

# Prevalence and Influencing Factors of Rubber Dam Use among Tunisian Dentists: A Cross-Sectional Study

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## ABSTRACT

**Context:** Despite its undeniable advantages, the rubber dam (RD) is still struggling to claim its rightful place as the most effective used isolation tool in endodontics. The study aimed to estimate the prevalence of RD use during endodontic treatment and to identify factors associated with its use by Tunisian dentists. **Materials and Methods:** A cross-sectional study was conducted. An online Google Form was emailed to a sample of Tunisian dentists, randomly selected from the National Dental Council register. It contains 33 questions divided into five parts: demographic characteristics, general endodontic practice, clinical applications of RD, reasons for not using RD, and alternative methods. The sample size, comprising 300 dentists, was calculated considering a previous prevalence. Chi-square/Fisher exact tests and *t* test have been used to investigate factors influencing RD use. For the multivariable analysis, we used binary logistic regression. **Results:** Among the 174 respondents, 56.3% were women, with a mean age of  $37.7 \pm 6.6$  years. Seventy-three percent did not have postgraduate training on RD placement. Seventy-one percent reported never using RD for root canal treatments (RCTs) during undergraduate study. Forty-four percent used it with variable frequencies. In the univariable analysis, the number of RCTs per week, years of experience, duration of endodontic sessions, age, pre-endodontic buildup, and undergraduate training were associated with RD use. In the logistic regression, the duration of endodontic sessions [adjusted odds ratio (OR) = 1.053; 95% confidence interval (CI) = 1.023–1.083;  $P < 10^{-3}$ ] and the undergraduate training (adjusted OR = 4.625; 95% CI = [1.88–11.378];  $P = 0.001$ ) were associated with RD use. **Conclusion:** The use of RD by Tunisian dentists during endodontic procedures is not common. RD application is associated with the duration of the endodontic session and the undergraduate training. Greater emphasis should be placed on the application of RD at dental school and in clinical practice through continuous dental education programs.

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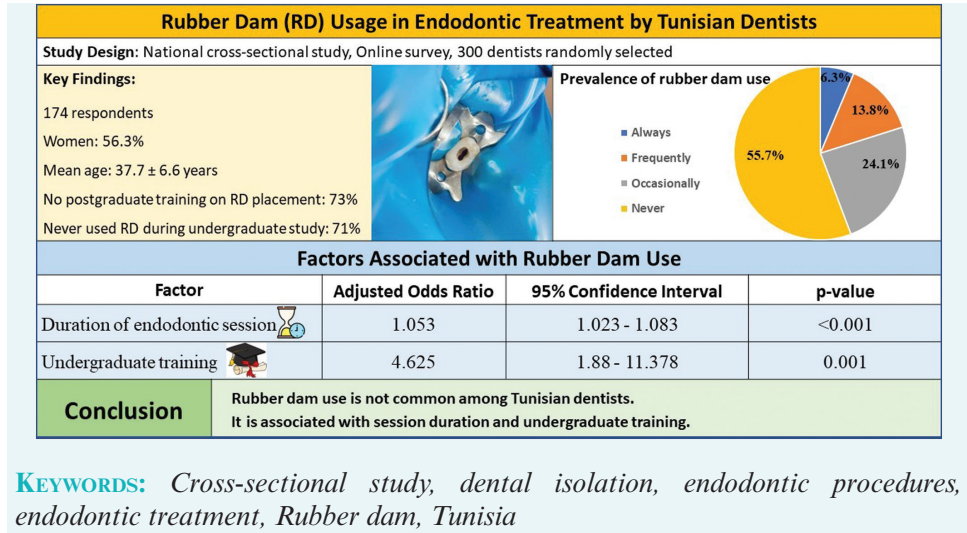
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**INTRODUCTION**

