Original Article

KNOWLEDGE, ATTITUDE AND PRACTICE ON STERILIZATION AMONG DENTAL COLLEGE STUDENTS - A SURVEY

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Abstract

Introduction: Sterilization refers to the process of removing any kinds of microorganisms such as fungi, bacteria and spores or other biological agents like prions present in the surface or objects. Any surgical instruments that penetrate our bloodstream or skin must be sterilized before using and examples of these instruments are pacemakers and needles. There are different types of sterilization methods like physical and chemical sterilization in which heat, incineration and flaming comes under physical type and ethylene oxide, formaldehyde and hydrogen peroxide comes under chemical type of sterilization . Some of the advantages of sterilization methods are destruction of bacterial spores and it is the most cheap and economical method .

Aim: The aim of this study is to determine the knowledge, attitude and practice on sterilisation protocols among dental college students.

Materials and Methods: A well structured questionnaire containing socio-demographic information, knowledge, attitude and perception was framed and circulated through google forms survey link. The results were imported to excel and were statistically analysed using IBM SPSS software v.26.

Results and Discussion: The results conclude that awareness on sterilization protocols was good among dental college students and further studies can be done for more awareness in a different and large population. From the data, chi square value was obtained by comparing gender of the participants in which p value <0.05 is statistically significant.

Conclusion: In this study, the students had knowledge and sufficient awareness about the sterilization protocols. The students were exposed for the methods of sterilization and also they knew the types of sterilization methods. Therefore, from this study, we conclude that dental college students were aware of sterilization protocols.

Key Words: KAP survey, Sterilisation, Disinfection, Dental, Innovative technique

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INTRODUCTION:

Sterilization refers to the process of removing any kinds of microorganisms such as fungi, bacteria and spores or other biological agents like prions present in the surface or objects. Any surgical instruments that penetrate our bloodstream or skin must be sterilized before using and examples of these instruments are pacemakers and needles (Senthilnathan *et al.*, 2016). There are different types of sterilization methods like physical and chemical sterilization in which heat, incineration and flaming comes under physical type and ethylene oxide, formaldehyde and hydrogen peroxide comes under chemical type of sterilization (Lerouge and Simmons, 2012). The most commonly used sterilization is autoclave which is characterized under steam under pressure, the temperature of autoclave is 120°C and is checked by non toxigenic strains of *Bacillus stearothermophilus* which is a biological control (Jain, Jain and Jain, 2020). Another important type of sterilization is hot air oven which uses high temperatures for destruction of bacteria and bacterial spores (Alkadhim, 2018). Some of the advantages of sterilization methods are destruction of bacterial spores and it is the most cheap and economical method (Gosney ES, 1930). Recently mercuric chloride is emerging as an effective tool in the sterilization process but the other methods are better (Wolf *et al.*, 1989). The common types of sterilization methods used in dentistry are steam sterilization, Dry heat sterilization and chemical vapor sterilization (Custer, 1912).

Previously, they compared three types of lasers (argon, CO2, and NdYAG) for sterilizing dental instruments and they concluded that argon laser sterilized the instruments with low energy effectively (Powell and Whisenant, 1991). Endodontic files were cleaned with gas and argon plasma and it was effective for decontamination of dental instruments and endodontic files which reduces the risk of Iatrogenic diseases (Whittaker *et al.*, 2004). In a study done by Parker, clinical handpieces which are entrapped with bacterias were subjected to ethylene oxide gas and concluded that ethylene oxide prevented bacterial growth and can be used as an effective sterilizer (Parker and Johnson, 1995). Antiseptics and disinfectants were used as sterilizers in vivo and vitro and it was concluded that these were used to control the multiplication of microorganisms (Balan *et al.*, 2017). Endodontic and dental burs which are packed are not sterile so we have to rigorously sterilize to avoid bacterial contamination (Morrison and Conrod, 2010). In a study, it is mentioned that type B and S autoclave is helpful in sterilizing dental handpieces but complete removal is not achieved (Sasaki and Imazato, 2020).

There are many types of sterilization methods for different types of instruments and culture media. Some surveys have been conducted among a wider population group including practicing dentists in order to evaluate their knowledge and awareness on sterilization protocols. Our team has extensive knowledge and research experience that has translate into high quality publications(Dinesh *et al.*, 2013; Krishnan and Lakshmi, 2013; Muthukrishnan and Warnakulasuriya, 2018; Sekar *et al.*, 2019; Gomathi *et al.*, 2020) (Sathivel *et al.*, 2008; Panda *et al.*, 2014; Govindaraju, Neelakantan and Gutmann, 2017; Johnson *et al.*, 2020; Saraswathi *et al.*, 2020).The main aim of this study was to determine the knowledge, attitude and perception of sterilization protocols among dental college students.

