

## ORIGINAL ARTICLE

**Different Techniques for Rubber Dam Isolation: A Cross-Sectional Study**

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**ABSTRACT**

**Objective:** To assess knowledge, regarding use of rubber dam during root canal treatment among dentists in Rawalpindi and Islamabad.

**Study Design:** Descriptive cross-section.

**Place and Duration of Study:** The Study was carried out at Operative Department Armed Forces Institute of Dentistry (AFID), Rawalpindi from 1<sup>st</sup> March 2020 to 31<sup>st</sup> May 2020.

**Materials and Methods:** A web-based questionnaire, comprising of close-ended questions in the categories of demographics, clinical experience, usage of isolation techniques and knowledge regarding rubber dam (RD) use, procedures, and contraindications was sent through internet to 387 dentists of Rawalpindi and Islamabad. The response rate was 77.5%. Data was analyzed using SPSS version 20, and was displayed as numbers and percentages.

**Results:** 79 out of 300 i.e. 26.33% respondents used rubber dam in restorative and endodontic procedures. 73.3% were using other methods of isolation such as cotton rolls, saliva ejectors and high volume suction. All the respondents were aware about the importance of rubber dam. The most challenging factor for dentists (57.3%) was high influx of patients per day.

**Conclusion:** Rubber dam is not being used commonly by participating dentists of tertiary dental hospitals of Rawalpindi and Islamabad mainly because of high patient turnover per day, combination of cotton rolls and saliva high-volume ejector or gauze is the most common alternative to rubber dam isolation. Rubber dam isolation is highly recommended.

**Key Words:** *Advances, Dentistry, Isolation, Optra Dam, Rubber Dam.*

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**Introduction**

Success of restorative dental procedures depends upon many factors but most important of them is isolating the tooth from microbes, moisture or anything that obscure the operating field.<sup>1</sup> Better Visibility, patient and operator safety, infection control and the physical properties of dental materials are all compromised when proper isolation is lacking.<sup>2</sup> The idea of using rubber dam (RD) for

these advantages is not a new concept, it dates back 120 years ago.<sup>3</sup> Despite all its advantages the use of rubber dam has always been frowned upon by majority of the dentists in Pakistan. Over the last two decades, various researchers in Pakistan have surveyed the reasons for the rejection of rubber dam and potential improvements for better acceptance. Their results showed that dentists basically do not use rubber dam since they believe it to be too time consuming and cumbersome and patients does not accept it. It seems that the arguments against using rubber dam, have not been changed since past 120 years.<sup>4,5,6</sup>

Various modalities and advances are made in the "Rubber Dam Design" and "Techniques of use" in order to make it convenient for both the patient and the dentist. Pre-articulated dams which eliminates

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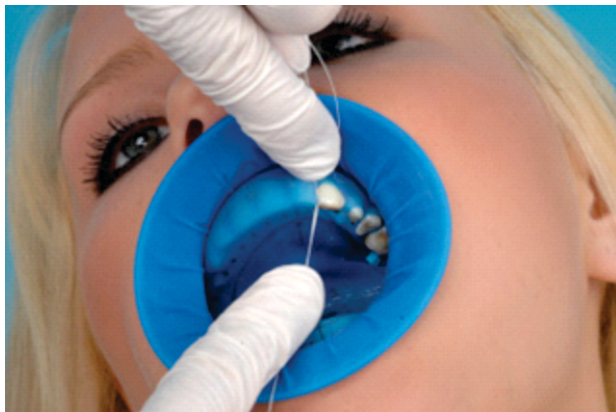
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the need of a frame and clamps with long jaws were introduced in operative practice.<sup>7,8</sup> One of next generation of rubber dam Optra-Dam (Figure 1) was introduced by the dental enterprise Ivoclar Vivadent AG (Schaan, Lichtenstein) combining the benefits of a lip and cheek retractor with the total isolation of a rubber dam (Figure 1). The anatomical shape, high flexibility and patented inner-ring design allows it to be placed without the need for clamps. Additionally, there is no need for a separate rubber dam frame making it even more time and cost efficient.<sup>9</sup>

Along with alterations in the design, many changes have also been made in the methods of rubber dam usage in order to minimize tooth and gingival trauma. Two most commonly followed techniques are *Dam Coverage Method* (Clamping rubber dam over the tooth) and *Silicone Coverage Method* (Silicone impression material interposed between the tooth and the clamp).<sup>10</sup>



**Fig 1: Optra-dam by Ivoclar Vivadent**

Regardless of recent advances, no studies have been reported from Pakistan related to the knowledge of about recent modalities or clinical trials evaluating the treatment outcomes among dentists. The objective of this study is to evaluate the awareness of dentists of Rawalpindi and Islamabad regarding latest isolation techniques and advances in rubber dam.