The use of rubber dam (RD) has been universally recommended by professional organizations for some procedures in dentistry. According to the consensus of the European Society of Endodontology published in 2006<sup>[1]</sup> and The American Association of Endodontists' Guide to Clinical Endodontics,<sup>[2]</sup> proper isolation using RD is an essential prerequisite for successful endodontic treatment. It improves vision and access to the operative field, ensures asepsis and controls cross-infection, and enables safety against accidental ingestion and inhalation of instruments and irrigants. It also improves the outcomes of endodontic treatments. Lin *et al.*<sup>[3]</sup> documented the importance of using RD. The survival probability of initial root canal treatment (RCT) using RDs was significantly greater than that observed without the use of RDs.<sup>[3]</sup> Furthermore, studies showed that RD isolation during operative dental procedures is effective and efficient in preventing the spread of bio-aerosol.<sup>[4,5]</sup> Dentists have a responsibility to adopt an evidence-based approach in their clinical practice and oral healthcare. This is commonly known as evidence-based dentistry.

Despite its undeniable advantages, the RD, after more than 150 years of its invention, is still struggling to claim its rightful place as the most widely used isolation tool in restorative dentistry and endodontics. Many questionnaire-based studies have shown a lack of RD use among clinicians in several countries.<sup>[6]</sup> In these investigations, authors were confronted with the question of whether a certain exposure is related to the use of RD. Questions like these can be answered using

multivariable regression analysis. This technique can be used in observational research to adjust for confounders, assess the effect size of risk factors, or develop prediction models.<sup>[7]</sup> Many reasons were reported such as: placement difficulty, time consumption, patients' rejection, lack or insufficient training, and high cost. In addition, gender, undergraduate and postgraduate training, treated tooth and number of RCTs performed, year of qualification, graduation from different dental schools, practice location and type, and high interest in endodontics have been investigated as possible influencing factors. No published studies on the use of RD in Tunisia were found; only one unpublished study conducted in one city (Monastir) was identified. It has shown a lack of RD use among practitioners in this city. A survey on a larger geographical scale should be conducted to assess RD application more broadly in Tunisia. The objectives of this work were to estimate the frequency of RD use during endodontic treatment and to identify influencing factors for using it by Tunisian general dental practitioners (GDP).

**MATERIAL AND METHODS**

A cross-sectional study was conducted using an online survey to investigate the use of RD during endodontic treatment among Tunisian GDP. This survey took place from October 2022 to February 2023. A pilot study was conducted on a group of 10 GDP, to ensure that questions were easily understood. Then, an online Google Form was emailed to a random sample of GDP. The survey link was dispersed to the selected dentists through e-mail for the first time, then social

media (Facebook and Messenger), and finally, phone calls were made to motivate selected dentists to respond to the questionnaire. The results of the responses were received online.

The sample was randomly selected from the National Dental Council register. The inclusion criteria consist of Tunisian dentists who are under 60 years old and currently residing in Tunisia. They should practice endodontics in their private dental office. The exclusion criteria consist of specialist dentists, practitioners who do not work in Tunisia anymore, and practitioners who work in public health care. The sample size was calculated considering an  $\alpha$  error of 5%, power of 80%, and a previous prevalence of 34% of the outcome, with 34% of GDP using the RD in 2018 (according to the unpublished study). The sample size was calculated as  $n = (z_{\alpha/2})^2 pq/i^2$ . Where  $n$  represents the minimum required sample size,  $z$  is 1.96, corresponding to a 95% confidence interval,  $p$  stands for the previous prevalence used for this estimation, and the precision, denoted as  $i$ , is calculated as  $p/5 = 0.068$ .

Thus, a sample of 186 individuals was estimated. Considering potential refusals, we added around 60% to the initial sample size, thus comprising approximately 300 individuals.

The questionnaire was created in the French language. It contains 33 questions and was divided into five parts concerning with demographic characteristics, general endodontic practice, clinical applications of RD, reasons for not using RD and alternative methods, and finally infection control during the COVID-19 pandemic. Published guidelines for good practice in endodontics<sup>[1]</sup> formed the basis of the content of the questionnaire, and all factors described in the literature that could be related to RD use were included.

