ORIGINAL ARTICLE

# A SURVEY ON ENDODONTIC IRRIGANTS USED BY DENTISTS IN PAKISTAN

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**ABSTRACT**

*The purpose of this study was to determine the use of endodontic irrigants by dentists in Pakistan and to compare these irrigants between private practitioners and full time teaching dentists.*

*A questionnaire was distributed by hand to dentists in the major cities of Pakistan which inquired about their choice of irrigant in teeth; with vital pulp, non-vital pulp, with periapical radiolucency and with immature apices Descriptive statistics and frequency distribution were computed. Chi-square test was applied to compare the difference between dentists working in teaching hospitals versus private practitioners. The level of significance was kept at 0.05*

*Of the 400 survey forms sent, 269 were received and the response rate was 67.3%. The most commonly used irrigant for endodontics was 2.5% sodium hypochlorite. Normal saline was the preferred secondary irrigant of choice for fulltime teaching dentists. Private practitioners chose other irrigants. There was a statistically significant difference between private practitioners and fulltime teaching dentists for their choice of irrigant used for performing endodontics on teeth with a vital pulp, teeth with non-vital pulp, teeth with periapical radiolucency and teeth with immature apices.*

**Key Words:** *Endodontics, Irrigants, Sodium hypochlorite, Normal Saline, Root canal treatment.*

## INTRODUCTION

The aim of endodontic treatment is to reduce the infection of the root canal system (RCS) sufficiently to allow the host response to favor healing of the periapical tissues. There are many endodontic 'solutions' available which are claimed to help prepare and disinfect the RCS. However, only a few have evidence to support their use clinically.[1]

Even with modern techniques that use nickel-titanium files, more than 35% of the root canal's surface can be left un-instrumented after nonsurgical root canal treatment.[2] To remove debris and address these un-instrumented surfaces, it is necessary to copiously irrigate the root canal.[3]

Irrigating root canals is important because it performs certain mechanical functions like removing particulate debris, wetting of the root canal and removing the smear layer. Irrigation also possesses certain biologic functions which pertain to the irrigants bacteriostatic or bactericidal properties.[4] The ideal root canal irrigant has been described by Zehnder[5] as being systemically nontoxic, non-irritant and biocompatible to the oral hard and soft tissues, possessing broad antimicrobial qualities, capable of dissolving necrotic pulp tissue, and either preventing the formation of a smear layer or dissolving it once it has formed. Many irrigating solutions have been studied extensively to determine which best exhibit these ideal properties, but the ideal irrigant has not yet been realized.[6]

Several studies have revealed that the majority of dentists do not comply with the formulated guidelines on the quality of root canal treatment. These studies investigated the attitude of dentists in Western countries such as Germany, UK, Belgium and the USA. On the other hand, few studies have investigated the attitude of general dental practitioners toward various aspects of endodontic treatment in developing countries.[7] Although, many different irrigants and treatment protocols have been studied, little research has been carried out to determine the widespread practice or acceptance of the available materials and methods among dentists in Pakistan.

A Cochrane review evaluated 11 studies on endodontic irrigants, which included 851 participants with 879 teeth[8]. It was observed that sodium hypochlorite in a range of strengths was the most commonly used irrigating solution. However, at present there is uncertainty as to which solutions, what concentrations and what methods of their delivery are most effective. Indeed, answers to these questions have the potential

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to change practice and ultimately improve outcomes that are relevant to both clinicians and patients. With this rationale in mind, it was decided to conduct a survey to assess and compare how clinicians in Pakistan are using the above mentioned irrigants as part of the endodontic practice; this helped formulate the research question; to explore which endodontic irrigants are being used by clinicians in Pakistan.

Objectives was to objective of the present study was to determine the use of endodontic irrigants by dentists in Pakistan and to compare the use of these irrigants between private practitioners and full time teaching dentists.

