

**Knowledge and practice of sterilization and disinfection protocols in fixed prosthodontic procedures among interns, general dental practitioners, post graduate students and specialists in districts of Coimbatore and Namakkal - A questionnaire based survey**

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**Abstract**

**Aim:** To assess the knowledge and practice regarding sterilization and disinfection protocol measures in fixed prosthodontic procedures among Interns,General dental practitioners, post graduate students and specialists in coimbatore and Namakkal districts (Tamilnadu).

**Materials and methods:** A preformed questionnaire comprised of 17 questions related to sterilization and disinfection protocol measures in fixed prosthodontic procedures was prepared.This questionnaire based survey was then conducted among Interns,General dental practitioners, post graduate students and specialists in

Coimbatore and Namakkal districts (Tamilnadu). Data were then recorded and analyzed.

**Results:** It was observed that 91.2% of specialists were aware that hand piece belonged to a semi critical item according to Spaulding classification. About 79.4% of specialist respondents believed that the best method of sterilization of dental handpiece was by autoclaving. 100% of dentists between 5-10 years of practice followed pre procedural antimicrobial mouth rinse therapy. About 76% of dentist's  $\leq 5$  years of practice were aware that pre-procedural anti microbial rinse therapy could significantly reduce the amount of oral microbial flora.

**CONCLUSION:** The study revealed there is adequate knowledge while there was a lack of practice in fixed prosthodontic procedures among interns, General dental practitioners, post graduate students and specialists in the districts of Coimbatore and Namakkal (Tamil nadu).

**Keywords:** Sterilization, Disinfection, Cross infection.

### Introduction

Sterilization is defined as the process by which an article, surface, or medium is made free of all microorganisms either in the vegetative or spore state. Disinfection means the destruction or removal of all pathogens or organisms capable of producing infections<sup>1</sup>.

Routinely dental care professionals are at an increased risk of cross infection while treating patients.<sup>1</sup> This occupational potential for disease transmission becomes evident initially when one realizes that most human microbial pathogens have been isolated from oral secretions. Because of repeated exposure to the microorganisms present in blood and saliva, the incidence of certain infectious diseases has been significantly higher among dental professionals than observed for the general population. Hepatitis B, tuberculosis and herpes simplex virus infections are well recognized and indicate the need

for increased understanding of modes of disease transmission and infection control procedures by dental care providers.<sup>2</sup>

Prosthodontic treatment involves various stages in the construction of a fixed prosthesis. Therefore, these fixed prosthodontic procedures require a high degree of concern regarding cross contamination between the clinic and laboratory.<sup>2</sup> Dental impressions, maxillomandibular registration bases and apparatus, trial and final prostheses are all exposed to contamination in the patient's mouth which can spread infectious agents to the clinician, other patients and the dental technicians. Furthermore, dental personnel were at a 5–10 fold higher risk of getting infected from hepatitis B infection as compared to the general population. This necessitates the implementation of sterilization and disinfection protocol measures as an integral part in dental clinical practice.<sup>3</sup>

The aim of this questionnaire based survey is to assess the knowledge and practice regarding sterilization and disinfection protocol measures in fixed prosthodontic procedures among Interns, General dental practitioners, post graduate students and specialists in Coimbatore and Namakkal districts (Tamilnadu).

### Materials and Methods

#### Study design and population

The present study included Interns, General dental practitioners, post graduate students and specialists in Coimbatore and Namakkal districts (Tamilnadu). Prior to the initiation of the study, ethical clearance was obtained from the Institutional Ethical Committee.