All the data obtained from the questionnaire were exported from the Google Sheet to an Excel sheet and then transferred to the Statistical Package for the Social Sciences version 25 (IBM Corp., Chicago, IL, USA) software for further analysis. Chi-square/Fisher exact tests have been used to find the significance of study parameters on a categorical scale between two or more groups.  $t$  test has been used to find the significance of study parameters when comparing two means ( $n \geq 30$ ). For the multivariable analysis, we used the binary logistic regression. The independent variables included in the model were: the biological factors (gender, age), all variables that were associated with the use of RD in the univariable analysis ( $P \leq 0.05$ ), and all variables with  $P \leq 0.2$  but also any variable known as related to the use of RD in the literature. We chose backward

stepwise likelihood ratio (LR) method. Hosmer and Lemeshow tests were used to assess the goodness of fit. Two statistics were used to test whether a model is appropriate: the Pearson Chi-square statistic and the LR.

Participants' personal information, including e-mail addresses, remains confidential in web-based surveys, even the data collector will not be able to reveal them.

## RESULTS

Of the 300 selected dentists, eight were discarded for reasons including deceased, overseas (left Tunisia permanently), no longer in practice, or not known at the address, leaving 292 GDP. The overall response rate was  $174/292 = 59.6\%$ . Of the 174 respondents in this study, 76 (43.7%) were men, and 98 (56.3%) were women, with a mean age  $37.7 \pm 6.6$  years. One hundred thirty-eight participants (79.3%) were working in urban areas, 12.1% in rural areas, and 8.6% in suburban areas. One hundred fifty-six (89.7%) participants worked in solo practice, and 10.3% were working in group practice. Seventy-three percent did not have postgraduate training on RD placement. Seventy-one percent reported never using RD for RCTs during undergraduate study. Forty-four percent used it with variable frequencies [Table 1]. On average, an endodontic treatment session lasts (duration)  $34 \pm 15$  min. Single-visit RCT was reported by 43.7% of the respondents. Overall, sodium hypochlorite was the most common endodontic irrigant (93.6%), but it was used with different concentrations [Table 1]. More than 70% of the participants never (14.9%) or rarely (56.9%) make pre-endodontic buildup, while 24.1% and 4% do it frequently or always. If the tooth is broken, 62.33% rebuild it and place RD, and 37.66% do not use RD.

All those who did not use RD reported the reasons for doing so. The principal disincentives suggested to influence nonuse of RD included "unavailability of equipment at work" (53.6%), patient intolerance (28.8%), lack of time (26.8%), insufficient training (22.7%), difficulty in use (19.6%), and uselessness of the RD (8.2%). For 12.4% of respondents, the expense was a disincentive. Seventy-one percent of RD non-users combined at least two other isolation means. Alternatives to RD are cotton roll (72.16%), saliva ejector (48.45%), or throat pack (68.04%). Three practitioners (1.7%) reported that they do not use any isolation means.

Eighty-eight percent of RD users agreed that RD reduces contamination [Table 2]. RD is used by 44.1%, 63.6%, and 94.8% of respondents when performing

**Table 1: Characteristics of included Tunisian dentists and their practices of root canal treatment**

Characteristics of included dentists		Practices of root canal treatment	
Respondents' experience	N (%)	Number of RCTs per week	N (%)
Less than 3 years	20 (11.5%)	1–3	12 (6.9)
Between 3 and 7 years	38 (21.8%)	4–6	57 (32.8%)
Between 7 and 15 years	78 (44.8%)	7–10	50 (28.7%)
Between 15 and 20 years	23 (13.2%)	11–15	29 (16.7%)
Between 20 and 25 years	9 (5.2%)	15–20	12 (6.9%)
More than 25 years	6 (3.4%)	More than 20	14 (8%)
RD use during undergraduate study	N (%)	Endodontic irrigant	N (%)
Never	125 (71.8%)	SH 0.5%	19 (10.9%)
sometimes	35 (20.1%)	SH 1%	10 (5.7%)
Always	14 (8%)	SH 2.5%	56 (32.2%)
Postgraduate training on endodontic	N (%)	SH 3.5%	28 (16.1%)
Yes	74 (42.5%)	SH 5%	50 (28.7%)
No	100 (57.4%)	Saline solution	4 (2.3%)
Postgraduate training on RD placement	N (%)	Chlorhexidine	5 (2.9%)
Yes	47 (27%)	Elses	2 (1.1)
No	127 (73%)	RD use during RCT	N (%)
Interest in further training in RD use	N (%)	Always	11 (6.3%)
Yes	111 (64.2%)	Frequently	24 (13.8%)
No	62 (35.8%)	Occasionally	42 (24.1%)
		Never	97 (55.7%)