## METHODOLOGY

A questionnaire was distributed by hand together with a covering letter to all the practicing dental surgeons who carried out endodontic treatment regardless of their dental specialty. The first page of the survey form which obtained consent for participation in the study and demographics of the responders. The second page of the survey form included a set of 14 questions regarding the choice of irrigant used for different clinical situations, the concentration and volume of irrigant used and adjuncts to irrigation if any; with multiple options provided to the participants to respond from to the attached survey form.

All licensed dentists performing endodontic treatment were included and those dentists who did not perform endodontics or were not practicing were excluded from the study. It was a cross-sectional/analytical study, conducted in teaching hospitals and private practices in three major cities of Pakistan i.e. Lahore, Karachi and Islamabad. The duration of the study was four months (June 2013-September 2013) with a sample size of 400 survey forms that were sent out. The sampling technique employed was non-probability, convenience sampling.

Data Analysis: SPSS version 19.0 was used to analyze the data and descriptive statistics and frequency distribution were computed. Chi-square test was used to compare the difference between dentists working in teaching hospitals and those in private practices. The level of significance was kept at 0.05. The study was approved from the institutional ethics research board, ref # ERC # 2823-Sur-ERC-13.

## RESULTS

Of the 400 survey forms sent, 269 filled forms were received giving a response rate of 67%. Of the 269 forms received, 158 were females (59%) and 111 were males (41%).

The comparison groups, clinical experience and specialty of practice are shown in figures 1-3 respectively. There was a statistically significant difference between private practitioners and teaching dentist for use of pre op rinses. (Table 1) There was also a statistically significant difference seen between the two groups for selection of irrigant in non-vital cases. (Table 2)

Similarly, a statistically significant difference was also observed between the two groups when asked about which irrigating solution was preferred for a vital pulp. (Table 3) In cases of periapical radiolucency, the results yielded a statistically significant difference between fulltime teaching dentists and private practitioners. (Table 4)

When asked about the irrigating solutions used for immature apices, the results yielded a statistically significant difference between the two groups. (Table 5)

TABLE 1: USE OF PRE-OPERATIVE ORAL RINSES

| | Group | | | |
|---|---|---|---|---|
| | **Full time teaching dentist (FTTD)** | **Private Practice (PP)** | **Total** | **P-value** |
| Always | 15 | 29 | 44 | 0.021 |
| Frequently | 14 | 22 | 36 | |
| Some times | 56 | 51 | 107 | |
| Never | 48 | 32 | 78 | |
| Total | 133 | 134 | 267 | |

Chi sq. test was applied at 0.05 level of significance

TABLE 2: IRRIGATING SOLUTION USED IN NON-VITAL PULP

| | Group | | | |
|---|---|---|---|---|
| **Irrigants** | **Full time teaching dentist (FTTD)** | **Private Practice (PP)** | **Total** | **P-value** |
| Sodium hypochlorite | 82 | 76 | 158 | <0.001 |
| Chlor hexidine | 6 | 14 | 20 | |
| Sterile water | 1 | 2 | 3 | |
| Normal saline | 33 | 12 | 45 | |
| Combination/ Others | 11 | 30 | 41 | |
| Total | 133 | 134 | 267 | |

Chi square test was applied at 0.05 level of significance.

TABLE 3: IRRIGATING SOLUTION USED IN VITAL PULP

| Group | | | | |
|---|---|---|---|---|
| **Irrigants** | **Full time teaching dentist (FTTD)** | **Private Practice (PP)** | **Total** | **P-value** |
| Sodium hypochlorite | 81 | 70 | 151 | |
| Chlorhexidine | 6 | 8 | 14 | |
| Sterile water | 0 | 2 | 2 | |
| Normal saline | 31 | 21 | 52 | 0.015 |
| Combination/ Others | 15 | 33 | 48 | |
| Total | 133 | 134 | 267 | |

Chi sq. test was applied at 0.05 level of significance.

