https://doi.org/10.54361/ajmas.258323

Original article

Preference for Using Rotary Endodontic Instruments Among Endodontists and General Practitioners in Tripoli, Libya

Rabia Daaeki, Ahmed Nouha, Sumaya Aghila*

Department of Conservative and Endodontic, Faculty of Dentistry, University of Tripoli, Libya.
Corresponding Email. S.aghila@uot.edu.ly

Abstract
Nickel-titanium (NiTi) rotary instruments have revolutionized root canal treatments by enhancing efficiency, accuracy, and patient outcomes. Despite their advantages, there is limited evidence explaining the factors influencing the adoption of nickel-titanium (NiTi) rotary instruments among general practitioners and endodontists in Tripoli, Libya. This study aimed to investigate the usage patterns, influencing factors, and practitioner perceptions regarding rotary versus hand instrumentation during root canal treatment among dentists in Tripoli, Libya**.** A cross-sectional, questionnaire-based survey was randomly distributed to 300 general dental practitioners and endodontists practicing in both public and private dental centers in Tripoli, Libya. The questionnaire comprised 12 structured items addressing participants' demographic profiles, professional designations, clinical experience with rotary instrumentation, preferred file systems, and key factors influencing instrument selection. Data collection was conducted through both manual distribution and electronic dissemination via online platforms. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated. Data analysis was performed using SPSS version 25.0, with a significance level set at $p < 0.05$. The survey revealed that the clinical preference for endodontic instrumentation among Libyan dental professionals is significantly influenced by the type of clinical setting. Rotary systems were more frequently utilized in private clinics, whereas hand instrumentation remained predominant in public healthcare centers. University and hospital environments tended to adopt a blended approach, integrating both techniques. Neither gender nor level of specialization demonstrated a statistically significant association with the type of instrumentation selected. However, practitioner training and case complexity emerged as the primary determinants influencing instrument choice. Cost sensitivity was notably higher among endodontists compared to general practitioners. Among the file systems used, E. Flex was the most widely adopted overall. Endodontists showed a clear preference for the T.Pro system, while other specialists more commonly selected ProTaper files.
Keywords. Rotary Instruments, Hand Instruments, Endodontists, General Practitioners.

Introduction

Endodontic treatment plays a vital role in contemporary dental practice, focusing on the preservation of natural teeth through the effective management of pulpal and periapical pathologies. One of its core objectives is the thorough cleaning and shaping of the root canal system, an essential step for achieving long-term treatment success [1]. Traditionally, this has been carried out using stainless steel hand instruments. However, the inherent rigidity and limited flexibility of these instruments have been associated with procedural complications, such as canal transportation and ledge formation [2], ultimately contributing to reduced treatment success rates [3]. Over the past two decades, root canal preparation techniques and associated instrumentation have undergone significant advancements, particularly with the introduction of nickel-titanium (NiTi) rotary systems. The emergence of NiTi rotary instruments has revolutionized endodontic practice by offering superior flexibility and operational efficiency compared to conventional stainless steel hand files [5]. These instruments enhance canal shaping and reduce procedural time [6] while also minimizing the risk of iatrogenic errors often associated with traditional hand instrumentation [7].

Despite these advancements, hand instrumentation, especially using the balanced force technique, remains a fundamental component of endodontic procedures. It is particularly recommended for initial canal negotiation and in the management of challenging canal anatomies or procedural complications. Furthermore, a study has demonstrated comparable clinical and radiographic outcomes between hand and rotary instrumentation techniques, particularly in the treatment of primary teeth [6]. The combined approach that integrates both hand and rotary instrumentation offers a balanced strategy, leveraging the strengths of each to enhance clinical outcomes. Although NiTi rotary systems are widely adopted globally, their usage varies across regions and practitioners, influenced by training, clinical experience, and resource availability.

In Libya, general dental practitioners (GDPs) and endodontic specialists have distinct instrument preferences. Recent studies indicate that while endodontists tend to favor nickel-titanium (NiTi) rotary systems for their efficiency and consistency in canal shaping, a considerable proportion of GDPs continue to rely on traditional hand instrumentation [8]. This reliance may be attributed to limited postgraduate training, financial constraints, or restricted access to rotary systems, particularly in public healthcare settings [9]. However, this trend is gradually shifting as more practitioners engage in continuing education and adopt contemporary endodontic techniques. Understanding current instrumentation practices among

Received*: 11-05-2025 -* ***Accepted****: 09-07-2025 -* ***Published****: 19-07-2025*

Libyan dental professionals is essential for identifying educational and infrastructural gaps and for promoting improved clinical outcomes. Therefore, the present study aims to assess the patterns of instrument use, the factors influencing their selection, and practitioner perceptions regarding rotary versus hand instrumentation in root canal treatment among dentists in Tripoli, Libya.

Methods

Study design

A cross-sectional, questionnaire-based study was conducted among general dental practitioners and endodontists practicing in both public and private dental centers in Tripoli. The study sample comprised 300 dentists, including 185 general practitioners, 54 endodontic specialists, and 61 practitioners from other dental specialties. Participants were recruited from a range of clinical settings, including private dental clinics, government healthcare centers, and university-affiliated hospitals across Tripoli. Data collection was carried out over three months, from April to June 2025.

Data Collection

Data were collected through a combination of Google Forms and hard-copy forms using a structured questionnaire. The questionnaire included 12 multiple-choice questions designed to gather information on participants' demographic characteristics, postgraduate training categorized as general practitioner, endodontic specialist, and other specialists, and clinical experience. Additional items addressed the number of root canal treatments (RCTs) performed per week, the use of hand and/or rotary instruments, and the reasons for not using rotary instrumentation. Undergraduate dental students were excluded from participating in this study.

