

The attitude and practice regarding the use of rubber dam among dental practitioners in southern zone Malaysia

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Abstract

Introduction: The rubber dam technique is widely used method of isolation for dental procedures as it comes with many advantages. However, many dental practitioners are not keen on using it because it is time-consuming or difficult to place. Thus, our research aims to evaluate the attitude and practice regarding the use of rubber dams among dental practitioners in Malaysia. **Methodology:** A cross-sectional survey was conducted among the dentists practicing in the Southern zone of Malaysia which included Melaka and Johor states. Online questionnaires were distributed to dental practitioners working in private clinics. The data were collected, and descriptive statistical analysis was done. **Results:** Around 109 responses were received. The factors which are significant regarding attitude of practitioners are relative ease of restoration under rubber dams, improved treatment outcome. It was considered more necessary while working in mandible and when adequate isolation cannot be achieved without it. For evaluating practice, factors which are significant include usage of rubber dam in routine practice and selection of clamp with its adaptation which made rubber dam application a difficult procedure. **Conclusion:** Dental practitioners in the Southern zone of Malaysia understand the advantages of rubber dams and utilize them in their daily routine. However, due to the limited sample size, further studies should be conducted to better understand the attitude and practice of dental practitioners regarding the use of rubber dams.

Keywords: Rubber dam, isolation, attitude, practice

Introduction

Tooth isolation is the key to successful dental treatments. There are various methods of isolation such as cotton rolls, buccal pad, Isolite, Optragate, rubber dam, Comfortview cheek retractor, Isovac.¹ The cotton roll is a traditional

method of isolation in which it can be easily placed into the oral cavity with ease. Isolite is said to be the best posterior dental isolation system. However, it comes with a fair share of struggles, for instance, when prepping palatal or lingual cusps for a crown. Optragate, rubber dam

and Comfortview cheek retractor are the options for anterior dental isolation system.¹

The rubber dam technique is one of the most widely used methods of isolation for various dental procedures. It is a tool introduced by Dr. Sanford Barnum in 1864, with the idea of isolating the teeth from surrounding tissues in the mouth. Since then, there have been numerous publications on the uses, practicality and method of application of rubber dams. In dentistry, we are often exposed to aerosol droplets from the use of hand instruments, and at times the oral cavity tends to be a challenge in controlling moisture.² Hence with that in mind, a rubber dam was created and it comes with many advantages which include the provision of a surgically clean operating field, isolation from hemorrhage and other tissue fluids, prevention of saliva contamination, patient protection from ingesting or aspirating endodontic instruments, tooth debris, medicaments, and irrigation solutions; retraction and protection of soft tissues from the cutting edge of the bur, improved properties of dental materials, reduction of cross-contamination of the root canal system thereby controlling the spread of infection, better accessibility and visibility in the working area, modification of patient behavior, improved operating efficiency and patient management simplified by avoiding the need to rinse out debris.³ When performing sensitive restoration or procedures, moisture control is utterly important. This is supported by studies that have shown that restorations done under the use of a rubber dam help to prolong the longevity of the restoration.⁴ This is both beneficial to the patient as well as the operator as the patient is saved from forking out more money on the same restoration many times due to inadequate moisture control and the operator is saved from performing the same restoration multiple times in hope that this time it would retain longer only to be making the same mistake. Apart from that, a rubber dam is placed to prevent any accidental swallowing or inhalation of endodontic instruments during the procedure.⁵ It is known that dentistry is

somewhat a form of micro art where we learn to use small instruments to gain access to the tooth and create something limitless. Therefore, the tendency for one of these tiny instruments to fall into the patient's pharynx or larynx is high as the patient is constantly in a supine or semi supine position.⁵ To prevent such situations from occurring, a rubber dam is placed. Next, in these recent times where our country Malaysia is still in battle with Covid, it has only made us more aware of the importance of infection control. Apart from Covid, other examples of aerosol transmitted diseases include tuberculosis, pneumonia, chickenpox and measles. Dental professionals are at high risk of contracting any one of these infectious diseases if they are not careful. With that said, rubber dams help to break the transmission of such diseases and reduce the risk of cross-infection contamination in dental practice.⁶

