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Irrigants Used For Endodontic Procedures - A Survey Among General Dental Practitioners and Specialists

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Abstract:
Introduction: Bacteria have long been thought to be the main cause of pulp and periapical lesions. The number of bacterial species present in endodontic infections is infinite, deprived of nutrient availability, and low oxygen potentials in teeth with necrotic pulp causes root canal infection. These selective conditions lead to survival of strictly anaerobic microorganisms, particularly *E.faecalis*, which survive and multiply, causing infections that stimulate bone resorption and are more resistant to endodontic treatment.
Aim: The aim of the pressure study was to evaluate the knowledge, attitude and practice of dental practitioners towards endodontic irrigants used in dentistry
Materials and Methods: A well-structured questionnaire of 16 questions covering information, knowledge, attitude and practice on irrigants used in dentistry was framed and circulated as google forms among dental practitioners and specialists.
Results: About 75.33% of the participants responded that the sodium hypochlorite was the best, Majority of the females know the best irrigant used in endodontic treatment. In this study p value is 0.00 hence it is less than 0.05, it is said to be statistically significant.
Conclusion: This study concludes that awareness was created among all dentists about irrigants and many were aware of usage of irrigants in endodontic treatment.

INTRODUCTION:
Irrigants are nothing but used in the root canal treatment(1). It must posses certain properties like dissolving organic and inorganic tissues, it must remove smear layer. Irrigants are non toxic and it is not irritant, successful root canal treatment reveals the combination of proper instruments, irrigant and obturation of the root canal therapy. Bacteria have long been thought to be the main cause of pulp and periapical lesions(2). The number of bacterial species present in endodontic infections is limited, nutrient availability, and low oxygen potentials in teeth with necrotic pulp causes root canal(3). These selective conditions lead to survival of strictly anaerobic microorganisms, particularly *E.faecalis*, which survive and multiply, causing infections that stimulate bone resorption and are more resistant to endodontic treatment (4). Cleaning thoroughly eliminates microorganisms, allows for improved tolerance of filling products, and increases the quality of intracanal medications(5). Even though irrigants differ in their ability to serve as lubricants during instrumentation and flush debris, smear layer, and bacteria out of the canal, choosing the right one is crucial(6). The smear layer may not only prevent the permeation of medication and so suppress canal disinfection, but also prevent compact root canal filling(7).

Endodontics should be simple to understand, cost-effective, and predictable.An objective of endodontic treatment is removal of diseased tissue, elimInation of bacteria from the canal system and prevention of recontamination.(8). The primary endodontic treatment goal must be optimized to root canal disinfection and prevent reinfection. Moreover, patients' expectations of success are higher than ever, making it critical to improve the disinfection process during endodontic care. There is no indication that the type of irrigant used has a clear correlation with endodontic outcome.

During root canal treatment, a 2% solution of chlorhexidine gluconate (CHX) can be used as an irrigating solution.(9). CHX is an amphiphilic with bis-guanide and antiseptic properties(10). CHX has antimicrobial properties and is biocompatible(11). However, since CHX can discolour teeth and cause side effects such as loss of taste, burning sensation of the oral mucosa, subjective dryness of the oral cavity, and tongue discoloration, its usage as an endodontic irrigant is usually limited(12). For decades, sodium hypochlorite (NaOCl) has become the most commonly used root canal irrigating solution(13). Its excellent tissue dissolution and antimicrobial activity make it the irrigating solution of choice for the treatment of teeth with pulp necrosis, despite the fact that it has a number of drawbacks, including tissue toxicity, the possibility of emphysema when overfilled, allergic potential (13,14). An unpleasant odour and taste, Furthermore NaOCl does not totally clean the root canal walls' surfaces(15). Our team has extensive knowledge and research experience that has translated into high quality publications(16–25),(26–29),(30–34) (35)).
The aim of the survey was to assess the knowledge, attitude and practice of irrigants used for endodontic procedures among general dental practitioners and specialists.

MATERIALS AND METHODS:

Study design:

The cross sectional investigation was conducted among the undergraduate dental students through a closed ended questionnaire comprising 15 questions on knowledge, attitude and practice on surface treatment of irrigants used for post endodontic treatment.. The sample size of the investigation was 100.
Inclusion criteria of the study is that the participants should be dental practitioners

Exclusion criteria of the study is that the participants who were not available to take the survey and participants who were not willing to participate.

