikar.sdc@saveetha.com)

<sup>3</sup>[pradeep@saveetha.com](mailto:pradeep@saveetha.com)

## ABSTRACT:

Infection control practices are important in a clinical setup to avoid the risk of infection among the patients and practitioners. Proper infection control measures such as proper basic disposal and sterilization of instruments that are basic infection control measures should be directly followed in a clinical setup. This study aims to access the knowledge, attitude and practice regarding occupational hazards and infection control measures among dental students. The study was conducted among dental undergraduates and postgraduates. The study group consisted of 3rd year, 4th year and Interns and Postgraduate students. Total number of students included in the study was 121 participants. The data was collected and analysed through IBM SPSS statistical analysis. Descriptive statistics were done. About 90.9% of the dental students answered that the dental clinics are more prone for infectious disease. Among all the dental students, 76.9% of the students experienced the accidental injury in clinics. Among them 44.6% of the students reported that needle injury was the cause for the occupational injury followed by 21.5% of scalpel blade, 4.1% of burs. About 11.4% of dental students were not immunized against Hepatitis B virus (HBV). Among them who received vaccination, 43.8% of them had completed the three recommended doses of HBV vaccination. The students know the importance of infection control and the knowledge among all students about the protocols about infection control was high but practice was quite low. A better knowledge of infection control is essential for safe practice in dentistry. This will ensure the provision of better and safer dental health-care service for the population.

**KEYWORDS:** Disinfection, Infection Control, Needle stick Injuries, Universal Precautions, Vaccination.

## INTRODUCTION:

The Dental Clinic is an environment where disease transmission occurs easily (1) . Prevention of cross infection in the dental clinics is therefore a crucial aspect of dental practice, and dental clinic workers must adopt certain basic routines while practicing. Dental healthcare professionals are at risk of infections caused by various microorganisms such as Mycobacterium tuberculosis. Hepatitis B and Hepatitis C virus, staphylococci, streptococci, Herpes simplex virus (HIV), Mumps, Influenza and Rubella (2).

Infections may be transmitted in the dental operatory through several routes, including direct contact with blood, Oral fluids, other secretions; indirect contact with contaminated instruments, operative equipment, (or) aerosols of oral and respiratory fluids (3). Infections via any of these routes such as a susceptible host, a pathogen with sufficient infectivity control strategies to cause infection.

In older times, the dentists are more prone to hepatitis B infection(4) . However, the limitations of universal precautions were recognized subsequently and in 1996, the CDC adopted the term standard precautions to embrace a border concept of the prevention and transmission of blood or any other body fluid excreted from the patents. Wearing of gloves by dental personnel has been advised as an essential element of cross-infection control in dental surgery (5).

Hands are considered to be a major source of infection (6) where the infected substance is retained in the fingernail for a longer period (up to five days) (7). It is difficult to remove contaminated material from the hands, particularly from the subungual and nail fold areas.

The risk of Hepatitis C is approximately 1.8%, ranging from 0 to 7%. with AIDS , the risk is 0.3% in percutaneous injuries and less than 0.1% in mucous membrane injuries (8). Exposure to infected blood can result in transmission from patient to dentist, from dentist to patient which frequently encounters patient blood and blood contaminated saliva during dental procedures.

Paramount to the prevalence of infection disease is the strict adherence to standard precautions for all dentists. This includes though not limited to eye protection with lateral shields; facemask and protective clothing. Despite the considerate emphasis placed on standardized infection control procedures, it appears that few dentists have adhered to these procedures in the clinical practice (9). Even in dental schools, future dentists have not always properly adhered to these procedures (10).

Previously our team has conducted numerous clinical trials, (11), (12), and lab animal studies (13), (14), (15), (16), (17) and in-vitro studies (18), (19) , case studies (20), (21), (22), (23), and literature reviews (24), (25) over the past 5 years. Hence, this time, our aim was to evaluate the knowledge, awareness and attitude of dental students studying at a University in Chennai regarding the occupational hazards and infectious disease.

## **METHODS AND MATERIALS:**

### **Study design:**

A cross sectional questionnaire based study was carried out among dental undergraduates and postgraduates of a University in Chennai who were practicing in clinics.

### **Sampling:**

This study was conducted in an online setting. A total of 121 dental undergraduates and postgraduates participated in this study. The sample consisted of Nineteen Third year students, Twenty six Final year students, Thirty five Internship students and Forty One Post graduate students.

### **Approval:**

Informed consent was obtained from all the participants before conducting the study. Ethical clearance was obtained from the Institutional Ethical Committee and Scientific Review Board of the University [SDC/SIHEC/2020/DIASDATA/0619-0320].

### **Questionnaire:**

The 17 questions were framed with the help of experts in the field. A self-administrated questionnaire consisting of Seventeen close ended questions were used for data collection. The dental students answered the questionnaire through an online setting-survey planet. There were six questions to access knowledge, four questions to assess attitude, and five questions to judge infection control practice of the respondents.

