Experience and Practicality of Rubber Dam Use among Undergraduate Dental Students in Fiji

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Abstract

Background: Every dental school has the responsibility to teach its students the ideal techniques of isolation prior to the clinical procedure. Rubber dam is considered to be an essential tool for conservative dentistry; hence its preclinical training to dental students is of utmost importance. Due to lack of previous study, this study aims to assess the experience of undergraduate dental students at Fiji National University (FNU) on use of rubber dam.

Methodology: This is a cross-sectional quantitative study whereby 48 self-administered questionnaires were distributed among the third, fourth and fifth year dental students at FNU. All the students in that respective year were also observed for the time taken to place rubber dam using an observation checklist. The data was analyzed using the Epi-info software.

Results: A 100% response rate was obtained. Among the 48 participants, 30 were females and 18 were males. 75% of the participants stated moisture control as the major advantage of rubber dam use. Difficulty in placing rubber dams was a main disadvantage highlighted by 35% of the student while 27% stated that placing rubber dam took up extra clinical time. The mean time taken to place rubber dam was 6 minutes to the nearest minute on adult patients. Students preferred to use cotton rolls for isolation during Glass Ionomer Cement (79%) and Amalgam (65%) procedures. Majority of the students felt that the training and teaching sessions on rubber dam are sufficient. The major problems identified by students while placing rubber dam were lack of appropriate clamps, patient acceptance and compliance.

Conclusion: The level of knowledge among undergraduate students on the advantages and disadvantages of rubber dam is high. There are various factors in practice and training that could be emphasized to encourage students on future use of rubber dam. Among the undergraduate dental students there was still a high possibility that they might not practice routine placement of rubber dam after graduation. There is scope for further study on the rubber dam practice of general dental practitioners.

Keywords: Rubber dam; Experience; Practicality; Fiji

Introduction

Rubber Dam is defined as a thin rubber sheeting through which holes can be punched and teeth are allowed to protrude through isolating it from other teeth, cheeks, gums in the mouth [1]. Rubber dam clamps are usually required to hold the rubber dam in its stable position around the tooth [2,3].

Rubber dam being an important component of clinical dentistry has very obvious advantages. Studies done prove that rubber dams provide safety to the patient and the operator. It decreases the risk of transferring infective agents between dentist and patient [2-5]. During procedures like endodontic (root canal filling) rubber dams provide enhanced protection to the patient as it prevents ingestion of instruments, solvents and irrigations materials accidentally and also protects the patients gingival and soft tissues [3-5]. Compared to other methods of isolation rubber dam is considered the best method of moisture control [6].

Dental education always contains courses and pre-clinical sessions which train students to efficiently place and develop a habit to use rubber dam at an undergraduate level. Students at times do not feel that rubber dams should be placed routinely. Common arguments put across are that it takes time to place it successfully [2,3]. Literature also suggests that patients do not like rubber dam [2,3]. Dental practitioners commented that they had undergone insufficient and lack of undergraduate training so they do not have the skill to place rubber dam efficiently and it was difficult for them to place rubber dam [4]. Cost and fees mainly in private practices was another disadvantage [3].

The undergraduate program of Bachelor in Dental Surgery consists of mandatory training in placement of rubber dam in the school of oral health at FNU. The training is implemented during year 2 level of the BDS course. Since there is no study conducted about the use of rubber dam in undergraduate dental program in the Pacific so this study is aimed to determine the experience and practice of students in year 3, 4 and 5 at FNU towards rubber dam use and application.

Method

This is a cross-sectional study done on the 3rd, 4th, and final year dental students with a total of 48 students. Data collection tools included an observational checklist and a self-administered questionnaire. The questionnaire consists of eleven questions with a mixture of preference, training and barrier questions. This questionnaire was piloted earlier among the assessors and two assessors were identified to be collecting
data. A pilot study was done on a group of 10 year 2 dental students at Department of Oral Health, FNU in 2011 to validate the questionnaire. The modified questionnaire was given to students in year 2 because they had finished the preclinical exercise in rubber dam placement and were freshly introduced to rubber dam.

In this survey each student was observed twice by the investigator and supervisor in consecutive clinical sessions using an observation checklist. Each student was observed twice while placing rubber dam and an average of their time was taken to maintain a consistency in measurement. The observation checklist was created to observe and note the student's time taken, the procedure being carried out and the level of study of the student. Students being observed were informed earlier that they would be observed on their clinical session for the day however, they were unaware of the exact procedure being observed. Rubber dam placement times were recorded to the nearest minute and averaged after observing the student twice. The assessors were also calibrated for consistency. After observing the students, they were given a questionnaire to answer prior to leaving the clinic. The information received was entered into electronic software (Epi-Info) for analysis.