However, in recent times, many dental practitioners regardless of private or government clinics are not keen on using the rubber dam technique as their preferred method of isolation.⁷ This is because the rubber dam technique comes with a range of disadvantages. One of them is time-consuming which is a common difficulty faced by dentists. This prolongs the treatment time for the patient, especially when dam weight, frame, hole location, sizing and dam placement is not precise.⁸ At times, during the application of the rubber dam, it might tear off leaving behind tiny fragments of the dam which would go unnoticed by the dentists. In such cases, saliva control is compromised leading the tiny fragments into the gingival sulcus resulting in soft tissue inflammation, apical migration of epithelial attachment and possible tooth loss.¹⁵ The next disadvantage is patient discomfort. Some patients might have difficulty breathing due to blockage of the airway or suffer irritation to their mucosa and skin¹⁴. In addition, rubber dam components such as the clamps may be accidentally ingested or aspirated by the patients if they are not secured with the dental floss correctly.⁹ Most rubber dams are made from

latex rubber, and they tend to tear, leak and disintegrate on exposure to air and its pollutants. This could cause latex allergy or episodes in some patients.¹³

Rubber dams are often used in endodontic procedures, especially during root canal treatment, composite restoration, caries - filling of both posterior and anterior teeth because as mentioned earlier it provides great moisture control as well as better visibility.¹⁰⁻¹²

Though it comes with many disadvantages, rubber dam technique is still an ideal method of isolation for certain dentists because dental procedures done with the help of rubber dam yield more successful results than the ones done without the rubber dam. Our research focuses on attitude and practice regarding the use of rubber dams among dental practitioners in southern zones of Malaysia.

According to several research, the attitude and practice of rubber dam use amongst dental practitioners are still not well accepted⁷, although it has a handful of advantages, such as establishing infection control, ability to prolong restoration life, avoiding accidental swallowing or inhalation of endodontic instruments and lastly providing excellent moisture control and visibility to the operator. The advantages of rubber dams have made it universally accepted and taught and practiced in every dental school, yet the use of rubber dams is frequently ignored by dental practitioners.² Reasons for not utilizing the rubber dam were common, these are always: 1) It's difficult; 2) It's time-consuming, and 3) My patients wouldn't like it, summed up this poor acceptance rate of rubber dams by saying: *'Probably no other technique, treatment or instrument used in dentistry is so universally accepted and advocated by the recognized authorities and so ignored by the practicing dentists'*.

Hence, this study was conducted to evaluate the attitude and practice regarding the use of rubber dams, especially among dental practitioners in southern zones of Malaysia.

Methodology

Ethical approval for the study received from Institutional ethics committee. This quantitative cross-sectional utilized convenience sampling method among the dental practitioners around southern zones of Malaysia. The sampling frame was the list of dental practitioners registered under southern zones of Malaysia (Melaka and Johor). Names of the practitioner were collected from the Malaysian Dental Council with regards to the address and details of Malaysian practitioners in the southern zone of Malaysia and google form links were distributed directly to each practitioner to be filled out. All Malaysian dental practitioners registered with the dental council who are practicing in southern zones of Malaysia were included. Non- Malaysian registered dental practitioners were excluded. Practitioners' gender, size of municipality and length of clinical experience were considered independent variables. We used the questionnaire that we collected from another research. Written and informed consent from the participating dental practitioners. Confidentiality of the data was maintained.

The structured questionnaire consisted of demographic questions about the gender, size of municipality and length of career and questions assessing attitude and practice of dental practitioners regarding the use of rubber dam.

Fisher exact test was used. P value < 0.05 considered statistically significant. Data entry and analysis were done using Epi Info and IBM SPSS v. 29.0 trial version.

Results

A total of 109 responses were received. Out of these 109 respondents, 34 (31.2%) were male and 75 (68.8%) were female. Majority of the respondents, that is 62 (56.9%) of them have been practicing dentistry for less than 5 years. About 66 (60.6%) of the respondents belong to the urban areas whereas 43 (39.5%) of them belong to the rural areas. (Table 1)

Table 1. Socio Demographic profile of patients (n=109)

| Variable | | n | % |
|--------------------------------|--------|----|------|
| Gender | Male | 34 | 31.2 |
| | Female | 75 | 68.8 |
| Size of Municipality(citizens) | Rural | 43 | 39.5 |
| | Urban | 66 | 60.6 |
| Length of Career(span) | <5 | 62 | 56.9 |
| | 6-15 | 31 | 28.4 |
| | 16-25 | 4 | 3.7 |
| | 26-35 | 8 | 7.3 |
| | >36 | 4 | 3.7 |