### **Statistical analysis:**

The data from their response were entered in the excel sheets. The analysis was done using SPSS software through frequency tests and Chi-square tests.

### **RESULTS AND DISCUSSION:**

A total of 121 dental students participated in this study, among which 19 (15.7%) Third year, 26 (21.5%) Final year, 35 (28.9%) Internship and 41 (33.9%) Post Graduate students filled the questionnaire [Table 1] gives the number of participants in each year of study. Further tables and figures show the level of knowledge, attitude and practice regarding infection regarding infection control among dental students.

About 90.9% of the dental students answered that the dental clinics are more prone for infectious disease [Graph 1]. Among these dental students, 76.9% of the students experienced the accidental injury in clinics [Graph 2]. Among them 44.6% of the students reported that needle injury was the cause for the occupational injury followed by 21.5% of scalpel blade, 4.1% of burs [Graph 3]. About 11.4% of dental students were not immunized against Hepatitis B virus (HBV) [Graph 4]. Among them who received vaccination, 43.8% of them had completed the three recommended doses of HBV vaccination [Graph 5].

About 75.2% students always remove their accessories during dental procedures [ Graph 6]. The use of protective barriers such as gloves, mask and gown, 86.8% of the students used them always, 5.0% of the students used them sometimes [Graph 7]. It is seen that 68% students change their mask from one patient to another whereas 28.1% does not change and 15.2% students change their mask sometimes [Graph 8]. 61.2% of students used protective eye wear for patients during treatment while 14.0% of students used protective eye wear only sometimes and 24.8% did not use the protective eye wear to the patient [Graph 9]. Following proper biomedical waste disposal methods in which 81.8% of students follow proper methods whereas 9.7% does not follow the proper methods and rules [Graph 10].

Similarly, Sterilization of instruments after each use is essential to prevent the spread of infection from one patient to another. The majority of the students (77.7%) consider heat sterilization (Autoclave) as the most reliable method and 62.0% of students know the exact aim of sterilization [Graph 11,12]. 87.6% of dental students answered that HIV transmission can take place by minute needle stick injury [Graph 13]. 22.31% were aware of the exact minimum time (15 min) required for sterilization in autoclave [Graph 14]. 79% of students answered that wash with soap and water for immediate action taken in case of direct blood contact with HIV patients whereas 24.8% of students answered to squeeze out blood with soap and water which is absolutely prohibited [Graph 15]. 90.9% of students have knowledge of use of respiratory masks and reduce the exposure of infectious TB [Graph 16]. [Graph 17] shows the association between years of study and awareness that dental clinics are more prone for infectious disease. Postgraduates, Interns and Final Year were more aware that dental clinics are more prone for infectious disease compared to Third years. Pearson Chi Square test, P Value = 0.000<0.05, hence the association is statistically significant. [Graph 18] shows the association between years of study and students were immunized against Hepatitis B virus. Majority of the Postgraduates and Interns were immunized against Hepatitis B virus

when compared to others. Pearson Chi Square test, P Value =  $0.000 < 0.05$ , hence the association is statistically significant. [Graph 19] shows the association between years of study and the importance of protective eyewear for patients during treatment. Post Graduates and interns were aware of the importance of protective eyewear for patients during treatment. Pearson Chi Square test, P Value =  $0.000 < 0.05$ , hence the association is statistically significant. [Graph 20] shows the association between years and study and the students suffered more accidental injury compared to others. Interns and Final year students suffered more accidental injury compared to others. Pearson Chi Square test, P Value =  $0.000 < 0.05$ , hence the association is statistically significant.

Dentists are at high risk of infection by blood borne pathogens, as they are continually exposed to blood and saliva mixed with blood and many even suffer needle puncture (26). The key to reducing or preventing the transmission of a variety of microorganisms to dentists lies in strict adherence to infection control practice. This study evaluated the attitude and awareness of dental students and post graduates towards infection control measures in Private dental hospitals.

Majority of the students believe that dental clinics are more prone for infectious disease than other medical fields. These findings are in accordance with the study conducted by Rahman *et al.* where 87.1% of students thought that dental clinics are more prone for infectious disease when compared to other medical fields (27). Majority of injuries were due to needlestick injury. These findings are in accordance with the study conducted by (27).

Proper Hepatitis B vaccination is the best way of providing protection to dentists against contagious transmission of pathogens during dental treatment (28). The prevalence of hepatitis B vaccination varies among dental workers from 38% to 100% (29). In our study, only 77.7% of students reported having been vaccinated against HBV. 43.8% of them had completed the three recommended doses which was similar to the study conducted by De Souza *et al* (28) in which more than 40% of students received the required three doses of HBV vaccination. Notably, only 33.88% of the vaccinated students had received the recommended 3 doses of vaccination. This percentage was very low compared with other findings reported by De Souza *et al* (83.3%) and Rahman *et al.* (64.7%) among dental students in Brazil and the UAE, respectively (28),(27).

