PERCEPTION AND DECISION-MAKING IN DENTAL EDUCATION: AWARENESS OF DIRECT COMPOSITE AND SANDWICHED METHODS AMONG SAUDI STUDENTS

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Abstract

Background: Restoration of Class V cervical lesions presents unique challenges due to anatomical constraints, access difficulties, and material limitations. Dental students must be well-versed in different restorative techniques, including the direct composite method and the sandwiched method, to ensure effective clinical outcomes. However, there is limited research on students' knowledge, awareness, and perception of these methods.

Methods: A cross-sectional study was conducted in two dental colleges in Al-Qassim, Saudi Arabia, from May 2023 to January 2024. A total of 135 dental students and internship physicians participated. A structured questionnaire assessed their awareness and knowledge of the direct composite and sandwiched restoration methods. Data were analyzed using the chi-square test.

Results: Among participants, 46.7% were aware of the sandwiched method, while 83.7% were familiar with the direct composite technique. While 91.9% recognized polymerization shrinkage as a drawback of the direct composite method, only 37.8% identified improved bonding with composite as an advantage of resin-modified glass ionomer cement (RMGIC) in the sandwiched technique. The primary reasons for Class V cervical lesion failures included proximity to crevicular fluid (35.6%) and poor adhesive properties (29.6%).

Conclusion: The study indicates a gap in dental students' understanding of the sandwiched method and the benefits of RMGIC. Educational interventions are necessary to enhance knowledge and improve the clinical application of these techniques. Further research is recommended to evaluate the effectiveness of the sandwiched method in Class V cervical restorations.

Keywords: Knowledge, Awareness, Perception, Direct composite, Sandwiched method, Restoration of class V cervical lesions

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Introduction

Dental restorations have evolved significantly over the years, yet Class V cervical lesions remain one of the most challenging conditions for both practitioners and students. These lesions occur in a complex anatomical region where moisture control, accessibility, and material adaptation pose significant hurdles. Selecting the right restorative technique is crucial to ensure longevity and functional success. Among the various restorative approaches, the sandwich technique has emerged as a promising method due to its ability to balance aesthetics, durability, and adhesion. However, how well do dental students understand and apply these techniques. This study aims to explore their awareness, knowledge, and perceptions regarding the sandwich technique and its alternatives.

Students of dentistry often face numerous challenges due to demanding coursework, clinical responsibilities, and the need to develop advanced manual skills. Compared to experienced clinicians, students may struggle more with treating Class V lesions due to their inexperience and the intricate nature of these lesions. Class V lesions occur in the cervical third of the buccal or lingual surfaces and can be categorized as either carious or non-carious. Non-carious cervical lesions include abrasions, abfractions, and erosions (1).

One of the primary challenges in restoring Class V lesions is achieving effective isolation. The cervical area's morphology and anatomical features complicate the use of clamps and rubber dams, making isolation difficult (2). When lesions extend towards the root or subgingival areas, proper visualization and material placement become even more complicated. These factors contribute to difficulties in achieving an ideal seal, often resulting in material overuse or underuse, which may lead to marginal leakage, poor adhesion, and eventual failure of the restoration (3,4). To address these issues, restorative techniques such as incremental layering and sandwich restorations have been developed to reduce polymerization shrinkage and enhance marginal adaptation (5).

Glass-ionomer cements (GICs) have been widely used in treating Class V cervical lesions due to their self-healing properties, fluoride release, and chemical adhesion to dentin. However, conventional GICs exhibit weaker mechanical properties and aesthetics compared to composite resins (6). To overcome these drawbacks, resin-modified glass ionomer cement (RMGIC) was developed, offering improved resistance to contamination, enhanced fluoride release, and better mechanical properties (7,8). These materials help preserve tooth structure, chemically bond to dentin, and contribute to long-term cavity remineralization (9).

Despite these benefits, RMGICs still fall short in terms of aesthetics when compared to composite resins, which offer superior translucency, compressive strength, and wear resistance (10). This has led to the widespread adoption of the sandwich technique, a hybrid approach combining both RMGIC and composite resin to optimize restoration outcomes. The sandwich technique can be classified into open sandwich (where the underlying RMGIC layer is exposed to the oral environment) and closed sandwich (where it is completely covered by composite resin) (10). The choice between these techniques depends on clinical indications, material properties, and operator preference.