Appropriate approvals were obtained from the Department of Oral Health research committee and the college research committee of Fiji National University. Confidentiality of the student responses to the questionnaires had been maintained. The values obtained were kept anonymous by de-identifying participants and during data entry the results were coded.

Results

A 100% response rate was obtained from the students of year 3, 4 and 5. 30 females were present and 18 males. The ratio of male: female was 0.6: 1. There was approximately twice the number of females as males. The largest ethnic groups were the students from the other Pacific Island Countries such as Samoa, Tonga (27). There was only one student from Korea. Altogether there are 91 Taufa’ahau students and 11 Fijians of Indian origin.

As Table 1 shows majority of the students (75%) did identify “moisture control” as a major advantage of using rubber dam which followed by “increases visibility and access” and “patient safety” (each 37.5%).

The results also revealed that “sometimes difficult to place” (36%) was the major disadvantage of using rubber dam which followed by “extra time taken” and “decreases access sometimes” (each 27.08%) (Table 2).

Students took a mean of 6 minutes to place rubber dam on to their adult patients (to the nearest minute). Bachelor of Dental Surgery year 3 took an average of 8 min; Year 4 students took 4 min while year 5 took 3 min (Figure 1).

Majority of the students (79%) commended that rubber dam should not be placed when doing Glass Ionomer restorations; instead they would prefer using cotton roll or gauze to isolate. Interestingly there were 2 students who stated that they do not prefer the use of rubber dam during endodontic procedure and anterior composites. 10% did not use rubber dam for posterior composite (Figure 2).

41 out of 48 students (85%) agreed that they had received adequate training at year 2 level. However, 3 students claimed that they had not received adequate training and 4 students highlighted that they weren't sure if the training given was adequate. 36 out of 48 students (75%) agreed that they had received adequate chair-side assistance while placing rubber dam on patients. However, 3 students claimed otherwise and 4 students stated that they weren't sure. 41 out of 48 students (85%) claimed that they are confident in placing rubber dam while 2 students feel they are not confident in placing rubber dam. 5 students are unsure about their confidence level.

Referring to Figure 3 the greatest hindrance to placing the dam amongst the student population was identified as lack of appropriate clamps (71%), 54% of the participants stated lack of patient acceptance and compliance as a concomitant barrier. 31% proposed lack of exposure and experience in rubber dam use. 4% stated lack of supervisor support and inadequate training as a barrier in placing rubber dam.

Discussion

The findings suggested that the level of knowledge among the Fiji National University dental students, regarding the most important advantage of rubber dam was good (75%) which was moisture control. 35% of the participants highlighted difficulty in rubber dam placement as the major disadvantage followed by extra time taken to place (27%) and decrease in access to the tooth (27%). Rubber dam has been shown in many studies [3,4] to improve access to the tooth being treated; however, the participants in this study suggested that rubber dam placement was more likely to decrease access to the tooth.

| Level of importance | Moisture control N (%) | Increases visibility and access N (%) | Patient safety N (%) | Reduces cross – infection N (%) | Medico-legal N (%) | Makes work faster N (%) |
|---------------------|-----------------------|--------------------------------------|---------------------|-------------------------------|------------------|------------------------|
| 1 (most important)  | 36 (75)               | 18 (37.5)                            | 18 (37.5)           | 15 (31.25)                    | 2 (4)            | 2 (4)                  |
| 2                   | 7 (14.56)             | 11 (22.92)                           | 12 (25)             | 11 (22.92)                    | 0 (0)            | 0 (0)                  |
| 3                   | 4 (8.33)              | 12 (25)                              | 10 (20.83)          | 8 (16.67)                     | 0 (0)            | 0 (0)                  |
| 4 (Least important) | 1 (2)                 | 7 (14.56)                            | 8 (16.67)           | 14 (29.17)                    | 0 (0)            | 0 (0)                  |

| Level of importance | Difficult to place sometimes N (%) | Need LA for clamps N (%) | Extra time taken N (%) | Decreases access sometimes N (%) | Uncomfortable to the patient N (%) |
|---------------------|-----------------------------------|--------------------------|-----------------------|----------------------------------|-----------------------------------|
| 1 (Most important)  | 17 (35.42)                        | 6 (12.5)                 | 13 (27.08)           | 13 (27.08)                       | 1 (2)                             |
| 2                   | 10 (20.83)                        | 11 (22.92)               | 11 (22.92)           | 15 (31.25)                       | 0 (0)                             |
| 3                   | 11 (22.92)                        | 13 (27.08)               | 11 (22.92)           | 7 (14.58)                        | 0 (0)                             |
| 4 (Least important) | 9 (18.75)                         | 17 (35.42)               | 13 (27.08)           | 13 (27.08)                       | 0 (0)                             |
Figure 1: Average times taken by students to place rubber dam.