Study Setting:

The study was conducted with the approval of the Institutional Ethics Committee. The study consisted of one assessor and one guide .

Study method:

Self administered questionnaire of 15 close-ended questions was prepared and was validated by the Institutional Review Board(IRB). The questionnaire was distributed among undergraduate dental college students of private dental college institutions through an online survey form “GOOGLE FORMS” . Demographic details were also included in the questionnaire.

Sampling Technique:

The study was based on a non probability consecutive sampling method. Ethical considerations:
Returning the filled questionnaire was considered as implicit consent with no need for signing for a return consent. Ethical approval of study is obtained from the Institutional Review Board (IRB).

Statistical analysis:

Data was analysed with the SPSS version (22.0). Descriptive statistics as number and percent were calculated to summarize qualitative data. Chi square test was used to analyze and compare the education level of students and their knowledge, attitude and practise on surface treatment of post in post treatment among undergraduate dental students. The confidence level was 95% and the statistical significance $p < 0.05$ was considered statistically significant. Finally the results were represented by using bar charts and

frequency tables.

Results:
The results obtained on this current survey depicts the following

TABLE: REPRESENTING RESPONSES OF THE STUDY POPULATION TO THE QUESTIONNAIRE

S.No	QUESTIONS	CHOICES	RESPONSES
1	Age	-18-20 years -20-22years -22-24years	-44.67% -39.33% - 16%
2	Gender,	- Male - Female	-44% -56%
3	how often you used irrigant	-Daily -not at all - rarely	- 90.67% - 2% - 7.33%
4	" how much concentration of sodium hypochlorite should be used ?"	-0.5% to 1.5% - 1.6% to 2.5% - 4.1% to 5%	- 80.67% - 18.67% -0.67%
5	"which irrigant is used when treating teeth with vital pulp"	-Chlorhexidine -normal saline -Sodium Hypochlorite	-10% -9.33% -80.67%
6	"most commonly preferred irrigant" .	- Sodium Hypochlorite - Chlorhexidine - Normal saline	- 75.33% - 1.33% - 23.33%
7	"which irrigant is used commonly while treating necrotic pulp"	- Sodium Hypochlorite - Chlorhexidine -Normal saline	- 62% - 18% -18.67% -1.33%

		-hydrogen peroxide	
8	"percentage of concentration of chlorhexidine to be used"	- 0.17% -0.18%-9% -2%	- 83.33% - 8.67% - 8%
9	"Is there is choice of irrigant differ based on pulpal or peri apical diagnosis".	-yes - no	- 96.67% - 2.67%
10	"about the EDTA"	- chelating agent - reducing agents	- 92.67% - 7.33%
11	"which irrigant used for final irrigation".	- Sodium Hypochlorite -Chlorhexidine -Normal saline -EDTA	- 12.67% -6.67% -2% -78.67%
12	" Disadvantages of NaOCL".	- all the above - unpleasant smell - irritant to periapical tissues - lubricant	- 10.67% - 58% - 22.67% - 8.67%
13	irritant primarily used when treating a previously treated tooth".	-Sodium Hypochlorite -Hydrogen peroxide -Normal saline	- 78% - 4.67% - 17.33%
14	" which irrigant is used for the smear layer".	-Sodium Hypochlorite	- 13.33% - 85.33%

		-EDTA	
		-Normal saline	- 1.33%
15	Awareness about irrigant functions	- Yes - No	- 96.67% - 3.33%

