

Evaluation of Rubber Dam Use in Endodontic Treatments in Terms of Patients' Awareness Level, Acceptability, and Usage Experience

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ABSTRACT

Objective: This study aimed to measure patients' awareness levels about rubber dam used in endodontic treatments and their opinions about the necessity of its use, to evaluate their endodontic treatment experiences with rubber dam, and to compare the relationship between these opinions and treatment experience.

Methods: A survey including 16-questions was designed to access the participants' demographic information and previous rubber dam experiences, their current experience, and their preferences for the use of rubber dams in subsequent treatments. 9 questions aimed to measure the attitude via five-point Likert scale indicating measurements ranging from strongly agree to strongly disagree. The survey was completed when the number of participants reached 150 patients. Fisher-Freeman-Halton test, Fisher's Exact test and Pearson Chi Square test were used to compare categorical data, and multiple comparisons were examined with the Bonferroni Corrected Z test. $p < 0.05$ was considered sufficient for statistical significance.

Results: 27.3% of the participants had previously received dental treatment with rubber dam. It was determined that there were significantly more patients with primary education levels among those who did not know the benefits of rubber dam use before coming to treatment ($p = 0.013$). There was a statistically significant connection between the question "I was informed by my dentist about the reasons for using rubber dam before the treatment" and the question "I think the use of rubber dam is necessary for the dentist/patient" ($p < 0.001$). In this study, only 4 people were observed who did not prefer rubber dam for the next treatment.

Conclusion: Before endodontic procedures, the advantages and necessity of rubber dam use should be explained to patients in detail and the questions in the patients' minds should be eliminated. The clinician should improve himself in the use of rubber dam and provide the patient with a more comfortable treatment.

Keywords: Endodontic treatment, patient, rubber dam, survey.

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INTRODUCTION

Endodontic treatment is a method applied to prevent early tooth loss to ensure that the tooth remains in the mouth for a long time, and improve canal pathologies by eliminating microorganisms

in the root canals [1]. For a successful root canal treatment, it is obligatory to isolate the tooth to be treated by preventing bacterial and saliva contamination throughout the entire treatment.

Infection control is one of the most essential factors determining the prognosis of endodontic treatment. For a high standard of endodontic treatment, cross-contamination must be prevented at each step of the treatment [2]. Today, the rubber dam is the most ideal option for tooth isolation and cross-contamination prevention and is considered an indispensable step of root canal treatment [3,4]. The rubber dam is defined as the gold standard in endodontic treatment by international organizations such as the European Society of Endodontology and the American Association of Endodontics [3,5].

The use of rubber dams is actively used today, with many advantages such as increasing the field of view of clinicians and allowing easier application of dental materials, as well as creating an aseptic work area, and preventing aerosol contamination. Rubber dam has many advantages for patients as well as clinicians. It provides a more comfortable treatment for the patient by eliminating soft tissues and protecting them from injuries, preventing swallowing and aspiration of endodontic instruments, and preventing the used solutions from coming into contact with the oral environment [6,7]. The use of rubber dam prevents cross-infection and protects both the patient, clinician, and clinical assistant staff from diseases transmitted through blood and saliva [8].

However, despite all these advantages, it has been observed that the use of rubber dam is not as widespread as desired [9,10]. Clinicians list the main reasons why they do not want to use rubber dam as they think that the application takes time and is difficult to use, they find the equipment costly, and some of their patients worry about the lack of knowledge about this application

and do not accept it because they feel uncomfortable [11,12]. Many clinicians say that patients do not like rubber dam and do not want them to be used. However, studies have reported that patients have a positive attitude towards rubber dam and that they may prefer it at the next examination after experiencing it [11,13].

Although there are studies investigating dentists' opinions on the use of rubber dams in Turkish society, there are few studies examining patients' awareness of rubber dams and their feedback on their usage experience [9,10,14-16].

The aim of this study was to measure patients' awareness levels about rubber dam used in endodontic treatments and their opinions about the necessity of its use, to evaluate their endodontic treatment experiences with rubber dam, and to compare the relationship between these opinions and treatment experience.

MATERIALS AND METHODS

Determining the Number of Participants

The sample size was calculated using the sample-size calculating software G*Power version V3.1.9.6 (Kiel University, Kiel, Germany) based on the data acquired from a previous study [15] and as a result of this power analysis of the study, the total number of participants in the study was determined as 150.