PPE is vital for protecting Health Care Workers from occupationally acquired infection during patient care, particularly from droplet- or airborne-transmitted diseases. The use of protective barriers during treatment among the dental students in our study were 86.8%. These results were similar to the previous studies assessing the use of PPE among dental students (29). Compliance with the use of protective eyewear was 61.2%. These results were similar to the study conducted by Freire *et al* (30) in which 59.7% patients use protective eyewear. 56.2% of patients reported changes mask from one patient to another. This finding was consistent with earlier studies conducted by Rahman *et al* (27). It is well known that disinfection alone is not adequate to kill all the bacteria, viruses and their spores due to which more powerful and best techniques such as autoclave is necessary for sterilizing dental instruments. In this study 77.6% of dental practitioners preferred autoclave as a means of sterilization, 22.31% estimated the correct time which revealed a good knowledge and practice. In different studies, authors have mentioned that more than ninety percent dentists sterilize instruments through autoclave but in Turkey only 18% dentists autoclave handpieces and instruments at the end of the day (31).

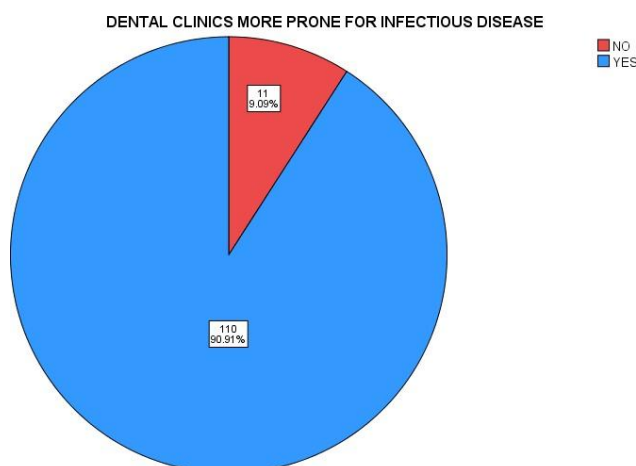
The risk of transmission after exposure to HIV infected blood in one of the studies has been highlighted to be about 0.3% whereas it is estimated to be up to 100 times greater for HBV (30%) and could be high as 10% of hepatitis C virus (32).

Awareness related to infection control practices ie: universal precautions guidelines, in this study was found to be 86.8% which in accordance to the survey at Armed forces hospital, Sorourah, in which 81% HCWs were aware about the universal precaution (32). In contrast, only 21.6% were aware of universal precautions guidelines in the survey conducted by Siddique et al., (32). About 76.9% of the students mentioned that they had experienced non-sterile occupational injuries which are in accordance to that reported among dental students in Canada. In which 80% of students reported among dental students in Brazil this prevalence rate was only 30% (28). Sharp injuries are more likely to occur in the dental environment than in other health care settings; usually due to the small operating field. Overall Postgraduates and Intern have more knowledge on occupational hazards and infection control and showed statistically significant values.

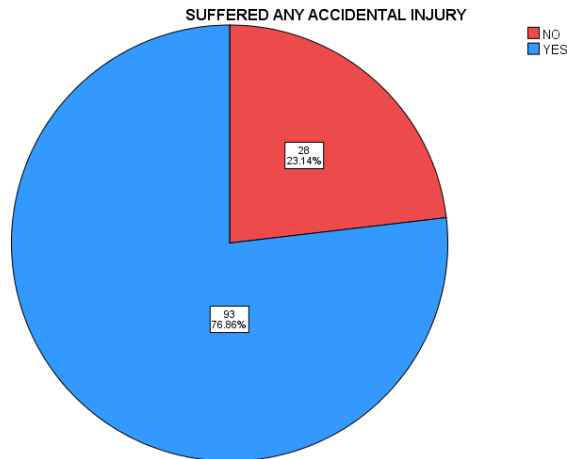
The purpose of infection control measures is to break the chain by consistently practicing standard protocols which would prevent the infection. Almost all dental students believe that proper isolation during treatment prevents the transmission of hazardous infection. The majority of the study population considered disinfection of dental clinics with sterilization of instruments. Most of them were practicing proper biomedical waste disposal methods. The study results demonstrate that practice of standard protocols are better among dental students.