#### Questionnaire

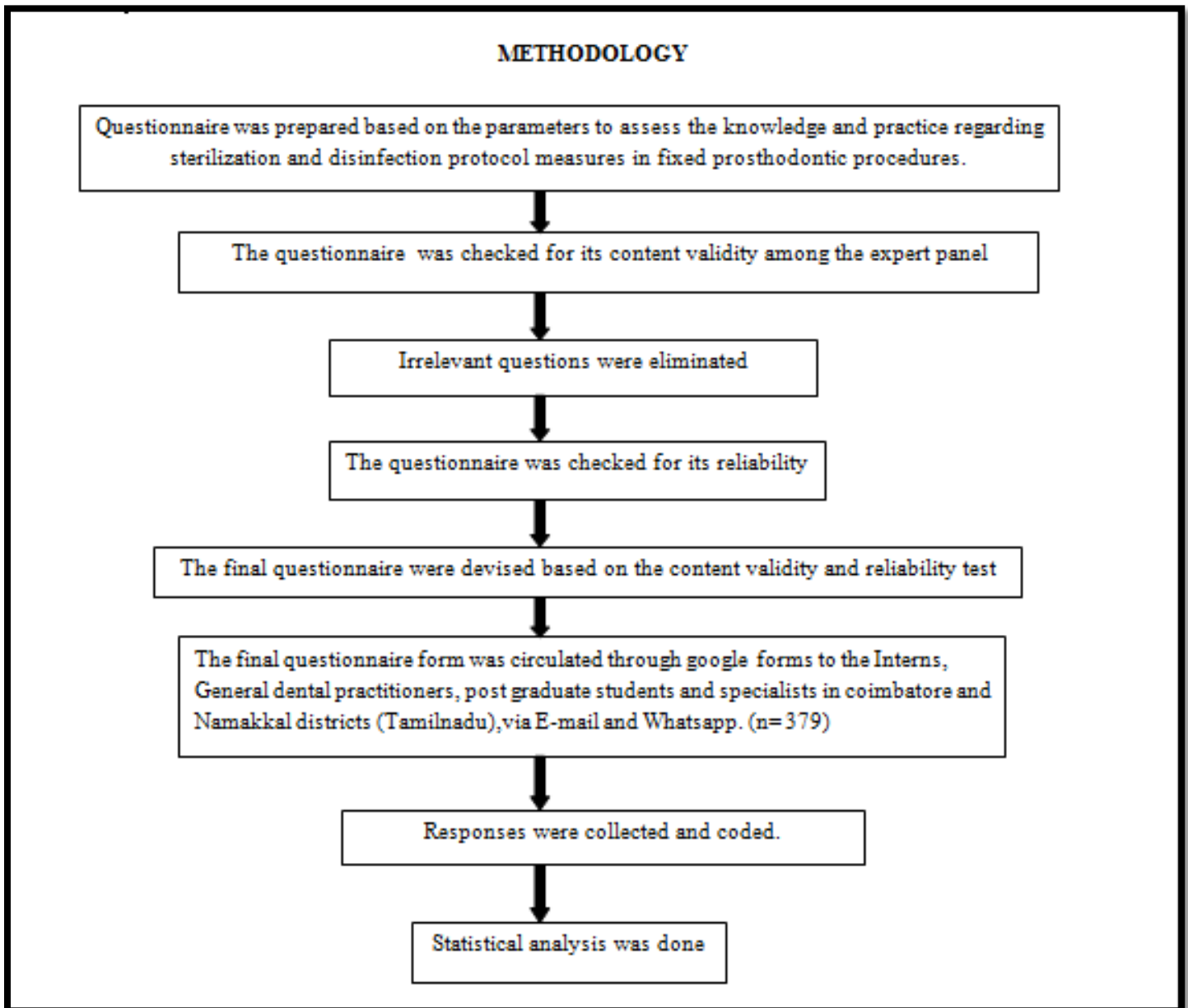
A pre formed questionnaire was prepared which comprised of 17 questions [Table 1].

The questions were prepared to assess the knowledge and practice, regarding sterilization and disinfection protocol

measures in fixed prosthodontic procedures No time limit was imposed on participants so as to reduce induced error. Data were then recorded and tabulated in excel sheets for analysis.

### Statistical Analysis

Data were tabulated and examined using the Statistical Package for Social Sciences Version 20.0 (IBM SPSS Statistics for Mac, Armonk, NY: IBM Corp, USA). A Descriptive statistical analysis was carried out for the present study. Results on categorical data were presented as Frequency distribution.



### Results

The total number of participants in this study were n= 379. The 379 respondents were categorized into different groups based on their qualification as Interns (n=173),

General dental practitioners (GDP) (n=84), post graduate students (n=88) and specialists (n=34) (Graph 1).The total of 379 respondents, on the grounds of experience, were grouped as those with < 5 years of practice (n=276)

and those with 5-10 years of practice (n=73) and >10years of practice (n=30). **(Graph 2).**The collected data was analyzed statistically using Pearson Chi Square test. The results with a p value  $\leq 0.05$  were considered as statistically significant.

#### **Analysis based on category (knowledge assessment)**

Interpretation of the collected data were summarized in Table 2 (From Q1-Q10).