MATERIALS AND METHODS:

The cross-sectional descriptive survey was conducted among 100 dental students that consist of both male and female population within 18 to 23 years of age. The survey consists of 15 self-administered questions. This was conducted through an online survey, the results were collected and tabulated. The results were analyzed using statistical analysis. The survey was cast to create and gather data among heterogeneous populations. A simple random sampling link was done to eliminate response bias. Measures taken for minimizing errors are internal and external validity. This study was approved by the scientific review board, Saveetha Dental College. Knowledge, attitude and perception are the output variables. The descriptive statistics were done using SPSS software. Gender and age were independent variables whereas knowledge and perception were dependent variables. Chi-Square analysis was performed and $p<0.05$ was considered as statistically significant.

RESULTS:

In this study, Among the 100 participants 57% of them were male and 43% of them were females [Figure: 1]. 95% of the students were aware of sterilization and only 5% of the students were not aware [Figure: 2]. 83% of the students knew that sterilization and disinfection are not the same and 17% of the students did not know that sterilization and disinfection are not the same [Figure:3]. 94% of the students think that sterilization is more effective than disinfection and 6% of the students think that disinfection is more effective than sterilization [Figure: 4]. We have seen the correlation between gender and effectiveness of sterilization and disinfection [Figure: 5] and different methods of sterilization [Figure: 6]

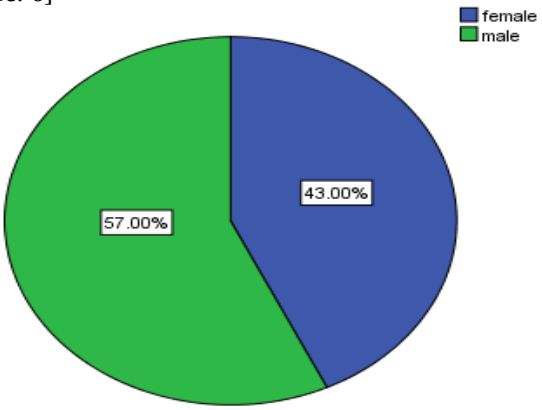

Figure 1: Pie chart showing the percentage distribution of gender of the participants.57% - male (green), 43% - female (blue).

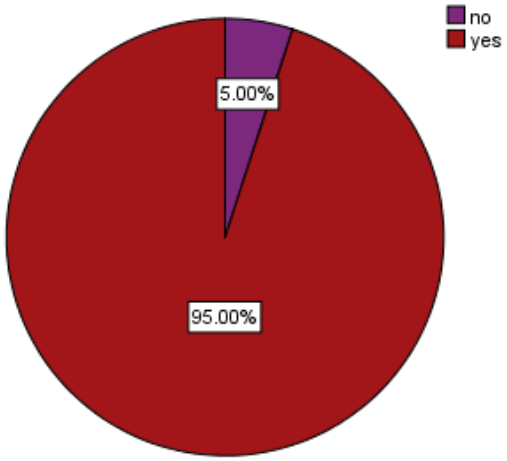

Figure 2: Pie chart showing the percentage distribution of the participants aware of sterlization. 95% - aware(red), 5% - not aware (violet).

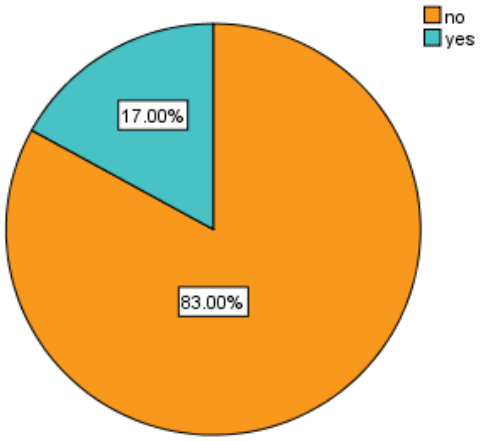

Figure 3: Pie chart showing the percentage distribution of the participants knowing that disinfection and sterilization is not the same. 83% - knew that disinfection and sterilization are not the same(orange), 17% - did not know that disinfection and sterilization are not the same (blue).

