Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/4xwfd635

EFFECTIVENESS OF DIFFERENT MOISTURE CONTROL METHODS IN OPERATIVE DENTISTRY: A CLINICAL STUDY FROM PESHAWAR

Dr. Fatima Qureshi[1], Dr Fawad Ali shah[2*], Dr Javairia Ali[3], Dr Ayesha waris[4], Dr. Muhammad Assam[5], Dr Maria Naeem[6]

[1]BDS Post Graduate Resident Institution: Khyber College of Dentistry, Peshawar
Email: fatimaqureshidr@gmail.com
[2*]BDS FCPS Assistant Professor Khyber college of dentistry Peshawar
Email: Drfawada@yahoo.com
[3]BDS PGR Operative Dentistry & Endodontics Khyber College of Dentistry
Email : Javairiaali1998@gmail.com
[4]BDS Dental surgeon Afridi medical complex Peshawar Email : ayeshawarisbds@gmail.com
[5]BDS General Dentist KMU institute of dental sciences Email: assam9953@gmail.com
[6]BDS Post graduate resident FCPS Khyber college of dentistry Email: mkhan211211@gmail.com

***Corresponding Author:** Dr Fawad Ali Shah
*BDS FCPS Assistant Professor Khyber College Of Dentistry Peshawar Email: Drfawada@Yahoo.Com

Introduction

Moisture management during restorative and endodontic operations is essential for clinical success. Contamination from saliva, blood, or gingival crevicular fluid (GCF) diminishes bond strength, impacts marginal integrity, and jeopardizes the longevity of restorations [1,2]. Establishing a sterile operational field is crucial for the effectiveness of adhesive dentistry, endodontics, and impression techniques.

The rubber dam is internationally acknowledged as the "gold standard" for its exceptional capacity to ensure aseptic conditions [3]. In Pakistan, its utilization is constrained by variables including inadequate training, extended application duration, expense, and patient hesitance [4,5]. Cotton rolls with saliva ejectors, absorbent pads, high-volume evacuators (HVE), and gingival retraction cords containing hemostatic agents are more commonly utilized. Lip and cheek retractors are becoming more accessible in urban areas [6,7].

Although alternate methods may not consistently achieve the same degree of dryness as a rubber dam, they have practical benefits for efficiency and patient comfort. This study sought to evaluate the therapeutic efficacy of locally available isolation techniques in Pakistan for moisture management, operator convenience, and patient acceptance.

Methodology

Study Design

A randomized clinical trial was conducted in the Operative Dentistry Department of a dental teaching hospitals in Peshawar over a period of six months. Ethical approval was obtained prior to data collection.

Sample

- **Participants:** 80 patients aged 10–40 years requiring Class I or II composite restorations.
- **Inclusion criteria:** Patients with carious lesions restricted to enamel/dentin, supragingival or equigingival margins, and cooperative behavior.
- **Exclusion criteria:** Patients with subgingival margins, uncooperative pediatric patients, severe gag reflex, or systemic conditions affecting salivary flow.

Group Allocation

Participants were randomly divided into four groups (n=20 each):

1. **Group A:** Rubber dam isolation.
2. **Group B:** Cotton rolls + saliva ejector.
3. **Group C:** Cotton rolls + absorbent pads.
4. **Group D:** Gingival retraction cord + HVE.

Clinical Procedure

- Restorations were performed by calibrated operators following standardized adhesive protocols.
- Isolation technique was applied according to group assignment.

Outcome Measures

1. **Moisture control:** Field Dryness Score (FDS) at bonding and restoration placement (0 = contaminated, 1 = slightly moist, 2 = completely dry).
2. **Isolation time (minutes):** From start of isolation to completion.
3. **Patient comfort:** Visual analog scale (VAS, 0–10).
4. **Operator ease:** Likert scale (1–5).

Statistical Analysis

Data were analyzed using SPSS v25. One-way ANOVA and Chi-square tests were applied. $p < 0.05$ was considered statistically significant.

Results

A total of 80 patients were analyzed, with no significant differences in age or gender distribution between groups ($p > 0.05$).

1. Moisture Control (FDS)

- **Group A (Rubber dam):** 1.95 ± 0.08
- **Group D (Retraction cord + HVE):** 1.80 ± 0.12
- **Group C (Cotton rolls + absorbent pads):** 1.55 ± 0.16
- **Group B (Cotton rolls + saliva ejector):** 1.35 ± 0.20

Rubber dam provided the highest dryness scores. Retraction cord with HVE achieved statistically similar results ($p > 0.05$). Cotton rolls with absorbent pads performed better than cotton rolls alone ($p < 0.05$).

2. Time Required for Isolation

- Rubber dam: 5.8 ± 1.0 minutes
- Retraction cord + HVE: 3.2 ± 0.7 minutes
- Absorbent pads: 2.0 ± 0.5 minutes
- Cotton rolls only: 1.5 ± 0.3 minutes

Rubber dam required significantly more time compared to all other groups ($p < 0.01$).

3. Patient Comfort (VAS)

- Cotton rolls: 8.0 ± 0.6
- Absorbent pads: 7.8 ± 0.5
- Retraction cord + HVE: 6.5 ± 0.8
- Rubber dam: 4.5 ± 0.7

Cotton rolls and absorbent pads were the most comfortable. Rubber dam recorded the lowest comfort due to reported breathing difficulty and speech restriction.