RCT = root canal treatment, RD = rubber dam, SH = sodium hypochlorite

anterior, premolar, and molar endodontic procedures, respectively. A total of 93.5% of the users of RD reported failures during RD placement; dental dam sheet tearing (47.3%), lack of sealing (38.1%), and unstable clamp (64.4%) are the most common ones. Other less common difficulties were reported [Table 2].

RD isolation was used by 11.5% of the GDP as a bio-aerosol-reducing procedure, during the COVID-19 pandemic. Aeration time between patients was recognized by 73.5% of participants as a method to reduce bio-aerosol and the chance of COVID-19 cross-infection. Pre-procedural oral rinse (54.6%), high-volume evacuators (16.1%), and avoidance of the use of the high-speed handpiece (11.5%) were other procedures to reduce the bio-aerosol. The combination of pre-procedural oral rinse and aeration time between

**Table 2: The use of rubber dam by Tunisian dentists**

Reasons for using RD	N (%)	
Asepsis	68 (88.3%)	
Practitioner comfort	43 (55.8%)	
Airway protection/safety	42 (54.5%)	
Better visibility and easy access	40 (51.9%)	
Keeping the mouth open during treatment	33 (42.8%)	
Preventing patients from speaking during treatment	15 (19.5%)	
Medical-legal protection	10 (13%)	
Patient comfort	8 (10.4%)	
The use of RD according to the teeth	N (%)	
Maxillary incisors	27 (35%)	
Mandibular incisors	23 (29.8%)	
Maxillary canine	24 (31.1%)	
Mandibular canine	25 (32.4%)	
Maxillary premolars	32 (41.5%)	
Mandibular premolars	46 (59.7%)	
Maxillary molars	45 (58.4%)	
Mandibular molars	66 (85.7%)	
All teeth	17 (22.1%)	
Preferred technique for RD placement	Anterior	Posterior
Two-step technique RD first	6 (7.8%)	13 (16.9%)
Two-step technique clamps first	17 (22.08%)	8 (10.3%)
One-step technique	28 (36.3%)	37 (48%)
No preferred technique	26(33.7%)	19 (24.6%)
Difficulties during RD placement	N (%)	
Limited mouth opening	43 (55.8%)	
Difficulty of taking radiographs	43 (55.8%)	
Insufficient tooth structure	36 (46.7%)	
Difficulty in performing additional anesthesia	29 (37.6%)	
Difficulty in adjusting RD in the interproximal area	22 (28.6%)	
The concerned tooth is a bridge support	13 (16.9%)	
Latex allergy	9 (11.7%)	
Difficulty to breath	2 (2.6%)	
Gag reflex	3 (3.9%)	
Macroglossia	1 (1.3%)	

patients was indicated by 71 (40.8%) dentists. Twenty (11.5%) dentists did not use any procedure. This study did not identify increased reported use of RD during the COVID-19 pandemic; 82.8% reported the same frequency of RD use before and during the COVID-19 pandemic, 12.1% increased their use of RD, and 5.2% used it less than usually.

In the univariable analysis, the number of RCTs per week, years of experience, duration of endodontic sessions, age, pre-endodontic buildup, and undergraduate training were associated with RD use [Table 3].



