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Comparison of Knowledge and Awareness of Rotary Endodontics among Dental Interns Studying in Various Colleges in North India: A Questionnaire based Study

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KEYWORDS

Awareness,

Dental interns,

Rotary endodontics.

ABSTRACT:

Introduction: Nickel–titanium (NiTi) rotary instrumentation has transformed root canal therapy by improving efficiency, precision, and clinical outcomes. However, its knowledge and practical adoption among dental interns remain insufficiently explored.

Objectives: To assess the knowledge, awareness, and clinical exposure to rotary endodontics among dental interns studying in government and private dental colleges in North India.

Methods: A structured questionnaire was distributed among dental interns to evaluate theoretical knowledge, training sources, hands-on experience, and confidence in using rotary endodontic systems, including endomotors and apex locators. The data was analyzed using SPSS software (v26.0), with results presented as frequency and percentage.

Results: The study revealed that although most interns demonstrated awareness of rotary endodontic instruments, limited hands-on experience and reduced confidence in using advanced devices were observed, highlighting a discrepancy between theoretical knowledge and clinical training.

Conclusions: The study concludes that there is a need for enhanced, standardized, and clinically oriented training in rotary endodontics to improve intern competence and preparedness for independent practice.

1. Introduction

In order to preserve natural teeth and prevent tooth loss, endodontic treatment—especially root canal therapy—is essential. This has a big impact on patient health and dental care in general. Traditionally, endodontic procedures have relied heavily on stainless steel (SS) manual instruments. While these instruments are effective, they often result in longer treatment times and an increased risk of procedural errors such as canal transportation, ledging, and instrument fracture. With the advent of rotary instrumentation, particularly nickel-titanium (NiTi) rotary files, there has been a significant shift in endodontic practice. NiTi rotary instruments are preferred for their flexibility, resistance to fracture, and superior cutting efficiency. These properties, which provide increased accuracy, fewer procedural errors, and better treatment results, have completely changed root canal therapy [1]

The integration of rotary instruments into clinical practice has drastically simplified the treatment process, reducing the number of tools needed and minimizing operator fatigue. Because of their extreme superelasticity, rotary instruments allow dentists to perform more complex treatments while maintaining the root canal anatomy. This advancement has greatly increased the predictability and success rate of endodontic treatments. Despite the many advantages of rotary endodontics , its adoption among general dental practitioners (GDPs) has not been universal. Barriers such as the high cost of equipment, lack of formal training, and limited exposure during dental education have resulted in a slower uptake of rotary instruments in

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some regions [2] In India, the shift towards rotary endodontics is still evolving. The adoption of NiTi rotary files is relatively new, and there is considerable variation in how dental schools incorporate these modern techniques into their curriculum. Although dental interns receive foundational training in various dental procedures, including endodontics, the extent of exposure to advanced techniques like rotary instrumentation often varies significantly across institutions. [3] This disparity in training can lead to gaps in the knowledge and practical skills required for efficient use of rotary instruments, which is crucial as dental interns transition from theoretical learning to real-world clinical practice.

Dental interns, who are in the final stage of their undergraduate education, represent the future of the dental profession. As they prepare to enter clinical practice, it is essential that they are proficient in modern endodontic techniques, including rotary instrumentation. Their preparedness to handle advanced endodontic procedures directly impacts the quality of care they provide to patients. Despite the critical importance of these skills, there is limited research on the knowledge and awareness of rotary endodontics among dental interns, particularly in North India. Understanding the level of awareness and the factors influencing their confidence in using rotary instruments is essential for identifying gaps in dental education and ensuring that future dental professionals are equipped with the necessary skills to meet modern clinical demands. [4]

This study aims to explore the knowledge and awareness of rotary endodontics among dental interns studying in various government and private dental colleges in North India. By assessing the theoretical understanding, practical proficiency, and overall awareness of rotary instrumentation, the study seeks to identify the areas where training and education on rotary endodontics can be enhanced. Given the advancements in endodontic techniques and the importance of equipping dental interns with these skills, this study aims to provide insights that can help shape the future of dental education, ensuring that rotary endodontics is adequately incorporated into dental curricula across the country.

