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Comparative Study of Endodontic Practices among Dentists in India: A Nation-wide Cross-sectional Survey

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ABSTRACT

Introduction: Endodontic in the field of dentistry is a constantly evolving specialty; hence it recommends the need to update the clinical practice with more advanced techniques and materials.

Objective: To investigate the attitude of the dentists towards modern endodontic treatment options and to study the association of the no. of patients treated and the type of tooth treated with the preferred method of working length determination, method of magnification, instrumentation and the drug regimen followed by them.

Methods: A questionnaire-based cross-sectional, descriptive survey was conducted among the dentists who are enrolled under the Masters of Dental Surgery (MDS) (postgraduates) curriculum or have completed MDS and are into speciality or general partitioning in different dental colleges of India from November 2020 to March 2020. A total of 1601 dentists enrolled in the study. A self-fabricated questionnaire was prepared and validated. It was made into Google Form format and the link was emailed and shared among the eligible participants. There were twenty self-explanatory closed-ended questions themed on "Root Canal Treatment practices".

Results: The study findings depict that most of the dentists treated multi-rooted tooth and it was seen that the MDS other branch practitioners treated more than ten patients every week followed by Endodontists. It was seen most of the dentists preferred the combination method of working length determination and the technique of instrumentation. A strong correlation between the number and type of tooth treated with the preference of drug prescribed was observed.

Conclusion: The study findings reveal that there is still a lack of adaptation of various modern endodontic practices, which recommends the need to incorporate training of the postgraduate students about the advanced methods of endodontic practice.

Key Words: Endodontists, Survey, Endodontic practices, Dentists, Nationwide survey, Questionnaire

INTRODUCTION

Endodontic in the field of dentistry is a constantly evolving speciality. Modern endodontic treatment protocols are persistently under the scanner as it encompasses different types of armamentarium, techniques, and materials which are promoted every day. However, adapting to the latest techniques does not always translate into a success rate of treatment. Thereby, a better comprehension of the current trends enclosing operating microscopes, nickel-titanium rotary devices, ultra-sonic endodontic tips and techniques of working length determination, prescription of certain drug regimens,

and many more holds prime importance, as they affect the daily endodontic practice.

Not only the above factors but also the number of patients encountered by practising dental health care professionals paramount to the reason behind why certain techniques or methods of instrumentation are taken up by these professionals. This enables one to have a clear understanding of the suggested failure rates in endodontic treatment which escalate up to 78.8% as stated by Iqbal et al.¹

A Questionnaire survey serves as a prevalent method to study the drastic change in scenarios about all the above-

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mentioned factors.² The following web-based survey not only throws light on the materials and methodology but also the importance of dentist to population ratio and the increasing tendency of patient referrals to specialist dentists. This survey will help in spotting the lacunae in the current protocols and reveal the ratio of dentists who do not comply with the already established guidelines. The purpose of the current study is to investigate the attitude of the dentists towards modern endodontic treatment options and to study the association of the no. of patients treated and the type of tooth treated with the preferred method of working length determination, method of magnification, instrumentation and the drug regimen followed by them.

MATERIALS AND METHODS

A questionnaire-based cross-sectional, descriptive survey was conducted among the dentists who are enrolled under the Masters of Dental Surgery (MDS) (postgraduates) curriculum or have completed MDS and are into speciality or general partitioning in different dental colleges of India from November 2020 to March 2020.

Sample Population

The total study population was divided into four groups: Endodontist, MDS-other branch, Dentists enrolled in MDS – Endodontia, and also MDS other branch students. A total of 2100 Dentist were approached for the survey through email conversation; finally, 1601 dentists enrolled for the study. A total of 76.23% was the response rate. The dentists who practised root canal treatment regularly either in the clinic or in the college and willingly participated in the survey were included.