**Table 3: Univariable analysis of factors influencing the use of rubber dam by Tunisian dentists**

Factors	Rubber dam (RD) use		P value
	Rarely or never	Always or frequently	
Gender			NS
Man	58 (76.3%)	18 (23.7%)	
Woman	81 (82.7%)	17 (17.3%)	
Age	38.4 ± 6.871	34.89 ± 4.861	0.001
DES	31.01 ± 13.704	45.43 ± 15.405	<10 <sup>-3</sup>
NPO			NS
One	128 (82.1%)	28 (17.9%)	
Many	11 (61.1%)	7 (38.9%)	
Single-visit			NS
Yes	59 (77.6%)	17 (22.4%)	
No	80 (81.6%)	18 (18.4%)	
Pre-endodontic buildup			<10 <sup>-3</sup>
Occasionally or never	109 (87.2%)	16 (12.8%)	
Always or frequently	30 (61.2%)	19 (38.8%)	
PT on endodontics			NS
Yes	59 (79.7%)	15 (20.3%)	
No	80 (80%)	20 (20%)	
PT on RD placement			NS
Yes	36 (76.6%)	11 (23.4%)	
No	103 (81.1%)	24 (18.9%)	
Undergraduate training			<10 <sup>-3</sup>
Without RD (never)	111 (88.8%)	14 (11.2%)	
With RD (sometimes, always)	28 (57.1%)	21 (42.9%)	
Region of work			NS
Urban area	123 (80.4%)	30 (19.6%)	
Rural area	16 (76.2%)	5 (23.8%)	
Years of experience			0.003
≤7 years	39 (67.2%)	19 (32.8%)	
>7 years	100 (86.2%)	16 (13.8%)	
Endodontic irrigant			NS
Sodium hypochlorite ≤1%	27 (93.1%)	2 (6.9%)	
Sodium hypochlorite 2.5%	45 (80.4%)	11 (19.6%)	
Sodium hypochlorite 3.5%	23 (82.1%)	5 (17.9%)	
Sodium hypochlorite 5%	36 (72%)	14 (28%)	
Number of RCT per week			0.002
<7	47 (68.1%)	22 (31.9%)	
≥7	92 (87.6%)	13 (12.4%)	

NS = not significant, NPO = number of practitioners per office, DES = duration of endodontic session, RCT = root canal treatment, PT = postgraduate training

**Table 4: Results of multivariable analysis of factors influencing the use of rubber dam by Tunisian dentists**

	OR	95% CI for OR		P value
		Lower	Upper	
Duration of endodontic session	1.053	1.023	1.083	<10 <sup>-3</sup>
Undergraduate training	4.625	1.88	11.378	0.001
Constant	0.14			<10 <sup>-3</sup>

Hosmer and Lemeshow test ( $\chi^2 = 10.804, P = 0.213$ )

Logistic regression was carried out for 12 factors (age, gender, years of experience, region of work, undergraduate training, postgraduate training on RD placement, postgraduate training on endodontics, number of practitioners per office, duration of endodontic session, pre-endodontic buildup, number of RCT per week, and endodontic irrigant). Two statistics are used to test whether a model is appropriate: The Pearson Chi-square statistic and the LR.

Practitioners use RD 1.05 more when the duration of the endodontic session is important. The chance of using RD is 4.6 times higher for dentists who used it during their education compared to those who did not [Table 4].

**DISCUSSION**

Approximately 80% of Tunisian general dentists in private clinics do not use RD for all root canal therapy. Two factors were related to RD use: duration of RCT session ( $P < 10^{-3}$ ) and undergraduate training ( $P < 10^{-3}$ ).

**PREVALENCE OF RD USE**

The use of RD by GDP in Tunisia remains insufficient especially if we consider that just 20.1% declare that they use it regularly or always. In England, a 2020 survey found that 43% of GDP used RD routinely during the disinfection and the obturation of the root canals.<sup>[8]</sup> In India, a 2014 study showed that 19.2% of general dentists used it for all cases of RCT.<sup>[9]</sup> In Saudi Arabia, a survey published in 2016 showed that 21.6% of GDP used RD.<sup>[10]</sup> This was confirmed in another survey where 85.2% of those who were working in the private sector in Saudi Arabia did not use RD.<sup>[11]</sup> In China, 3.1% of GDP recognized using RD “every time” during RCT.<sup>[12]</sup> In the United States, 47% of general dentists reported always using an RD during RCT.<sup>[13]</sup> However, some surveys showed different results: 89% of GDP questioned in the United States (US) use RD in endodontics, with 58% claiming to use it in all their endodontic treatments.<sup>[14]</sup> A study of more than 1000 alumni of one US dental school observed that 11% of dentists never use an RD for endodontic

procedures.<sup>[15]</sup> In New Zealand, 57% use RD regularly in endodontics.<sup>[16]</sup> The prevalence of using RD in developing countries is still relatively low compared with those in developed ones.