2. Objectives

The objective of this study was to explore the knowledge and awareness of rotary endodontics among dental interns studying in various government and private dental colleges in North India. By assessing the theoretical understanding, practical proficiency, and overall awareness of rotary instrumentation, the study seeks to identify the areas where training and education on rotary endodontics can be enhanced. Given the advancements in endodontic techniques and the importance of equipping dental interns with these skills, this study aims to provide insights that can help shape the future of dental education, ensuring that rotary endodontics is adequately incorporated into dental curricula across the country.

3. Methods

The manuscript of this laboratory study has been written according to the Preferred Reporting Items for Laboratory studies in Endodontology (PRILE) 2021 guidelines.

A cross-sectional, questionnaire-based study was conducted to assess the knowledge and awareness of rotary endodontics among dental interns studying in various government and private dental colleges in North India. The study aimed to evaluate the level of training received by dental interns, identify the sources of their knowledge, and explore factors influencing their proficiency and confidence in performing rotary endodontic procedures.

Study Design

The study was designed as a cross-sectional survey targeting dental interns from a range of institutions, including both government and private dental colleges in North India. A well-structured questionnaire was developed to gather data on the interns' theoretical knowledge, practical skills, and overall awareness of rotary endodontics The questionnaire consisted of multiple-choice questions (MCQs), ensuring easy categorization and analysis of responses.[5]

Participant selection

The target population included interns undergoing Bachelor of Dental Surgery (BDS) internship. Both male and female interns from recognized government and private dental colleges in North India were eligible to participate. Participation was voluntary, and only interns who provided informed consent were included.

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Questionnaire Development

Based on a review of existing literature and expert opinion a structured, self-administered questionnaire was designed. The questionnaire comprised multiple-choice questions divided into four sections:

1. Demographic details (age, gender, type of institution)
2. Theoretical knowledge of rotary endodontics
3. Practical exposure and use of rotary systems
4. Confidence and perception regarding rotary instrumentation

Information regarding sources of knowledge, including lectures, demonstrations, workshops, and self-study, was also recorded.[6] (Table 1)

Validation and Reliability

The questionnaire was evaluated for content validity by a panel of endodontic specialists. A pilot study was conducted among a small group of interns to assess clarity and comprehension. Necessary modifications were made based on feedback before final dissemination.

Data Collection Procedure

The finalized questionnaire was distributed electronically via email and messaging platforms (e.g., WhatsApp) to dental interns in selected colleges. Only one response per participant was permitted. Data collection was carried out over a period of four weeks.

Ethical Considerations

Ethical clearance was obtained from the Institutional Ethics Committee [IPDC/SS/2024/1859C(4)] prior to the study. Digital informed consent was obtained from all participants. Confidentiality of responses was maintained.

Statistical Analysis

Data were compiled and analyzed using SPSS software version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were expressed as frequency and percentage. Chi-square test was used to evaluate associations between variables such as type of institution and confidence level. A p-value <0.05 was considered statistically significant.

4. Results

A total of 270 dental interns from government and private dental colleges across North India participated in the study. The mean age of participants was 23.48 ± 2.12 years. Among them, 71.1% were females and 28.9% were males. A majority (74.1%) were from private colleges, while 25.9% were from government institutions. (Table 2)

Overall, 94.4% of interns were aware of rotary endodontics, indicating high theoretical exposure. However, only 52.2% had received formal training, and nearly half lacked hands-on experience, demonstrating a gap between awareness and clinical application.(Table 3)

Among those without formal training, 94.4% agreed that rotary endodontics should be incorporated into the undergraduate curriculum, reflecting recognition of its clinical importance.(Table 4)

The majority of dental interns who received training in rotary endodontics reported that it was provided through their respective colleges (64.4%). A slightly higher proportion of government college interns (72.9%) received training through their institutions compared to private college interns (61.5%)(Table 5)

While 64.8% correctly identified Nickel-Titanium (Ni-Ti) as the standard material for rotary files, 30.7% incorrectly selected stainless steel, indicating conceptual gaps. Only 29.6% reported replacing rotary files after every use, whereas 47.0% believed replacement after 3–5 uses was adequate, suggesting inconsistency in knowledge of safety protocols33.3% of interns were unaware of the difference between rotary and reciprocating files, indicating a need for better theoretical instruction on instrumentation mechanics.