It was observed that 91.2% of specialists were aware that hand piece belonged to a semi critical item according to Spaulding classification. About 79.4% of specialist respondents believed that the best method of sterilization of dental handpiece was by autoclaving. About 85.3% of the specialists were aware that, the tip of the ejector should be in partial contact with the tissue. It was evident that 44.1% of specialists were aware that after lubricating the handpiece with lubricant, the handpiece must be run out for about 10-20 sec only with water. It was evident that 64.7% of specialists were aware that aerosol was the highest means of transmission of infection from the oral cavity. It was evident that interns, General dental practitioners, post graduate students and specialists agreed that they had didactic (theory) lectures about infection control measures under graduation. About 49% of the interns were aware that in three way syringe, water should be used first before air. Most of them were unaware that Low level disinfectant was sufficient to clean the spilled blood, on the floor. About 78.4% of post-graduate students and 82.4% of specialists were aware that high volume evacuators reduced the risk of air contaminants. 70.6% of specialists and 64.3% of General dental practitioners were aware that immersion was the best method for disinfection of alginate impression (Ref table 2).

#### **Analysis based on years of experience (practice assessment)**

Interpretation of the collected data were summarized in Table 3 (From Q11-Q17B).

It was observed that 100% of dentists between 5-10years of practice followed pre procedural antimicrobial mouth rinse therapy. About 76% of dentist's  $\leq 5$  years of practice were aware that pre-procedural anti-microbial rinse therapy could significantly reduce the amount of oral microbial flora. It was found that about 64% of dentist's  $\leq 5$  years of practice, disinfected wax bite records. Only about 42% of dentists  $\geq 10$  years of practice were using rinse and spray method to disinfect the wax bite records. It was found that only 47% of dentists, with  $\leq 5$  years of practice were found to disinfect the wax bite records with Iodophor. Only about 80% of the dentists  $\leq 5$  years of practice were disinfecting impressions, and about 76% of dentists  $\leq 5$  years of practice were found to disinfect the impression by immersion method. Around 56% of dentists  $\leq 5$  years of practice were using sodium hypochloride to disinfect the dental impression. It was found that about 90% of the dentists with 5-10 years of practice disinfected the prosthesis regularly in their clinical practice. It was evident that about 70% of the dentists with 5-10 years of practice, were using glutaraldehyde as a disinfection medium. About 100% of the dentists were used to cleaning their hand pieces periodically after each patient visit and only 19% of the dentists with 5-10 years of practice, were using plain soap and water to clean the handpiece, after each patient in their clinical practice. 99% of the dentists between 5-10 years of practice were used to running out the hand piece regularly after each patients visit. It was found that more than 90% of dentists above 5 years of experience were used to disinfecting turbines and dental unit water lines (DUWL). It was found that 77% of

dentists with  $\geq 10$  years of practice, were using sodium hypochlorite to disinfect the DUWL. About 43% of the dentists with  $\geq 10$  years of practice were using drinking water in the (DUWL). More than 89% of dentists were used to sterilizing burs and diamond points after use on each patient in their clinical practice. 60% of the dentists between 5-10 years of practice were using autoclave to sterilize the burs and diamond points. About 50% of the dentists were not sterilizing the new, unused burs and diamond points prior to use in their clinical practice (Ref table 3).

### Discussion

It is of utmost importance for any healthcare center to set up and govern its own measures to prevent the spread of infectious and communicable diseases.<sup>3</sup> To achieve this, it is important that health care professionals be aware of the protocols and risks involved in the practice.<sup>1</sup> The aim of this study was to assess the level of knowledge and practice of sterilization and disinfection protocols in fixed prosthodontic procedures among Interns, General dental practitioners, post graduate students and specialists in districts of Coimbatore and Namakkal. In this study, the level of knowledge and practice compliance with infection control measures was assessed. Cross contamination control between dental offices and prosthetic laboratories is very crucial and important to maintain the health of patients and dental office health care professional. The risk of cross infection of laboratory personnel by saliva or blood borne infections has been reported.<sup>5</sup> The items such as impressions, dental cast, denture prosthesis, cast metal framework, bite registration or wax rim should be properly disinfected before sending to the laboratory.<sup>4</sup> The Centers for Disease Control and Prevention Guideline for infection control in dental health care settings in 2003 recommended certain definite strategies to control cross