TABLE 4: IRRIGATING SOLUTIONS IN PERI-APICAL RADIOLUCENCY

| Group | | | | |
|---|---|---|---|---|
| **Irrigants** | **Full time teaching dentist (FTTD)** | **Private Practice (PP)** | **Total** | **P-value** |
| Sodium hypochlorite | 23 | 23 | 46 | |
| Chlorhexidine | 10 | 6 | 16 | |
| Sterile water | 8 | 5 | 13 | |
| Normal saline | 82 | 70 | 152 | 0.012 |
| Combination/ Others | 10 | 30 | 40 | |
| Total | 133 | 134 | 267 | |

Chi sq. test was applied at 0.05 level of significance

## DISCUSSION

The response rate was 67.3%. This was comparable to the survey conducted by Palmer et al in 2009 (response rate 70.9%).[10] But better when compared to other surveys conducted in the United States by Dutner et al. in 2012 (response rate 28.5%)[6] and Slaus et al. in 2002 (response rate 25.1%).[11]

TABLE 5: IRRIGATING SOLUTION USED IN IMMATURE APICES

| Group | | | | |
|---|---|---|---|---|
| **Irrigants** | **Full time teaching dentist (FTTD)** | **Private Practice (PP)** | **Total** | **P-value** |
| Sodium hypochlorite | 73 | 72 | 145 | |
| Chlorhexidine | 1 | 5 | 6 | |
| Sterile water | 6 | 1 | 7 | 0.007 |
| Normal saline | 43 | 32 | 75 | |
| Combination/ Others | 10 | 24 | 34 | |
| Total | 133 | 134 | 267 | |

Chi sq. test was applied at 0.05 level of significance

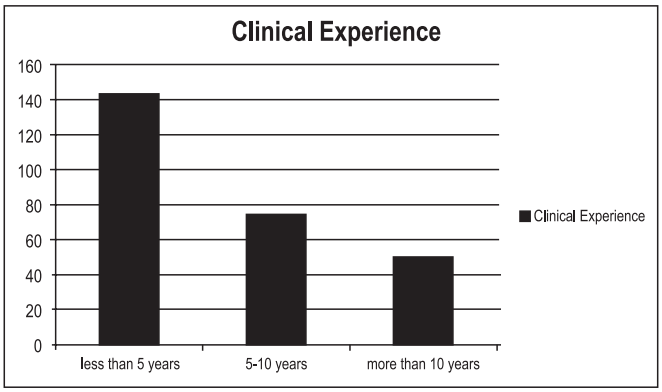


Fig 1: Clinical Experience

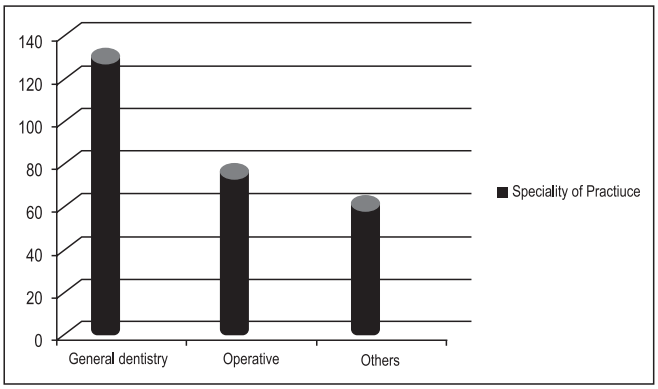


Fig 2: Speciality of Practice

The reliability of the present study was assessed by repeating a question regarding irrigating solutions used for periapical radiolucency at the end of the survey form. The study reliability was 59% which is considered weak. The probable reason for such a finding could be because practitioners mostly do not share what they

practice or that they did not fill in the questionnaire with proper attention.

When the specialists were compared with the general dentists it was alarming to note that the percentage of GDPs (49%) performing root canal treatment was much higher than specialists (28%) and that the clinical experience of most of these practitioners was less than 5 years (53.5%). The reason for such an outcome could probably be because majority of the respondents questioned were the general dental practitioners.

