

# Rubber Dam use during Non-Surgical Endodontic Treatment among a Population of Dentists in Edo State

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## ABSTRACT

**Objective:** To determine the use of rubber dam and possible barriers to its routine use during non-surgical endodontics among dentists in Benin City.

**Method:** This was a cross-sectional study of dentists in Benin City who had performed root canal treatment on patients in the last 6 months. Information obtained were: demographic characteristics of the participants, the frequency of performance of root canal treatment procedures, the method of isolation employed during non-surgical endodontic treatment, the frequency of use of rubber dam and barriers to the use of rubber dam. All data collated were analysed using IBM SPSS version 21.0.

**Results:** Of the 72 dentists who participated in this study, only (7) 9.7% claimed to use rubber dam, none of whom used it routinely. Availability was the only reason given for not using it routinely. Similarly, unavailability of rubber dam and lack of training on its use were the main reasons reported among those who had never used it. A higher proportion of those who had practiced for more than 10 years use it ( $p=0.049$ ).

**Conclusion:** Rubber dam isolation is critical to successful non-surgical endodontic treatment but its routine use to achieve this remains very low in Benin City. Although dentists in the Restorative Dentistry specialty seem to be embracing its use, there is still the need for all dentists who perform non-surgical endodontics, to routinely adhere to this recommended standard of care. Availability of rubber dam armamentarium in public hospitals and adequate undergraduate training on its use may encourage its routine use.

**Keywords:** Rubber dam, non-surgical endodontics, isolation

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## INTRODUCTION

Isolation of the operative field during dental treatment procedures is imperative and obligatory in some treatment cases such as root canal treatment.<sup>1</sup> Rubber dam use has been reported to be essential for effective isolation in endodontic practice. The use of rubber dam during dental treatment procedures is believed to reduce microbial contamination and the potential for patients to swallow or inhale foreign bodies,<sup>2</sup> thereby improving the efficiency of root canal treatment<sup>3</sup> as well as addressing safety

concerns. The quality assurance guidelines of the American Association of Endodontists state that cleaning, shaping, disinfection and obturation of all canals are best accomplished using an aseptic technique with dental dam isolation whenever possible.

Although, rubber dam application is considered mandatory in root canal treatment,<sup>4</sup> its use is not popular among dentists even though proposals for its more popular use have been made.<sup>5</sup> It is well-known that rubber dam protects patients against the

aspiration of instruments, prevents the laceration of soft tissue from rotary or hand instruments, improves accessibility and visibility, aids the retraction of soft tissue to some degree and also impedes cross-infection.<sup>5, 6-11</sup> The availability of rubber dam armamentarium and the ability of dental clinics to stock multiple sets of diverse types of metallic and plastic clamps that suit every tooth position and circumstance are said to be critical to encouraging its use.<sup>2</sup>

Rubber dam tends to be used more frequently for endodontic procedure than any other operative procedure.<sup>12</sup> The use of rubber dam for non-surgical endodontics is the standard of care<sup>13,14</sup> although other forms of isolation can be used.<sup>15</sup> A review of rubber dam usage for endodontic treatment revealed that rubber dam is not used routinely by dentists for root canal treatments due to concerns over patient acceptance, time required for its application, cost of equipment and materials, insufficient training, difficulty in use and low treatment fees.<sup>1,5, 12, 15-18</sup>

Studies have been reported in other countries on rubber dam use among dentists<sup>1,3,12,15-18</sup> and in a few Nigerian studies, among dentists<sup>19-21</sup> and dental students.<sup>22</sup> There is a paucity of knowledge on the reasons for use and non-use of rubber dam in our environment. Given the importance of rubber dam in endodontic treatment, it is imperative to determine the factors affecting its use to enable proper intervention to popularise its use. Hence, this study sought to determine the use of rubber dam among dentists in Benin City as well as to identify possible barriers to its routine use.

## MATERIALS AND METHODS

This was a cross-sectional study of dentists in Benin City, Edo State, Nigeria. Inclusion criteria for recruitment into the study were - fully registered dentists who had performed root canal treatment on patients in the last six months in the two main public hospitals in Benin City, (University of Benin Teaching hospital and Central Hospital Benin, City) and only those who gave informed consent. Excluded were intern house officers and dentists who had not been fully registered with the Medical and Dental Council of Nigeria, those who had not performed root canal in the last six months and those who did not give their consent to participate in the study.