contamination in the dental clinic and dental laboratory.<sup>3</sup> For infection control between the prosthodontic clinic and dental laboratory, few questions were asked to the respondents regarding the disinfection method and the type of disinfectant agent used.<sup>5</sup> In this study, 95.6% of the participants washed impressions daily in their clinical practice, and 60% of the participants disinfected impressions before sending it to the laboratory. In his survey, Alshiddi reported that almost 96.5% of the dental students and interns disinfect impression before sending directly to the laboratory.<sup>7</sup> Ahmad *et al*, Reported that around 87% of the undergraduates disinfected impressions before sending it to the laboratory.<sup>8</sup> Nearly, 14.4%–87.2% of respondents disinfect other dental items such as dental cast, denture prosthesis, metal framework, bite registration or wax rim and face bow and fork before sending them to technicians. These findings suggest that additional education is required to promote routine disinfection of impressions and prostheses. Kohli and Puttaiah in their textbook have mentioned that along with proper instruction by dental surgeon to technician there should be descriptive labeling depicting whether the material has to be disinfected or not.<sup>9</sup>

It was evident that only about 76% of dentists  $\leq 5$  years of practice were found to disinfect the impression by immersion method... These results depict the negligence and unawareness of dental professionals towards maintaining hygiene. Marya *et al*. stated that negligence in disinfecting could lead to cross contamination of laboratory area and could cause various infectious diseases.<sup>10</sup> Therefore, it is essential to disinfect any material contaminated by body fluids for our own protection. Immersion technique of disinfection was depicted to be the method of choice by 67.2% respondents followed by spraying method.<sup>9</sup> Chaudhary *et al*, study

showed similar findings and preferred immersion technique over spraying technique of disinfection as it constantly covered the entire surface of material to be disinfected.<sup>11</sup>

Nearly 45.3% respondents answered that immersion methods required immersion of impression for about 10 minutes. These results have shown that the majority of dentists were unaware of disinfection protocol. Kugel *et al.* have stated that most of the dentists were found to disinfect impressions by immersion longer than the recommended duration. The ideal time duration for disinfection of the impression was 10 min.<sup>12</sup>

Only about 43.3% of practitioners with  $\geq 10$  years of practice, were using drinking water in the Dental Unit water line.

When asked regarding their experience of previous education in infection control during the under graduation program, almost 84.9% of them had only a few lectures about infection control measures. However, 40.6% of the respondents had not attended clinical demonstration/hands on workshop about infection control during their academic program. These findings are in agreement with the previous studies reported by Askarian *et al.*, Abreu *et al.* and Alshiddi on dental students in Iran, Brazil and Saudi Arabia, respectively.<sup>13</sup> Lack of knowledge or interest may be one of the reasons that should have lead the students not to attend such educational programs.<sup>4</sup> Even lack of opportunities for students from dental school in analyzing their own experiences in the clinics from the perspective of infection control could have contributed in their demotivation.<sup>14</sup> Self assessment provides an important parameter in evaluating self satisfaction by students in regards to their knowledge and practice towards infection control practices in the prosthodontic clinic. Most of the subjects were evaluated for their knowledge and their

implementation of infection control most of them had adequate knowledge and their performance toward infection control policy. The result indicate undergraduates responses toward infection control and suggest the need of additional educational efforts to improve their awareness and attitudes. Definite strategies are needed to motivate students during their under graduation program may help them to implement adequate infection control measures with their routine clinical and laboratory work. Furthermore, dental schools and dental clinics could offer opportunities to analyze their own experiences in the dental clinic from the perspective of infection control. Machado Carvalhais *et al.*'s approach can be applied sensitizing students to their attitudes to change their behavior and consequently improve their quality of life.<sup>14</sup> This survey was carried in districts of Coimbatore and namakkal districts in dental schools and private dental clinics; however, the findings would be useful for planning and implementation of right strategies and interventions, including a national based survey of dental schools across the country.

### Conclusion

Within the limitations of the present study, it could be concluded that there is adequate knowledge while there was a lack of practice in fixed prosthodontic procedures among interns, General dental practitioners, post graduate students and specialists in the districts of Coimbatore and Namakkal (Tamil nadu). In dental institutes, OSHA and CDC guidelines should be made mandatory to reduce risk of exposure of pathogenic microorganisms among dental staff and patients.<sup>4</sup> Proper training sessions should be conducted to increase awareness among dental professionals for their well-being.<sup>8</sup> Further studies should be conducted to assess and evaluate the ignored aspect of

infection control so that possible measures could be taken to resolve the issue.