Use of pre-operative chlorhexidine based oral rinse is well documented in literature as it has its benefits of reducing the oral bacterial load and hence helps reduce the microorganisms in the mouth and respiratory tract that can be transported in aerosols and may contaminate the skin and mucous membranes of the mouth, respiratory tract and eyes.[12] In the present study the use of such pre-operative rinses for endodontics was found to be infrequent (78% cumulated from the option; sometimes and never) amongst the full time teaching general dental population (refer to Table 1) yielding statistically significant results, but 44% of the respondents in the current study used preoperative oral rinses which was comparable to the 21% of the respondents in the study conducted by Good et al. in 2012. This infrequent use of pre-operative rinses could possibly be because of a lack of awareness regarding the necessity of reducing the pre-operative bacterial load or a mere reluctance of bringing a change in the existing dental practice especially amongst the dentists practicing in teaching hospitals.

When assessing the primary irrigant of choice, majority of the other researchers[1,5,6,9,12] also had sodium hypochlorite as their primary irrigant, except for Jenkins et al.[13] who reported the use of local anesthetic as a primary irrigant and Ahmed et al.[14] who reported the use of hydrogen peroxide. Although there was a variety of other irrigants being used in international studies,[1,5,6,14-17] but none of them reported the use of normal saline as observed in the present study. The probable reason for such a finding, in this part of the world, could be the ease of availability of normal saline, its cost effectiveness as opposed to other fancier irrigants and the established fact that normal saline is least harmful to the oral hard and soft tissues.

Whether the diagnosis was of a vital pulp, non-vital pulp or of a peri-apical radiolucency regardless of either, the primary irrigant of choice for both comparison groups remained sodium hypochlorite. There was however a significant difference observed when it came to the secondary irrigant of choice where the private practitioners chose a combination of irrigants. The full time teaching dentists on the other hand chose normal saline as a secondary irrigant.

Sodium hypochlorite in a concentration of 2.5% was the irrigant of choice for 28.9% of the respondents in this present survey; this however is in contrast with Dutner et al.[6] who reported a concentration of greater than 5% and Omari et al[7] who reported a concentration of 0.5%. This concentration of 2.5% falls somewhere in the middle of the range of strengths (0.5% to 6%) that are mostly used for sodium hypochlorite and possibly is the easiest to formulate from the concentrate.

When reviewing the results from the other questions in the survey, no statistically significant results were found when questioned on irrigating solutions used for retreatment cases, the shape of irrigating needle, the estimated volume used for irrigation, total duration of contact time of the irrigant with the root canal or the preferred concentration of irrigant used for immature apices (refer to attached questionnaire).

Although there was no statistically significant difference seen between the two groups for the preferred concentration used for sodium hypochlorite, it was however observed that most full time teaching dentists and private practitioners used a 2.5% concentration followed by 0.5% concentration of sodium hypochlorite.

After analyzing the results and comparing them to the various other surveys conducted internationally[1,6,9,10,11] it can be speculated that majority of endodontic treatment in Pakistan is provided by the general dental practitioners most of which do not confirm to academic standards of treatment and established quality guidelines set by the American Association of Endodontics or the European Society of Endodontology. This could be due to lack of abundance of specialists in endodontics and fewer postgraduate programs in Pakistan.

The strengths of the present study were that it was a multi-centered study with representation from academic centers and private practices in three major cities of Pakistan. Multiple relevant questions being answered and baseline statistics on current endodontic trends were obtained. The limitations of the study were that convenience sampling was used and there was no data on non-responders. Also there were no means of retrieving that information.

## CONCLUSION

Within the limitations of this study it was seen that the use of preoperative oral rinses in endodontics was infrequent. Sodium hypochlorite was the most preferred irrigating solution for vital pulp, non-vital pulp and for periapical radiolucency. The preferred concentration of sodium hypochlorite was 2.5% followed by a concentration of 0.5%. However normal saline was found to be the preferred irrigating solution for immature apices.

## RECOMMENDATIONS

Our recommendation is to have a continuing education system for dentists so that they can incorporate current evidence in endodontic practice.

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