### Materials and Methods

This questionnaire-based survey was carried out among clinical residents and faculty members of teaching dental institutes situated in the Rawalpindi and Islamabad from 1<sup>st</sup> March 2020 to 31<sup>st</sup> May 2020 after taking approval from Institute's Ethical Committee (AFID No 905/Trg-ABP1K2). A self-

administered questionnaire was developed for this observational study. A pilot survey was conducted on 20% of the total study participants to test the validity and reliability of questionnaire. The reliability of the questionnaire was determined by using Test–Retest reliability and the values measured came out to be Kappa (k) = 0.91 and weighted Kappa (kw) = 0.87. The internal consistency of questionnaires was measured by applying Cronbach's Alpha ( $\alpha$ ) and the value of  $\alpha$  = 0.89 was measured.

The content comprised of close-ended questions in the categories of demographics, clinical experience, frequency and, of RD use and, knowledge about recent advances in RD , management of difficult cases leaking RD and reasons for non utilization of Rd in practice. Sample Size of 387 was calculated using WHO calculator, at confidence interval 95%, 5% margin of error and t hypothesized proportion of outcomes to be 50%. The questionnaire was sent through internet to 387 dentists of dental colleges of Rawalpindi and Islamabad out of which 300 responded. The response rate was 77.5%. Data from the completed questionnaires was analyzed using SPSS version 20 and was displayed as numbers and percentages. Chi square test was applied to check the association of rubber dam use among the group.

### Results

Females were more predominant with a percentage of 55.3% Majority (44.0%) of the participants were general dental practitioners. The numbers of dentists having less than 5 years were slightly more than half (N=52%), while the remaining 32.3% had 6-10 years and just 15.7% had more than 10 years of experience of clinical dentistry. The number of participants using other methods of isolation such as cotton rolls, saliva ejectors and high volume suction were 73.7%. All the respondents were aware about the importance of rubber dam. The most challenging factor for dentists (N= 57.3%) was high influx of patients per day.

The frequency of awareness level among the dentists to the recent isolation techniques using RD is shown in Table 1. Table 2 shows knowledge of Dentists regarding what interventions is required when there is a leak in placed Rubber dam. Similarly in Table 3 shows the responses of dentists to what is the accurate method of placing RD in conical, prepared and broken down teeth.

**Table 1: Knowledge of Dentists of Rawalpindi and Islamabad Regarding RD Use And Its Latest Technologies**

	Yes	No
1. Do You Use Rubber Dam in Routine Operative Procedures?	26.3%	73.7%
2. Is Rubber Dam usage an inconvenient Procedure for the dentist and the patient?	65.3%	34.7%
3. While Applying Rubber have you tried any modalities for challenging cases like Grossly carious/ Conical teeth?	45.7%	54.3%
4. Do you have any knowledge about Recent Advances in Rubber Dam Isolation?	40.1%	59.9%
5. Do you have any knowledge about Latest pre articulated Rubber Dams (Optra-Dam)	17.6%	82.4%
6. While Applying rubber dam have you used modalities in order to preserve dental and gingival structure?	36.4%	63.6%
7. Do you have any knowledge about Clamp over Dam Technique?	12.2%	87.8%
8. Do you have any knowledge about Silicone Coverage Technique?	7.9%	92.1%

**Table 2: Leaking RD management**

Respondents	Do not Seal	Seal the Leaking RD using:		
		Cavit or other temporaries	Ora-seal	Others
GDPs	39.6%	40.9%	4.5	15%
Endodontists	12.2%	35.3%	52.9	--

**Table 3: Methods of RD placement for conical, prepared and broken-down teeth**

Type of teeth	Rebuild the tooth	Make opposite undercut	Split dam technique	Clamp the gingiva	Refer to specialist
Conical or prepared for prosthetics	--	12.3%	46.7%	23.4	17.6%
Broken down	67.5%	1%	19.5%	10.6%	1.4%