Additionally, 33.3% of interns were unaware of the difference between rotary and reciprocating systems. Although 90.7% were familiar with the endomotor and 85.9% with apex locators, only 23% rated their knowledge of endomotor usage as very good, while 38.9% rated it as fair or poor.

Most interns (67.8%) recognized the advantages of rotary instrumentation, including improved efficiency, cleaning ability, and procedural safety.

These findings highlight a clear gap between theoretical awareness and clinical preparedness, emphasizing the

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need for structured hands-on training in rotary endodontics during undergraduate education.

TABLE 1 : Demographic Details

Variable	Estimate
Age	23.48 ± 2.12
Gender	Male: 78 (28.9%) Female: 192 (71.1%)
College	Government: 70 (25.9%) Private: 200 (74.1%)

TABLE 2 : How would you rate your understanding of rotary endodontics?

		Government	Private	Total	p-value
Excellent	**n**	11	46	57	0.270
	%	15.70%	23.00 %	21.10 %	
Good	**n**	38	82	120	
	%	54.30%	41.00 %	44.40 %	
Fair	**n**	16	56	72	
	%	22.90%	28.00 %	26.70 %	
Poor	**n**	5	16	21	
	%	7.10%	8.00 %	7.80 %	

The majority of the government and private college students rated their understanding of rotary endodontics as good and there was a non-significant difference in their responses.

TABLE 3 : Have you received professional training in rotary endodontics as part of your dental curriculum?

		Government	Private	Total	p-value
No	**n**	23	106	129	0.005*
	%	32.90%	53.00 %	47.80 %	
Yes	**n**	47	94	141	
	%	67.10%	47.00 %	52.20 %	

A significantly greater proportion of government students received professional training in rotary endodontics than the private college students.

TABLE 4 : If yes, where did you receive the training from?

		Government	Private	Total	p-value
College	**n**	51	123	174	0.232
	%	72.90 %	61.50 %	64.40 %	
While working in a private dental clinic	**n**	7	28	35	
	%	10.00 %	14.00 %	13.00 %	
Workshops/ certificate courses	**n**	12	49	61	
	%	17.10 %	24.50 %	22.60 %	

The majority of the government and private college students received the training from college and there was a non-significant difference in their responses.

Discussion

The present study evaluated the knowledge, awareness, and training experience related to rotary endodontics among dental interns in North India. The findings demonstrated high theoretical awareness but notable deficiencies in clinical training, confidence, and technical understanding, emphasizing the need for structured inclusion of rotary endodontics in the undergraduate curriculum.[7]

Almost all respondents were aware of rotary endodontics, indicating widespread exposure during undergraduate education. However, self-assessed

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understanding varied considerably, suggesting differences in the depth and quality of training across institutions. Similar trends have been reported in previous studies evaluating awareness and usage of rotary instrumentation among dental students and practitioners.[8]

While 52.2% of interns reported receiving formal training in rotary endodontics , nearly half of the participants had not received any hands-on exposure. Among those trained, most received instruction within their colleges, although a notable portion pursued external workshops or private clinical experiences. The high percentage of interns (94.4%) advocating for its inclusion in the curriculum suggests a strong perceived need for formalized training in this domain.