By comparing the gender of the practitioners with their attitude towards the use of rubber dams, the results found were not significant (Table 2). Similarly, there were no significant results found as well when comparing gender of practitioners with their practice towards the use of rubber dams (Table 3). In comparing the length of career years of practitioners with their attitude towards the use of rubber dam, more than 80% of those practitioners who have been practicing for less than 5 years as well as those who have been practicing for 6 to 15 years agreed that rubber dam eased the restoration stage and improved the success rate of treatment. 100% of those practitioners who have been working for more than 36 years believed that adequate isolation cannot be achieved without the use of rubber dam while 100% of those practitioners who have been

working for 16 to 25 years disagreed with the statement. Besides, majority of these respondents also agreed that rubber dams were more necessary while working in mandible. The remaining results found were not significant with the length of career years of the practitioners (Table 4). In comparing the length of career years of practitioners with their practice towards the use of rubber dam, there were no significant results found (Table 5). In association of the municipality of practitioners with their attitude towards the use of rubber dams, about 90% of the urban practitioners and 75% of the rural practitioners believed that provision of isolation and an aseptic working area was one of the greatest advantages offered by rubber dam. The remaining results found were not significant (Table 6).

In association of the municipality of practitioners with their practice towards the use of rubber dams, about 95% of the urban practitioners and 74% of the rural practitioners used rubber dams in their routine dental practice. Next, majority of the urban practitioners (66.7%) believed that selection of clamps and its adaptation was the major factor that made rubber dam application a difficult procedure. However, majority of the rural practitioners (53.5%) believed that placement of rubber dams was what made it a difficult procedure (Table 7).

Table 2. Comparing the gender of the practitioner with their attitude towards the use of rubber dam.

| Questions | | Female n (%) | Male n (%) | p-value |
|---|---|-----------------|---------------|---------|
| The greatest advantage offered by rubber dam | Provision of isolation and an aseptic working field | 66 (88.0) | 27 (79.4) | 0.352 |
| | Prevention of swallowing or aspirating materials | 8 (10.7) | 6 (17.6) | |
| | Prevent of ingestion of instruments | 1 (1.3) | 1 (2.9) | |
| Rubber dam eases the restoration stage | Agree | 72 (96.0) | 30 (88.2) | 0.201 |
| | Disagree | 3 (4.0) | 4 (11.8) | |
| Treatments performed using the rubber dam are more successful than those performed without it | Agree | 66 (88.0) | 26 (76.5) | 0.156 |
| | Disagree | 9 (12.0) | 8 (23.5) | |

Fisher's exact test. $P < 0.05$ is significant

Table 3. Association between Gender of participants and the Practice among Dental Practitioners

| Questions | | Female n (%) | Male n (%) | p-value |
|---|-----------|-----------------|---------------|---------|
| Using rubber dam in your routine dental practice | Yes | 66 (88.0) | 5 (14.7) | 0.760 |
| | No | 9 (12.0) | 29 (85.3) | |
| Ask your patients whether they have latex allergy prior to rubber dam use | Yes | 52 (69.3) | 26 (76.5) | 0.499 |
| | No | 23 (30.7) | 8 (23.5) | |
| Using rubber dam during amalgam restorations | Never | 35 (46.7) | 12 (35.3) | 0.080 |
| | Rarely | 15 (20.0) | 9 (26.5) | |
| | Sometimes | 22 (29.3) | 7 (20.6) | |
| | Always | 3 (4.0) | 6 (17.6) | |

Fisher's exact test. $P < 0.05$ is significant

Table 4. Association between career years of practitioner and the attitude among dental practitioners

| Questions | | <5 n (%) | 6 – 15 n (%) | 16 – 25 n (%) | 26 – 35 n (%) | >36 n (%) | p- value |
|---|---|----------------|-----------------|---------------------|------------------|-----------------|-------------|
| The greatest advantage offered by rubber dam | Provision of isolation and an aseptic working field | 54 (87.1) | 29 (93.5) | 2 (50.0) | 5 (62.5) | 3 (75.0) | 0.056 |
| | Prevention of swallowing or aspirating materials | 7 (11.3) | 2 (6.0) | 2 (50.0) | 2 (25.0) | 1 (25.0) | |
| | Prevent of ingestion of instruments | 1 (1.6) | 0 (0.0) | 0 (0.0) | 1 (12.5) | 0 (0.0) | |
| Rubber dam eases the restoration stage | Agree | 61 (98.4) | 29 (93.5) | 3 (75.0) | 7 (87.5) | 2 (50.0) | 0.005 |
| | Disagree | 1 (1.6) | 2 (6.5) | 1 (25.0) | 1 (12.5) | 2 (50.0) | |
| Treatments performed using the rubber dam are more successful than those performed without it | Agree | 58 (93.5) | 26 (83.9) | 1 (25.0) | 5 (62.5) | 2 (50.0) | <0.001 |
| | Disagree | 4 (6.5) | 5 (16.1) | 3 (75.0) | 3 (37.5) | 2 (50.0) | |