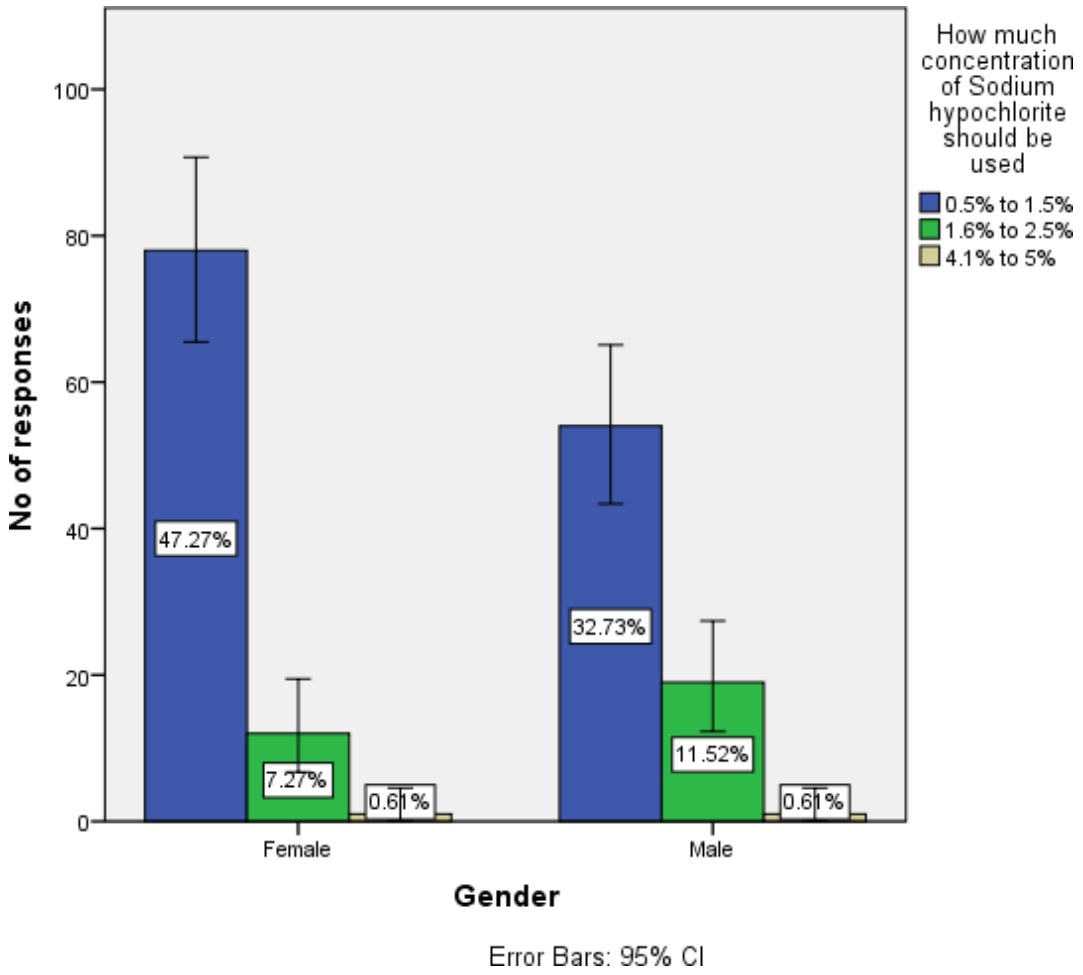

Figure16: Bar graph showing the association between gender and awareness about the concentration of sodium hypochlorite used. X axis represents the gender, Y axis represents the number of responses. Blue colour represents 0.5% to 1.5%, Green colour represents 1.6% to 2.5% and Brown colour represents 4.1% to 5%. Majority (47.27%)of female participants followed by male participants (32.73%) reported that the concentration of sodium hypochlorite is 0.5% to 1.5% (blue). (pearson's chi square value- 271.8, p value - 0.00 [< 0.05], Hence statistically significant)

