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Aisha Wali

BDS, MPH,
Assistant Director Research,
Sr Registrar, Department of
Medical Education and
Research, Baqai Dental College,
BMU, Karachi, Pakistan

Talha M Siddiqui

BDS, MCPS, Associate
Professor, Department of
Operative Dentistry, Baqai
Dental College, BMU,
Karachi, Pakistan

Mohsin Khan

BDS, Lecturer,
Department of Operative
Dentistry, Baqai Dental College,
BMU, Karachi, Pakistan

Asad Aftab

BDS, House surgeon,
Department of Operative
Dentistry, Baqai Dental College,
BMU, Karachi, Pakistan

Nabila Khan

BDS, House surgeon,
Department of Operative
Dentistry, Baqai Dental College,
BMU, Karachi, Pakistan

Correspondence

Aisha Wali

BDS, MPH,
Assistant Director Research,
Sr Registrar, Department of
Medical Education and
Research, Baqai Dental College,
BMU, Karachi, Pakistan

Clinical practices of various irrigating solutions amongst house surgeons of Karachi, Sindh

Aisha Wali, Talha M Siddiqui, Mohsin Khan, Asad Aftab and Nabila Khan

Abstract

Purpose: The aim of the present study was to assess the clinical practices of various irrigating solutions amongst house surgeons of Karachi, Sindh.

Materials and Methods: The present cross-sectional study was conducted to evaluate the practices of house surgeons regarding irrigation solutions used in endodontics in dental institutes of Karachi. A cluster sampling technique was employed and a sample size of 392 registered house surgeons employed in 6 different dental institutes of Karachi were recruited. All returned forms were evaluated and analyzed for frequency and percentages using SPSS version 22.

Result: One hundred and sixty five (42.1%) of the house surgeons were found in routine treating molars. Sodium hypochlorite was the found to be the choice of the irrigants to treat vital pulp. One hundred and fourteen (29.1%) of the house surgeons always used sodium hypochlorite.

Conclusion: The findings of the present study reported that majority of the house surgeons from different Dental institutes are using Sodium hypochlorite for irrigation during root canal treatment. Despite its complications, sodium hypochlorite is the gold standard irrigation solution used in everyday clinical practice. It is recommended that the Dental Hospitals should develop a strict policy regarding irrigation solutions considering the gold standard protocols and further studies are recommended for better delineation of these irrigating solutions.

Keywords: chlorhexidine, irrigating solutions, normal saline, sodium hypochlorite

1. Introduction

Irrigation of the root canal system is considered to be one of the most important as well as the most critical step during endodontic treatment. Despite of modern technologies and equipment, more than one third of the root canals can be left uninstrumented. [1] To remove debris from these uninstrumented root canals, it is necessary to copiously irrigate the root canal and help by killing microorganisms, flushing debris, and removing both the organic and inorganic portions of the smear layer from the root canal system. [2] However there is no particular irrigating solution that sufficiently fulfills all the ideal functions required for an irrigant. [3] The most widely used endodontic irrigant is 0.5 to 6.0% sodium hypochlorite as it is bactericidal and has an ability to dissolve vital and necrotic organic tissue [4, 5] but no activity on inorganic tissues. [6] Reducing the concentration of an irrigation solution tends to reduce its toxicity, antibacterial effect and ability to dissolve tissues. Increasing the volume or warming of the solution increases its effectiveness as a root canal irrigant. [7] The result of a recent study reported that the most effective irrigation regimen is 5.25% at 40 minutes but irrigation with 1.3% and 2.5% of sodium hypochlorite for this same time interval is ineffective in removing *E. faecalis* from infected dentin [8].

Chlorhexidine gluconate has been used for the past 50 years for caries prevention [9], in periodontal treatment and as an oral antiseptic mouthwash. [10] It has a broad-spectrum antibacterial action, persistent action and low toxicity. [7] Because of these properties it is also recommended as a potential root canal irrigant. [7, 9] The advantages of chlorhexidine over sodium hypochlorite is its less cytotoxic, lack of foul smell and bad taste. However some of the disadvantages of chlorhexidine over sodium hypochlorite that it fails to dissolve organic substances and necrotic tissues present in the root canals and also it is unable to kill all the microorganisms but cannot remove the smear layer [11, 12].

Normal saline is very mild in action and it causes gross debridement and lubrication of root canals. In addition it can be used as a chemical irrigant. Normal saline with 0.9% W/V concentrations are generally used as an irrigant in endodontics. Its acts by flushing action and can be used as final rinse for root canals to remove any chemical irrigant left after root canal preparation.^[1,3]

The aim of the present study was to assess the clinical practices of various irrigating solutions amongst house surgeons of Karachi, Sindh.