Year of study	Frequency	Percent
Third Year	19	15.7%
Final Year	26	21.5%
Intern	35	28.9%
Post Graduate	41	33.9%
<b>Total</b>	121	100.0%

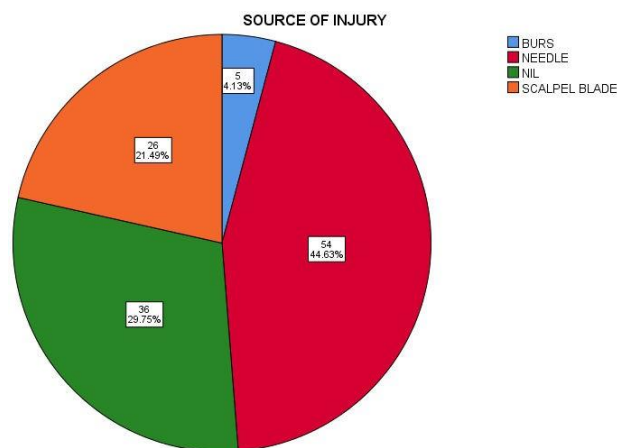
**Table 1:** Frequency distribution of various dental students who participated in the survey. Post Graduate students (33.9%) responded higher among other dental students.



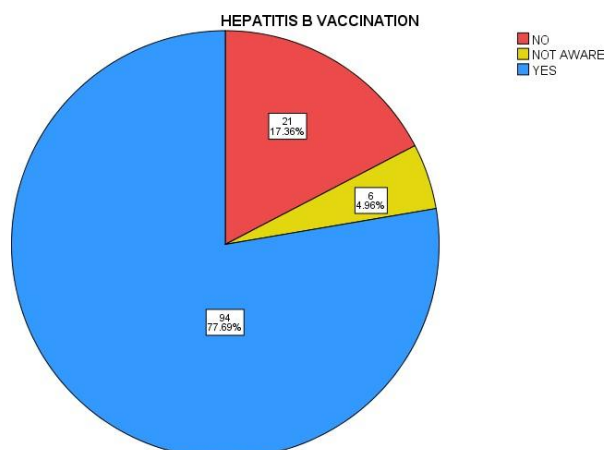
**Graph 1:** Pie chart showing the distribution of the study population who were aware of Dental clinics being more prone for infectious disease. Majority of the dental students 90.91% (Blue) agreed that Dental clinics are more prone for infectious disease and 9.09% (Red) not agreed that Dental clinics are more prone for infectious disease.



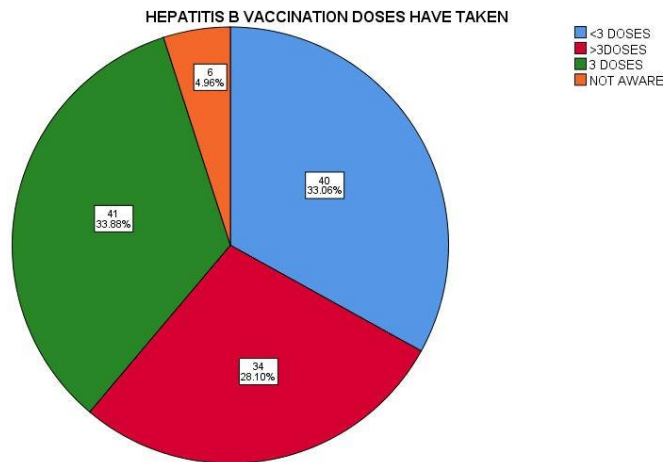
**Graph 2:** Pie chart showing the distribution of the study population who suffered accidental injury. Majority of the dental students 76.86% (Blue) agreed that they suffered from accidental injury and 23.14% (Red) reported that they had not suffered from accidental injury.



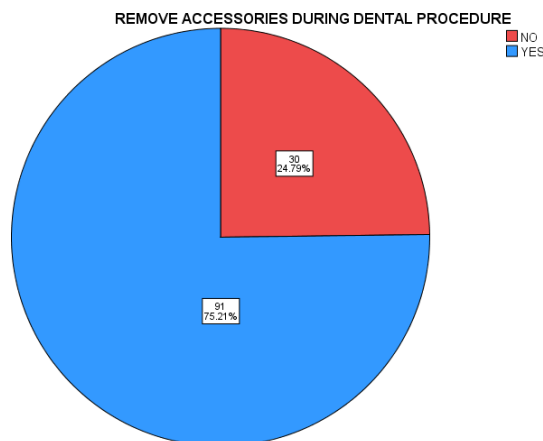
**Graph 3:** Pie chart showing the distribution of the study population who were aware of the source of injury. Majority of the dental students 44.63% (Red) suffered from needle stick injury, 21.49% (Orange) suffered from Scalpel Blade, 4.13% (Blue) suffered from burs and 29.7% (green) reported that they had not experienced any injury.