Survey Design

Ethics committee approval for the study was received from the Kocaeli University Non-Interventional Ethics Committee on 13 July 2023 with project number 2023/231. A survey including 16-questions was designed to access the participants' demographic information and previous rubber dam experiences, their current experience, and their preferences for the use of rubber dams in subsequent treatments. The 9 questions measuring attitude used a five-point Likert scale indicating measurements ranging from strongly agree (5) to strongly disagree (1). High scores reflected the participant's positive attitude towards the rubber dam. The average duration of the survey was 1-2 minutes.

Distribution of the Survey

This survey was completed by 150 volunteer patients who were indicated for endodontic treatment at Kocaeli University Faculty of Dentistry, Department of Endodontics, between August and September 2023. All of the participants in the survey were selected from volunteer patients who would undergo root canal treatment

Main Points:

- The use of rubber dam is an indispensable step in root canal treatment.
- In this study, the attitudes of patients who undergo root canal treatment with rubber dam were evaluated.
- The survey was completed with 150 volunteer participants.
- Informing about rubber dam before root canal treatment affects patients acceptance of rubber dam use.
- The clinician should improve himself about the use of rubber dam and provide the patient with a more comfortable treatment.

by endodontic residents, and a rubber dam was applied before endodontic procedures. All endodontic residents performing the procedure routinely use rubber dams in their treatments. The rubber dam placement technique was accomplished first with the clamp and dam, then with the frame.

Before the treatment, participants were given brief information about the survey and a survey form was distributed to those who accepted to participate in the research. Participant names or personal information were not requested for the purpose of collecting objective data. The survey continued until the number of completed surveys reached 150. The data obtained from the completed surveys were entered into the database.

Statistical Analysis

Statistical analysis was performed with the IBM SPSS V23 (IBM Corp., Armonk, NY, USA) program. Fisher-Freeman-Halton test, Fisher's Exact test, Pearson Chi Square test were used to compare categorical data, and multiple comparisons were examined with the Bonferroni Corrected Z test. Analysis results were presented as frequency (percentage). $p < 0.05$ was considered sufficient for statistical significance.

RESULTS

Participants in the study were 80 (53.3%) female and 70 (46.7%) male. The largest number of participants were between the ages of 26-40 with a rate of 35.3%. The demographic information and survey responses of the participants are given in Table 1.

27.3% of the participants had previously received dental treatment with rubber dam. There was no statistically significant connection between gender or age and the question "I knew the

benefits of using rubber dam before the treatment." ($p=0.257$, $p=0.373$). It was determined that there were significantly more patients with primary education level among those who did not know the benefits of rubber dam use before coming to treatment ($p=0.013$) (Table 2).

There was a statistically significant connection between the question "I was informed by my dentist about the reasons for using rubber dam before the treatment" and the question "I think the use of rubber dam is necessary for the dentist/patient" ($p < 0.001$). Detailed analysis of the answers given is shown in Table 3.

There was no statistically significant connection between the time of application and the question "I did not feel any pain during the rubber dam application" ($p=0.426$). There was no statistically significant connection between the time of the treatment and the question "I did not feel any pain during the rubber dam application" ($p=0.762$).

In this study, only 4 people were observed who did not prefer rubber dam for the next treatment. There was no statistically significant connection between the question "I would prefer to use a rubber dam in my next treatment." and gender ($p=0.623$). One of 4 people who did not prefer rubber dam selected the option "Disagree" to the question "I did not experience shortness of breath during the treatment with the rubber dam". A person who did not prefer rubber dam selected the option "Disagree" to the question "No solution got into my throat during the treatment with the rubber dam." Two of 4 people who did not prefer rubber dam responded to the question "I felt safe and comfortable during the treatment with the rubber dam" by saying "Disagree".