Sampling

Proportionate multistage cluster random sampling methodology was adopted. The country was fractionated into five different zones: Central zone, Northern zone, Southern zone, Eastern zone, and Western zone. Uneven dispensation of the dental colleges in the divided zones indicated a proportionate random sampling technique. The southern zone had the highest density of dentists while the eastern zone had the least. The list of colleges imparting MDS courses was made and the colleges were randomly selected using the lottery method. The list of the practitioners satisfying the inclusion criteria was attained from the state dental council and the postgraduates who fulfilled the criteria were enlisted from the Heads of the colleges.

Sample size calculation

G Power 3.0 software was used to determine the minimum sample size. A minimum of 625 dentists was required for the study.

Questionnaire

A self-fabricated questionnaire was prepared and validated. It was made into Google Form format and the link was emailed and shared among the eligible participants. There were twenty self-explanatory closed-ended questions themed on “Root Canal Treatment practices” among the dentists. There were three sections in the questionnaire: Pre-treatment equipment usage for root canal treatment; preferred methods of instrumentation and the most commonly used techniques during Root Canal Treatment and postoperative drug regimen. The total questions including the demographic questions added up to twenty-eight. Cronbach’s alpha value was calculated for each subscale to know the reliability coefficient. A high internal consistency was indicated with $\alpha = 0.97$.

Pilot study

A pilot survey was hosted with 50 eligible subjects to know about the feasibility, uniform understanding, and difficulty related to the study before the main study. These participants were excluded from the main study. Institutional ethical committee permission was obtained (KIMS/KIIT/IEC/14/2019). All the participating dentists were requested to digitally sign an informed consent form before proceeding with the questionnaire. A copy of the completed responses was mailed to the participants and they were not allowed to edit their responses further.

Statistical Analysis

Data was imported to MS EXCEL Version 2016 from Google Sheet. The data were manually coded in MS Excel and IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp. program was used to statistically interpret the data. Inferential statistics (means and standard deviation) were calculated along with the Chi-square test for the comparison between the group and in-between various zones. $P < 0.05$ was considered to be statistically significant.

RESULTS

The study findings depict that most of the dentists treated multi-rooted tooth and it was seen that the MDS other branch practitioners treated more than ten patients every week followed by Endodontists. The difference between the groups was statistically significant ($P < 0.0001$).

The difference between the study groups was seen to be statistically significant for the study variables. It was seen most of the dentists preferred the combination method of working length determination and the technique of instrumentation. It was seen that most of the dentists did not use any method of magnification. Most of the Endodontists preferred analgesics only (56%) while most of the endodontic Postgraduates preferred antibiotics as a drug regimen (51.6%) (Table 2).

A strong correlation between the number and type of tooth treated with the preference of drug prescribed was observed. The correlation among the variables was significant for the

number and type of treated tooth and the working length determination, methods of instrumentation, and methods of magnification (Table 3).

Table 1: Demographics of the study population

Variable		PG ENDO (N %)	PG OTHER BRANCH (N %)	MDS OTH-ER BRANCH (N %)	MDS ENDO (N %)	χ ²	P-value
Type of Tooth	Single-rooted	44(12.6)	28(5.1)	45(10.0)	30(11.9)	1680.397	<0.0001*
	Multi-rooted	298(85.4)	521(94.9)	406(90.0)	218(86.5)		
Avg no. of RCT's per week	0-5	272(77.9)	310(56.5)	90(20.0)	19(7.5)	77.35	<0.0001*
	5-10	52(14.9)	149(27.1)	202(44.8)	79(31.3)		
	>10	18(5.2)	90(16.4)	159(35.3)	150(59.5)		