The data collection tool was a self-administered questionnaire which sought information on the

demographic characteristics of the participants, the frequency of performance of root canal treatment procedures, the method of isolation employed while undertaking a non-surgical endodontic treatment, the frequency of use of rubber dam and barriers to the use of rubber dam.

All data collated were analysed using IBM SPSS version 21.0. The statistical tools employed in the statistical analysis of data garnered were frequency counts, percent, cross tabulations, mean and standard deviation. Chi square test was used to determine association between variables with p set at 0.05. However, Fischer's exact test was used when more than 20% of the cells had counts less than 5,

## RESULTS

The population consisted of 72 dentists made up of 54.2% females and 45.8% males. Most (68.1%) of the respondents were aged 31-40 years. The two specialties most represented were Restorative Dentistry (31.9%) and Family Dentistry (30.6%). The respondents had practiced for 2 to 22 years with those who had practiced for 2 to 10 years making up 76.4% (Table 1).

On the frequency of performing non-surgical endodontic treatment, a higher proportion of the respondents (31.9%) could not state for certain, the frequency of their performing non-surgical endodontic treatment. However, 18.1% claimed to perform (any form of) non-surgical endodontic treatment daily while 16.7% reported performing non-surgical endodontic treatment thrice a week (Table 2).

All respondents reported using one method of isolation or the other while performing non-surgical endodontic treatment. The use of cotton rolls was reported by 90.3% of the respondents while 59.7% stated that they used suction and only 9.7% claimed to use rubber dam, (Figure 1). Of those who used rubber dam as a means of isolation, none used it all the time. Unavailability was the only reason given for not using it routinely.

Table 3 depicts the reason for the non-use of rubber dam during non-surgical endodontic treatment. Unavailability of rubber dam was the main reason reported for its non-use (73.6%). Extra cost to the patient was not adduced as a reason by any of the respondents. However, 18.1% claimed to be untrained in the use of rubber dam hence their non-usage.

Table 1: Socio-demographic characteristics of the respondents

Characteristics	Frequency	Percent
<b>Age (years)</b>		
21-30	8	11.1
31-40	49	68.1
41-50	15	20.8
<b>Gender</b>		
Male	33	45.8
Female	39	54.2
<b>Specialty</b>		
Restorative Dentistry	23	31.9
Oral and Maxillo-facial surgery	13	18.1
Family Dentistry	22	30.6
Oral Pathology	3	4.2
Orthodontics	5	6.9
Community Dentistry	1	1.4
Paedodontics	1	1.4
Periodontics	4	5.6
<b>Status</b>		
Dental officer	14	19.5
Registrar	42	58.3
Senior Registrar	16	22.2
<b>Years of practice</b>		
2 to 10	55	76.4
>10	17	23.6
<b>Total</b>	<b>72</b>	<b>100.0</b>

Table 2: Frequency of non-surgical endodontic procedures by the respondents

Frequency of performance of non-surgical endodontic treatment	Frequency	Percent
Daily	13	18.1
Thrice in a week	12	16.7
Twice in a week	8	11.1
Once in a week	8	11.1
Once in 2 weeks	5	6.9
Once in a month	3	4.2
Not certain	23	31.9
<b>Total</b>	<b>72</b>	<b>100.0</b>

A statistically significant association was observed between the years of practice and the usage of rubber dam during non-surgical endodontic treatment with a higher proportion of those who had practiced for more than 10 years using it ( $p=0.049$ ). A higher proportion of those in Restorative Dentistry

specialty used the rubber dam compared to other specialties. However, this was not statistically significant ( $p=0.366$ ). Similarly, a higher proportion of senior registrars used the rubber dam compared to other cadres of respondents but this was also not statistically significant ( $p=0.212$ ) (Table 4).

