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Endodontic Irrigation Trends among Dental Practitioners in Karachi

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Abstract

The purpose of the study was to determine current trends in endodontic irrigation among dental practitioners in Karachi working in teaching dental institutes and private dental clinics. In this cross-sectional study, 230 self- prepared questionnaires were hand distributed to different dental clinics and teaching dental institutes of Karachi. Practitioners not willing to participate and incompletely filled questionnaire were excluded from the study. Survey practitioners were asked about preferred endodontic irrigation solution, its percentage, total time spent on endodontic irrigation, preferred method for irrigation and use of adjuncts to irrigation. SPSS version 21 was used for the calculation of frequency and percentage. Total 230 survey forms were distributed, 190 were received with total response rate of 82.7%. Most of the participants preferred using 0.5% to 1.5% sodium hypochlorite for irrigation purpose (26%). Majority of the participants spend up to 5 minutes on irrigation and 90% of the respondents prefer needle irrigation. Most of the participants use open ended beveled type of irrigation needle (63%) and 27-gauge irrigation needle is mostly preferred by the participants (32%). Majority of the participants preferred keeping irrigation needle 2 - 3 mm short of the working length (34%). 88% of the participants claimed that they have never experienced sodium hypochlorite extrusion accident. 84% of the respondents don't use any adjunct to endodontic irrigation. Most of the dental practitioners of Karachi do not follow optimal endodontic irrigation protocol. Measures should be taken to spread the awareness especially among the private practitioners to improve the overall quality of endodontic therapy.

Keywords: *Irrigation Methods; Irrigation Solutions; Endodontics and Current Trends*

Introduction

The aim of root canal treatment is to prevent or treat periapical periodontitis. The procedure of root canal treatment involves chemo mechanical preparation and obturation. 35% of root canal surface remains un-instrumented after non-surgical root treatment [1]. Chemical debridement of root canal system requires delivery of irrigation solution into the root canals to ensure optimal debridement of areas inaccessible by mechanical instruments [2,3]. Sodium hypochlorite (NaOCl) is a gold standard for endodontic irrigation [4-6]. The goal of various irrigation devices is to evenly spread irrigation solution throughout root canal system [7]. Factors like root canal

anatomy, presence of pulp or dentine tissue, mode of irrigation delivery, agitation and surface tension of the irrigation solutions affect irrigant penetration. Many techniques from needle irrigation to machine driven systems are used as adjuncts [8]. Needle irrigation is the most common irrigation method chosen by general dentists and endodontists globally [9-13]. The ability of needle irrigation to debride root canal system depends on the gauge of the needle, penetration length of the needle, tip design of the needle and whether solution is delivered passively or with agitation [14]. Effectiveness of needle irrigation is affected by the depth of insertion, chances of fluid extrusion, incomplete dentinal debris debridement, limited irrigation replacement limited to 1 - 1.5 mm beyond needle tip [15]. These limitations necessitate use of adjuncts or alternative irrigation devices. Although many different irrigation protocols have been studied, little research has been conducted to determine the widespread use of irrigation adjuncts or acceptance of these methods therefore, this study was carried out to determine the currents trends in endodontic irrigation among dental practitioners of Karachi, Pakistan.

Methodology

This cross-sectional survey based study included dental practitioners of Karachi. A sample size of 230 was calculated by using Open Epi software with 90% confidence interval, and anticipated population proportion P = 0.5. Questionnaires were hand distributed and filled forms were retrieved at the same day. A total of 230 questionnaire comprising of 18 questions was hand distributed to the house officers, post graduate residents in endodontic department, endodontists and general dental surgeons, or consultants specializes in other fields of dentistry performing endodontic therapy, of Karachi. Respondents were asked about the preferred endodontic irrigant, its concentration, approximate time spent on irrigation, preferable method of irrigation, type and design of needle, needle penetration depth and use of adjunct to irrigation. Data were collected and analyzed using SPSS version 21.0 and descriptive statistics and frequency and percentage were computed.