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 25.0. Descriptive statistics—including frequencies, percentages, means, and standard deviations—were used to summarize demographic data, clinical practices, and instrument preferences. The chi-square test was employed to assess associations between demographic variables and instrument selection, as well as to compare influencing factors across different dental specialists. A p-value of < 0.05 was considered statistically significant.

Results

Figure 1 illustrates the demographic and professional distribution of the participants. Gender distribution was nearly equal, with males slightly more represented (50.3%). The majority of respondents were general practitioners (61.7%), followed by specialists (20.3%) and endodontists (18.0%). Nearly half of the practitioners worked in private clinics (48.3%), with the rest distributed between government centers (26.3%) and university/hospital settings (25.3%). Most dentists (93.0%) reported performing root canal treatment (RCT), while only 8.7% did not perform any. Regarding the frequency of RCTs, over three-quarters of respondents performed fewer than 10 cases per week.

Received*: 11-05-2025 -* ***Accepted****: 09-07-2025 -* ***Published****: 19-07-2025*

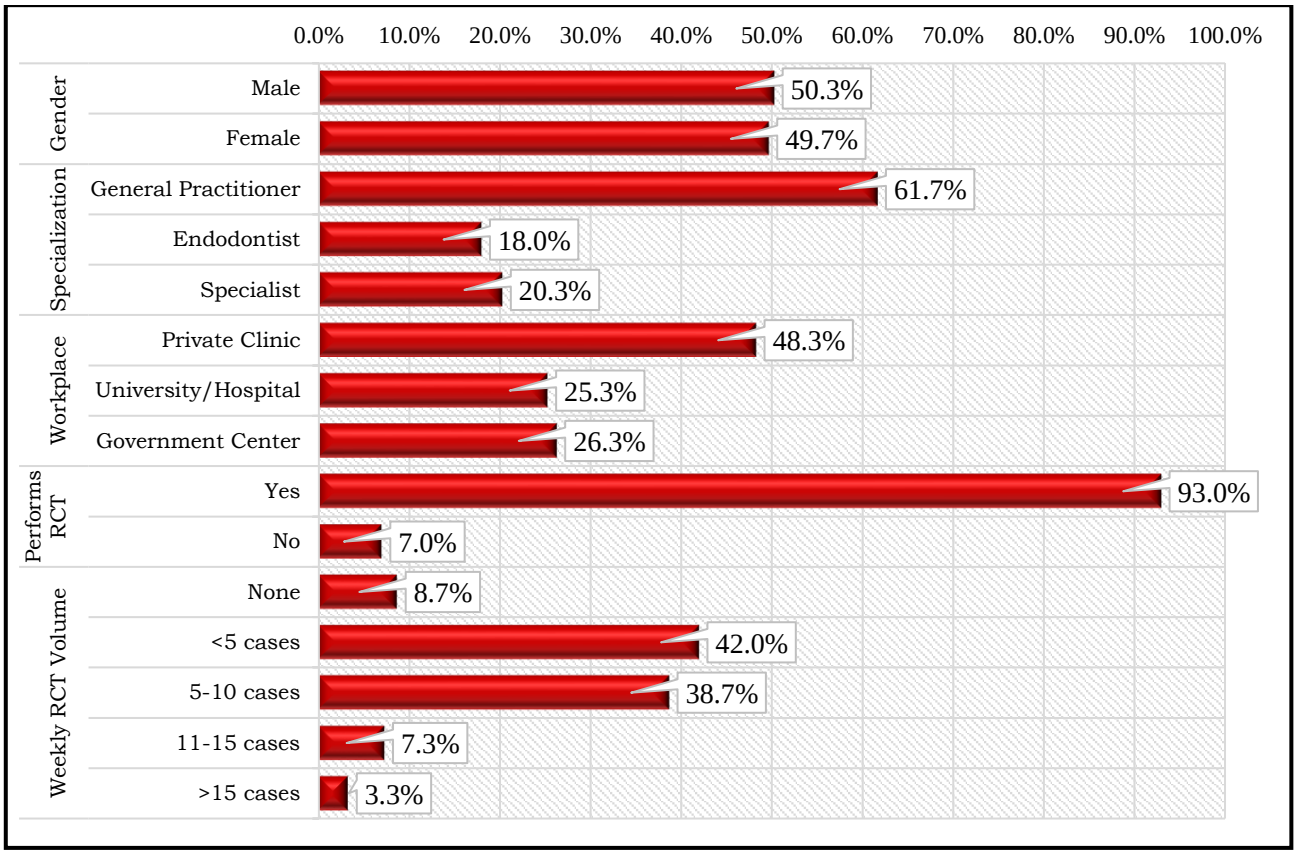

Figure 1: Demographic and Practice Profile Among Participants

As shown in Figure 2, the majority of respondents 76.3% utilized a combination of hand and rotary instruments in endodontic procedures. A smaller proportion relied exclusively on rotary instruments (14.3%), while only 9.3% used hand instruments alone.