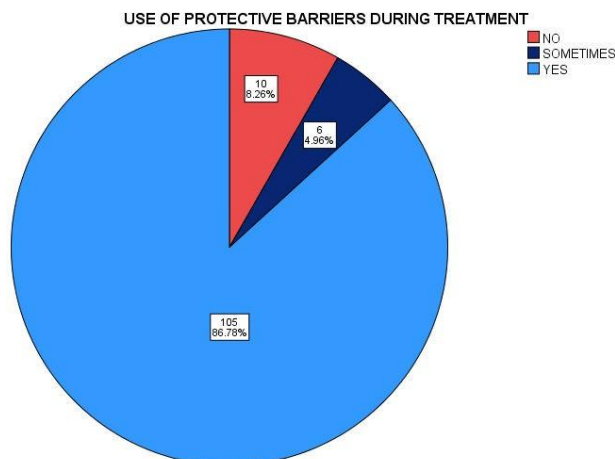
**Graph 4:** Pie chart showing the distribution of the study population who were immunized against Hepatitis B virus. Majority of dental students 77.69% (Blue) agreed that they were immunized against hepatitis B virus, 17.36% (Red) reported that they were non immunized for Hep B and 4.96% (yellow) were not aware of their hepatitis B vaccination.



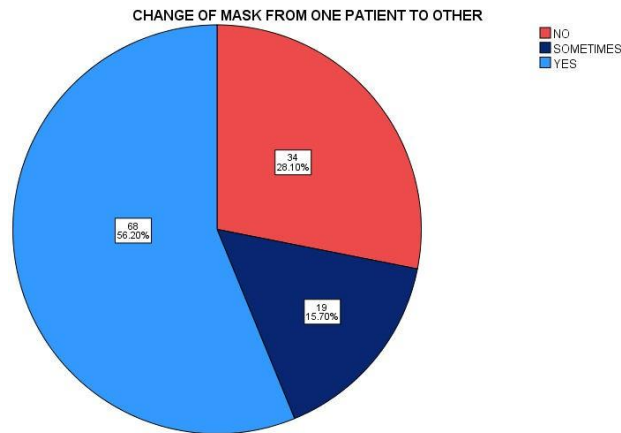
**Graph 5:** Pie chart showing the distribution of the study population about Hepatitis B vaccination dosage. Majority of dental students 33.06% (Blue) agreed that they had taken <3 Doses of vaccination, 28.10% (Red) of students had taken >3 doses of vaccination, 33.88% (Green) had completed the three doses of HBV vaccination and 4.96% (Orange) were not aware of Hepatitis B vaccination.



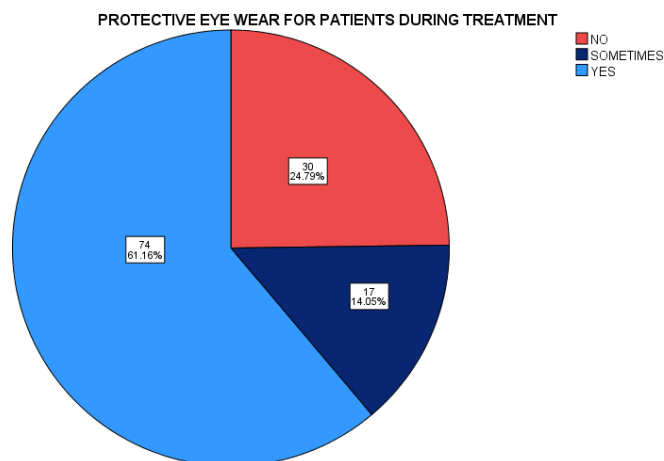
**Graph 6:** Pie chart showing the distribution of the study population who always remove their accessories during dental procedures. Majority of dental students 75.21% (Blue) agreed that they remove their accessories during dental procedures and 24.79% (Red) denied that they remove their accessories during dental procedures.



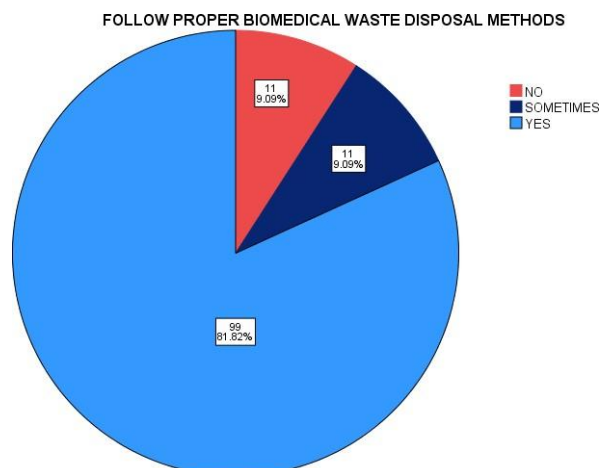
**Graph 7:** Pie chart showing the distribution of the study population who always uses protective barriers such as gloves, mask and gown during treatment. Majority of dental students 86.78% (Blue) agreed that they use protective barriers during treatment and 8.26% (Red) did not agree and 4.96% (Dark blue) agreed that sometimes they use protective barriers such as gloves, mask and gown during treatment..