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Legend Tables and Graphs

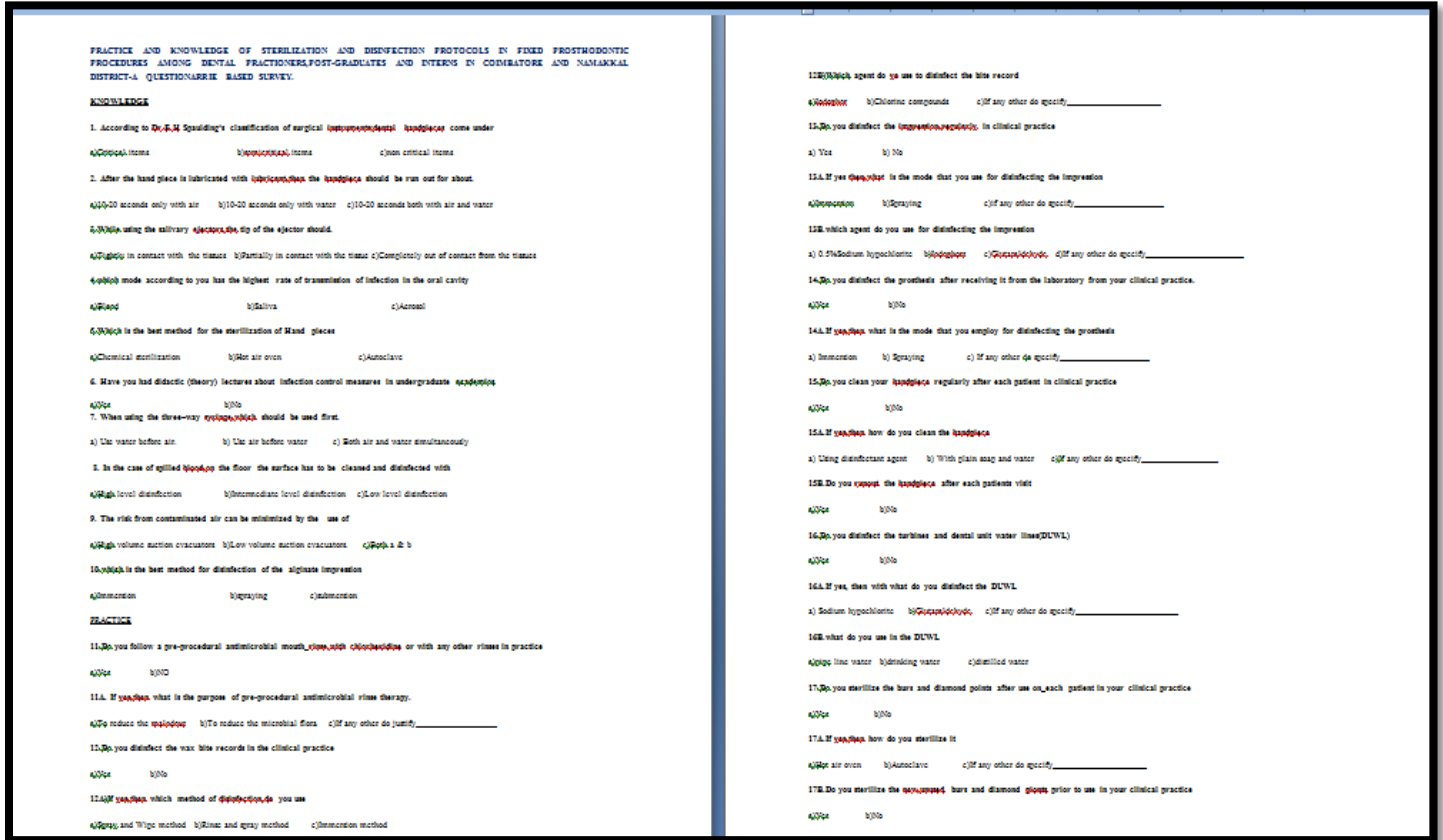
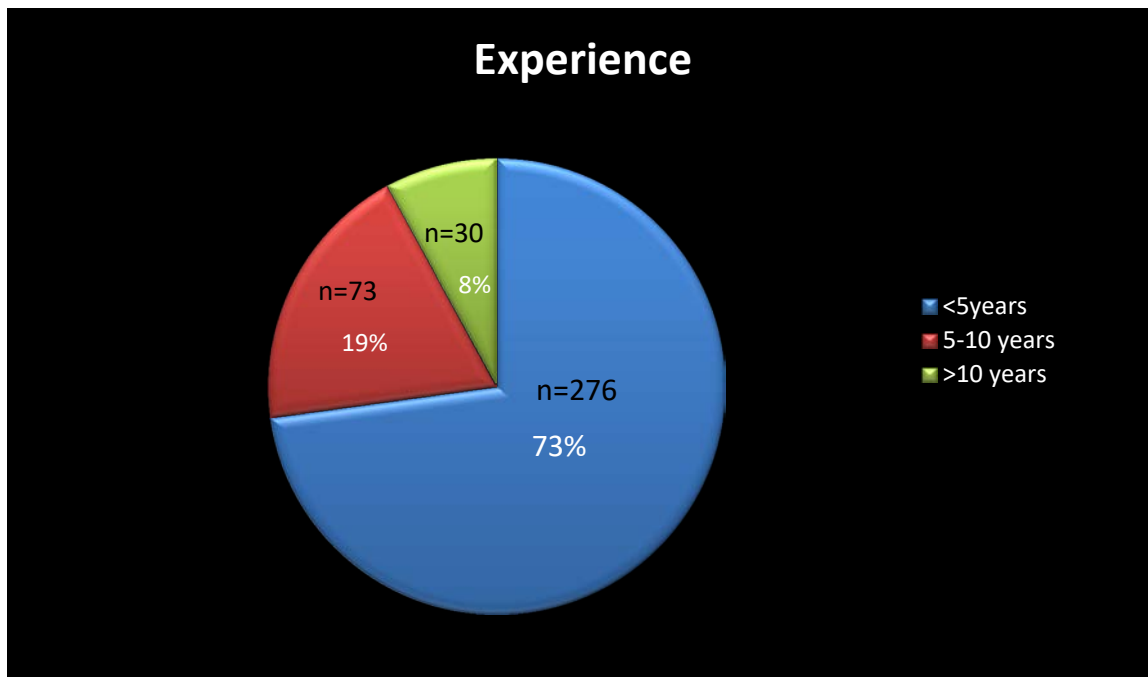


