



Evaluate the Usage of Different Advanced Endodontic Instruments and Techniques in Pediatric Dentistry

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ABSTRACT

Objective: The purpose of study is to find the prevalence of usage of different advanced endodontic instruments and techniques in pediatric dentistry.

Materials and methods: A self-administered, structured questionnaire written in English validated through a pretested survey was randomly mailed to the postgraduate students in different dental colleges. A total of 182 of the complete filled questionnaires were returned with response rate of 68.2%. The data were analyzed using the SPSS version 15.0. The Student's t-test and ANOVA test were used as test of significance. Karl Pearson's correlation test was used to assess years of education and usage of endodontic instruments.

Results: There was a limited use of new endodontic technologies in the present study. The highest positive response to the usage of advanced endodontic instruments was related to NiTi rotary files with highest number seen among 3rd year students. A linear relationship was found between years of postgraduation and usage of advanced endodontic instruments using Karl Pearson's correlation coefficient.

Clinical significance: Based on the results of the present study, it seems that the usage of advanced endodontic instruments is not up to the level. Also we found increased use of new technologies with years of postgraduation.

Keywords: Pediatric dentistry, Advanced instruments, Endodontic.

How to cite this article: Kathariya MD, Patil S, Patil A, Jadav RH, Mandlik J, Sharma AS. Evaluate the Usage of Different Advanced Endodontic Instruments and Techniques in Pediatric Dentistry. *J Contemp Dent Pract* 2013;14(1):61-64.

Source of support: Nil

Conflict of interest: None declared

INTRODUCTION

The field of endodontics is undergoing a continual evolution in terms of materials and techniques, as well as growth in the number of patients who can benefit from endodontic treatment. The greatest innovations in endodontics occurred, more or less, in the decade of the 1990's. The most important

innovations have been the utilization of the dental operating microscope, ultrasonic technology and related instruments, nickel-titanium (NiTi) rotary shaping files, mineral trioxide aggregate (MTA), etc. Each of these innovations has dramatically impacted endodontics and significantly contributed to more predictable success.¹

The introduction of the operating microscope has changed both nonsurgical and surgical endodontics. In non-surgical endodontics, every challenge existing in the straight portion of the root canal system, even if located in the most apical part, can be easily seen and managed competently under the microscope. In surgical endodontics, it is possible to carefully examine the apical segment of the root-end and perform an apical resection of the root without an exaggerated bevel.²

Ultrasonics in endodontics has enhanced the quality of treatment and represents an important adjunct in the treatment of difficult cases. Since its introduction, US has become increasingly more useful in applications, such as gaining access to canal openings, cleaning and shaping, obturation of root canals, removal of intracanal materials and obstructions and endodontic surgery.³

The introduction of NiTi to endodontics almost two decades ago one has dramatically changed the way root canal preparation is performed, in both general and specialist practices. The perceived most significant advantage lies in the predictability with which a desired shape is achieved. Possibly more important, the use of rotary instruments requires attention to detail, e.g. regarding the efficacy of antimicrobial regimes that further contribute to successful endodontic therapy. Then, cases of varying degrees of difficulty can be successfully treated, with excellent long-term outcomes.⁴ Truly, NiTi rotary instrumentation has been one of the most significant changes in dentistry in the past 25 years.⁵

There have been many studies regarding usage of different advanced endodontic instruments in several countries, including Sudan, Denmark, Australia, Belgium, Sweden and recently, in the United States of America.⁶ But very few were conducted among pedodontists.

Endodontic techniques represents a fundamental step in the multidisciplinary of dentistry and it is important to realize that pedodontists are making big impact on success rate of dental treatment among children. There are many opinions on how to accomplish the goals of endodontic treatment in the best manner. Thus, the purpose of this study to evaluate the usage of different advanced endodontic instruments and techniques in pediatric dentistry.

MATERIALS AND METHODS

This present cross-sectional study was conducted to assess the usage of different advanced endodontic instruments in the specialty of pedodontics from different dental institutes in India from August to October 2012. Before commencement of the survey, ethical approval was obtained from the Ethical Committee.