#### FACTORS ASSOCIATED WITH THE USE OF RD

There was a significant positive association between the use of RD during undergraduate study and after graduation. At the Faculty of Dental Medicine of Monastir, the only faculty of dental medicine in Tunisia, the year 2011 was marked by the obligatory use of RD in endodontics performed by students. This may explain the tendency of the new generation to use RD more than more experienced dentists. This association has also been demonstrated by several studies.<sup>[14,16-19]</sup>

We found an association between the use of RD and the duration of endodontic sessions. When the RD is applied, the session of RCT lasts longer. This could not be explained by the time required to place an RD. Because even for inexperienced dentists (students), it takes a few minutes.<sup>[20,21]</sup> But, the practitioners may try to achieve many steps of RCT in the same session and reduce the number of dental office visits. Furthermore, 62.33% rebuild the tooth before placing the RD. This result is comparable to Madarati's study, which reported that 63.3% of participants rebuilt the tooth.<sup>[11]</sup>

#### REASONS BEHIND THE REFUSAL OF THE RD USE

The principal disincentive suggested to limit the use of RD included "unavailability of equipment at work." This was also the most commonly (40.5%) reported reason, in the Madarati's study.<sup>[10]</sup> Patient intolerance was reported to be the second most cited reason by participating dentists. Although studies that actually query patients have found patient acceptance for using RD to be high,<sup>[22,23]</sup> it has been reported to be low (<10%) in the Al-Sabri study.<sup>[24]</sup> In our investigation, more than one-quarter of the sample complained about the time required for RD application. This reason was also cited by 85.8% in the Shashirekha *et al.*<sup>[9]</sup> "Insufficient training" (91.9%), followed by "difficulty in using" (88.8%), was the main reasons for not using RD, in Shashirekha *et al.*<sup>[9]</sup> These two arguments are linked and were reported in many previous studies. Dentists agree that RD is difficult to apply.<sup>[17,18,24]</sup> "Cost of equipment and materials" received the least important ratings among the reasons for not using RD. Practitioners reported that the treatment fees were inadequate (low). This can explain the unavailability of equipment which was the principal reason selected by the respondents. In Shashirekha *et al.*,<sup>[9]</sup> cost was the reason for 84% of the non-users of RD.

#### RD USING FOR INFECTION CONTROL DURING THE COVID-19 PANDEMIC

Dentists are highly exposed and vulnerable during the coronavirus disease (COVID-19) pandemic, as physical proximity to patients is necessary for effective dental examination and treatment. In addition, the use of dental instruments usually generates aerosols, which can cause the airborne transmission of SARS-CoV-2. In the United States, the Occupational Safety and Health Administration has classified dentists in the very high-risk category because of the potential for exposure to the virus.<sup>[25]</sup> Studies conclusively showed that RD isolation during operative dental procedures is effective and efficient in preventing the spread of bio-aerosol.<sup>[4,5]</sup> Consequently, his application was recommended during the COVID-19 pandemic, by international organizations (World Health Organization and Centers for Disease Control and Prevention).<sup>[26,27]</sup> This study did not identify increased reported use of RD during the COVID-19 pandemic. RD isolation was used by 11.5% of GDP as a bio-aerosol-reducing procedure, during the COVID-19 pandemic. In Mexico, 84.6% of dentists agreed that using the RD can minimize the production of aerosols contaminated with saliva and blood when a high-speed handpiece was used,<sup>[28]</sup> and 64.3% used RD as prevention measure during the COVID-19 pandemic.<sup>[29]</sup> In Nepal, 83% of dentists did not use RD isolation for COVID-19 prevention. Only 6% did it for every patient.<sup>[30]</sup>