Results

Total 230 questionnaire forms were distributed and 190 were collected back with overall completion rate of 82.7%. 62% of the total participants were female and 38% were male. Although 61.57% of the respondents preferred sodium hypochlorite for endodontic irrigation (Table 1), 26.32% of the respondents use sodium hypochlorite in the strength of 0.5% - 1.5% (Table 2). 40% of the total participants spend 1 minute on endodontic irrigation followed by 21.57% who spend 5 Minutes (Table 3). Needle irrigation is most commonly practiced mode of irrigation by the participants (93.68%) (Table 4). Beveled open ended irrigation needles are preferred by 62.63% of the participants. Moreover, 19.47% of the participants use side vented needles (Table 5). 31.57% of the participants use 27-gauge irrigation needles. These were used most commonly by endodontists, house officers and PG residents. 51% of the general practitioners were not aware of the gauge of needle used for irrigation (Table 6). Majority of the participants (33.68%) keep irrigation needle 2 - 3 mm short of the working length. Whereas 30% of the respondents keep needle as deep as it goes inside the canal (Table 7). 88.2% of the respondents never experienced sodium hypochlorite accident (Table 8). 83.38% of the participants don't use any adjunct to endodontic irrigation. Only 38.29% of the endodontists, 10.41% of PG residents, 4.1% of House officers and 10.63% of general practitioners use adjuncts to endodontic irrigation (Table 9). Use of adjuncts for irrigation is very limited, even amongst endodontists. Only 10% respondents use adjunct, among which ultrasonic activation is the preferred choice. Most common reason of not using adjuncts is the awareness, cost and availability.

	Qualification				Frequency	Percentage
	House officers	PG Residents	Endodontists	General dentist		
Normal saline	6	0	0	18	24	12.63%
Sodium hypochlorite	38	26	33	18	115	60.52%
Hydrogen peroxide	1	0	0	9	10	5.26%
Others	2	4	0	0	6	3.15%
Combination	1	18	14	2	35	18.42%

Table 1: *Distribution of preferred endodontic irrigant among dental practitioners.*

	Qualification				Frequency	Percentage
	House officers	PG Residents	Endodontists	General dentist		
< 0.5%	25	6	9	5	45	23.68%
0.5 - 1.5%	8	9	18	15	50	26.31%
1.6 - 2.5%	8	18	5	2	33	17.36%
2.6 - 4%	0	10	4	8	22	11.57%
4.1 - 5%	1	1	3	1	5	2.63%
> 5%	2	4	8	4	18	9.47%
Don't use NaOCl	3	0	0	12	15	7.89%

Table 2: *Distribution of preferred percentage of NaOCl by dental practitioners.*

	Qualification				Frequency	Percentage
	House officers	PG Residents	Endodontists	General dentist		
1 minute	24	4	18	30	76	40%
3 minutes	5	15	5	5	30	15.78%
5 minutes	8	16	11	6	41	22.57%
10 minutes	8	6	8	5	27	14.21%
20 minutes	2	7	3	1	13	6.8%
Never checked	0	0	1	0	1	0.52%

Table 3: *Distribution of total time spent on irrigation by dental practitioners.*

	Qualification				Frequency	Percentage
	House officers	PG Residents	Endodontists	General dentist		
Needle and syringe	44	46	44	44	178	93.68%
Self-adjusting files	0	0	1	0	1	0.52%
Anesthetic needle and syringe	0	1	1	2	4	2.10%
Triple syringe	4	0	1	1	6	3.18%
Others	0	1	0	0	1	0.52%

Table 4: *Distribution of preferred method of endodontic irrigation.*

	Qualification				Frequency	Percentage
	House officers	PG Residents	Endodontists	General dentist		
Flat open ended	3	3	11	0	17	8.94%
Bevelled open ended	30	31	23	35	119	62.63%
Side vented	10	10	12	5	37	19.47%
Others	0	0	1	0	1	0.52%
Never checked	5	4	0	7	16	8.42%

Table 5: *Distribution of preferred irrigation needle tip design among dental practitioners.*

	Qualification				Frequency	Percentage
	House officers	PG Residents	Endodontists	General dentist		
30 gauge	0	10	7	0	17	8.94%
27 gauge	18	16	17	9	60	31.57%
26 gauge	14	5	21	3	43	22.63%
22 gauge	3	6	1	11	21	11.05%
Never checked	13	11	1	24	49	25.78%

Table 6: *Distribution of preferred irrigation needle gauge.*

	Qualification				Frequency	Percentage
	House officers	PG Residents	Endodontists	General dentist		
Up to the whole length of root canal	3	6	0	1	10	5.26%
1 - 2 mm short of the length	13	11	12	6	42	22.1%
2 - 3 mm short of the length	8	18	31	7	64	33.68%
5 mm short of the length	9	0	0	8	17	8.94%
As deep as the needle goes in the canal	15	13	4	25	57	30%