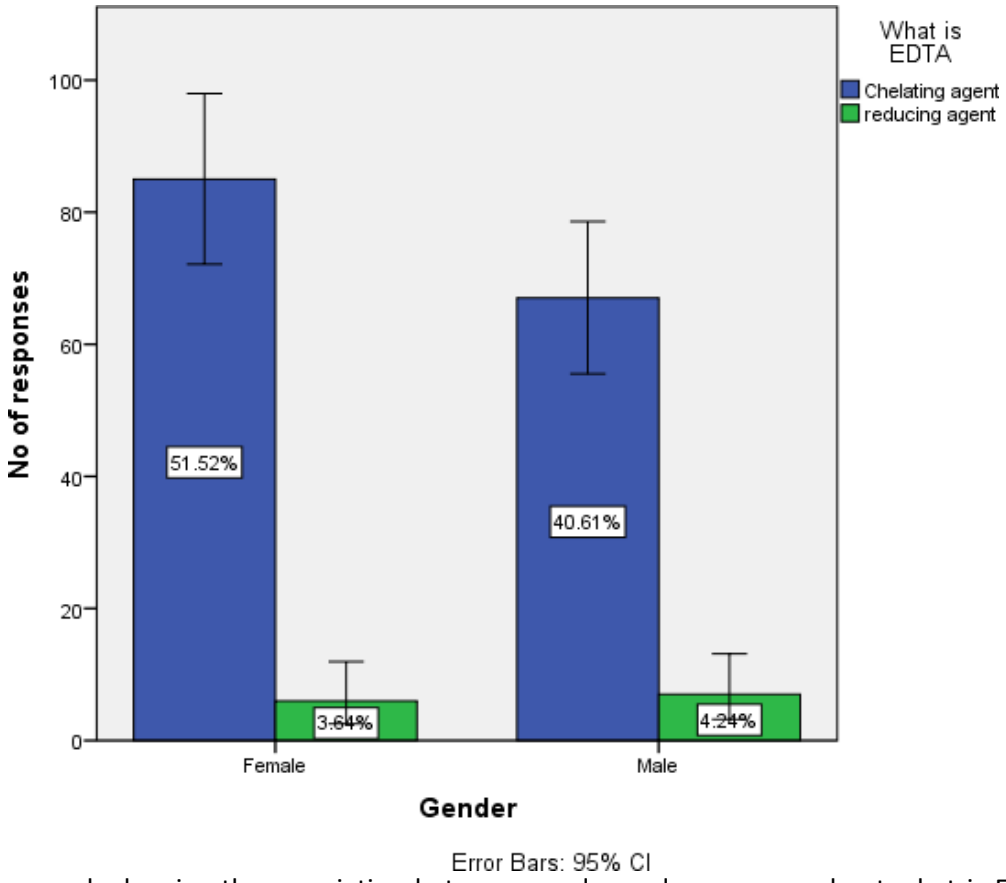

Figure17: Bar graph showing the association between gender and awareness about what is EDTA. X axis represents the gender; Y axis represents the number of responses. Blue colour represents chelating agent and Green colour represents reducing agents. Majority (51.52%) of female participants followed by male participants (40.61%) reported that they are aware that EDTA is a Chelating agent(blue). (pearson's chi square value- 265.7, p value - 0.00 [< 0.05], Hence statistically significant)