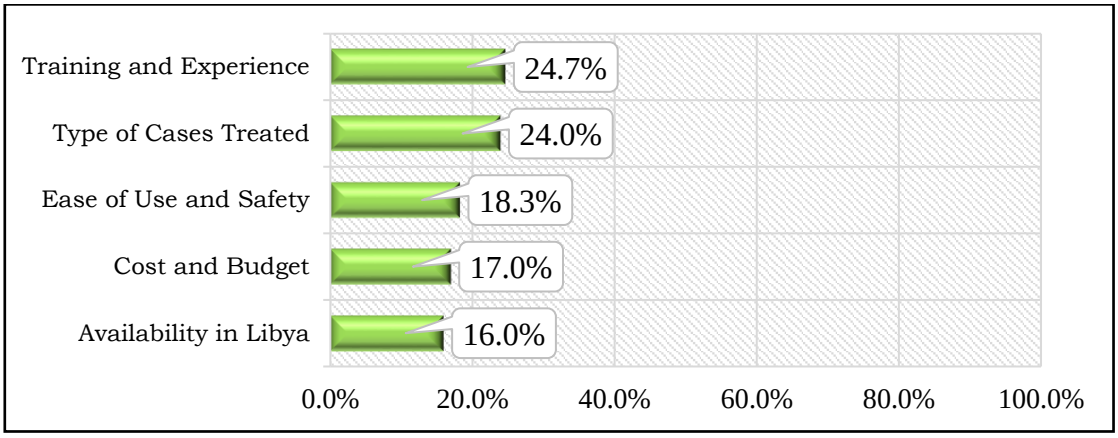

Figure 2. Distribution of Instrumentation Preferences Among Participants

Table 1 presents the relationship between demographic variables and instrument choice. No statistically significant difference was found between gender and instrumentation preference (p = 0.564). Similarly, specialization was not significantly associated (p = 0.125), although endodontists exclusively used rotary or combined techniques. The workplace setting showed a significant association with instrumentation preference (p < 0.001). Practitioners in private clinics predominantly used rotary instruments alone (72.1%), while those in government centers were more likely to use only hand instruments (67.9%). University-based practitioners favored using both methods (27.9%).

Table 1. Distribution of Instrumentation Preferences by Gender, Specialization, and Workplace

Received*: 11-05-2025 -* ***Accepted****: 09-07-2025 -* ***Published****: 19-07-2025*

Variable	Category	Hand Only n (%)	Rotary Only n (%)	Both n (%)	p-value
Gender	Male	12 (42.9)	24 (55.8)	115 (50.2)	0.564[C]
	Female	16 (57.1)	19 (44.2)	114 (49.8)	
Specialization	General Practitioner	21 (75.0)	27 (62.8)	137 (59.8)	0.125[C]
	Endodontist	0 (0.0)	7 (16.3)	47 (20.5)	
	Specialist	7 (25.0)	9 (20.9)	45 (19.7)	
Workplace	Private Clinic	3 (10.7)	31 (72.1)	111 (48.5)	**0.001[C]**
	University/Hospital	6 (21.4)	6 (14.0)	64 (27.9)	
	Government Center	19 (67.9)	6 (14.0)	54 (23.6)	

C; Chi-square test. p < 0.05 is considered significant

Figure 3 outlines the primary factors influencing instrument choice. Training and experience were the most cited factors (24.7%), followed closely by case complexity (24.0%). Ease of use and safety reported for 18.3%, cost and budget 17.0%, and availability of instruments within Libya 16.0%.

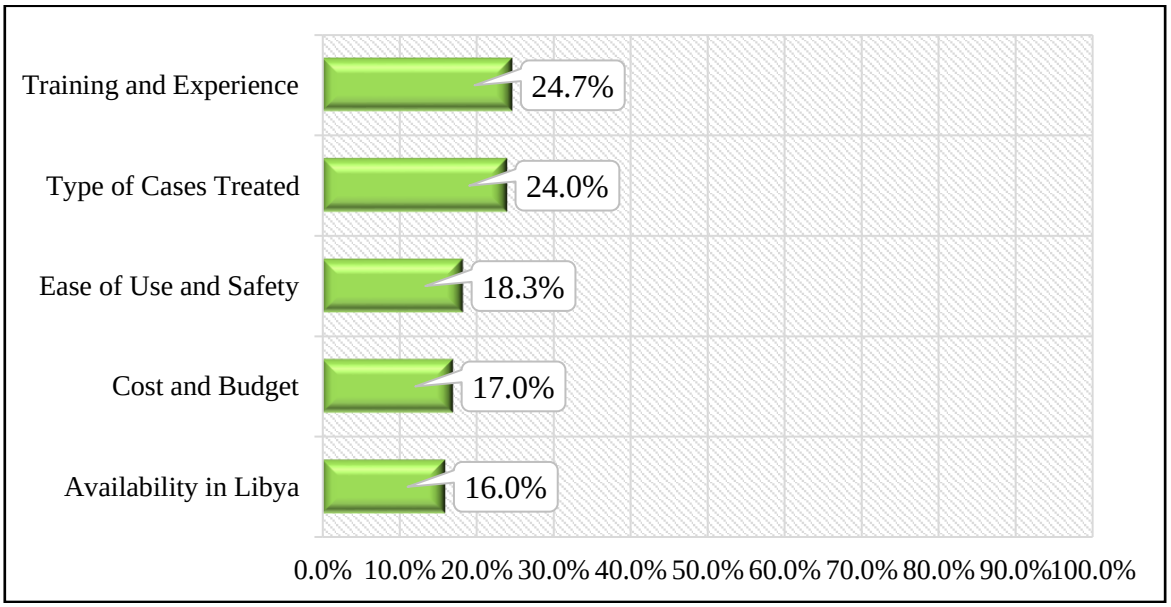

Figure 3: Key Factors Influencing Instrumentation Preferences

Table 2 explores these factors across dental specialties. Ease of use and safety were significantly more important among specialists (p = 0.048). General practitioners valued training most (27.0%), while endodontists prioritized case complexity (29.6%) and cost (31.5%) more than others.

Table 2. Distribution of Key Factors Influencing Instrumentation Preferences by Specialty

Factor	GP n (%)	Endodontist n (%)	Specialist n (%)	*p*-value
Ease of Use and Safety	34 (18.4%)	6 (11.1%)	15 (24.6%)	0.048[C]
Training and Experience	50 (27.0%)	9 (16.7%)	15 (24.6%)	
Type of Cases Treated	43 (23.2%)	16 (29.6%)	13 (21.3%)	
Cost and Budget	27 (14.6%)	17 (31.5%)	7 (11.5%)	
Availability in Libya	31 (16.8%)	6 (11.1%)	11 (18.0%)	

C; Chi-square test. p < 0.05 is considered significant.