A self-administered, structured questionnaire written in English validated through a pretested survey was used among all the participants. The questionnaire was pilot-tested in a sample of 30 subjects to ensure an acceptable level of validity and degree of repeatability (Cronbach's $\alpha = 0.78$). All the postgraduate students in the specialty of pedodontics were mailed the questionnaire during the study period.

The questions were based on sociodemographic variables, the use of new endodontic materials and methods, such as surgical microscopes, ethyl chloride spray, loops, digital radiography, apex locators, NiTi rotary files, electric motors, ultrasonic devices, intraoral cameras and MTA.

The performa including the entire questionnaire were randomly mailed to the postgraduate students in different dental colleges. A total of 182 of the complete filled questionnaires were returned with response rate of 68.2%. Those who left the questionnaire incomplete and did not return it were excluded. Among all 104 were males and 78 were females and according to academic years they were assorted as 69, 61 and 52 subjects in 1st, 2nd and 3rd years of postgraduation respectively.

DATA ANALYSIS

For data analysis, each positive response was given a score '1' and each negative response was assigned as a score of '0'. Individual scores were summed up to yield a total score. Data was analyzed using SPSS version 15.0. Descriptive

statistics were obtained and frequency distribution, means, standard deviation were calculated. Student's t test was used to find the significance of difference in the means of usage of endodontic instruments in relation to gender and one-way ANOVA was used to find the significance of difference in usage of endodontic instruments among different academic years at p-value <0.05. Karl Pearson's correlation was used to assess the relation of education and usage of endodontic instruments among all subjects.

RESULTS

The distribution of postgraduate students according to gender and years of education is mentioned in Tables 1 and 2 respectively. The highest positive response to the usage of advanced endodontic instruments was related to NiTi rotary files with highest number seen among 3rd year students. The lowest response was related to surgical microscopes with only 13.5% subjects. Postgraduate students belonging to 3rd year of academics were having more usage of instruments followed by 2nd and 1st years. There were significant differences in responses to use surgical microscope, ethyl chloride, loop for magnification, digital radiography, apex locator, NiTi rotary file and electric motor for NiTi rotary file among all years ($p < 0.05$) (Table 3).

Table 1 shows that males had more use of new endodontic instruments and treatment modalities compared to females. Table 2 shows the usage rates of new endodontic instruments and techniques separately for graduation year, demonstrating significant relationship between all the years ($p = 0.00$). A linear relationship was found between years of postgraduation and usage of advanced endodontic instruments using Karl Pearson's correlation coefficient (Table 4).

Table 1: Usage of different advanced endodontic instruments according to gender

Sex	No.	Mean	Std. deviation	p-value
Male	104	2.86	2.081	0.350*
Female	78	2.08	1.974	–

*Not significant

Table 2: Usage of different advanced endodontic instruments according to years of postgraduation

Years of postgraduation	No.	Mean	Std. deviation	p-value
1st year	69	1.57	1.736	0.000*
2nd year	61	2.43	1.987	–
3rd year	52	3.52	2.015	–
Total	182	2.41	2.052	

*Significant

Table 3: Usage of different advanced endodontic instruments according to years of postgraduation

Sr. no.	Questions	1st year (%)	2nd year (%)	3rd year (%)
1.	Surgical microscope	0.0	0.0	13.5
2.	Ethyl chloride spray for the cold test of pulp vitality	24.6	24.6	44.2
3.	Loop for magnification	15.9	39.3	51.9
4.	Digital radiographic technique	21.7	36.1	50.0
5.	Apex locator to determine working length	26.1	44.3	59.6
6.	NiTi rotary files for canal preparation	31.9	49.2	67.3
7.	Electric motor for NiTi rotary files	14.5	23.0	36.5
8.	Ultrasonic device	21.7	19.7	21.2
9.	Intraoral camera	0.0	6.6	7.7
10.	Use of MTA in pedodontic procedures	17.4	32.8	30.8

Table 4: Correlation between years of postgraduation and usage of advanced endodontic instruments using Karl Pearson's correlation test

Relationship between		Karl Pearson's coefficient of correlation	p-value
Years of postgraduation	Usage of instruments	0.386*	0.000*