Table 2: Intergroup comparison of the study variables

Variable		PG ENDO (N %)	PG OTHER BRANCH (N %)	MDS OTH-ER BRANCH (N %)	MDS ENDO (N %)	χ ²	P-value
Working length determination	Radiographs	123(35.2)	189(34.4)	79(17.5)	75(29.8)	1135.127	<0.0001*
	EAL	57(16.3)	79(14.4)	21(4.7)	23(9.1)		
	Combination	159(45.6)	281(51.2)	345(76.5)	154(61.1)		
Technique of instrumentation	Hand	112(32.1)	140(25.5)	40(8.9)	10(4.0)	1953.328	<0.0001*
	Rotary	37(10.6)	69(12.6)	238(52.8)	130(51.6)		
	Combination	190(54.4)	340(61.9)	173(38.4)	112(44.4)		
Methods of magnification	Loupes	39(11.2)	120(21.9)	190(42.1)	77(30.6)	556.218	<0.0001*
	Microscopes	16(4.6)	31(5.6)	19(4.2)	31(12.3)		
	Both	47(13.5)	54(9.8)	24(5.3)	12(4.8)		
	None	247(70.8)	344(62.7)	218(48.3)	132(52.4)		
Antibiotic And Analgesics	Antibiotics	180(51.6)	308(56.1)	207(45.9)	106(42.1)	1445.114	<0.0001*
	Analgesics	160(45.8)	230(41.9)	228(50.6)	141(56.0)		
	Combined	9(2.6)	10(1.8)	15 (3.3)	5 (2.0)		

Table 3: Correlation (Pearson's) of the no. of the tooth treated and the type of tooth treated with working length determination, methods of instrumentation, methods of magnification, and drug preference

Variable		Working length determination	Methods of instrumentation	Methods of magnification	Drug Preference
No. of Tooth treated	r value	0.271	0.075	-0.243	0.001
	P value	<0.0001**	0.003*	<0.0001***	0.985
Type of tooth treated	r value	0.148	0.114	-0.139	0.010
	P value	<0.0001**	<0.0001***	<0.0001***	0.695

DISCUSSION

The present study was the first of its kind in comparing the endodontic practices among the postgraduates enrolled under different specialities, the Endodontists and also the MDS completed practitioners practising root canal procedures. These groups were selected for the study purpose to focus on the variations of modern endodontic practices amongst dentists in India. The adoption of the electronic method of survey added to the wide distribution of the questionnaire among the eligible participants. The response rate (76.23%) was less as compared to other surveys conducted on general

dentists in India where the response rate was found to be 88%.³ This could be attributed to a busy schedule or lack of interest in participating in surveys.

Working length determination

Molyneux et al. reported that 44.5% of the general dental practitioners in England used the EAL method of working length determination.⁴ The European Consensus along with the Royal College of General Dental Practitioners' guidelines recommend the combined use of EALs and radiographic techniques for working length determination to avoid.^{5,6} Lee et al. concluded that 70% of the participants

used digital radiographic techniques as compared to a conventional radiographic technique for the same.⁷ In a study conducted by Gupta et al.⁸ including general practitioners in India, 44% of the participants reported using radiographic methods of working length determination as compared to our study where most of the dentists (45-61%) were using combined methods (radiographic and EAL). Another nationwide Indian study conducted by Kohli et al. reports a similar finding where he found 55% of the dentist using combined methods for working length determination.⁹ Minimum usage of the EAL method was reported by the MDS other branch practitioners in the present study. This could be attributed to a more accurate combined method of working length determination. The accuracy of the modern endodontic apex locators have been reported by many authors, but are usually used in combination with radiographic techniques due to the additional information about the tooth anatomy that is governed by the radiographs and that radiographs provided a permanent record.¹⁰