As shown in Table 3, the majority (93.3%) agreed that specialization influenced their choice of instruments. Nearly all (98.7%) affirmed that clinical experience impacted their confidence in rotary use. Furthermore, 86.7% attended rotary training.

Table 3: Practitioner Agreement with Statements on Instrumentation and Confidence

Statement	Agreement %

Received*: 11-05-2025 -* ***Accepted****: 09-07-2025 -* ***Published****: 19-07-2025*

Specialization influences instrument choice	93.3%
Experience affects confidence	98.7%
Attended rotary training	86.7%

(Figure 4) shows reasons for not adopting rotary instruments. The most common reason was previous procedural failure (61.7%), followed by cost (20.0%), fear of file fracture (7.0%), lack of training (5.7%), limited access (5.3%), and personal preference for hand instruments (0.3%).

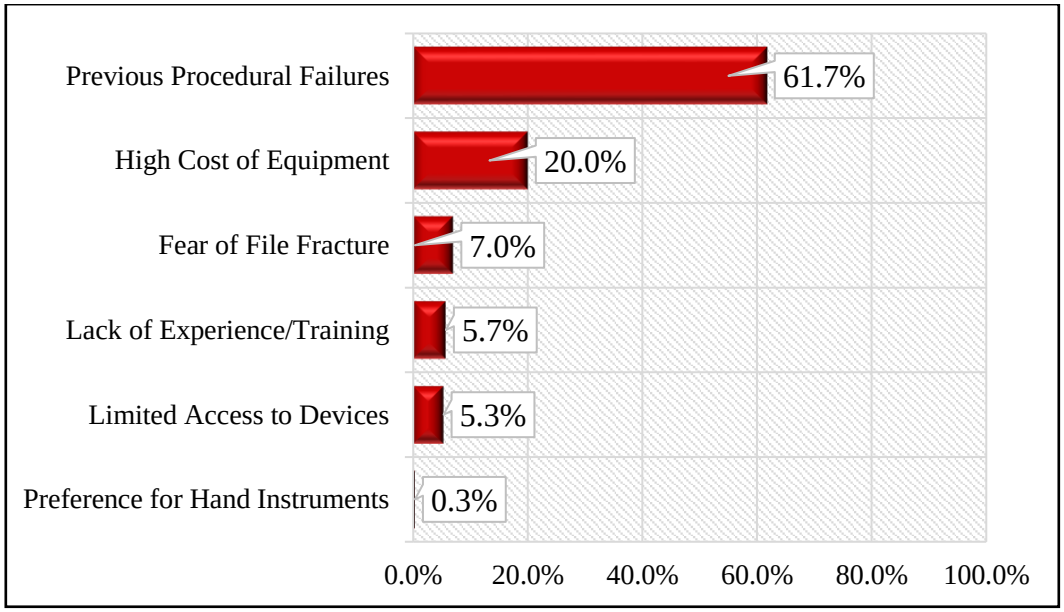

Figure 4: Reasons for Non-Adoption of Rotary Instruments Among Participants

The frequency of specific rotary systems used by the participants is detailed in (Table 4). The most used system was E. Flex (24.7%), followed by T Pro (22.0%) and M Pro (13.7%). Less commonly used systems included Rain (13.0%), ProTaper (8.7%), Reciproc Blue (8.7%), Rogin (6.0%), and Wave One Gold (3.3%).

Table 4. Distribution of Rotary Instrument Systems Used Among Practitioners

Rotary System	Frequency	Percentage (%)
E. Flex	74	24.7%
T Pro System	66	22.0%
M Pro System	41	13.7%
Rain	39	13.0%
ProTaper	26	8.7%
Reciproc Blue	26	8.7%
Rogin System	18	6.0%
Wave One Gold	10	3.3%

RCT performance varied by specialty (Table 5). Almost all endodontists (98.1%) and most general practitioners (93.5%) performed RCTs, compared to 86.9% of specialists. Although this difference was not statistically significant (p = 0.056), the number of weekly RCTs performed showed significant variation (p = 0.001). Most general practitioners performed fewer than 5 cases, while endodontists predominantly performed 5–10 cases weekly.

Table 5: Root Canal Treatment Practices by Dental Specialty

Variable	General Practitioner n (%)	Endodontist n (%)	Specialist n (%)	*p*-value
Do you perform RCT in your practice?				

Received: *11-05-2025* - ***Accepted***: *09-07-2025* - ***Published***: *19-07-2025*

Yes	173 (93.5%)	53 (98.1%)	53 (86.9%)	0.056
No	12 (6.5%)	1 (1.9%)	8 (13.1%)	
Average number of RCTs per week				
0.00	19 (10.3%)	1 (1.9%)	6 (9.8%)	0.001
<5	99 (53.5%)	9 (16.7%)	18 (29.5%)	
5–10	49 (26.5%)	35 (64.8%)	32 (52.5%)	
11–15	11 (5.9%)	8 (14.8%)	3 (4.9%)	
>15	7 (3.8%)	1 (1.9%)	2 (3.3%)	

C; Chi-square test. $p < 0.05$ is considered significant

Rotary usage patterns across specialties are presented in Table 6. E. Flex was the most used system overall, but endodontists showed higher usage of T Pro (33.3%) and Reciproc Blue (14.8%). Specialists preferred ProTaper (19.7%). A statistically significant association existed between rotary system choice and specialty (p = 0.007). Regarding the factors influencing instrumentation preference, only cost and budgetary considerations demonstrated a statistically significant variation across specialties (p = 0.006). Endodontists (31.5%) were more cost-conscious compared to general practitioners (14.6%) and specialists (11.5%). Other factors—such as ease of use, training, case type, and local availability—did not show statistically significant differences.