Table 1. Participants' responses to survey

	n	%
Gender		
Female	80	53,3
Male	70	46,7
Age		
13-25	38	25,3
26-40	53	35,3
41-55	38	25,3
Above 55	21	14
State of education		
Primary Education	21	14
High School	65	43,3

University	64	42,7
Have you ever used a rubber dam in your dental treatment?		
Yes	41	27,3
No	109	72,7
I knew the benefits of using rubber dam before the treatment.		
Strongly disagree	68	45,3
Disagree	20	13,3
Neutral	16	10,7
Agree	19	12,7
Strongly agree	27	18
I was informed by my dentist about the reasons for using rubber dam before the treatment.		
Strongly disagree	9	6
Disagree	5	3,3
Neutral	12	8
Agree	37	24,7
Strongly agree	87	58
The dentist's explanations were convincing about the necessity of using a rubber dam.		
Strongly disagree	6	4
Disagree	2	1,3
Neutral	12	8
Agree	28	18,7
Strongly agree	102	68
I think the use of rubber dam is necessary for the dentist.		
Strongly disagree	1	0,7
Disagree	-	-
Neutral	7	4,7
Agree	33	22
Strongly agree	109	72,7
I think the use of rubber dam is necessary for the patient.		
Strongly disagree	1	0,7
Disagree	-	-
Neutral	9	6
Agree	24	16
Strongly agree	116	77,3
I did not feel any pain during the rubber dam application.		
Strongly disagree	3	2
Disagree	2	1,3
Neutral	10	6,7
Agree	34	22,7
Strongly agree	101	67,3
I did not experience shortness of breath during the treatment with the rubber dam.		
Strongly disagree	2	1,3
Disagree	4	2,7
Neutral	3	2
Agree	26	17,3
Strongly agree	115	76,7
No solution got into my throat during the treatment with the rubber dam.		
Strongly disagree	3	2

Disagree	3	2
Neutral	4	2,7
Agree	25	16,7
Strongly agree	115	76,7
I felt safe and comfortable during the treatment with the rubber dam.		
Strongly disagree	1	0,7
Disagree	2	1,3
Neutral	3	2
Agree	20	13,3
Strongly agree	124	82,7
I would prefer to use a rubber dam in my next treatment.		
Yes	146	97,3
No	4	2,7
Placement Time of rubber dam		
Less than 1 min	100	66,7
1-5 min	32	21,3
6-10 min	6	4
11-20 min	12	8
Treatment time with rubber dam		
Less than 15 min	12	8
15-60 min	109	72,7
More than 60 min	29	19,3

Table 2. Relationship between state of education and rubber dam knowledge level

	I knew the benefits of using rubber dam before the treatment.					p
	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	
State of Education						
Primary education	17 (81) ^a	1 (4,8)	1 (4,8)	1 (4,8)	1 (4,8)	
High School	20 (30,8) ^b	13 (20)	6 (9,2)	12 (18,5)	14 (21,5)	0,013*
University	31 (48,4) ^b	6 (9,4)	9 (14,1)	6 (9,4)	12 (18,8)	

* Fisher-Freeman-Halton test; ^{a-b}: There is no difference between groups with the same letter

Table 3. The relationship between being informed by the dentist and dentist/patient necessity

	I was informed by my dentist about the reasons for using rubber dam before the treatment.					p*
	Strongly disagree	disagree	Neutral	Agree	Strongly Agree	
I think the use of rubber dam is necessary for the dentist.						
Strongly disagree	0 (0)	0 (0)	0 (0)	0 (0)	1 (1,1)	<0,001
Neutral	1 (11,1) ^{ab}	0 (0) ^{ab}	3 (25) ^b	2 (5,4) ^{ab}	1 (1,1) ^a	
Agree	1 (11,1) ^{ab}	1 (20) ^{ab}	5 (41,7) ^{ab}	16 (43,2) ^b	10 (11,5) ^a	
Strongly Agree	7 (77,8) ^{ab}	4 (80) ^{ab}	4 (33,3) ^b	19 (51,4) ^b	75 (86,2) ^a	
I think the use of rubber dam is necessary for the patient.						
Strongly disagree	0 (0)	0 (0)	0 (0)	0 (0)	1 (1,1)	<0,001
Neutral	2 (22,2)	1 (20)	2 (16,7)	1 (2,7)	3 (3,4)	
Agree	0 (0) ^{ab}	1 (20) ^{ab}	4 (33,3) ^b	13 (35,1) ^b	6 (6,9) ^a	
Strongly Agree	7 (77,8) ^{ab}	3 (60) ^{ab}	6 (50) ^b	23 (62,2) ^b	77 (88,5) ^a	

* Fisher-Freeman-Halton test; ^{a-b}: There is no difference between groups with the same letter.