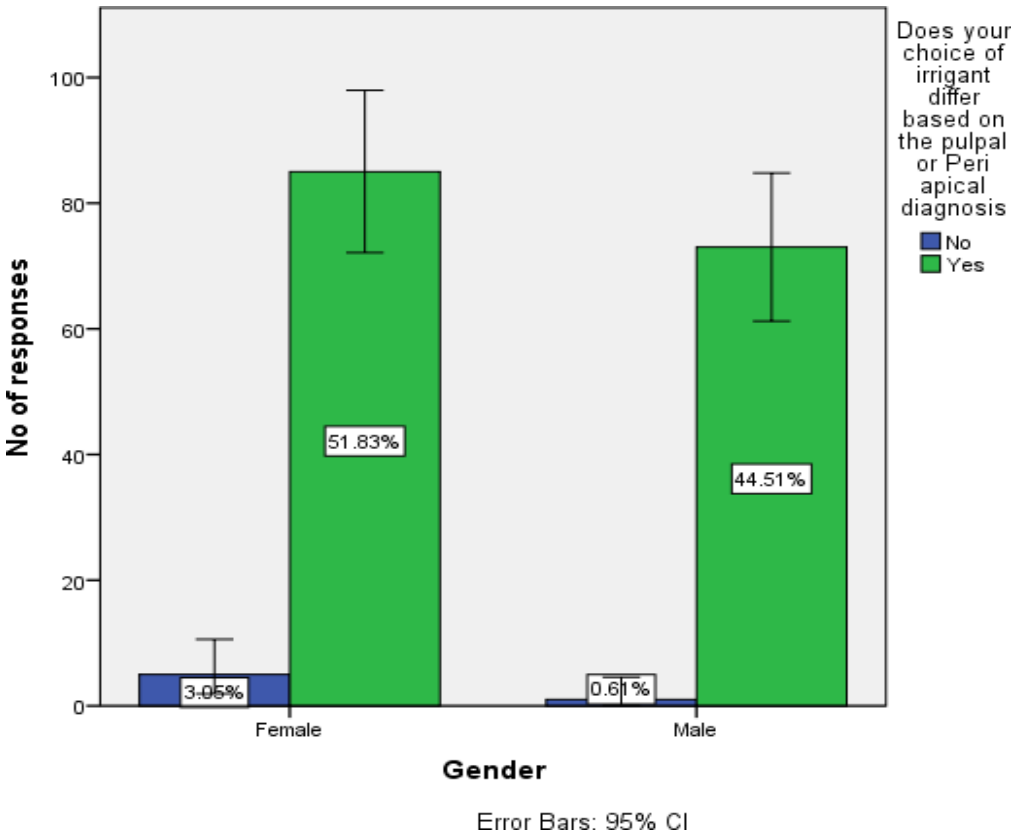

Figure18: Bar graph showing the association between gender and choice of irrigant based on the pulpal or periapical diagnosis. X axis represents the gender, Y axis represents the number of responses. Blue colour represents No and Green colour represents Yes. Majority (51.83%)of female participants followed by male participants (44.51%) reported that they are aware of the choice of irrigant used on the pulpal or peri apical diagnosis (green). (pearson's chi square value- 268.2, p value - 0.00[<0.05], Hence statistically significant)

Discussion:

In this study, we examined the Irrigant used for endodontic procedure shows that about % use the irrigants more often but in previous studies they say that often they use irrigants(36).Previous studies that showed that the antimicrobial efficacy of MCJ against E. faecalis was investigated in this study, and it was discovered that the minimum inhibitory concentration was 6% (37)**.** By combining categories 2 and 3 of the standard smear layer removal criterion, the tests were important to organize and less objective, as blinded reviewers did not have to measure more than or less than 50% smear layer removal(38). The smear layer adhering to the increased canal wall has been indicated by several researchers to have a serious effect on the healing response in infected teeth(39). According to previous findings, both groups had a high rate of negative culture in the second culture(40). Many researchers have found that a 15 percent EDTA solution is the most effective way to remove the smear layer.(41). Previous studies show how to get a real negative culture, it is necessary to remove most or all of the smear layer, the report that it was hypothesised when the smear layer on the canal wall was removed using ultrasonics and an EDTA solution, previously undetected microorganisms mixed with the smear layer were discovered via bacteriological review(42). When asked about the concentration of sodium hypochlorite, the majority of the participants responded that 0.5% to 1.5% was standard concentration used in endodontic treatment.

Also when asked about which irrigant is used when treating teeth with vital pulp, the majority of the participants in my study and in previous study responded that sodium hypochlorite is used as endodontic irrigant(10). The desired concentration for endodontics, on the other hand, has been a point of contention. Studies have shown the effectiveness of various NaOCl concentrations as well as the negative effects associated with them. In previous study and present study, the smear layer on the canal wall was eliminated by EDTA solution by ultrasonics(43). In previous studies they have reported usage of EDTA as a primary irrigant(44) but in present study most of them use Sodium hypochlorite as primary irrigant. Both in the previous study and present study have concluded that low concentration of Sodium hypochlorite is used as an irrigant in endodontic treatment(45).

Conclusion:

Within the limitations of the present survey, the results demonstrate that most of the population about 80.67% know that low concentration of sodium hypochlorite is used. About 58% of the population was aware that the disadvantage of sodium hypochlorite is an unpleasant smell. We know from this survey that all dental practitioners are aware of the importance of irrigants in endodontic treatments, and that the majority of them use irrigants often in their practise.

Author Contribution:

John Francis carried out the study by collecting data and drafted the manuscript after performing the necessary statistical analysis. J Mahalakshmi aided in conception of the topic, has participated in the manuscript. All the authors have discussed the results among themselves and contributed to the final manuscript.

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Conflict of interest:
NIL

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