This study investigates the awareness and knowledge of dental students regarding the sandwich technique, their understanding of material selection, and their perception of the advantages and limitations of different restorative methods. By assessing these factors, we aim to identify gaps in knowledge and provide insights that could enhance dental education and clinical training.

Materials and methods

This research was done in the dental clinics of two Colleges of Dentistry in AlQassim-Saudi Arabia from May 2023 to January 2024. It was a cross-sectional study. A total of 135 dental students and internship physicians were involved in the research. Every participant was provided with an informed consent form that they were required to read and sign before to commencing the questionnaire (15).

Each and every member is required to respond to a questionnaire. Applying the chi-square test. The survey consists of many parts, including gender, age, educational attainment, as well as knowledge of the materials, their benefits, and drawbacks. The responses of each participant were gathered and recorded in an Excel spreadsheet, and then subjected to statistical analysis

Questionnaire on Knowledge, Awareness, and Perception of Class V Cervical Lesion Restoration Methods

Year of Study: _____

Age: _____

Gender: _____

Education: _____

Section 1: Knowledge, Perception, and Awareness of the Sandwich Technique

1. You are aware of the different methods used for restoring class V cervical lesions. (Agree/Disagree)

2. You are familiar with the sandwich method for restoring class V cervical lesions. (Agree/Disagree)

3. If you are familiar with the sandwich method, you can explain the steps involved in its restoration.

- Explained correct steps
- Did not explain correct steps
- Just mentioned GIC - Composite
- Not aware

Section 2: Knowledge, Perception, and Awareness of the Direct Composite Technique

4. You are aware of the direct composite method for restoring class V cervical lesions. (Agree/Disagree)

5. If you are familiar with the direct composite method, you can explain the steps involved in its restoration.

- Explained correct steps
- Did not explain correct steps
- Just mentioned Etching-Bonding-Composite
- Not aware

6. The advantages of using composite restoration include: (Select one)

- Aesthetic Property
- Adhesiveness
- Mechanical Property
- All of the above

7. The restoration method that provides better strength is:

- Sandwich method
- Direct composite

- The direct composite technique is preferred in the following cases: (Select one)

- Superficial lesion
- Lesion involving part of dentin
- Aesthetic concern
- All of the above

8. The direct composite restoration has the drawback of polymerization shrinkage, leading to stress on the tooth-restoration interface. (Agree/Disagree)

9. The material with the highest degree of polymerization shrinkage is:

- Flowable composite
- Conventional composite
- Compomer

Section 3: Knowledge, Perception, and Awareness of GIC and RMGIC

10. The advantages of Resin-Modified Glass Ionomer Cement (RMGIC) include: (Select one)

- Retention
- Marginal adaptation
- Prevents sensitivity
- All of the above
- None of the above

11. Conventional GIC has poorer mechanical properties than RMGIC. (Agree/Disagree)

12. The advantage of using RMGIC instead of conventional GIC in the sandwich technique is: (Select one)

- Better bonding with composite
- Less micro leakage
- Better strength

13. RMGIC is preferred in the following cases: (Select one)

- Superficial lesion
- Lesion involving part of dentin
- Aesthetic concern
- All of the above

14. The most common cause of class V cervical lesion failure is: (Select one)

- Poor adhesive properties of the material
- Closeness to the crevicular fluid
- Micro leakage
- Poor flexural strength of the material

Results

This study aimed to assess the knowledge, perception, and awareness of dental students regarding different restorative techniques for Class V cervical lesions, specifically the Sandwich technique, Direct Composite technique, and the use of Glass Ionomer Cement (GIC) and Resin-Modified Glass Ionomer Cement (RMGIC). A total of 135 dental students, comprising both undergraduate and postgraduate participants, completed the survey. The findings provide insight into their familiarity with these restorative methods, their advantages and drawbacks, and factors influencing restoration failure.

Table 1 presents data on participants' knowledge, perception, and awareness of the Sandwich technique. The results indicate that 46.7% of the participants reported being familiar with the Sandwich technique for repairing Class V cervical lesions, while 53.3% stated that they were not familiar with it.