**Graph 8:** Pie chart showing the distribution of the study population who always changes masks from one patient to another patient. Majority of dental students 56.20% (Blue) agreed that they change their mask from one patient to another patient, 28.10% (Red) did not agree and 15.70% (Dark blue) agreed that sometimes they change masks from one patient to another patient. .

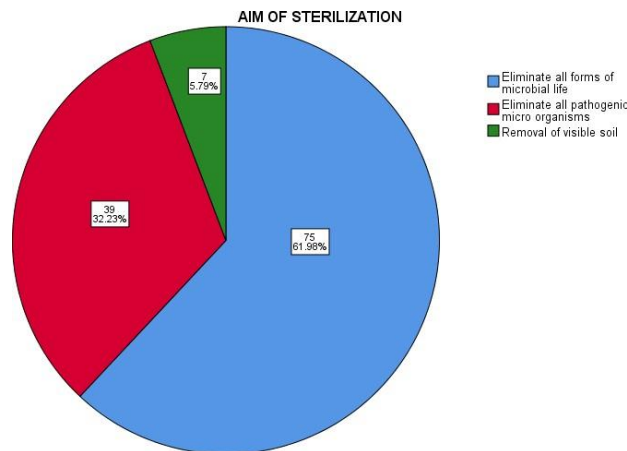


**Graph 9:** Pie chart showing the distribution of the study population who always wore protective eyewear for patients during treatment. Majority of dental students 61.16% (Blue) agreed that they always wore protective eyewear for patients during treatment, 24.79% (Red) did not agree and 14.05% (Dark Blue) agreed that sometimes they wore protective eyewear for patients during treatment.

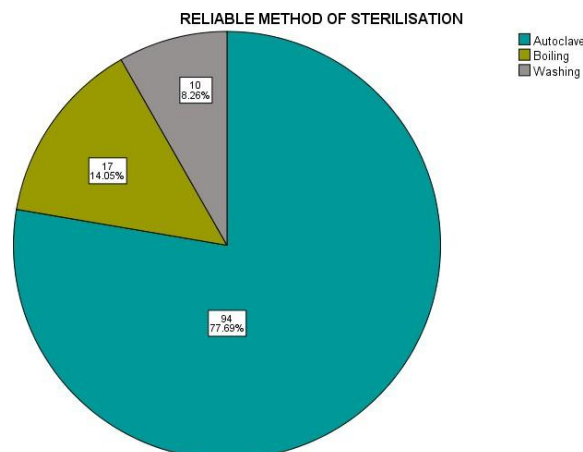




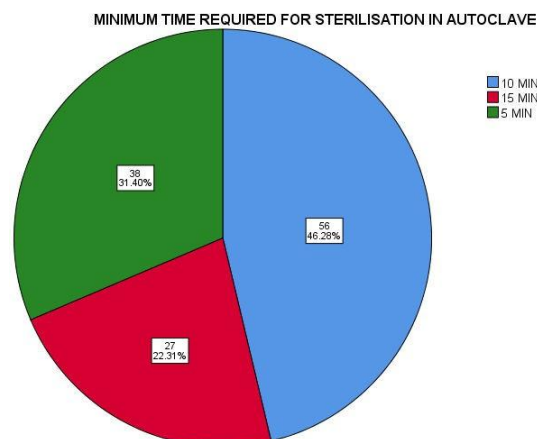
**Graph 10:** Pie chart showing the distribution of the study population who always follow proper biomedical waste disposal methods. Majority of dental students 81.82% (Blue) agreed that they always follow proper biomedical waste disposal methods, 9.09% (Red) did not agree and 9.09% (Dark Blue) agreed that sometimes they follow proper biomedical waste disposal methods.



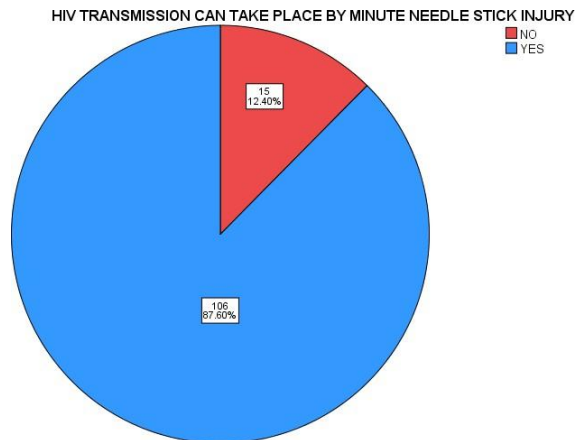
**Graph 11:** Pie chart showing the distribution of the study population who know the aim of sterilisation. Majority of dental students 61.98% (Blue) agreed that the aim of sterilisation was to eliminate all forms of microbial life, 32.23% (Red) agreed that the aim of sterilisation was to eliminate all pathogenic microorganisms and 5.79% (Green) agreed that the aim of sterilization was to removal of visible soil.