Table 1: A pre formed questionnaire was prepared which comprised of 17 questions

Graph 1





Graph 2

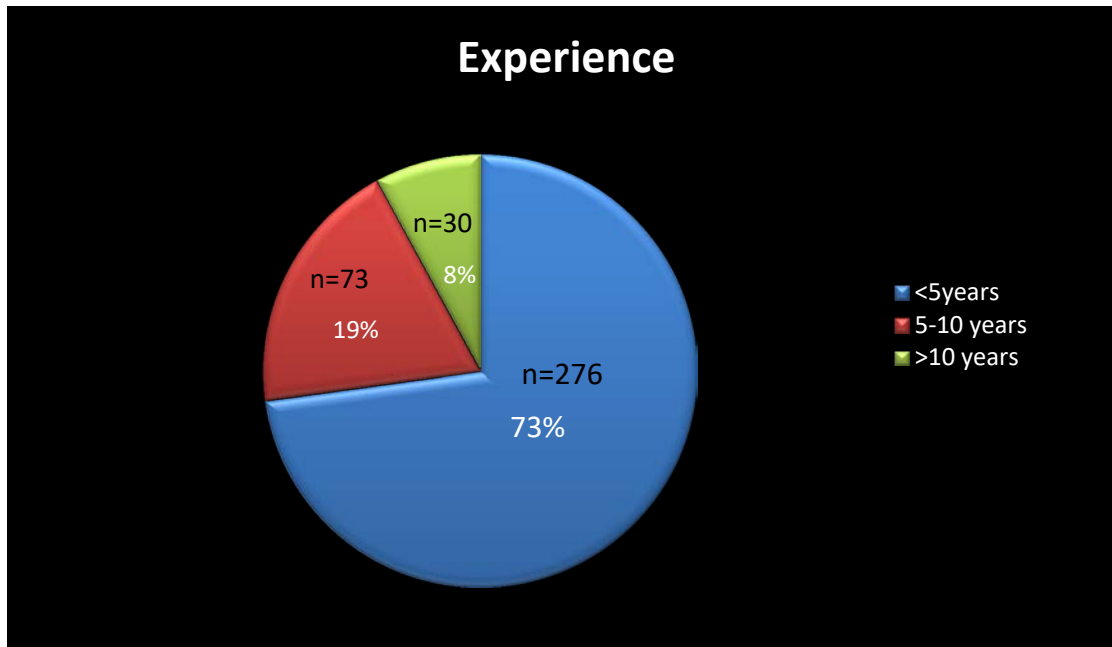


Table 2: Analysis Based On Category (Knowledge Assessment)