Table 2 presents data on the knowledge, perception, and awareness of individuals regarding the Direct Composite approach. The results indicate that 83.7% of the participants reported being familiar with the Direct Composite approach used to repair Class V cervical lesions, while 16.3% stated that they were not familiar with it. Additionally, 91.9% of the participants acknowledged that Direct Composite restoration has the disadvantage of polymerization shrinkage, causing stress on the contact between the tooth and the repair. Regarding the degree of polymerization shrinkage among different dental materials, the distribution in this study was as follows: flow able composite (36.3%), conventional composite (51.9%), and compomer (11.9%).

Table 3 presents data on the knowledge, perception, and awareness of GIC and RMGIC. One of the benefits of utilizing Resin-Modified Glass Ionomer Cement (RMGIC) instead of traditional Glass Ionomer Cement (GIC) in the Sandwich technique is its enhanced adhesion to the composite material, as reported by 37.8% of the participants. The primary causes of Class V cervical lesion failure identified in this study include inadequate adhesive properties (29.6%), close proximity to the crevicular fluid (35.6%), micro-leakage (25.2%), and insufficient flexural strength (9.6%) (Table 1-3).

Discussion

The present study aimed to evaluate the knowledge, awareness, and perception

Table 1. Knowledge, perception and awareness about Sandwich technique.

Question	Frequency	Percentage
You are aware of the different methods used for restoring class V cervical lesions.		
Agree	124	91.9
Disagree	11	8.1
You are familiar with the sandwich method for restoring class V cervical lesions.		
Agree	63	46.7
Disagree	72	53.3
If you are familiar with the sandwich method, you can explain the steps involved in its restoration.		
Explained correct steps	22	16.3
Did not explain correct steps	13	9.6
Just mentioned GIC - Composite	28	20.7
Not aware	72	53.3

Table 2. Knowledge, perception and awareness about direct composite technique.

Question	Frequency	Percentage
You are aware of the direct composite method for restoring class V cervical lesions.		
Agree	113	83.7
Disagree	22	16.3
If you are familiar with the direct composite method, you can explain the steps involved in its restoration.		
Explained correct steps	40	29.6
Did not explain correct steps	44	32.6
Just mentioned Etching-Bonding-Composite	28	20.7
Not aware	23	17.0
The advantages of using composite restoration		
Aesthetic Property	32	23.7
Adhessiveness	11	8.1
All of the above	87	64.4
Mechanical Property	5	3.7
The restoration method that provides better strength		
Sandwich Method	75	55.6
Direct Composite	60	44.4
The direct composite technique is preferred in the following cases		
superficial lesion	28	20.7
lesion involving a part of dentin	10	7.4
aesthetic concern	21	15.6
all of the above	76	56.3
The direct composite restoration has the drawback of polymerization shrinkage, leading to stress on the tooth-restoration interface.		
Agree	124	91.9
Disagree	11	8.1
The material with the highest degree of polymerization shrinkage		
flowable composite	49	36.3
conventional composite	70	51.9
compomer	16	11.9

Table 3. KNOWLEDGE, perception and awareness about GIC and RMGIC.

Question	Frequency	Percentage
The advantages of Resin-Modified Glass Ionomer Cement (RMGIC)		
Retention	9	6.7
Marginal Adaptation	12	8.9
Prevents sensitivity	43	31.9
all of the above	61	45.2
none of the above	10	7.4
Conventional GIC has poorer mechanical properties than RMGIC.		
Agree	85	63.0
Disagree	50	37.0
The advantage of using RMGIC instead of conventional GIC in the sandwich technique		
better bonding with the composite	51	37.8
less micro leakage	39	28.9
better strength	45	33.3
RMGIC is preferred in the following cases		
superficial lesion	28	20.7
lesion involving a part of dentin	10	7.4
aesthetic concern	21	15.6
all of the above	76	56.3
The most common cause of class V cervical lesion failure		
poor adhesive property of the material	40	29.6
closeness to the crevicular fluid	48	35.6
micro- leakage	34	25.2
poor flexural strength of the material	13	9.6

of dental students regarding the direct composite method and the sandwiched technique for restoring Class V cervical lesions. Our findings indicate that while the majority of students (90%) are aware of the direct composite technique, only 67% are familiar with the sandwiched technique. This discrepancy suggests that further educational efforts are needed to improve awareness of alternative restoration techniques.