DISCUSSION

The rubber dam introduced by Dr. Barnum in the 1860s has increased its importance day by day and has become accepted as the standard in root canal treatment. Through the rubber dam, which has many benefits for patients and clinicians, a more professional, comfortable and safe treatment is possible [17,18]. Although rubber dam has been known for a long time and has many advantages, its use is not as widespread as desired. A study conducted in Turkey found that 16.7% of dentists preferred the use of rubber dams during root canal treatment [10]. Among the reasons for not using rubber dam, the patient is uncomfortable and refuses to apply rubber dam. However, contrary to popular belief, patients do not reject the use of rubber dam and may prefer treatment with it at the next treatment [7,19]. In the study conducted by Kaşıkçı et al. [4] among endodontists and endodontic Resident/Ph.D. students only, 89.1% of the participants stated that they applied rubber dam in their routine endodontic treatments, especially after the COVID-19 pandemic. In this survey study, the opinions of patients who underwent root canal treatment with rubber dams and their rubber dam post-application experiences were examined.

The first treatment experience with rubber dam affects the patient's general attitude towards rubber dam [6]. 72.7% of the participants had root canal treatment with rubber dam for the first time. 97.3% of the participants preferred the use of rubber dam in their subsequent treatments. A good treatment experience may increase the acceptability of rubber dam in the next treatment.

The majority of patients did not know about rubber dams before the appointment. It has been shown that providing information about the importance and benefits of rubber dam before treatment has a very positive effect on patients' preference for treatment with rubber dam isolation [20]. This survey study, similar to many studies, showed that informing patients before treatment affected the acceptance of rubber dam use [13,20,21].

According to the findings, explaining the advantages of using rubber dam plays an important role in convincing the patient. It is very important that the clinician informs the patient about the reasons and benefits of using a rubber dam before the procedure. The fact that an adequate explanation was given to the majority of patients before the application convinced them that the rubber dam would be beneficial to both themselves and the clinicians.

The second most common cause of accidental swallowing in

adults is dental procedures. Swallowing or aspirating instruments used during endodontic treatment can be life-threatening. The use of a physical barrier such as a rubber dam is of great importance in preventing unwanted accidents [22,23]. In this study, almost all of the patients felt safe and comfortable during rubber dam treatment.

The majority of patients participating in this study expressed positive preferences for the use of rubber dam in their next treatment. Similar results were found in other studies examining patients' attitudes towards rubber dams [13,21,24,25]. The results obtained support that patients do not view the rubber dam application negatively and even want to apply it.

The experience of the person applying the rubber dam may affect the patient's thoughts and preferences about the application. Görduysus [16] showed that the acceptability of the rubber dam increases as experience increases. With a good understanding of the basic principles and sufficient experience, rubber dam insulation can be achieved in a very short time [19]. In this study, no significant relationship was found between rubber dam application time or treatment duration and patients' preferences. This may be because the clinicians performing the practice already have similar experiences.

It is stated that the pain and discomfort felt during rubber dam application affect the choice of use in the next treatment [20,26]. In this study, most patients did not feel pain during rubber dam application. By ensuring the depth of anesthesia and selecting the appropriate clamp, patients' pain can be reduced during rubber dam application.

Although the survey questions were written in simple sentences, the possibility that the patients did not understand the questions correctly can be considered a limitation of the study. Additionally, the evaluations were made after only a single session of rubber dam experience. It is recommended to conduct a study with more participants in which different factors regarding the use of rubber dam are evaluated.

CONCLUSION

It is observed that when patients are informed correctly about rubber dam by their clinicians before endodontic treatment, patients' positive attitude towards the use of rubber dam increases and they want to prefer the use of rubber dam in their next endodontic treatment. Before endodontic procedures, the

advantages and necessity of rubber dam use should be explained to patients in detail and the questions in the patients' minds should be eliminated. The clinician should improve himself in the use of rubber dam and provide the patient with a more comfortable treatment.

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Data availability statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of Interest: The authors deny any conflict of interest related to this study.

Ethical Approval: Non-interventional ethics committee of the Kocaeli University approved this *in vitro* study (GOKAEK-2023/12.36).

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