#### STRENGTHS AND LIMITATIONS OF THIS STUDY

This is a national study to assess the use of RD by Tunisian general dentists. Another study was conducted but was located in limited regions of Tunisia. Moreover, our sample was randomly selected, including dentists with a diverse range of socio-professional characteristics. It was a detailed assessment of the clinical practice of RD. Despite the sample did not achieve the required size (186), it was closed, and the valid response rate was interesting ( $174/186 = 93.5\%$ ). It is a questionnaire-based study, so answers given by dentists were subjective. This self-administered questionnaire allows more sincere answers far from the judgment of the investigator which can cause an overestimation of the use of the dam. This online questionnaire allowed us to collect information more easily and quickly, but the response rate was significantly reduced (among the 292 practitioners contacted, 174 responded). Study limits did not impact the results.

#### RECOMMENDATIONS

Dentists are more likely to continue practicing what they have been taught in dental school after graduation. The use of RD during undergraduate

study was the most important factor influencing RD use among GDP.<sup>[10,19]</sup> Better undergraduate education can be the most effective measure to increase its usage in dental practice. Greater emphasis should be placed on the application of RD at dental school and in clinical practice through continuous dental education programs, to remind them about the advantages of RD use and to provide dental treatment to patients of a recognized standard. Practitioners need to be aware of treatment quality issues, as well as medico-legal and safety concerns for both professionals and patients. They have a responsibility to adopt an evidence-based approach in their clinical practice.

## CONCLUSION

The use of RD by Tunisian GDP during endodontic procedures is not common. RD application is associated with the duration of the endodontic session and the undergraduate training. Greater emphasis should be placed on the application of RD at dental school and in clinical practice through continuous dental education programs.

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Nil.

## CONFLICTS OF INTEREST

There are no conflicts of interest.

## AUTHORS CONTRIBUTIONS

Not applicable.

## ETHICAL POLICY AND INSTITUTIONAL REVIEW BOARD STATEMENT

Not applicable.

## PATIENT DECLARATION OF CONSENT

Not applicable.

## DATA AVAILABILITY STATEMENT

Not applicable.