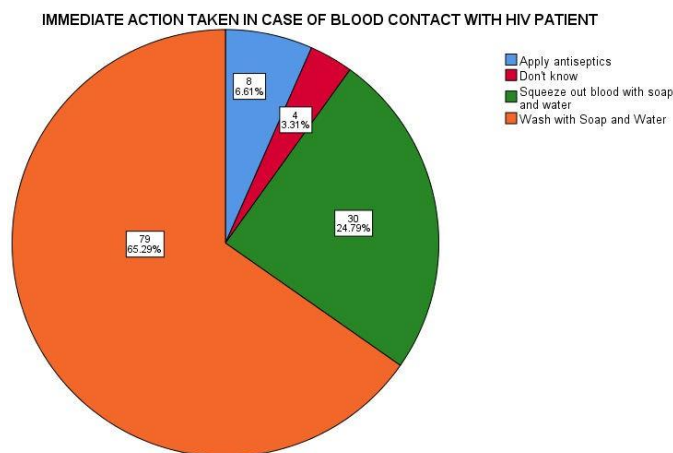
**Graph 12:** Pie chart showing the distribution of the study population who know the Reliable method of sterilisation. Majority of dental students 77.69% (Green) agreed that the reliable method of sterilisation was Autoclave, 14.05% (Olive) agreed that the reliable method of sterilisation was Boiling, 8.28% (Grey) agreed that the reliable method of sterilisation was washing.



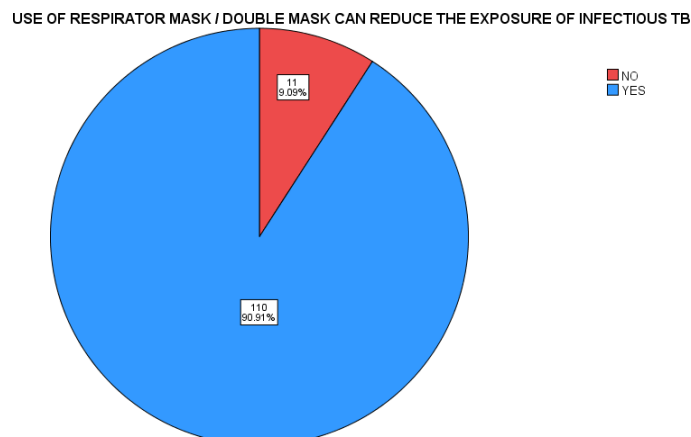
**Graph 13:** Pie chart showing the distribution of the study population who know the minimum time required for sterilisation in autoclave. About 22.31% were aware of the exact minimum time (15 min) (Red) required for sterilization in autoclave whereas 48.28% responded to 10 minutes (Blue) and 31.40% responded to 5 minutes (Green)



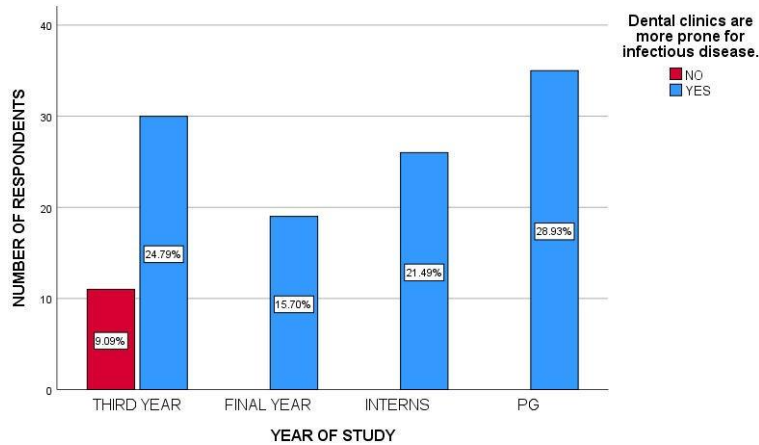
**Graph 14:** Bar chart showing the distribution of the study population who were aware of HIV transmission that can take place by minute needle stick injury. Majority of dental students 87.60% (Blue) agreed that the HIV transmission can take place by minute needle stick injury and 12.40% (Red) did not agree that the HIV transmission can take place by minute needle stick injury.