Table 6: Rotary Systems Used and Influencing Factors by Dental Specialty

Variable / System	General Practitioner n (%)	Endodontist n (%)	Specialist n (%)	p-value
Rotary System Used				
Pro Taper	12 (6.5%)	2 (3.7%)	12 (19.7%)	0.007[C]
Wave One Gold	5 (2.7%)	3 (5.6%)	2 (3.3%)	
Reciproc Blue	14 (7.6%)	8 (14.8%)	4 (6.6%)	
Rogin System	12 (6.5%)	4 (7.4%)	2 (3.3%)	
E. Flex	49 (26.5%)	12 (22.2%)	13 (21.3%)	
Rain	30 (16.2%)	0 (0.0%)	9 (14.8%)	
T Pro System	35 (18.9%)	18 (33.3%)	13 (21.3%)	
M Pro System	28 (15.1%)	7 (13.0%)	6 (9.8%)	
Factors influencing instrumentation preference				
Ease of Use & Safety	34 (18.4%)	6 (11.1%)	15 (24.6%)	0.176[C]
Training & Experience	50 (27.0%)	9 (16.7%)	15 (24.6%)	0.299[C]
Type of Cases Treated	43 (23.2%)	16 (29.6%)	13 (21.3%)	0.538[C]
Cost & Budget	27 (14.6%)	17 (31.5%)	7 (11.5%)	0.006[C]
Availability in Libya	31 (16.8%)	6 (11.1%)	11 (18.0%)	0.542[C]

C; Chi-square test. $p < 0.05$ is considered significant.

Among 300 respondents, 296 (98.7%) affirmed that rotary systems expedite root canal procedures, while only 4 (1.3%) disagreed.

Received*: 11-05-2025 -* ***Accepted****: 09-07-2025 -* ***Published****: 19-07-2025*

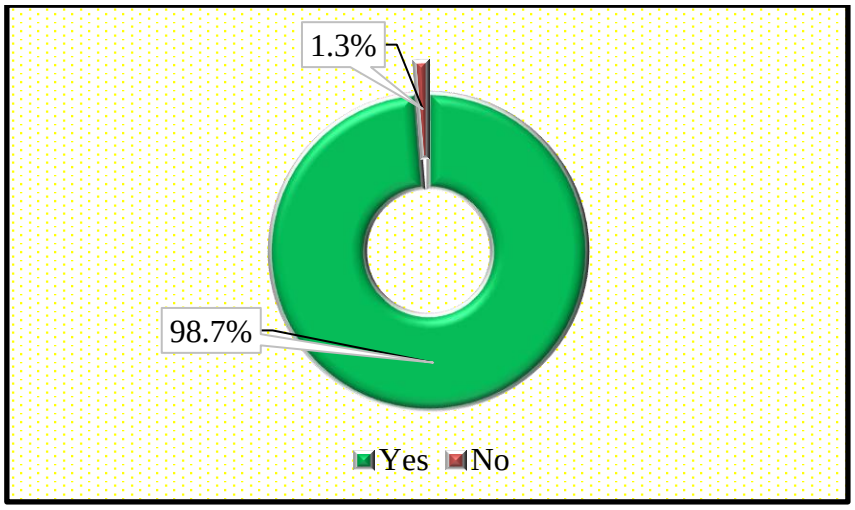

Figure 5. Practitioner Perceptions on Rotary Instrumentation Perceived Time Efficiency

Discussion

Despite its high success rate, effective RCT requires clinical expertise, time, and access to appropriate instrumentation [10]. In Libya, the number of endodontic specialists is steadily increasing, and the adoption of advanced technologies has contributed to the evolution of root canal treatment protocols.

This cross-sectional study examined the usage patterns and perceptions of rotary and hand instrumentation among dental practitioners in Tripoli, Libya. Among the 300 respondents, 61.7% were general practitioners, including 18% endodontists, and 20.3% from other specialties. Nearly half of the practitioners (48.3%) worked in private clinics, while the rest were distributed across government centers (26.3%) and university/hospital settings (25.3%). These demographics are comparable to previous regional studies conducted in Saudi Arabia [11], Tehran [12], and Taibah University [13].

In the present study, 93.0% of participants reported routinely performing RCTs, closely aligning with the 96.4% reported by Azeez et al. in Iraq [14]. This is notably higher than in earlier studies, such as CheAb Aziz et al. (2006) [15], likely since the current study was conducted in 2025, when advancements in endodontics and increased access to postgraduate training.

The gender distribution was balanced (50.3% male), with no statistically significant association between gender and instrumentation preference ($p = 0.564$). This is consistent with findings from Tehran [12] and contrasts with other regional studies [11,16,17], which observed gender-based differences in the adoption of advanced techniques. The difference could be attributed to the fact that female and male dental practitioners participate in the same ongoing and on-the-job training courses, resulting in improved understanding and greater adoption of new treatments.

Previous studies have established a direct relationship between the average number of teeth treated per week and the use of nickel-titanium (NiTi) rotary instruments [18,19]. In the present study, over three-quarters of respondents reported performing fewer than ten root canal cases per week. This finding aligns with data from a study conducted in Tehran, where 38.5% of participants used NiTi instruments to treat between 6 and 10 teeth per week [12], and is consistent with the findings of Parashos and Messer as well as Madarati et al. [1,13]. However, it contrasts with other studies that reported higher treatment volumes [20], possibly due to differences in the types of rotary systems employed. The relatively low case volume in Tripoli may be attributed to several factors, including the growing number of dental graduates, limited clinical opportunities, and the relatively small population size in both Tripoli and Libya as a whole. Additionally, younger dentists, who often begin their careers as assistants to more experienced practitioners, tend to treat fewer cases weekly. This limited clinical exposure may hinder their skill acquisition and confidence in using advanced techniques such as rotary instrumentation. Therefore, structured mentorship and supervision by experienced clinicians are essential to support the professional development of early-career dentists and enhance their competence in endodontic procedures.