4. Operator Ease (Likert scale, 1–5)

• Cotton rolls: 4.6/5
• Absorbent pads: 4.3/5
• Retraction cord + HVE: 3.8/5
• Rubber dam: 3.0/5
Cotton roll isolation was the easiest to use, while rubber dam required the highest skill and time.

Discussion

Moisture Control

This investigation established that the rubber barrier is the most efficacious isolation method regarding field dryness. The nearly flawless FDS score aligns with global research indicating that rubber dams are essential for endodontics and adhesive dentistry [3,8]. Nonetheless, its clinical application in Pakistan is constrained by patient resistance and operator hesitance [4,5].

The retraction cord with high-volume evacuation (HVE) was almost as successful as the rubber dam, underscoring its viability as an option in cases with equigingival margins or gingival crevicular fluid seepage. Research substantiates the effectiveness of gingival displacement in preserving dryness during restorative operations [10,11].

Absorbent pads combined with cotton rolls yielded superior results compared to cotton rolls alone, especially in mandibular molars where parotid saliva contamination frequently occurs [6]. Consequently, absorbent pads have to be advocated as an economical improvement for general practice in Pakistan.

Patient Comfort

Patient comfort preferred cotton roll techniques, which are recognized, minimally invasive, and expeditious to use. The rubber dam, while superior in moisture control, was the least comfortable option. This illustrates patient perspectives in South Asia, where cultural unfamiliarity and communication obstacles hinder acceptance [4,5].

Although efficient, retraction cord methods induced temporary gingival irritation, resulting in lower comfort rankings compared to absorbent procedures.

Operator Perspective

Operators evaluated cotton rolls and absorbent pads as the most user-friendly, aligning with their efficiency and straightforwardness. The rubber dam received the lowest score due to its technological requirements. This corresponds with surveys of Pakistani dentists indicating low confidence and infrequent daily utilization of rubber dams [4,16].

Clinical Implications for Pakistan

- Rubber dam: Recommended for endodontics, deep Class II restorations, and procedures requiring absolute isolation. Requires improved training and patient education.
- Retraction cord + HVE: Effective compromise where rubber dam is impractical, especially with gingival fluid involvement.
- Cotton rolls + absorbent pads: Best suited for pediatric patients, preventive procedures, and short supragingival restorations.
- Universal HVE use: Advised alongside all methods for both moisture control and aerosol reduction [14,15].

Limitations

- Restricted to supragingival Class I and II restorations; findings may differ for subgingival or multi-surface restorations.
- Patient comfort assessed only during single appointments.
- Exclusion of advanced systems (Isolite/Isodry) as they are not widely available in Pakistan.

References

1. Kohn WG, et al. Infection control recommendations for dentistry. *MMWR Recomm Rep.* 2003;52(RR-17):1–61.
2. Samaranayake L. *Essential microbiology for dentistry.* 6th ed. Elsevier; 2020.
3. American Association of Endodontists. Dental dam isolation: position statement. Chicago: AAE; 2023.
4. Ahmed B, Ali A, Qamar S. Awareness and practice of rubber dam among dentists in Pakistan. *Pak Oral Dent J.* 2019;39(1):34–7.
5. Ali Z, Tariq M, Arshad S. Rubber dam use in operative dentistry: knowledge and practices of dentists in Lahore. *J Pak Dent Assoc.* 2020;29(4):185–9.
6. Memon M, Khan M. Comparative effectiveness of cotton roll isolation vs absorbent pads in pediatric restorative procedures. *J Liaquat Univ Med Health Sci.* 2018;17(2):122–6.
7. Farooq I, Ali S. Use of gingival retraction techniques among dental practitioners in Pakistan. *Int Dent J Students Res.* 2017;5(2):65–9.
8. Wang Y, et al. Rubber dam isolation for restorative treatment. *Cochrane Database Syst Rev.* 2016;9:CD009858.
9. Brum VS, et al. Rubber dam vs cotton roll isolation in primary molars: 30-month RCT. *Braz Oral Res.* 2024;38:e134.
10. Sahu SK, et al. Influence of hemostatic agents on smear layer and bonding. *J Int Soc Prev Community Dent.* 2021;11(4):372–81.
11. Makakova DR, et al. Absorptive capacity of gingival retraction cords. *Dent J (Basel).* 2024;12(5):211.
12. Falacho RI, et al. Intraoral humidity and its effect on enamel bond strength. *J Esthet Restor Dent.* 2023;35(5):823–32.
13. Alhareky M, et al. Patient satisfaction with Isolite and traditional methods. *Saudi Dent J.* 2014;26(4):163–9.
14. Innes N, et al. Effectiveness of HVE in reducing droplets and aerosols. *J Clin Med.* 2022;11(8):2211.
15. Rautemaa-Richardson R, et al. High-volume evacuation reduces aerosol spread. *Sci Rep.* 2023;13:18321.
16. Tariq A, et al. Knowledge, attitude, and practice of isolation techniques in Pakistani dental students. *Pak J Med Health Sci.* 2021;15(4):1011–5.