Fisher's exact test. $P < 0.05$ is significant

Table 5. Association between career years of practitioner and the attitude among dental practitioners

| Questions | | < 5 n (%) | 6-15 n (%) | 16-25 n (%) | 26-35 n (%) | > 36 n (%) | p- value |
|---|-----|--------------|---------------|----------------|----------------|---------------|-------------|
| Using rubber dam in your routine dental practice | Yes | 57 (91.9) | 26 (93.9) | 4 (100.0) | 5 (87.5) | 3 (75.0) | 0.71 |
| | No | 5 (8.1) | 5 (16.1) | 0 (0.0) | 3 (37.5) | 1 (25.0) | |
| Ask your patients whether they have latex allergy prior to rubber dam use | Yes | 44 (71.0) | 22 (71.0) | 2 (50.0) | 6 (75.0) | 4 (100.0) | 0.95 |
| | No | 18 (29.0) | 9 (29.0) | 2 (50.0) | 2 (25.0) | 2 (25.0) | |

| | | | | | | | |
|--|-----------|-----------|-----------|----------|----------|----------|------|
| Using rubber dam during amalgam restorations | Never | 27 (43.5) | 13 (41.9) | 3 (75.0) | 3 (37.5) | 3 (37.5) | 0.62 |
| | Rarely | 16 (25.8) | 4 (12.9) | 1 (25.0) | 2 (25.0) | 2 (25.0) | |
| | Sometimes | 17 (27.4) | 8 (25.8) | 0 (0.0) | 2 (25.0) | 2 (25.0) | |
| | Always | 2 (3.2) | 6 (19.4) | 0 (0.0) | 1 (12.5) | 1 (12.5) | |

Fisher's exact test. $P < 0.05$ is significant

Table 6. Association between size of municipality and the attitude among dental practitioners

| Questions | | Rural n (%) | Urban n (%) | p-value |
|---|---|-------------|-------------|---------|
| The greatest advantage offered by rubber dam | Provision of isolation and an aseptic working field | 33 (75.7) | 60 (90.9) | 0.045 |
| | Prevention of swallowing or aspirating materials | 8 (18.6) | 6 (9.1) | |
| Rubber dam eases the restoration stage | Prevent of ingestion of instruments | 2 (4.7) | 0 (0) | 0.701 |
| | Agree | 41 (95.3) | 61 (92.4) | |
| Treatments performed using the rubber dam are more successful than those performed without it | Disagree | 3 (4.0) | 4 (11.8) | 0.844 |
| | Agree | 66 (88.0) | 26 (76.5) | |
| | Disagree | 9 (12.0) | 8 (23.5) | |

Fisher's exact test. $P < 0.05$ is significant

Table 7. Association between size of municipality and the practice among dental practitioners

| Questions | | Rural N (%) | Urban N (%) | p-value |
|---|-----------|-------------|-------------|---------|
| Using rubber dam in your routine dental practice | Yes | 32 (74.4) | 64 (95.5) | 0.002 |
| | No | 11 (25.6) | 3 (4.5) | |
| Ask your patients whether they have latex allergy prior to rubber dam use | Yes | 31 (72.1) | 47 (71.2) | 0.999 |
| | No | 12 (27.9) | 19 (28.8) | |
| Using rubber dam during amalgam restorations | Never | 18 (41.9) | 29 (43.9) | 0.683 |
| | Rarely | 11 (25.6) | 13 (19.7) | |
| | Sometimes | 12 (27.9) | 17 (25.8) | |
| | Always | 2 (4.7) | 7 (10.6) | |

Fisher's exact test. $P < 0.05$ is significant

Discussion

This study aimed to know the attitude and practice in the use of rubber dam among dental practitioners in southern zones of Malaysia. A total of 109 dental practitioners participated in this study. Out of these 109 respondents, 34 (31.19%) were male and 75 (68.81%) were female. Our study showed predominance of

females and the reason could be due to higher number of females enrolling into dentistry program compared to males as suggested by Shishir et al.²¹ Besides, it was also found that rubber dams are used more frequently by practitioners who have been practicing for less than 5 years compared to those who have been practicing for a longer period. This is in accordance with the results of Martin et al²² who

suggested it could be due to the implementation of the use of rubber dam into undergraduate dentistry.