Qn.	Options	Interns (n=173)	GDP (n=84)	PG Students (n=88)	Specialists (n=34)
1	Critical	35.8% (n=62)	26.2% (n=22)	26.1% (n=23)	8.8% (n=3)
	Semi critical	56.1% (n=97)	70.2% (n=59)	70.5% (n=62)	91.2% (n=31)
	Non critical	8.1% (n=14)	3.6% (n=3)	3.4% (n=3)	0% (n=0)
		<b>P=0.003</b>			
2	Chemical sterilization	40.5% (n=70)	31% (n=26)	30.7% (n=27)	14.7% (n=5)
	Hot air oven	11% (n=19)	6% (n=5)	5.7% (n=5)	5.9% (n=2)
	Autoclave	48.6% (n=84)	63% (n=53)	63.6% (n=56)	79.4% (n=27)
		<b>P=0.016</b>			
3	10-20 secs only with air	32.9% (n=57)	31% (n=26)	36.4% (n=32)	20.6% (n=7)
	10-20secs only with water	22.5% (n=39)	28.6% (n=24)	23.9% (n=21)	44.1% (n=15)
	10-20 secs both with air and water	44.5% (n=77)	40.5% (n=34)	39.8% (n=35)	35.3% (n=12)
4	Tightly in contact with the tissues	11% (n=19)	6% (n=5)	2.3% (n=2)	5.9% (n=2)
	Partially in contact with the tissue	60.1% (n=104)	69% (n=58)	68.2% (n=60)	85.3% (n=29)
	Completely out of contact	28.9% (n=50)	25% (n=21)	29.5% (n=26)	8.8% (n=3)
	From the tissues				
		<b>P=0.027</b>			
5	Blood	15.6% (n=27)	42.9% (n=36)	30.7% (n=27)	35.3% (n=12)
	Saliva	25.4% (n=44)	10.7% (n=9)	11.4% (n=10)	0% (n=0)
	Aerosol	59% (n=102)	46.4% (n=39)	58% (n=51)	64.7% (n=22)
		<b>P=0.000</b>			

6	Yes	74.6% (n=129)	75% (n=63)	68.2% (n=60)	82.4%(n=28)
	No	25.4% (n=44)	25% (n=21)	31.8% (n=28)	17.6% (n=6)
7	Use water before air	48.6%(n=84)	41.7%(n=35)	36.4% (n=32)	35.3%(n=12)
	Use air before water	31.8%(n=55)	25% (n=21)	36.4% (n=32)	41.2%(n=14)
	Both air and water simultaneously	19.7%(n=34)	33.3%(n=28)	27.3% (n=24)	23.5% (n=8)
8	High level disinfection	86.7% (n=150)	82.1%(n=69)	77.3% (n=68)	85.3%(n=29)
	Intermediate level disinfection	12.1%(n=21)	16.7%(n=14)	19.3% (n=17)	14.7% (n=5)
	Low level disinfection	1.2% (n=2)	1.2% (n=1)	3.4% (n=3)	0% (n=0)
9	High volume suction evacuators	48.6% (n=84)	71.4%(n=60)	78.4% (n=69)	82.4%(n=28)
	Low volume suction evacuators	13.9%(n=24)	15.5%(n=13)	8% (n=7)	11.8% (n=4)
	Both a & b	37.6% (n=65)	13.1%(n=11)	13.6% (n=12)	5.9% (n=2)
					<b>P=0.000</b>
10a	Immersion	51.4% (n=89)	64.3%(n=54)	56.8% (n=50)	70.6%(n=24)
	Spraying	35.3%(n=61)	16.7%(n=14)	34.1% (n=30)	20.6% (n=7)
	Submersion	13.3%(n=23)	19% (n=16)	9.1% (n=8)	8.8% (n=3)
					<b>P=0.022</b>
10b	To reduce the malodor	23% (n=50)	27.1% (n=19)	24.1% (n=7)	20% (n=8)
	To reduce the microbial flora	75.8% (n=191)	67.1% (n=40)	75.9% (n=22)	56% (n=7)
	Both	1.2% (n=3)	5.7% (n=4)	0% (n=0)	0%(n=0)

Interpretation of the collected data were summarized in Table 2 (From Q1-Q10).