*Significant

DISCUSSION

Endodontics is associated with new instruments and techniques and great advances have been made in the endodontic materials and instruments since 1990. The new techniques available now include electric motors with NiTi rotary systems, apex locators, digital radiography sensors, microscopes and ultrasonic units. Nowadays postgraduate programs are designed based on these new instruments and techniques in many countries.⁷ The introduction of these new technologies made endodontic treatment easier, faster and most importantly, better. Principal among these is NiTi rotary instrumentation that results in consistent, predictable, and reproducible shaping.⁵ The purpose of this article is to find usage of newly endodontic instruments and techniques among postgraduate students in pediatric dentistry.

Several studies have shown that proper and correct use of instruments along with the use of new instruments, and practitioners' experience, expertise, and knowledge result in a success rate of 90% in endodontic treatment. It is obvious that shortcomings in any of the steps above might result in the failure of endodontic treatment.⁸

In the present study it was found that males having more usage rate of new endodontic instruments and techniques than females. Similar results were found in other studies conducted by Tay et al in 2008, in New Zealand.⁹ The difference might be attributed to the fact that male students take part in continuing dental education programs and do more special cases more frequently than females, which results in the improvement of their knowledge and increases the frequency of the use of new techniques. According to academic years of postgraduation the rate of the use of new

endodontic techniques were more commonly seen among senior students than junior ones. This indicates that there is an increase in the frequency of the use of new endodontic instruments and techniques with an increase in the knowledge and experience of dentistry.

The findings of present study stated that only 13.5% subjects had usage of surgical microscope which is much lesser than other studies.² This might be attributed to the high cost of such microscopes in India.

Overall half of the subjects used NiTi rotary files for root canal preparation. Mozayeni MM mentioned that 98.4% of endodontists and 50.6% of general dentists in Tehran.¹⁰ Parashos et al reported that 22% of general dentists and 64% of endodontists in an Australian study,¹¹ approximately 70% of general dentists and almost 83% of endodontists in a study performed in UK.^{12,13} Reith and Bjorndal in 2005 in Denmark reported a 10% usage rate for NiTi rotary files.¹⁴ Lee et al reported that 28% of their subjects used NiTi rotary files in the United States in 2009.⁸ Slaus and Bottenberg, in 2002 reported 47% usage rates for NiTi hand files.⁷ It is obvious that use of rotary systems decreases the time needed for canal debridement and as a result decrease the number of treatment sessions.¹⁵

The use of apex locators was found in around 43% of subjects, which was higher than that reported by some other studies.¹⁴ In a study carried out by Lee et al in 2009, 72.5% of the participants used apex locators.⁸

In the present study digital radiographic techniques were used by almost 35.0% of postgraduates which was similar to general dental practitioners in Iran.¹⁶ However, Brian and Williamson reported that 19.7% of Indian dental practitioners used digital radiographic techniques in 2007.¹⁷ The high price of the equipment might be a reason why some dental practitioners do not use it.

Very few postgraduates use intraoral cameras in this study compared to Sharland findings among dental practitioners in 2004 in England.¹⁸ Morse et al in 2010 in England reported usage rates of 59% for digital cameras, 34% for intraoral cameras and 19% for video cameras.¹⁹ The differences between the results of the present study

and those of the three above-mentioned studies might be attributed to out-of-date academic instructions.

The usage rate for ultrasonic units in endodontic surgeries was much lower than that reported by Lee et al⁸ in 2009 in the United States (97.8%). MTA was used by about 26.0% of postgraduate students in the present study.

Around 31% of subjects used ethyl chloride for the cold test of pulp vitality which higher than Elham's study among Iranian dentists. The results of the present study show that in some cases the usage rates of new endodontic instruments are less than what is expected.

CONCLUSION

The results of the present study concluded that the highest positive response to the usage of advanced endodontic instruments was related to NiTi rotary files with highest number seen among 3rd year students. Also it was found that instead of availability newly advanced endodontic instruments and techniques, the use and acceptance of such instruments and techniques by postgraduate students of pediatric dentistry is not at an acceptable level. Results of present study stated that students need more training and more comprehensive education regarding new techniques and methods.

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