**Discussion**

This study was conducted to evaluate the knowledge regarding recent advances in RD isolation among dentists. Rubber Dam isolation of teeth, undergoing endodontic and restorative procedures, has been reflected as standard of care and a mandatory protocol due to its various advantages.<sup>6</sup> Nevertheless, our results showed that only 26.3% of respondents were using RD. This poor usage rate,

however, is not an exception and almost similar results has been reported in several previous studies. Al Omari et al.<sup>11</sup> reported 2% , Peciuliene et al.<sup>12</sup> 12 %, Kapitan M et al.<sup>13</sup> 20 %, and Palmar NO et al. reported 30%.<sup>14</sup> utilization of this technique Similarly, a study of current endodontic practice in Turkey indicated that more than 70% dentists never used rubber dam during endodontic treatment, whereas 1.5% dentists used it in dental practice.<sup>15</sup> Another survey conducted in Rawalpindi, Pakistan concluded that the 28% of general dentists use rubber dam in their practice.<sup>16</sup> However, other studies conducted in developed states like Birmingham have reported a significantly higher prevalence i.e 52.8% of rubber dam usage especially.<sup>17</sup> Result of the current study shows 57.33% of the respondents don't use rubber dam because of "increased number of patient inflow" they were treating per day, Increased number of patient such that every patient needs to be treated under a limited period of time, leaves lesser room for provision of RD and other Isolation Methods. However these results were contradictory to previous studies which showed a vast variety of disincentives to regular RD use amongst General Dental practitioners (GDP), which were placement difficulty, unavailability, and dentist inability to place RDs.<sup>18,19</sup> One report showed that the most common causes for GDPs negative attitudes were inconvenience to the patient and dentist.<sup>20</sup> In order to overcome the negative attitude of dentist, new protocols are introduced, Most of the dentists (N= 83.4%) in our study were not aware of latest generation of OptraDam. Studies have shown that OptraDam, being made of soft flexible material, allows patients to maintain full mobility of their jaw along with additional comfort throughout the procedure. It provides most favorable isolation as well as keep patient at ease. Due to better flexibility of the plastic rings, it can be positioned more effortlessly in the patient's mouth. Its anatomical shape helps achieve a considerably larger treatment field and complete isolation of both arches simultaneously.<sup>21,22</sup> Conical shaped teeth, teeth prepared for crowns or bridges or severely broken-down teeth are problematic to retain RDs clamps in a stable manner. In the present study, RD users reported different

tactics to fix this problem. The highest proportion of them (N=46.7%) used a split dam technique for conical or prepared teeth. Anchoring the dam to the adjacent teeth is an acceptable approach. However, the highest proportion of RD users (N=67.5%) opted to rebuild the broken-down tooth to enable RD placement before commencing RCTs.

There may be clinical situations in which placing a RD does not provide complete isolation. Hence, intra-oral liquids may contaminate the root-canal system and irrigation solutions may escape, injuring surrounding soft tissues, which imposes sealing the leaking RD. Many materials have been used to seal the leak, including Cavit Orabas, periodontal dressing, rubber base adhesive, or Oraseal.<sup>23,24</sup> The majority of RD users in the current study (N=76.2%) sealed the leaking RD reflecting their understanding of the importance of isolating teeth, and sealing the leaking RD.<sup>25</sup>

This study was conducted on dentists limited to Rawalpindi and Islamabad area which can be considered as a limitation. A high response rate in range of 70–80 % is preferred to minimize the risk of bias hence the overall 75% response rate obtained in this study is satisfactory. This is especially true with the fact that internet-based surveys achieve lower response rates than those of postal ones.<sup>26</sup> Approaching dentists by email rather than mail post service can be another limitation of this study.

## Conclusion

We concluded that rubber dam is not being used commonly and limited awareness about latest advances in RD is present in dentists of tertiary dental hospitals of Rawalpindi and Islamabad. The most common alternative to rubber dam is combination of cotton rolls and saliva high-volume ejector or gauze.