Figure 2: Frequency of participants’ response to isolation techniques preferred over rubber dam.

Figure 3: Barriers to rubber dam placement as identified by students.
The average time taken by students was 6 minutes to place rubber dam on adult patients (converted to the nearest minute). The trend in this result indicates a reduction in average time taken to place rubber dam with experience for both anterior and posterior dam placements. We could expect that the observed decrease in placement time to continue with further experience to possibly 2 minutes as suggested by Lynch, in his study of general dental practitioners [5]. Ryan and Connell suggest that the average time taken to successfully place a rubber dam was around 5 minutes [2].

A majority of the students felt that restorative work; including GIC and Amalgam fillings did not require the use of rubber dam. Typically rubber dam usage is considered mandatory for all restorative and endodontic procedures, however educators should promote critical thinking skills in which students analyze a clinical situation and determine the best choice of treatment and technique [4]. Rubber dam is considered mandatory when it comes to doing composites and clinical procedure involving the pulp [4-7]. Despite knowing this, some participants still opted to use cotton roll and gauze isolation for endodontic and composite procedures. A similar study done in Saudi Arabia demonstrated that students were less convinced to the use of rubber dam in amalgam and composite restorations [8-14].

Students highlighted that the undergraduate training they had received at year 2 level was sufficient. Most of the students also agreed that they were given adequate chair-side support and they were confident in placing rubber dam.

Research done on undergraduate dental students in Dublin Dental hospital stated that they had received adequate training for use of rubber dam in adults (98%) highlighting that undergraduate students had sufficient confidence and training to reliably place a rubber dam for adult patient. They went on to recommend to increase the likelihood of its use being continued in future practice students must be convinced and confident in rubber dam prior to graduation [2].

In 2016, a survey aimed to investigate the attitude of senior dental students towards rubber dam use, especially in endodontic practice was carried out and it was revealed that students showed a positive attitude towards rubber dam use [11]. It also suggests that there is a scope for increased teaching of rubber dam techniques in dental school to overcome problems such as difficulty in placement and in doing so improve application times and remove associated concerns such as perception of wasted chair-side time during rubber dam application [3]. It was recently confirmed speculation that many restorative techniques taught in dental school are not consistently applied once graduates settle into private practice. It was suggested that dental educators should focus more on relevance than technique of rubber dam placement, anticipating that, after graduation, knowledgeable practitioners might value quality and merit overtime and perceived inconvenience. Typically rubber dam usage is considered mandatory for all restorative and endodontic procedures [12] however educators should promote critical thinking skills in which students analyze a clinical situation and determine the best choice of treatment and the technique.

The questionnaire highlighted many different barriers to placing rubber dam. The greatest hindrance to placing the dam was identified as lack of appropriate clamps (71%).54% of the participants stated lack of patient acceptance and compliance as a concomitant barrier; this could be as a result of poor patient preparation prior to rubber dam placement or lack of discussion of the patient benefits of rubber dam placement. This aspect might warrant investigation by further study of student communication skills. 31% proposed lack of exposure and experience in rubber dam use.

Conclusion

Undergraduate BDS students at FNU are well aware of the advantages and disadvantages of rubber dam placement. Thus during training more emphasis should be placed on the advantages of using rubber dam.

The average time taken to place rubber dam in this study was 6 minutes, which is similar to most other studies concerning rubber dam placement. With increased experience and exposure, the time taken to place rubber dam improves and the habitual practice of rubber dam placement will tend to improve future use of rubber dam [1].

This research revealed that the students felt they had received adequate training on rubber dam placement. The major issue with placing rubber dams for the undergraduate students was the lack of appropriate clamps. Developing and maintaining a positive attitude towards rubber dam through good undergraduate training can make it a friend for life.

Recommendations

An obligatory placement of rubber dam for all preclinical restorative exercises would help to reduce the time taken to place rubber dam by students, similarly more pre-clinical exercise on clinical partners applying rubber dam in different quadrants would also assist students. By increasing the exposure and experience in using rubber dam will increase the time taken to place rubber dam as seen in this study.

Clinical supervisors may demonstrate to students who did not like rubber dam the best, innovative and easiest rubber dam technique. Appropriate approach for encouraging patients to accept rubber dam as a necessary part of restorative dental treatment can also be discussed.

There is a need to increase the variety of rubber dam clamps for clinical use at the dental teaching clinics of the Fiji National University as majority of the student found it to be a barrier in rubber dam placement.

For further development of this study, the department can explore why the students did not feel that rubber dam was ideal isolation technique during GIC, Amalgam, and composite and endodontics procedures.

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