Table 7: *Distribution of preferred depth of needle penetration.*

	Qualification				Frequency	Percentage
	House officers	PG Residents	Endodontists	General dentist		
0	44	46	44	34	168	88.42%
1 - 3	1	2	2	1	6	3.15%
> 3	0	0	1	0	1	0.52%
I don't use sodium hypochlorite	3	0	0	12	15	7.89%

Table 8: *Distribution of sodium hypochlorite accident.*

	Qualification				Frequency	Percentage
	House officers	PG Residents	Endodontists	General dentist		
Ultrasonic activation	0	3	8	3	14	7.36%
Sonic activation	0	1	1	0	2	1.05%
Sub sonic activation (endo activator)	0	0	2	0	2	1.05%
Negative pressure (endo vac)	0	0	1	0	1	8.94%
Others	2	2	6	2	12	6.31%
I dont use any adjuncts	46	42	29	42	159	83.68%

Table 9: *Distribution of adjuncts to endodontic irrigation by dental practitioners.*

Discussion

This survey evaluates the preferences regarding materials and techniques employed in endodontic irrigation in different dental teaching institutes and private dental clinics across Karachi. Present study showed 82.7% of the response rate. Surveys on endodontic irrigation conducted in Pakistan showed response rate of 79% for Usman., *et al.* and 67.3% for Hussain MS., *et al*. [12-16], whereas surveys performed by Raoof., *et al.* in Iran, Gupta., *et al.* in India, Savani., *et al.* in US, Lee., *et al.* in American board of endodontics, Kohli., *et al.* in India and Kaptan., *et al.* in turkey demonstrated response rate of 84.88%, 88%, 24%, 35%, 42% and 43% respectively [9,11,17-19]. In the present study it was found that 61.57% of the dental practitioners in Karachi use sodium hypochlorite for endodontic irrigation. However, 38.29% of general dentists use normal saline for endodontic irrigation. Another study conducted in Pakistan reported that 61.94% dentists use normal saline whereas 32.74% use sodium hypochlorite for endodontic irrigation [20]. In another study, it was found that sodium hypochlorite was the most preferred irrigant followed by normal saline by dentists in Pakistan [12] whereas a survey conducted in North Jordan concluded that 32.9% of general dentists use sodium hypochlorite where as in United Kingdom survey, sodium hypochlorite was found to be the most commonly used irrigant [21]. In the Present study, most of the participants use sodium hypochlorite in the strength of < 0.5% whereas another study on Pakistani dentists demonstrated that 2.5% concentration is widely accepted by the practitioners [12]. Full strength i.e. more than 5% NaOCl is preferred by the members of AAE [22]. A survey in India concluded that 2.6% to 4% of NaOCl is widely used [23]. Whereas in Turkey varying concentration of NaOCl is used by the dental practitioners [11].

According to the results of the present study, a needle irrigation was found to be most widely accepted method of irrigation. Another survey shows similar results [20]. Most of the dental practitioners in Karachi use 27-gauge irrigation needle, whereas 26-gauge needle was most commonly used by dental practitioners in India [23]. 88.42% of the practitioners in Karachi had not experienced sodium hypochlorite accident as most of the practitioners preferred keeping irrigation needle 2 - 3 mm short of working length. 58% of the participants of a survey carried out in America claimed that they never had sodium hypochlorite extrusion [25]. In the present study, it was found that the use of adjunct to endodontic irrigation is extremely less (83.68%). whereas another survey conducted in Pakistan has reported that 58.4% of the practitioners do not use adjuncts [16]. Another survey concluded that only 10.61% of the participants use manual agitation as adjuncts to endodontic irrigation [20]. Even amongst the members of American Association of Endodontics, the use of adjuncts is limited to 45% [22]. In India, 47% of the practitioners use adjuncts to endodontic irrigation [23] and in US, only 19% practitioners prefer using adjuncts to endodontic irrigation [9,24].

Conclusion

According to the results of the present study, most of the dental practitioners of Karachi do not follow optimal endodontic irrigation protocol. Measures should be taken to spread the awareness especially among the private practitioners to improve the overall quality of endodontic therapy.

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