A majority of respondents (76.3%) reported using a combination of hand and rotary instruments. Only 14.3% relied solely on rotary systems, while 9.3% used hand files exclusively. These findings are consistent with previous studies in Libya [22] and Iraq [14] and like the findings of Logsdon et al. [1,21–25]. The growing popularity of NiTi rotary instruments is likely due to their flexibility, efficiency, and safety, particularly in curved canals [27,28]. However, in contrast to the findings of the present study, a 2013 study by Gaikwad et al. [29] reported that 71.2 percent of dentists relied on hand instruments and were generally reluctant to adopt advanced engine-driven procedures for shaping the root canal system, while just 12.6% used rotary instruments. Furthermore, the Danish study found that only 18% of Copenhagen dentists frequently negotiated root canals [30]. The explanation behind the present findings is that the dentists in Libya are aware of the advantages of utilising NiTi-RIs over SSIs, which include increased resistance to failure, greater

Received*: 11-05-2025 -* ***Accepted****: 09-07-2025 -* ***Published****: 19-07-2025*

centring ability [12,31], reduced instrumentation time [32], fewer procedural errors, and the potential for enhanced treatment outcomes [33].

The clinical setting in the current study significantly influenced instrumentation preference. Rotary systems were most frequently employed by practitioners in private clinics (72.1%), whereas those in government centers used mainly hand instruments (67.9%). University-based practitioners preferred employing both strategies (27.9%). These findings are consistent with those in Taibah, Saudi Arabia [13], while 75% of those working in hospital dental clinics did not use NiTi-RIs because they saw no advantage, 42% of those working in community dental clinics did so owing to the high cost [34]. This study clearly shows that different forms of practice, with diverse settings and funding, might influence dentists' preferences for using NiTI-RIs. The financial support for employing NiTi-RIs in ordinary dental practices in government centers and it is generally accepted that private medical centers in Tripoli, Libya, are more advanced than government facilities.

The current study found that training and experience were the most frequently noted characteristics, closely followed by case complexity. Ease of use and safety were reported, as well as the cost and budget of equipment in Libya. This conclusion is consistent with those in Iraq [14], which demonstrated that dental practitioners' failure to use rotary endodontic instruments was due to a lack of skills in using rotary endodontic instruments for RCTs. This hesitation could be linked to a lack of continuous training courses and, as a result, GDPs' unfamiliarity with the tools, device accuracy, and high equipment costs.

98.7% of dentists in the present study agreed that rotary technologies speed up root canal procedures. In addition, the most important reason for using rotary in the current study was ease of use, and safety was substantially more important among specialists. General practitioners rated training the most (27.0%), whereas endodontists valued case complexity (29.6%) and cost (31.5%) over others. This was compatible with the results revealed by Parashos& Messer and Mozayeni et al., which were 73% and 59%, respectively [1,12]. Though faster root-canal instrumentation is a desirable feature, it should not be overemphasized.

The most common reason for not using rotary tools was past procedural failure, followed by expense, concern of file fracture, a lack of training, limited access, and a personal preference for manual instruments. In a study by Mosad et al. [11], the reasons for not using rotary endodontics were determined; it was noticed that lack of availability was the most frequently stated reason, followed by a lack of education, and only 1.6% of respondents felt that there was no perceived advantage to using rotary endodontic instruments. On the other hand, in an Australian study [1], the top cause was a lack of education and training, while a study in Tehran [12] found that the most important reason for not adopting NiTi equipment seemed to be a lack of education. This study demonstrates that a dentist's years of experience have a direct impact on the dentist's ability to manage failures and hardships experienced during treatment, most likely due to greater knowledge gained over time and continued clinical practice [35].

According to the findings of this study, E. Flex (24.7%) was the most utilised system, followed by T Pro (22.0%) and M Pro (13.7%). Rain (13.0%), ProTaper (8.7%), Reciproc Blue (8.7%), Rogin (6.0%), and Wave One Gold (3.3%) were some of the less popular systems. This frequency differs from the previous study, which showed that the most desired rotary instrument is Mtwo by 40%, followed by 20% K3, 18% Protaper, 6% Heroshaper, and 6% [36]. The study in Khartoum, Sudan, revealed that the Pro Taper system is the most used when compared to other systems. The current findings differed from those of Guobin Yang et al. [37] and the American Board of Endodontists, who found that ProFile or ProTaper were the most utilised rotary files [10,12]. Also, the present finding contrasts with the study on Saudi Arabian dentists [38], which revealed that only 27.5% of practitioners used the ProTaper file system. While in a study by Orafi et al. in Libya (2021) [39], the highest proportion of respondents (42.1%) used M3Pro Gold, other studies showed that the ProTaper rotary file was used by most endodontists (86.2%). These results could be due to its availability in various nations, cost considerations play a major role making some systems are more accessible to general practitioners or public sector clinics., and ease of use, institutional procurement policies and promotional efforts by manufacturers could also influence adoption rates, particularly in settings where purchasing decisions are made at the organizational level rather than by individual clinicians.