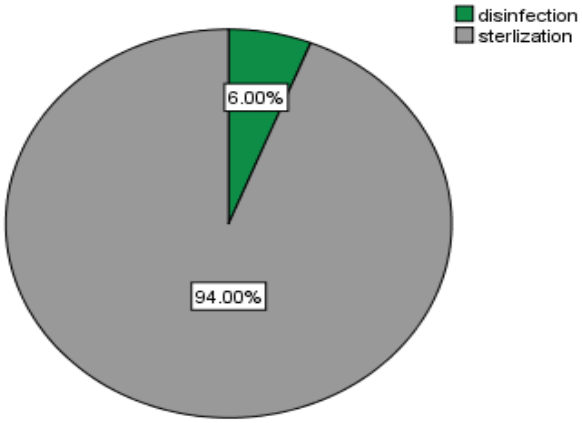

Figure 4: Pie chart showing the percentage distribution of the participants knowing which is more effective-sterilization or disinfection. 94% - sterilization(grey), 6% - disinfection (green).

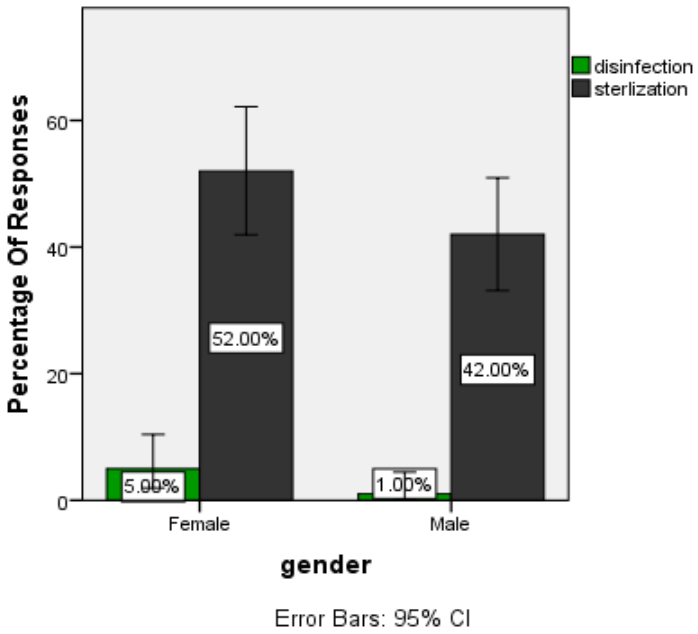

Figure 5: Bar graph representing the association between gender and the percentage of participants knowing which is more effective - sterilization or disinfection. The X-axis represents the gender and the Y-axis represents the number of responses, of which green indicates disinfection and grey indicates sterilization. The majority of the students know that sterilization is more effective than disinfection. There was statistical significance between gender and the percentage of participants knowing the effectiveness. Pearson's Chi-square value :0.611, p-value - 0.258 (p>0.05), hence statistically insignificant.

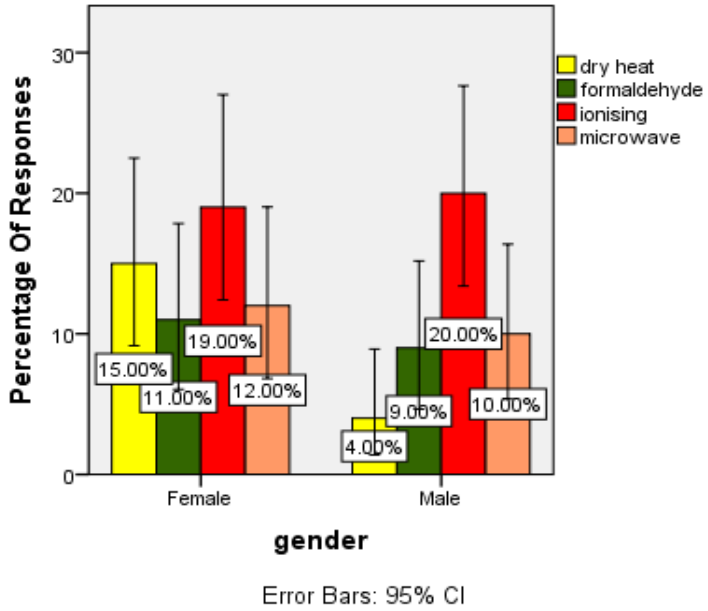

Figure 6: Bar graph representing the association between gender and the percentage of participants using different methods of sterilization. The X-axis represents the gender and the Y-axis represents the number of responses, of which green indicates formaldehyde, yellow indicates dry heat, red indicates ionising and orange indicates microwave. The majority of the students know that they use ionising. There was statistical significance between gender and the percentage of participants using different methods of sterilization. Pearson's Chi-square value :0.776, p-value - 1.106 (p>0.05), hence statistically insignificant.