2. Materials and Methods

The present cross-sectional study was conducted to evaluate the practices of house surgeons regarding irrigation solutions used in endodontics in dental institutes of Karachi. The study was approved by Ethical Committee, Baqai Medical University. The sample size was calculated by taking 50% prevalence rate and computed using Open Epi version 3.03a at 95% confidence interval and $\alpha = 5\%$. A cluster sampling technique was employed and a sample size of 392 registered house surgeons employed in 6 different dental institutes of Karachi were recruited. House surgeons with a minimum of 1 year and not more than 5 years of clinical practice were included in the study. General dental practitioners, undergraduates and postgraduate students were excluded from the study. A structured questionnaire was developed which comprised of a total of 25 questions. Focus was laid on year of clinical practice, the choice of irrigant used, the concentration of the irrigant prior to the type of pathosis diagnosed, smear layer removal and the depth of penetration of needle into the canal for irrigation. The questionnaires were distributed to the participants of 6 different teaching institutes by two calibrated house surgeons. All returned forms were evaluated and analyzed for frequency and percentages using SPSS version 22.

3. Results

A total of 392 house surgeons were selected from different dental teaching institutes of Karachi. House surgeons who had just recently started their professional activity in endodontics were found to be 181(46.17%). (Fig 1) One hundred and sixty five (42.1%) of the house surgeons were found in routine treating molars. (Table 1)

Sodium hypochlorite was the found to be the choice of the irrigants to treat vital pulp. One hundred and fourteen (29.1%) of the house surgeons always used sodium hypochlorite for vital pulp followed by normal saline and chlorhexidine. (Table 2)

One hundred and thirty nine (35.5%) of the house surgeons always used sodium hypochlorite to treat necrotic pulp followed by chlorhexidine and normal saline. (Table 3)

Eighty nine (22.7%) of the house surgeons always used sodium hypochlorite as their choice of irrigation when treating previously root canal treated teeth. (Table 4)

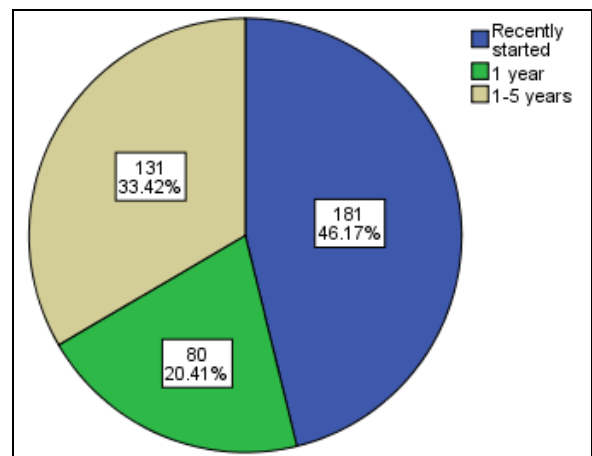


Fig 1: Shows the duration of post-graduation experience

Table 1: Frequency of routine treatment

Variables	Responses			
	always	often	occasionally	never
Do you routinely treat anterior teeth	88(22.4%)	203(51.8%)	84(21.4%)	17(4.3%)
Do you routinely treat premolar teeth	68(17.3%)	259(66.1%)	57(14.5%)	8(2%)
Do you routinely treat molar teeth	165(42.1%)	155(39.5%)	71(18.1%)	1(0.3%)

Table 2: Irrigants used to treat vital pulp

Irrigants	Responses			
	always	often	occasionally	never
Sodium hypochlorite	114(29.1%)	153(39%)	93(23.7%)	32(8.2%)
chlorhexidine	68(17.3%)	129(32.9%)	135(34.4%)	60(15.3%)
Normal saline	78(19.9%)	163(41.6%)	138(35.2%)	13(3.3%)

Table 3: Irrigants used to treat necrotic pulp

Irrigants	Responses			
	always	Often	occasionally	never
Sodium hypochlorite	139(35.5%)	179(45.7%)	71(18.1%)	3(0.8%)
chlorhexidine	65(16.6%)	180(45.9%)	104(26.5%)	43(11%)
Normal saline	58(14.8%)	198(50.5%)	110(28.1%)	26(6.6%)

Table 4: Irrigants used for previously root canal treated teeth

Irrigants	Responses			
	always	Often	occasionally	never
Sodium hypochlorite	89(22.7%)	161(41.1%)	132(33.7%)	10(2.6%)
chlorhexidine	56(14.3%)	198(50.5%)	93(23.7%)	45(11.5%)
Normal saline	71(18.1%)	142(36.2%)	131(33.4%)	48(12.2%)

4. Discussion

A relatively high percentage of the dental practitioners perform endodontic treatment when compared to other developing countries. Maina S *et al.* reported 67% of the respondents carried out root canal treatment in Kenya. ^[14] Khalid S *et al.* ^[15] in a study reported that 89% of the general dental practitioners in Saudi Arabia performed root canal treatment of molars. The reason was due to lack of enough skill, facilities and materials to perform such treatment ^[15]. The present study reported that 165 (42.1%) of the house surgeons routinely performed root canal treatment of molars.