In the current study, nearly all endodontists (98.1%) and most general practitioners (93.5%) conducted RCTs, compared to 86.9% of specialists. Although the difference was not statistically significant, it differed from the results of the Iranian's study [16], which found a substantial association between dental practitioners' experience (general practitioner vs. specialist) and the rate of usage of innovative endodontic procedures. In 2005, Reith and Bjorndal in Denmark reported a 10% use rate for NiTi rotary files [40]. According to Lee et al., 28% of study patients utilized NiTi rotary files in the United States in 2009 [41]. In 2002, Slaus and Bottenberg reported NiTi hand file utilisation rates of 47% and 50%, respectively [42]. Other investigations have found 1.6-22% utilisation rates for NiTi rotary files [1,41,40,43]. The results of the current study suggests that the use of new endodontic devices and treatments is becoming more common as dental practitioners' knowledge and expertise improve and reflect the remarkable progress in the field of dental services in the city of Tripoli in Libya and the extent of the ambition of dentists there to improve the quality of service for their patients. An additional reason is that the rapid advancement in endodontic education and training, particularly in urban centers like Tripoli, has played a key role in equipping new graduates. The time gap could be a major factor for the difference between previous investigations and the

Received*: 11-05-2025 -* ***Accepted****: 09-07-2025 -* ***Published****: 19-07-2025*

current one. Likely reflects the awareness of the clinical benefits of NiTi rotary instrumentation—such as increased efficiency, safety, and preservation of canal anatomy—has grown, so too has its adoption.
Finally, to present study findings underscore the complex interplay of practice environment, specialty focus, and practical considerations shaping endodontic instrumentation preferences in Libya. Addressing key barriers, particularly cost and technical proficiency, requires targeted strategies such as enhanced hands-on training and tailored clinical guidelines to optimize care delivery across diverse practice settings.

Conclusion

This study demonstrates that the workplace setting is the most significant determinant of endodontic instrumentation choice among Libyan dentists. Practitioners in private clinics predominantly adopt rotary systems, while those in government centers primarily rely on hand instrumentation. University and hospital-based clinicians favor a combined approach. Although gender and specialization type showed no significant association with technique selection, endodontists exclusively utilized rotary or hybrid methods and performed substantially more root canal treatments weekly than general practitioners. Training and clinical experience emerged as the primary overall factors guiding instrumentation preferences, alongside case complexity. However, distinct specialty-driven priorities were observed: endodontists emphasized cost considerations and case-specific demands, specialists prioritized ease of use and safety, while general practitioners valued training most highly. Despite widespread participation in rotary training, procedural challenges and economic constraints remained the foremost barriers to broader adoption. Rotary system preferences also varied significantly by specialty, with E.Flex being the most popular overall. Endodontists predominantly opted for T.Pro systems, whereas specialists most frequently used ProTaper. Cost sensitivity was most pronounced among endodontists. These findings underscore the need for enhanced hands-on training programs, cost-reduction strategies for rotary technologies, and tailored clinical guidelines that account for workplace resources and specialty-specific requirements to optimize endodontic care in Libya.

Conflicts of Interest

There are no financial, personal, or professional conflicts of interest to declare.

References

1. Fadl FB, Aghila S, Hakoma MB, Jedeh M. Current trends in endodontic clinical practice in Tripoli, Libya: a cross-sectional study. AlQalam J Med Appl Sci. 2025 Jun 21:1137-47.
2. Aboalgaith E, Ragab E, Altayib A. A survey of standard protocols for endodontic treatment among general dental practitioners in Zawia, Libya. Khalij-Libya J Dent Med Res. 2023 Nov 7:137-45.
3. Serene TP, Adams JD, Saxena A. Nickel-titanium instruments: applications in endodontics. St. Louis: CV Mosby; 1995. p. 80-96.
4. Sigurdsson A. Evaluation of success and failure. In: Walton RE, Torabinejad M, editors. Principles and practice of endodontics. 3rd ed. Philadelphia: WB Saunders Company; 2002. p. 331-45.
5. Grande NM, Castagnola R, Minciacchi I, Marigo L, Plotino G. A review of the latest developments in rotary NiTi technology and root canal preparation. Aust Dent J. 2023 Jun;68 Suppl 1:S24-S38.
6. Salem S, Agila N, Alkesher S. Shaping Ability of Three Ni-Ti Rotary Systems in Curved Root Canals of Extracted Teeth. Khalij-Libya J Dent Med Res. 2022;6(1):6–10.
7. AlRahabi M. Clinical performance of rotary vs. manual root canal instrumentation: a systematic review. J Endod Res. 2023;49(2):55-61.
8. Elmehdi A, Al-Tayeb M, Faraj A. Patterns of endodontic practice among Libyan dentists: a national survey. Libyan Dent J. 2023;17(1):23-30.
9. Ali R, Ghandour A. Endodontic instrumentation methods among general practitioners in Libya. Afr J Dent Educ. 2022;11(4):112-8.
10. Sjogren U, Hagglund B, Sundqvist G, Wing K. Factors affecting the long-term results of endodontic treatment. J Endod. 1990 Oct;16(10):498-504.
11. Altammami MF, Al-Oraini AA, Alotaibi AN, Alkhashman AA, Alshalawi MM, Almuhraj NA, et al. The use of rotary nickel-titanium endodontic instruments by dental practitioners in Saudi Arabia: a cross-sectional study. Med Sci. 2020;24(105):3017-23.
12. Mozayeni MA, Golshah A, NikKerdar N. A survey on NiTi rotary instruments usage by endodontists and general dentists in Tehran. Iran Endod J. 2011 Fall;6(4):168-75.
13. Madarati AA, Habib AA. Modalities of using endodontic nickel-titanium rotary instruments and factors influencing their implementation in dental practice. BMC Oral Health. 2018 Nov 21;18(1):192.
14. Azeez SM. Choice of rotary instrument usage among endodontists and general practitioners: a questionnaire survey. Med J Babylon. 2021;18:428-34.
15. Che Ab Aziz ZA, Abdullah M, Vello CDS, Thangavelu K. General dental practitioners' knowledge and practice on root canal treatment. Ann Dent. 2006;13:12-7.
16. Elham FG, Sedigheh Z. The use of instruments by Iranian endodontics and general practitioners. Open Dent J. 2012;6:105-10.
17. Tay KL, Wu JM, Yew MS, Thomson WN. The use of newer technologies by New Zealand dentists. N Z Dent J. 2008 Sep;104(3):104-8.
18. Jenkins SM, Hayes SJ, Dummer PM. A study of endodontic treatment carried out in dental practice within the UK. Int Endod J. 2001 Jan;34(1):16-22.