SL.NO	QUESTION	OPTION 1	OPTION 2	OPTION 3	OPTION 4
1.	Gender	Male (57%)	Female (43%)	-	-
2.	Are you aware of sterilization?	Yes (95%)	No (5%)	-	-
3.	Do you think that disinfection is more effective than sterilization?	Yes (17%)	No (83%)	-	-
4.	Which is more effective - sterilization or disinfection?	Disinfection (6%)	Sterilization (94%)	-	-
5.	Does sterilization kill bacterial spores?	Yes (79%)	No (21%)	-	-
6.	Is sterilization necessary in dental clinics?	Yes (94%)	No (6%)	-	-
7.	Do you sterilize your instruments after any procedure?	Yes (96%)	No (4%)	-	-
8.	Which is commonly used for sterilization?	Dry heat (19%)	Formaldehyde (20%)	Ionising radiation (39%)	Microwave (22%)
9.	Have you used ionising radiation for sterilization?	Yes (67%)	No (33%)	-	-
10.	Do you think chemical sterilization corrodes the surface of the instruments?	Yes (18%)	No (82%)	-	-
11.	Do you think instruments undergoing chemical sterilization can damage a patient's health?	Yes (31%)	No (69%)	-	-
12.	Is UV radiation more effective than chemical sterilization?	Yes (67%)	No (33%)	-	-

Table 1: Table representing the awareness on sterilization among dental college students

DISCUSSION:

In this study, Among the 100 participants 57% of them were male and 43% of them were females. 95% of the students were aware of sterilization and only 5% of the students were not aware. 83% of the students knew that sterilization and disinfection are not the same and 17% of the students did not know that sterilization and disinfection are not the same. 94% of the students think that sterilization is more effective than disinfection and 6% of the students think that disinfection is more effective than sterilization.79% of the students knew that sterilization kills bacterial spores and 21% of the students did not know that sterilization kills bacterial spores. 91% of students think that disinfection kills 100% of the bacteria and 9% of the students think that disinfection do not kill 100% of the bacteria.

78% of students preferred hot air ovens over autoclave and 22% of students did not prefer hot air ovens over autoclave. 87% of the students think that surgical instruments can be completely sterilized in a hot air oven and 22% of the students think that surgical instruments cannot be completely sterilized in a hot air oven. 94% of students think that sterilization is necessary in dental clinics and 6% of the students think that sterilization is not necessary in dental clinics. 96% of the students sterilise their instruments before use and only 4% of the students do not sterilize their instruments before use. 69% of the students preferred ionising radiation and 31% of the students did not prefer ionising radiation technique. 67% of the participants have used ionising radiation and 33% of the students did not use ionising radiation before. Among the hundred participants 19% of them used dry heat, 20% used formaldehyde, 39% used ionising radiation and 22% used microwave. 82% of students think that Chemicals used in chemical sterilisation can corrode the surfaces of instruments and 18% of the students think that it does not corrode the surfaces of instruments. 31% of the students think that chemicals can damage a patient's teeth and 69% of students think that it does not damage a patient's teeth. 67% of students think that chemical sterilisation is more effective than UV radiations and 33% of the students think that chemical sterilisation is not more effective than UV radiations. We have seen the correlation between gender and effectiveness of sterilization and disinfection, different methods of sterilization and effectiveness between chemical sterilization and UV radiation [Table:1].

In the current study, 83% of the students knew that sterilization and disinfection are not the same and 17% of the students did not know that sterilization and disinfection are not the same whereas a study stated that disinfection is quite similar to sterilization but it does not remove spores of the bacterial spores (Kumar, 2014; Damani, 2019). 91% of students think that disinfection kills 100% of the bacteria and 9% of the students think that disinfection does not kill 100% of the bacteria but disinfection kills the bacteria and not its spore form from which the infection can recur(Block and Lawrence, 1977; Shanson, 1989). 78% of students preferred hot air ovens over autoclave and 22% of students did not prefer hot air ovens over autoclave and in previous literatures, it was stated that hot air oven clearly kills all the bacterial contamination in the instruments but autoclave can also kill the bacterias in a different way (Committee and D13 Committee, no date; A., Safeena and Patil, 2013; Ertaş, 2016). The study was done only among saveetha dental college students and other dental colleges can be included in future studies. Further studies can be done on individual methods and their advantages.

CONCLUSION:

In this study, the students had knowledge and sufficient awareness about the sterilization protocols. The students were exposed for the methods of sterilization and also they knew the types of sterilization methods. They were also aware of the instruments sterilized in different sterilizers. Further studies aiming at individual sterilization methods like physical and chemical can be done. Therefore, from this study, we conclude that dental college students were aware of sterilization protocols.

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CONFLICT OF INTEREST: The author declares that there was no conflict of interest in the present study.

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