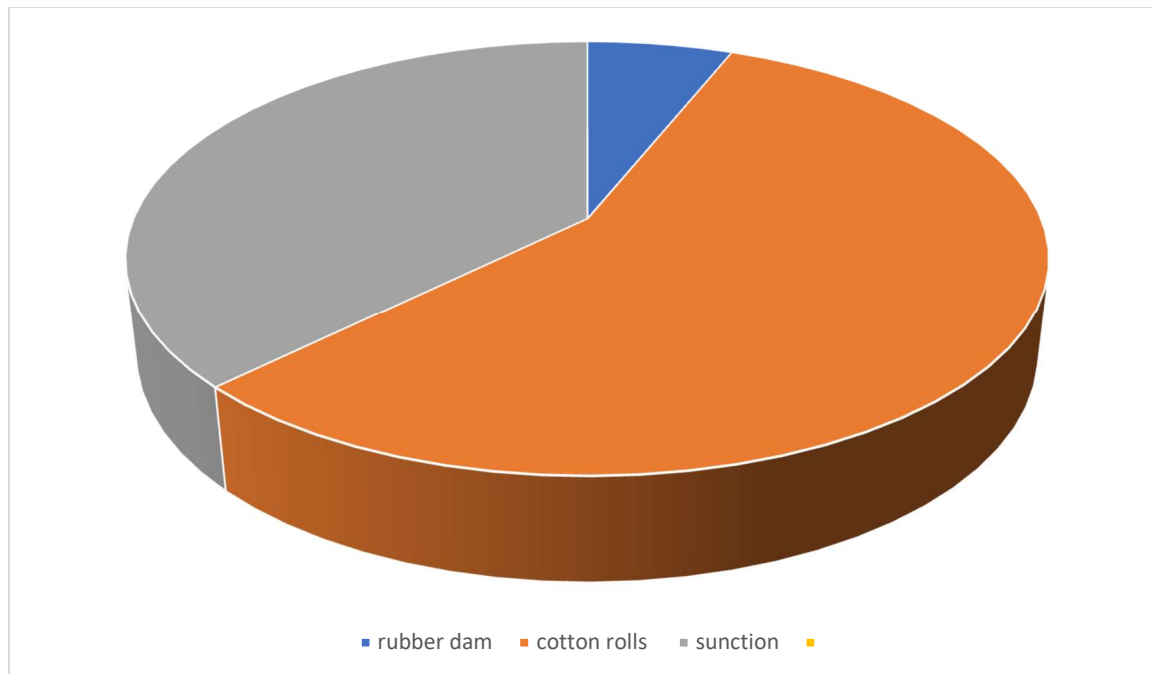


Figure 1: Distribution of the mode of isolation employed during non-surgical endodontic treatment

Table 3: Reasons for non-use of rubber dam during non-surgical endodontic treatment among the respondents\*

Reason for non-use of rubber dam	Frequency	Percent
Unavailability of rubber dam and its armamentarium	53	73.6
Untrained in the use of rubber dam	13	18.1
Relative success with non-surgical endodontic treatment without using rubber dam	5	6.9
Accustomed to working without using rubber dam	10	13.9

\*Multiple responses

Table 4: Association of some variables with use of rubber dam while performing non-surgical endodontic treatment

Variables	Rubber dam use		Total n (%)	P-value
	Yes n (%)	No n (%)		
<b>Years in practice</b>				<b>0.049*</b>
2-10	3 (5.5)	52 (94.5)	55 (100.0)	
>10	4 (23.5)	13 (76.5)	17 (100.0)	
<b>Specialty</b>				<b>0.366*</b>
Restorative Dentistry	4 (17.4)	19 (82.6)	23 (100.0)	
Family Dentistry	1 (4.5)	21 (95.5)	22 (100.0)	
<b>Status</b>				<b>0.212*</b>
Dental officer	2 (14.3)	12 (85.7)	14 (100.0)	
Registrar	2 (4.8)	40 (95.2)	42 (100.0)	
Senior Registrar	3 (18.8)	13 (81.3)	16 (100.0)	
<b>Total</b>	<b>7 (9.7)</b>	<b>65 (90.3)</b>	<b>72 (100.0)</b>	

\* Fischer's Exact

## DISCUSSION

The goal of non-surgical endodontic treatment is to ensure the proper cleansing, shaping, disinfection

and obturation of all canals using an aseptic technique, with dental dam isolation whenever possible. This has been defined as the standard of care by the American Association of Endodontists.<sup>23</sup> Endodontic treatment fails when treatment falls short of acceptable standards.<sup>24</sup>

The use of various isolation techniques during non-surgical endodontic treatment has been reported.<sup>1, 16,25,26</sup> This was also observed in this study with all respondents reporting the use of one method of isolation or the other while performing non-surgical endodontic treatment. The isolation techniques can be combined and this was also observed in this study. This buttresses the importance of isolation during non-surgical endodontic treatment. The most frequently used isolation technique was the use of cotton roll either used alone or in combination with other techniques, a finding similar to previous reports.<sup>20,25-27</sup>

The prevalence of use of rubber dam in this study was very low (9.7%), a value higher than 1.2% reported by Udoeye et al<sup>20</sup> and 5.9% reported by Loto and Awotile.<sup>21</sup> However, the prevalence in this study was lower than reported in a previous Nigerian study (18%)<sup>19</sup> and far lower than reported in other studies.<sup>1,15,18, 28,29.</sup> Although, this same previous Nigerian study observed that those who practiced in public hospitals used rubber dam more than those in private hospitals,<sup>19</sup> this study conducted among dentists practicing in public hospitals still shows a high level of underutilisation of rubber dam during non-surgical endodontic treatment.