One of the most important findings is the inconsistency in conceptual clarity. Although 64.8% correctly identified Nickel-Titanium as the preferred material for rotary files, over 30% incorrectly selected stainless steel—indicating a theoretical knowledge gap. Similarly, a third of the respondents were unaware of the difference between rotary and reciprocating endodontic systems. Such misunderstandings can have clinical implications, particularly as the mechanical behavior and application protocols for these systems differ substantially.[9]

Encouragingly, interns showed a strong understanding of the advantages of rotary instrumentation. The majority acknowledged the benefits of improved efficiency, better cleaning, reduced fatigue, and lower chances of procedural errors.[10] Furthermore, a significant proportion were familiar with adjunct tools such as the Endo motor (90.7%) and apex locator (85.9%), though self-assessed knowledge was moderate to poor in a considerable number of cases. This suggests that while the tools are introduced during training, opportunities for meaningful, supervised clinical usage may be limited.[11]

Clinical protocols such as irrigation practices and file replacement frequency also revealed variable responses. While 43.7% of interns used all standard irrigants (NaOCl, CHX, and Saline), a notable percentage relied solely on one, and 5.2% did not use any of the common solutions. Similarly, views on rotary file replacement varied, with only 29.6% opting for single-use replacement—a recommended best practice to avoid file separation—indicating a gap in safety protocol adherence.[12,13]

Overall, the findings suggest that although interns are aware of rotary endodontics and its relevance, their clinical preparedness and technical confidence remain areas of concern. The lack of standardization in training content and hands-on exposure across institutions contributes to this inconsistency. These insights are consistent with previous literature, which has highlighted that formal training, especially with real clinical exposure, significantly improves confidence and proficiency in rotary endodontics.

Limitations

This present study relied on self-reported responses, which may be subject to response bias and overestimation of knowledge or skills. Although participants were recruited from multiple institutions, the findings may not fully represent all dental colleges across India.

Future Directions

Future studies should incorporate objective assessments of clinical competence and evaluate the impact of curriculum-integrated rotary endodontic training modules. Development of standardized national guidelines for undergraduate endodontic training may help ensure uniform exposure to rotary instrumentation and improve clinical preparedness among dental graduates.

Conclusion

Within the limitations of this study, dental interns demonstrated high awareness of rotary endodontics but limited clinical exposure and confidence in its use. Variability in training experiences across institutions highlights the need for a standardized, practice-oriented undergraduate curriculum with greater emphasis on hands-on training and evidence-based protocols. Strengthening clinical training in rotary endodontics will help improve competence, confidence, and quality of endodontic care among future dental practitioners.

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Legends for Tables

Table 1

QUESTIONS	ANSWERS
1) Have you heard about rotary endodontics before	Yes No
2) If, yes, where did you first learn about rotary endodontics?	College Workshop Online Platform Peer Discussion Others Not Applicable
3) How would you rate your understanding of rotary endodontics?	Excellent Good Fair Poor
4) Have you received professional training in rotary endodontics as part of your dental curriculum?	Yes No
5) If yes, where did you receive the training from?	College Workshop/Certificate courses While working in a private dental clinic
6) If no, do you think it should be included in the curriculum?	Strongly agree Agree Neutral Disagree
7) Which material is commonly used for rotary endodontics?	Stainless steel Ni-Ti Plastic Carbin fibre
8) What are the advantages of using rotary endodontic instruments over traditional hand files?	Increased efficiency Reduced operator fatigue Better cleaning and shaping Lower risk of canal transportation All of the above
9) Are you familiar with what an Endo motor is ?	Yes No
10) How would you rate your knowledge of an Endo motor?	Very good Good Fair Poor
11) Have you heard of an apex locator?	Yes No
12) Are you aware of the difference between rotary and reciprocating endodontic files?	Yes No
13) Which irrigation solutions do you commonly use during root acnal treatment?	Sodium Hypochlorite (NaOCL) Chlorhexidine(CHX) Saline All of the above None of the above
14) How often should rotary files be replaced?	After every use After 3-5 uses After 10 uses When it exhibits sign of wear
15) How do you clean and sterilize rotary files?	Ultrasonic cleaner Autoclave Chemical disinfectant Manual ceaning

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