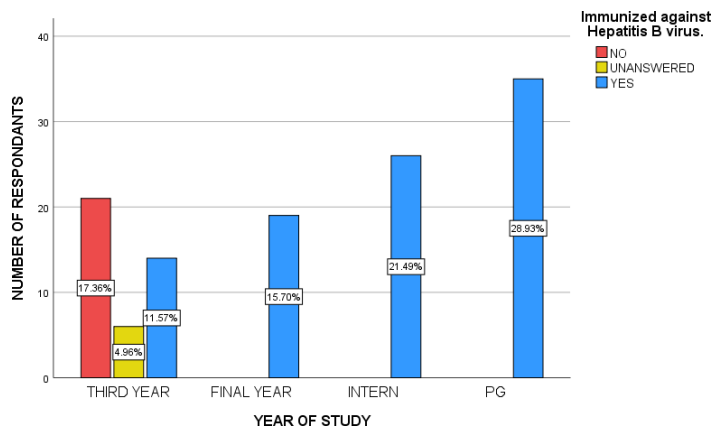
**Graph 15:** Pie chart showing the distribution of the study population who were aware of immediate action taken in case of blood contact with HIV patients. Majority of dental students 65.29% (Orange) agreed that immediate action should be taken in case of blood contact with HIV patients by washing with soap and water



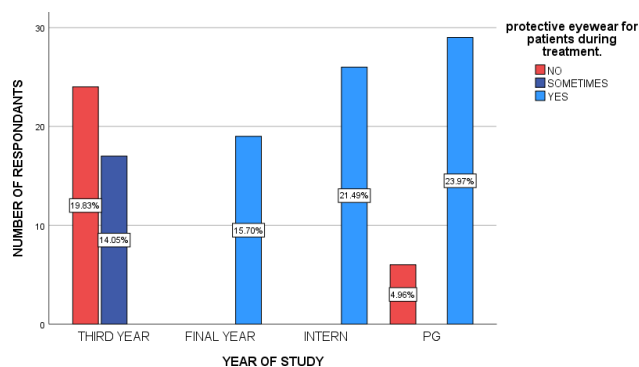
**Graph 16:** Pie chart showing the distribution of the study population who were aware of the use of respirator masks/ Double masks can reduce the exposure of infectious TB. Majority of dental students 90.91% (Blue) agreed that the use of respirator masks/ Double masks can reduce the exposure of infectious TB, 9.09% did not agree that the use of respirator masks/ Double masks can reduce the exposure of infectious TB .



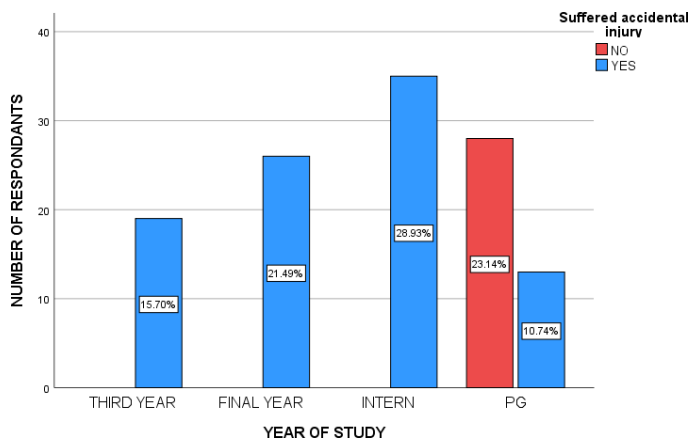
**Graph 17:** The bar graph represents the association between the year of study and their responses to the given question, whether the dental clinics are more prone for infectious disease. X-axis represents the year of study of students and Y-Axis represents the number of respondents. Postgraduates were more aware (Blue) that dental clinics are more prone for infectious disease compared to others. Pearson Chi Square test, P Value = 0.000<0.05, hence the association is statistically significant.



**Graph 18:** The bar graph represents the association between the year of study and their responses to the given question that, if the dental students are vaccinated against the Hep B virus. X-axis represents the year of study of students and Y-Axis represents the number of respondents. Majority of the Postgraduates were immunized (Blue) against Hepatitis B virus when compared to others. Pearson Chi Square test, P Value = 0.000<0.05, hence the association is statistically significant.



**Graph 19:** The bar graph represents the association between the year of study and their responses to the given question that, if they wear protective eyewear for the patients during the treatment. X-axis represents the year of study of students and Y-Axis represents the number of respondents. Post Graduates were aware (Blue) of the importance of protective eyewear for patients during treatment. Pearson Chi Square test, P Value = 0.000<0.05, hence the association is statistically significant.



**Graph 20:** The bar graph represents the association between the year of study and their responses to the given question that, if they had suffered any accidental injury before. X-axis represents the year of study of students and Y-Axis represents the number of respondents. It showed that the Interns had suffered more accidental injury compared to others.. Pearson Chi Square test, P Value = 0.000<0.05, hence the association is statistically significant.

**CONCLUSION:**

Dental students in this study have a good level of knowledge and positive attitude towards infection control. Overall Postgraduates and Intern have more knowledge on occupational hazards and infection control measures to be taken and showed statistically significant values. However, the knowledge acquired must be transferred into daily practice thereby improving compliance with proper infection control measures. Continuing education programs and refreshing courses regarding cross infection and control procedures are necessary to update the knowledge of dental practitioners and to implement the same in their practice.

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