The prevalence of those who never used rubber dam was very high (90.3%) in this study but was lower than that reported among dental students in Nigeria<sup>22</sup> and close only to the 77% reported in that previous Nigerian study<sup>19</sup> and the 76.2% reported in India<sup>1</sup>, but far higher than in other previous reports of 11%,<sup>30</sup> 15%<sup>15</sup> and 44.5%.<sup>28</sup> Rubber dam facilitates treatment and provides a host of clinical benefits that enhance patient safety and improve treatment outcomes.<sup>22,31</sup> Although, frequency of use of rubber dam in the UK was observed to have increased by 10% over a ten-year period,<sup>18,29</sup> there are still concerns over its non-use during non-surgical endodontic treatment.<sup>31</sup>

Of those who used rubber dam as a means of isolation, none used it routinely. They all used it sometimes whenever it was available, a finding different from reports in previous studies.<sup>15,17, 32-34</sup> Wide variations in rubber dam use have been reported. It was reported that 44% of the respondents used rubber dam for all non-surgical

root canal treatment procedures, 24% used it in 51-99% of cases, 17% used it in 1-50% of cases in a study.<sup>15</sup> In another study,<sup>32</sup> it was observed that 59% of American general dental practitioners always used rubber dam. In reports from Belgium, 64.5% of practitioners did not use rubber dam routinely.<sup>33,34</sup> Similarly, rubber dam was observed to be routinely used by 57% of respondents in another study.<sup>17</sup> Also, a report from Denmark showed that rubber dam was not routinely used.<sup>35</sup> Another report showed that 58% of the respondents always used rubber dam.<sup>30</sup> The reasons adduced for the non-use of rubber dam in this study were different from those reported in other studies.<sup>12,30</sup> but similar to a previous Nigerian study.<sup>21</sup> Although the rubber dam is a low-cost and high efficiency appliance,<sup>1</sup> the most prevalent reason for the non-use of rubber dam during non-surgical endodontic treatment in this study was unavailability and lack of training in its use. A study among dental students showed that the students were dissatisfied with the level of hands-on training in rubber dam placement that they had received.<sup>22</sup> It has been advocated that dental educators need to improve on the technique of teaching the usage of rubber dam in dental practice.<sup>1</sup> Furthermore, it has been opined that students who acquire competence and are confident in the use of rubber dam during their undergraduate training are more likely to use it upon graduation.<sup>22</sup>

The reasons for not using rubber dam reported in other studies were inconvenience, not a necessity, patient refusal, time,<sup>30</sup> cumbersomeness and difficulty to apply and type of teeth whether anterior teeth, premolar or molars.<sup>12</sup> An Indian study<sup>1</sup> reported reasons for its non-use to include its time-consuming placement, poor patient compliance, cost, and operators not being sure of the technique. Although there was no statistically significant association, a higher proportion of those in Restorative Dentistry and senior residents used rubber dam more regularly. This may be because non-surgical endodontics is a routine procedure in Restorative Dentistry.

A statistically significant association was observed between the years of practice and the usage of rubber dam during non-surgical endodontic treatment with a higher proportion of those who had practiced for more than 10 years using it. This in contrast to a previous report that observed that dentists with less than 10 years' practice experience used rubber dam more than the more experienced practitioners.<sup>17</sup>

## CONCLUSION

Isolation is very important for successful non-surgical endodontic treatment. The routine use of rubber dam, which is considered the standard of care for non-surgical endodontics, is very low in Benin City. Although dentists in the Restorative Dentistry specialty seem to be embracing its use, there is the need for all dentists who undertake non-surgical endodontics to, routinely, adhere to this recommended standard of care. More availability of different types of rubber dam armamentarium and mandatory undergraduate training, including its routine use for conservation and non-surgical endodontic procedures, may encourage its widespread use, especially among younger practitioners.

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