## REFERENCES

1. Wang Y, Li C, Yuan H, Wong MC, Zou J, Shi Z, et al. Rubber dam isolation for restorative treatment in dental patients. *Cochrane Database of Systematic Reviews*. 2016; 9: Cd009858.
2. Awooda E, Alwan M. Knowledge, Attitudes and Practice of Rubber Dam use among dentists working in private clinics in Khartoum City. *Saudi J. Oral. Dent. Res*. 2016; 1: 19-23.
3. Al-Amad SH, Awad MA, Edher FM, Shahramian K, Omran TA. The effect of rubber dam on atmospheric bacterial aerosols during restorative dentistry. *Journal of infection and public health*. 2017; 10: 195-200.
4. Tanwir A, Amin M, Choudhry Z, Naz F. Knowledge, attitude and perception of dental fraternity towards practice of rubber dam. *Pak Oral Dent J*. 2015; 35: 691-4.
5. Khan HR, Azam S, Qureshi B. Knowledge and attitude of house officers regarding rubber dam use. *Pak Oral Dent J*. 2018; 38: 97-101.
6. Winkler R. *Kofferdam in Theorie und Praxis*. Quintessenz-Verlag; 1991.
7. Rane AV, Thakur S, Thakur R. Rubber dam—an introduction. *InHydraulic Rubber Dam 2019 Jan 1* (pp. 1-9). William Andrew Publishing.
8. Ballal NV, Khandeelwal D, Saraswathi MV. Rubber dam in endodontics: An overview of recent advances. *Int J Clin Dent*. 2013; 6: 319-30.
9. Mackenzie L, Waplington M, Bonsor S. *Splendid isolation: a practical guide to the use of rubber dam Part 1*. *Dental Update*. 2020; 47: 548-58.
10. Wambier LM, Gonzaga CC, Chibinski A, Wambier DS, Farago PV, Loguercio AD, et al. Efficacy of a Light-cured Tetracaine-based Anesthetic Gel for Rubber Dam Clamp Placement: A Triple-blind Randomized Clinical Trial. *Operative dentistry*. 2020; 45: E57-65.
11. Al-Omari WM. Survey of attitudes, materials and methods employed in endodontic treatment by general dental practitioners in North Jordan. *BMC oral health*. 2004; 4: 1-6.
12. Peciuliene V, Rimkuvienė J, Aleksejuniene J, Haapasalo M, Drukteinis S, Maneliene R. Technical aspects of endodontic treatment procedures among Lithuanian general dental practitioners. *Stomatologija*. 2010; 12: 42–50.
13. Kapitan M, Sustová Z. The use of rubber dam among Czech dental practitioners. *Acta Med (Hradec Kralove)*. 2011; 54: 144–8.
14. Palmer NO, Ahmed M, Grieveson B. An investigation of current endodontic practice and training needs in primary care in the north west of England. *Br Dent J. British Dental Journal*. 2009; 206: E22.
15. Kaptan R, Haznedaroglu F, Kayahan M, Basturk F. An investigation of current endodontic practice in Turkey. *The Scientific World Journal*. 2012; 2012: 565413.
16. Ali A, Aslam A, Rehman B, Tariq A. Rubber dam use by general dental practitioners-prevalence and obstacles to its use. *Pak Oral Dent J*. 2016; 36: 468-71.
17. Anabtawi MF, Gilbert GH, Bauer MR, Reams G, Makhija SK, Benjamin PL, et al. Rubber dam use during root canal treatment: findings from The Dental Practice-Based Research Network. *J Am Dent Assoc*. 2013; 144: 179–86.
18. Madarati AA. Why dentists don't use rubber dam during endodontics and how to promote its usage? *BMC Oral Health*. 2016; 16: 1-10.
19. Younes LM, Doumani M, Al-Nahlawi TF, Alharbi AS, Habib A. Syrian Senior Dental Students' Perception, Educational Satisfaction, and Attitude Regarding the Usage of Rubber Dam. *World*. 2020; 11: 48.
20. Jameel A, Shah A, Iqbal M, Hussain M. An assessment of knowledge and usage of rubber dam among dentists in a Karachi sample. *Pakistan Oral & Dental Journal*. 2018; 38: 102.
21. Sauveur G. Improvement of the rubber dam frame. *J. Endod*. 1997; 23: 765-7.

22. Santos AE, Linhares FN, Leite MC, Escócio VA, Nunes RC. A new device to simulate the performance of rubber dams for dental applications. *Polymer Testing*. 2021; 94: 107043.
  23. Loch C, Ratnayake J, Veerasamy A, Cathro P, Lee R, Brunton PA. Direct restorations, endodontics, and bleaching: materials and techniques used by general dentists of New Zealand. *International journal of dentistry*. 2019; 2019: 6327171.
  24. Ng YL, Spratt D, Sriskantharajah S, Gulabivala K. Evaluation of protocols for field decontamination before bacterial sampling of root canals for contemporary microbiology techniques. *Journal of Endodontics*. 2003; 29: 317-20.
  25. Compton J, Glass N, Fowler T. Evidence of selection bias and non-response bias in patient satisfaction surveys. *The Iowa orthopaedic journal*. 2019; 39: 195–201.
  26. van Gelder MM, Bretveld RW, Roeleveld N. Web-based questionnaires: the future in epidemiology? *Am J Epidemiol*. 2010; 172: 1292–8.
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