## REFERENCES

1. European Society of Endodontology. Quality guidelines for endodontic treatment: Consensus report of the European Society of Endodontology. *Int Endod J* 2006;39:921-30.
2. American Association of Endodontists. *Guide to Clinical Endodontics*. 6th ed. Chicago, IL: American Association of Endodontists; 2013.
3. Lin PY, Huang SH, Chang HJ, Chi LY. The effect of rubber dam usage on the survival rate of teeth receiving initial root canal treatment: A nationwide population-based study. *J Endod* 2014;40:1733-7.
4. Samaranyake LP, Fakhruddin KS, Buranawat B, Panduwawala C. The efficacy of bio-aerosol reducing procedures used in dentistry: A systematic review. *Acta Odontol Scand* 2021;79:69-80.
5. Vernon JJ, Black EV, Dennis T, Devine DA, Fletcher L, Wood DJ, *et al.* Dental mitigation strategies to reduce aerosolization of SARS-CoV-2. *J Dent Res* 2021;100:1461-7.
6. Ahmad IA. Rubber dam usage for endodontic treatment: A review. *Int Endod J* 2009;42:963-72.
7. Wakkee M, Hollestein L, Nijsten T. Multivariable analysis. *J Invest Dermatol* 2014;134:1-5.
8. Gemmell A, Stone S, Edwards D. Investigating acute management of irreversible pulpitis: A survey of general dental practitioners in North East England. *Br Dent J* 2020;228:521-6.
9. Shashirekha G, Jena A, Maity AB, Panda PK. Prevalence of rubber dam usage during endodontic procedure: A questionnaire survey. *J Clin Diagn Res* 2014;8:ZC01-3.
10. Madarati AA. Why dentists don't use rubber dam during endodontics and how to promote its usage? *BMC Oral Health* 2016;16:1-10.
11. Madarati AA, Younes HAB. Survey on the modalities of rubber dam usage for root canal treatment. *J Taibah Univ Med Sci* 2016;11:152-8.
12. Zou H, Li Y, Lian X, Yan Y, Dai X, Wang G. Frequency and influencing factors of rubber dam usage in Tianjin: A questionnaire survey. *Int J Dent* 2016;2016:1-7.
13. Gilbert GH, Riley JL, Eleazer PD, Benjamin PL, Funkhouser E; National Dental PBRN Collaborative Group. Discordance between presumed standard of care and actual clinical practice: The example of rubber dam use during root canal treatment in the National Dental Practice-Based Research Network. *BMJ Open* 2015;5:e009779.
14. Hill EE, Rubel BS. Do dental educators need to improve their approach to teaching rubber dam use? *J Dent Educ* 2008;72:1177-81.
15. Anabtawi MF, Gilbert GH, Bauer MR, Reams G, Makhija SK, Benjamin PL, *et al.*; National Dental Practice-Based Research Network Collaborative Group. Rubber dam use during root canal treatment: Findings from the dental practice-based research network. *J Am Dent Assoc* 2013;144:179-86.
16. Koshy S, Chandler NP. Use of rubber dam and its association with other endodontic procedures. *N Z Dent J* 2002;98:12-6.
17. Lynch CD, McConnell RJ. Attitudes and use of rubber dam by Irish general dental practitioners. *Int Endod J* 2007;40:427-32.
18. Mala S, Lynch CD, Burke FM, Dummer PMH. Attitudes of final year dental students to the use of rubber dam. *Int Endod J* 2009;42:632-8.
19. Ahmed HMA, Cohen S, Lévy G, Steier L, Bukiet F. Rubber dam application in endodontic practice: An update on critical educational and ethical dilemmas. *Aust Dent J* 2014;59:457-63.
20. Filipović J, Jukić S, Miletić I, Pavelić B, Malčić A, Anić I. Patient's attitude to rubber dam use. *Acta Stomatol Croat* 2004;38:313-7.
21. Ryan W, O'Connell A. The attitudes of undergraduate dental students to the use of the rubber dam. *J Ir Dent Assoc* 2007;53:87-91.
22. Stewardson DA, McHugh ES. Patients' attitudes to rubber dam. *Int Endod J* 2002;35:812-9.
23. Loguercio AD, Luque-Martinez I, Lisboa AH, Higashi C, Queiroz VO, Rego RO, *et al.* Influence of isolation method of the operative field on gingival damage, patients' preference, and restoration retention in noncarious cervical lesions. *Oper Dent* 2015;40:581-93.

24. Al-Sabri FA, Elmarakby AM, Hassan AM. Attitude and knowledge of isolation in operative field among undergraduate dental students. *Eur J Dent* 2017;11:83-8.
25. Deery C. The COVID-19 pandemic: Implications for dental education. *Evid Based Dent* 2020;21:46-7.
26. Ather A, Patel B, Ruparel NB, Diogenes A, Hargreaves KM. Coronavirus disease 19 (COVID-19): Implications for clinical dental care. *J Endod* 2020;46:584-95.
27. Amato A, Caggiano M, Amato M, Moccia G, Capunzo M, De Caro F. Infection control in dental practice during the COVID-19 pandemic. *Int J Environ Res Public Health* 2020;17:4769.
28. Gómez-Clavel JF, Morales-Pérez MA, Argumedo G, Trejo-Iriarte CG, García-Muñoz A. Concerns, knowledge, and practices of dentists in Mexico regarding infection control during the coronavirus disease pandemic: A cross-sectional study. *Healthcare (Basel, Switzerland)* 2021;9:731.
29. Santana MAC, Zumarán AM, Marín NP, Silva BEC, Valencia CS, Orozco MFS. How dentists face the COVID-19 in Mexico: A nationwide cross-sectional study. *Int J Environ Res Public Health* 2021;18:1750.
30. Humagain M, Humagain R, Rokaya D. Dental practice during COVID-19 in Nepal: A descriptive cross-sectional study. *JNMA J Nepal Med Assoc* 2020;58:764-9.