Technique of instrumentation

Jenkins et al. reported the use of K-files (36%) for instrumentation among the younger dentists as compared to the more experienced ones. The findings were similar to our study where 35.2% of the PG-Endodontics and 34.4% of the PG other branch professionals used hand instruments.¹¹ In a nationwide survey conducted in Iran, Raouf et al. reported that 65.4% of the dentist's used hand instruments and 40% of them used rotary instruments.¹² Peru et al. reported that 91% of the dental practitioners preferred combined techniques of instrumentation as compared to only 5% of them preferring hand instruments or rotary instruments only.¹³ Rajbhandari et al. in their study found that 87.5% of the Endodontists in Nepal preferred the rotary technique of instrumentation.¹⁴ The present study findings (54.5%) were following a nationwide survey conducted by Kohli et al. where he reported that 71% of the dental practitioners preferred combined methods of instrumentation.⁹ The quality of instrumentation was established to be better with rotary instruments as reported in multiple studies,¹⁵⁻¹⁸ although a combination of instruments was quite commonly used by the dentists. This is because, before rotary instrument usage, hand instruments were commonly used by dentists to enlarge the canals.¹⁹ The use of hand instruments could be physically tiring and also requires more time. Thus, more experienced practitioners or those practitioners doing more number cases preferred combined technique of instrumentation.

Methods of magnification

The utilization of ultrasonics was found to be more in America as reported in studies.^{7,20} The overall utilization of magnification devices in India was comparatively less than the studies reported.^{7,21,22} Low use of magnification methods

among the general dental practitioners in Chennai city.²³ These findings were following the present study where it has been seen that there is low utilization of magnification techniques. This could be attributed to lack of equipment in the training institutes and lack of practice among other branch postgraduates other than Endodontists which subsequently lead to inappropriate confidence to practice regularly.²⁴

Antibiotic and Analgesics

Jayadev et al., in their study about the knowledge and practices of dentists towards antibiotic and analgesic usage, reported that 55.1% of the dentists do not prescribe antibiotics post root canal treatment.²⁵ This study also infers that only 31.7% of the participants were informed about the prophylactic usage of antibiotics. Multiple studies were conducted based on the preference of antibiotic and analgesic groups prescribed by dentists in India, but a scanty of articles reported about the drug choice. This could be attributed to the subjective symptoms which lead the dentist to prescribe drugs. Also, the severity of infection, the duration of infection, the symptoms of the patients were factors governing the prescription of the dentists. The present study shows that most of the dentists either preferred analgesics or antibiotics and only a few dentists preferred a combined drug therapy during and post endodontic procedures.

Strength and Limitation

The present study compared the practices of the postgraduate students enrolled under various MDS Specialities and practising endodontics and the MDS completed dentists who practice endodontics regularly. This was one of a kind to date. The effort has been made to recruit dental professionals from the entire country to improve the generalizability of the study. The study design could have been better if the exploratory component is incorporated in this study. Future recommendations for hosting qualitative study designs to research the reasons for adopting various modern endodontic methods are the need of the hour.

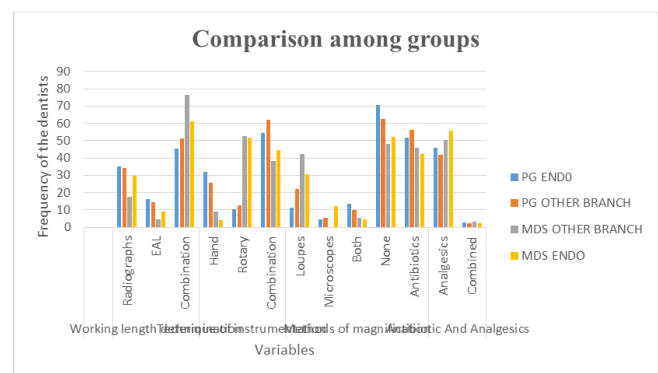


Figure 1: Group-wise comparison of the various procedures used in Root canal treatment.

CONCLUSION

The present study compared the various modern endodontic practice methods adopted by various groups including Postgraduates pursuing MDS in Endodontics, Postgraduate students pursuing MDS in other branches, Indian Endodontists, and MDS in other branches. The study findings reveal that there is still a lack of adaptation of various modern endodontic practices, which recommends the need to incorporate training of the postgraduate students about the advanced methods of endodontic practice.

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