Table 3: Analysis Based on Years of Experience (Practice Assessment)

Response of groups of dentists for the questionnaire (From Q11- Q17B)

Qn.	Options	years of experience		
		≤5 years	5-10years	≥10 years
Q11	Yes	90.9% (n=250)	100% (n=74)	93.3%(n=28)
	No	9.1% (n=25)	0% (n=0)	6.7% (n=2)
Q12	Yes	64.4% (n=177)	79.7% (n=59)	66.7% (n=20) p=0.043
	No	35.6% (n=98)	20.3% (n=15)	33.3% (n=10)
Q12A	Spray and Wipe method	40% (n=76)	31.1% (n=59)	28.9% (n=55)
	Rinse and spray method	31.7% (n=13)	26.8% (n=11)	41.5% (n=17)
	Immersion method	45.5% (n=10)	31.8% (n=7)	22.7% (n=5)
Q12B	Iodophor	46.9% (n=84)	50.8% (n=91)	2.2% (n=4)
	Chlorine compounds	66.7%(n=20)	33.3% (n=10)	0% (n=0)
	Glutaraldehyde	52.6%(n=10)	47.4% (n=9)	0% (n=0)

Q13	Yes	79.6% (n=219)	95.9% (n=71)	86.7% (n=26)
	No	20.4% (n=56)	4.1% (n=3)	13.3% (n=4)
Q13A	Immersion	75.7% (n=162)	74.6% (n=47)	81.5% (n=22)
	Spraying	24.3% (n=52)	25.4% (n=16)	18.5% (n=5)
Q13B	Sodium hypochlorite	55.6% (n=115)	69.5% (n=41)	59.3% (n=16)
	Iodophors	10.1% (n=21)	10.2% (n=6)	14.8% (n=4)
	Glutaraldehyde	34.3% (n=71)	20.3% (n=12)	25.9% (n=7)
Q14	Yes	66.5% (n=183)	90.5% (n=67)	80% (n=24)
	No	33.5% (n=92)	9.5% (n=7)	20% (n=6)
Q14A	Glutaraldehyde	58.5% (n=113)	69.8% (n=30)	65.2% (n=15)
	Dilute sodium hypochlorite	41.5% (n=80)	30.2% (n=13)	34.8% (n=8)
Q15	Yes	93.8% (n=258)	100% (n=74)	100% (n=30)
	No	6.2% (n=17)	0% (n=0)	0% (n=0)
Q15A	Using disinfectant agent	81.9% (n=204)	81.4% (n=57)	93.1% (n=27)
	With plain soap and water	15.7% (n=39)	18.6% (n=13)	6.9% (n=2)
	Spirit	2.4% (n=6)	0% (n=0)	0% (n=0)
Q15B	Yes	80.7% (n=222)	98.6% (n=73)	93.3% (n=28)
	No	19.3% (n=53)	1.4% (n=1)	6.7% (n=2)
Q16	Yes	61.1% (n=168)	77% (n=57)	76.7% (23)
	No	38.9% (n=107)	23% (n=17)	23.3% (n=7)
Q16A	Sodium hypochlorite	73.6% (n=134)	73.3% (n=22)	94.7% (n=18)
	Glutaraldehyde	26.4% (n=48)	26.7% (n=8)	5.3% (n=1)
Q16B	Pipe line water	30.5% (n=84)	44.6% (n=33)	23.3% (n=7)
	Drinking water	17.5% (n=48)	32.4% (n=24)	43.3% (n=13)
	Distilled water	52% (n=143)	23% (n=17)	33.3% (n=10)
Q17	Yes	88.7% (n=244)	100% (n=74)	96.7% (n=29)
	No	11.3% (n=31)	0% (n=0)	3.3% (n=1)
Q17A	Hot air oven	15.2% (n=33)	76% (n=165)	8.8% (n=19)
	Autoclave	13.8% (n=9)	60% (n=39)	26.2% (n=17)
	Spirit	10.7% (3)	75% (n=21)	14.3% (n=4)
Q17B	Yes	57.5% (n=158)	58.1% (n=43)	43.3% (n=13)
	No	42.5% (n=117)	41.9% (31)	56.7% (n=17)

Interpretation of the collected data were summarized in Table 3 (From Q11-Q17B).