It was found that treatment involving the mandible required greater usage of rubber dams. The mandible was ranked as the jaw where rubber dam placement was more necessary by most participants in a study by Tanalp et al.²⁶ which is agreement to our findings where in majority of dental practitioners agreed to place isolation in the lower jaw.

Majority of dental practitioners regardless of the length of their careers found that treatments using rubber dam provide better treatment outcomes than those without using it. Although this may be true, a few articles found that there were no significant differences between the type of isolation methods. Olegário et al.¹⁷ found that the survival rate of composite restorations using cotton roll isolation is non-inferior (not worse) than the use of rubber dam isolation. Apart from that, a Cochrane systematic review study by Wang Y et al.¹⁸ concluded that further high-quality research evaluating the effects of rubber dam usage on different types of restorative treatments is required as only a single study demonstrated a significant difference in survival rate in favor of restorations placed under rubber dam.

In respect to achieving proper isolation only with rubber dam usage, dental practitioners of majority agreed that, while some disagreed. It is a useful tool that offers better working conditions, maintaining dry field, retracting the tissues and preventing ingestion of dental materials.¹⁶ Apart from that, it is said that with rubber dam a reduction in bacterial aerosols was reported to be around 70-98.9%, significantly minimizing the inhalation of infective aerosols by dental personnel.^{18,19} It was suggested that during many dental procedures, using a rubber dam could eliminate almost all means of contamination arising from saliva and blood. This is in accordance with results by Accorinte et al. 2006¹⁹, where cotton roll and rubber dam were used in the treatment of direct pulp capping

results concurred that the placement of rubber dam reduced the chances of bacterial contamination in comparison to the usage of cotton roll. Although the rubber dam may be superior to other methods of isolation, no articles have proven it to be the best.¹⁷

The utmost advantage provided by rubber dam was aseptic work area, followed by ease of cavity preparation and restoration. This agrees with Tanalp et al.²⁶ Rubber dam is said to ease the restoration stage by allowing clear visibility and accessibility to the working area.

It was concluded that dental practitioners working in both urban and rural areas felt that using rubber dams had the greatest advantage of providing proper isolation and aseptic working area.²³ It is said during restorative treatment the use of a rubber dam during cavity preparation has been shown to greatly reduce the spread of microorganisms by 90%.²⁵

Regarding using rubber dams in dental practice, dental practitioners in urban areas are fonder of using it compared to those in rural areas. This could be simply because the communities staying in such rural areas are less likely to visit the dental office for treatment compared to urban.²³ Based on the study by Luo et al., 2020²⁴ rural community utilization of preventive dental services is still low in comparison to urban areas. Rural community has a higher rate of extraction, hence the utilization of rubber dam is said to be low. Apart from that, rubber dam placement can make the patient feel uncomfortable,^{8,5} hence opting for simpler methods of isolation.

A percentage of 66.7% of dental practitioners in the urban area found that the selection of clamp and its adaptation made it difficult to apply a rubber dam. The selection of the correct clamp can vary for different cases. About 53.5% of dental practitioners in rural areas found that placing the rubber dam itself was a difficult step. This is because the ability to place rubber dams successfully and efficiently comes with experience which, in turn, comes with regular use.^{8,20} Therefore, the limited utilization of this technique may be related to a lack of proficiency

rather than a lack of knowledge or insufficient training.^{8,20}

The study may be considered to be underpowered due to reduced number of responses compared to the sample size. While 109 responses provide an outline, the lack of statistical significance in several categories (like gender or career length) may simply be due to the small sample size rather than a true lack of difference.

Nevertheless, based on the results found in this study, there is no significance in relation to the gender of dental practitioners and the attitude of dental practitioners towards the use of rubber dams. There is also no significance with the gender of participants and practice among dental practitioners with the use of rubber dams. Lastly, there is no significance between the career of dental practitioner and the practice of rubber dam usage.

The method of data collecting done in this research was via questionnaire survey which is regarded as a common instrument to collect data in the healthcare field as large amount of data can be collected in a relatively short period of time. However, a major disadvantage of collecting data by this means is its low sample size as well as bias towards answering the questions. The sample size of 109 out 226 in the present study is reasonable, but it should be remembered as there may be a form of selection bias; those practitioners who are enthusiastic about the use of rubber dams may have been more likely to respond than those who are not.

Conclusion

Based on the results from this study, it can be concluded that effective isolation, infection control, better accessibility and visibility as well as improved treatment outcomes are the factors that reflect the attitude of dental practitioners towards the use of rubber dams.

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