Our results align with those of Preetha Parthasarathy (2023), who also found that awareness regarding the sandwiched technique among dental students was relatively low. The study concluded that the limited awareness of RMGIC and the sandwiched technique in restoring Class V cervical lesions underscores the need for enhanced education and training in this area.

When comparing our findings with clinical studies, Neo & Chew (1996) evaluated the performance of glass-ionomer cement, resin composite with a bonding agent, and the sandwich technique over a three-year period. Their results indicated that restorations using resin composite with a bonding agent had the highest percentage of loss over time. This finding suggests that while direct composite restorations are commonly used, they may not offer the best long-term retention, reinforcing the importance of alternative methods such as the sandwich technique.

Similarly, Hussainy et al. (2018) compared the clinical performance of RMGIC, flow able composite, and polyacid-modified resin composite (PMCR) in restoring no carious cervical lesions. Their results indicated that RMGIC exhibited superior marginal adaptation and discoloration resistance compared to flow able composite and PMCR. These findings support the use of RMGIC in the sandwiched technique, highlighting its advantages over direct composite restoration, particularly in terms of adaptation and aesthetics.

Folwaczny et al. (2000) conducted a 24-month follow-up study on various tooth-coloured restorative materials, finding that composite restorations exhibited the best overall performance, with composers following closely behind. However, RMGIC restorations displayed more marginal deterioration and discoloration over time. These results suggest that while direct composite restorations provide superior aesthetic outcomes, their longevity remains a concern, which justifies the need for techniques such as the sandwiched method to enhance restoration durability.

Perez (2010) explored an alternative technique for Class V resin composite restorations and noted that Class V restorations commonly face issues such as marginal excess, loss of retention, and secondary caries. The study demonstrated that improved isolation techniques and a combination of flow able and hybrid resin composites could minimize these issues. This aligns with our findings, as students demonstrated higher awareness of direct composite restorations, which are often considered for Class V lesions due to their aesthetic properties but may require additional procedural modifications to improve their clinical performance.

Finally, McCoy et al. (1998) investigated the clinical success of Class V composite resin restorations without mechanical retention, finding that retention rates were highly dependent on bonding techniques and material properties. Their findings reinforce the notion that while direct composite restorations remain a popular choice, factors such as adhesion and adaptation play a crucial role in long-term success, potentially explaining the lower awareness of alternative methods among students.

Limitations

This study has certain limitations that should be considered. First, the sample size was limited to a specific group of dental students, which may not fully represent the knowledge and awareness levels of students in other institutions or regions. Second, the study relied on self-reported data, which may be subject to recall bias or overestimation of knowledge. Third, the study focused on theoretical knowledge rather than practical skills, meaning that students' actual clinical proficiency in using the sandwiched technique remains uncertain. Future research should incorporate clinical assessments to evaluate students' hands-on experience with different restorative techniques.

Recommendations

1. Enhanced Curriculum Integration: Dental schools should incorporate comprehensive training on alternative restorative techniques, including the sandwiched technique, into their curricula to ensure students gain both theoretical and practical knowledge.

2. Hands-on Workshops: Practical training sessions and workshops should be conducted to familiarize students with different restorative materials and techniques to improve their clinical competency.

3. Clinical Case Exposure: Students should be given more opportunities to observe and perform restorations using different techniques under expert supervision to enhance their understanding of real-world applications.

4. Continuous Education Programs: Regular seminars, continuing education courses, and webinars should be organized to keep dental professionals updated on advancements in restorative dentistry.

5. Further Research: Future studies should include a broader sample size, diverse educational institutions, and clinical evaluations to provide a more comprehensive understanding of knowledge gaps and practical application of different restorative methods.

Conclusion

Overall, our findings indicate that while dental students have a strong awareness of direct composite restorations, knowledge about the sandwiched technique remains limited. The comparison with previous studies highlights the potential benefits of alternative restorative approaches, particularly in terms of longevity and marginal adaptation. Given these insights, it is imperative to enhance educational programs and clinical training to ensure a more comprehensive understanding of different restoration techniques for Class V cervical lesions.

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