Various types of irrigating solutions have been investigated but none of them been able to reveal all the ideal properties. Sleiman and Khaled *et al.* ^[16] recommended using combinations of irrigants in specific concentrations. Amongst various irrigating solutions recommended, sodium hypochlorite is considered to be gold standard due to its tissue dissolving property and chlorhexidine is one of the most effective antimicrobial agents used with substantivity ^[17]. Torabinejad suggested the use of chlorhexidine as root canal irrigant especially in the cases of retreatment and failures of root canal ^[18, 19].

Shrestha R *et al.* ^[20] in a study reported that 67(28.15%) of the respondents used saline while 46 (19.32%) of the respondents used sodium hypochlorite during treatment of vital teeth. It is unexpected to find that 32.77% of the respondents who do not use sodium hypochlorite when treating a tooth with vital pulp but it was more disturbing to find that 28.15% of the respondents used only saline as irrigating solution while treating vital tooth ^[20].

Gopikrishna V *et al.* ^[21] *et al.* reported that 79.3% of the respondents used sodium hypochlorite employed for teeth with vital pulp. The present study reported that 114(29.1%) of the respondents used sodium hypochlorite, 78(19.9%) used saline and 68(17.3%) used chlorhexidine to treat vital pulp.

Shrestha R *et al.* ^[20] reported that 76(31.93%) of the respondents used sodium hypochlorite, 16(6.72%) of the respondents used saline and 6(2.52%) of the respondents used chlorhexidine during treatment of tooth with necrotic pulp. The present study reported that 139(35.5%) of the respondents used sodium hypochlorite, 65(16.6%) used chlorhexidine and 58(14.8) used saline to treat necrotic pulp. Regarding choice of irrigation used during treatment of previously root treated teeth, Shrestha R *et al.* ^[20] reported that 70(29.41% of the respondents used sodium hypochlorite, 48(20.16%) used saline and 10(4.2%) used chlorhexidine respectively. The present study reported that 89(22.7%) of respondents used sodium hypochlorite, 71(18.1%) used saline and 56 (14.3%) used chlorhexidine during treatment of previously root canal treated teeth.

The ideal concentration of sodium hypochlorite ranges from 0.5% to 5.25%, higher the concentration better is the antimicrobial efficacy ^[22]. Shrestha R *et al.* ^[20] reported that majority of the respondents used 0.5 to 1.5% of sodium hypochlorite. The lowest concentration of 0.5-1% have shown significant antimicrobial action whereas at higher concentration the time needed for inhibition of bacterial growth is shortened ^[23]. Higher concentration increases the ability to dissolve necrotic and vital pulp tissues but at the same time has a higher risk of damage to periapical and oral tissues ^[24]. The present study reported that 100(25.5%) of the respondents used >0.5% of sodium hypochlorite while 149(38%) of the respondents used <0.5% of sodium hypochlorite.

The suggested concentration of chlorhexidine is 2% ^[19] but

studies have shown efficacy even at lower concentration ^[25]. Shrestha R *et al.* ^[20] reported that 20.2% of the respondents used 2% chlorhexidine.

During cleaning and shaping of root canals, the action of the instruments create a 1-5 µm thick smear layer composed of organic and inorganic materials which is deposited on the canal walls ^[26]. The smear layer hinders irrigants and medicaments from reaching periapical areas therefore it is advocated to remove the smear layer. When the pulp is necrosed, the smear layer itself may contain bacteria and yet protect microorganisms or biofilms underneath it ^[27].

Regarding smear layer removal the present study reported that 159(40.6%) of the house surgeons always aimed to remove smear layer. Koppolu M *et al.* ^[3] in a study reported that 59.7% of the respondents aimed to remove smear layer. Damanpreet *et al.* ^[28] reported that 21% of the respondents aimed to remove smear layer. De Gregorio *et al.* ^[29] in a study reported that 73.1% of General Dental Practitioners and 95% of the endodontists aimed to remove smear layer. Moss *et al.* ^[30] reported that 51% of the respondents aimed to remove smear layer. Dutner *et al.* ^[31] in a study reported that 77% of the respondents remove smear layer. Gopikrishna V *et al.* ^[21] reported that 68% of the respondents aimed to remove the smear layer during endodontic procedure.

5. Conclusion

The findings of the present study reported that majority of the house surgeons from different Dental institutes are using Sodium hypochlorite for irrigation during root canal treatment. Despite its complications, sodium hypochlorite is the gold standard irrigation solution used in everyday clinical practice. However most of them were also found using Normal saline as primary irrigant for treating vital pulp as well as necrotic pulp which has no or minimum benefit during root canal treatment. It is recommended that the Dental Hospitals should develop a strict policy regarding irrigation solutions considering the gold standard protocols and further studies are recommended for better delineation of these irrigating solutions.

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