Received*: 11-05-2025 -* ***Accepted****: 09-07-2025 -* ***Published****: 19-07-2025*

19. Reit C, Bergenholtz G, Caplan D, Molander A. The effect of educational intervention on the adoption of nickel-titanium rotary instrumentation in a Public Dental Service. Int Endod J. 2007 Apr;40(4):268-74.
20. Barbakow F, Lutz F. The 'Lightspeed' preparation technique evaluated by Swiss clinicians after attending continuing education courses. Int Endod J. 1997 Jan;30(1):46-50.
21. Logsdon J, Dunlap C, Arias A, Scott R, Peters OA. Current trends in use and reuse of nickel-titanium engine-driven instruments: a survey of endodontists in the United States. J Endod. 2020 Mar;46(3):391-6.
22. Orafi I. Opinions and attitudes of general dental practitioners in Libya towards the intracanal separation of endodontic instruments. Libyan J Sci Technol. 2022;11(2):126-35.
23. Madarati AA, Watts DC, Qualtrough AJE. Opinions and attitudes of endodontists and general dental practitioners in the UK towards the intra-canal fracture of endodontic instruments: part 1. Int Endod J. 2008 Aug;41(8):693-701.
24. Giragosyan H, Filipo I. Survey of the usage of endodontic instruments. Int J Adv Res. 2025;13(1):699-704.
25. Patil TN, Saraf PA, Penukonda R, Vanaki SS, Kamatagi L. A survey on nickel titanium rotary instruments and their usage techniques by endodontists in India. J Clin Diagn Res. 2017 May;11(5):ZC29-ZC35.
26. Barbakow F, Lutz F. The 'Lightspeed' preparation technique evaluated by Swiss clinicians after attending continuing education courses. Int Endod J. 1997 Jan;30(1):46-50.
27. Ataide IDN, Wagle R, Ferandes M. The quality of canal preparation using stainless steel hand and nickel-titanium rotary instrument. Endodontology. 1995;7:25-34.
28. Guelzow A, Stamm O, Martus P, Kielbassa AM. Comparative study of six rotary nickel-titanium systems and hand instrumentation for root canal preparation. Int Endod J. 2005 Oct;38(10):743-52.
29. Gaikwad A, Jain D, Rane P, Bhondwe S, Taur S, Doshi S. Attitude of general dental practitioners toward root canal treatment procedures in India. J Contemp Dent Pract. 2013 May;14(3):528-31.
30. Sjögren U, Figdor D, Persson S, Sundqvist G. Influence of infection at the time of root filling on the outcome of endodontic treatment of teeth with apical periodontitis. Int Endod J. 1997 Sep;30(5):297-306.
31. Schäfer E, Lohmann D. Efficiency of rotary nickel titanium FlexMaster instruments compared with stainless steel hand K-Flexofile - part 2. Cleaning effectiveness and instrumentation results in severely curved root canals of extracted teeth. Int Endod J. 2002 Jul;35(7):514-21.
32. Glosson CR, Haller RH, Dove SB, Del Rio CE. A comparison of root canal preparations using NiTi hand, NiTi engine-driven, and K-flex endodontic instruments. J Endod. 1995 Apr;21(4):146-51.
33. Cheung GS, Liu CS. A retrospective study of endodontic treatment outcome between nickel-titanium rotary and stainless-steel hand filing techniques. J Endod. 2009 Jul;35(7):938-43.
34. Thomas MB, Locke M, Dummer PH. A survey of adoption of endodontic nickel-titanium rotary instrumentation part 2: community and hospital dental practitioners in Wales. Br Dent J. 2013 Feb;214(3):E7.
35. Awooda EA. A survey of usage parameters of nickel-titanium rotary files among dentists working within private clinics in the city of Khartoum, Sudan. Saudi J Oral Dent Res. 2020 Sep;5(9):485-8.
36. Patturaja K, Leelavathi L, Jayalakshmi S. Choice of rotary instrument usage among endodontists: a questionnaire study. Biomed Pharmacol J. 2018;11(2):1-8.
37. Yang G, Yuan G, Yun X, Zhou X, Liu B, Wu H. Effects of two nickel-titanium instrument systems, Mtwo versus ProTaper universal, on root canal geometry assessed by micro-computed tomography. J Endod. 2011 Oct;37(10):1412-6.
38. Alowi WA, Maganur PC, Manoharan V, et al. Knowledge and practice of rotary instrumentation in primary teeth among Saudi Arabian dentists: a cross-sectional study. Int J Clin Pediatr Dent. 2022;15(S1):97-102.
39. Alfirjani S, Orafi I, Abdullah A. The implementation of endodontic rotary instrumentation in Libyan dental practice by general dental practitioners: a cross-sectional study. Libyan J Med Sci. 2022;6(4):221-7.
40. Bjorndal L, Reit C. The adoption of new endodontic technology amongst Danish general dental practitioners. Int Endod J. 2005 Jan;38(1):52-8.
41. Lee M, Winkler J, Hartwell G, Stewart J, Caine R. Current trends in endodontic practice: emergency treatments and technological armamentarium. J Endod. 2009 Jan;35(1):35-9.
42. Slaus G, Bottenberg P. A survey of endodontic practice amongst Flemish dentists. Int Endod J. 2002 Sep;35(9):759-67.
43. Peciuliene V, Maneliene R, Drukteinis S, Rimkuviene J. Attitudes of general dental practitioners towards endodontic standards and adaption of new technology: a literature review. Stomatologija. 2009;11(1):11-4.

Received*: 11-05-2025 -* ***Accepted****: 09-07-2025 -* ***Published****: 19-07-2025*