

Dentists' Perspectives on the Effectiveness of Restorative Materials in the Management of Dental Caries: A Cross-Sectional Study

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آراء أطباء الأسنان حول فعالية مواد الترميم في علاج تسوس الأسنان: دراسة مقطعية

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Abstract

Background: The selection of restorative materials is a fundamental aspect of contemporary dental practice, influencing both clinical outcomes and patient satisfaction. Dentists' preferences are shaped by multiple factors, including esthetics, durability, and perceived postoperative complications such as sensitivity.

Aim: This study aimed to evaluate dentists' perspectives on the effectiveness of different restorative materials used in the treatment of dental caries, with particular emphasis on material preference, postoperative sensitivity, and factors influencing clinical decision-making.

Materials and Methods: A cross-sectional study was conducted among 119 dentists using a structured electronic questionnaire distributed via social media platforms and Google Forms. The survey collected data on demographic characteristics, preferred restorative materials, perceived postoperative sensitivity, and factors influencing material selection. Statistical analysis was performed using SPSS version 26. Descriptive statistics and Chi-square tests were applied to assess associations between variables, with a p-value of < 0.05 considered statistically significant. Results: Composite resin was the most commonly preferred restorative material (60.5%), followed by glass ionomer cement (23.5%) and amalgam (16.0%). A considerable proportion of dentists reported that composite restorations were most frequently associated with postoperative sensitivity (52.1%). Esthetics was identified as the primary factor influencing material selection (65.5%), followed by durability and cost. A statistically significant association was found between years of clinical experience and material preference ($p = 0.013$), whereas no significant association was observed between specialty and material selection ($p = 0.087$).

Conclusion: Dentists predominantly prefer composite resin due to its superior esthetic properties; however, it is perceived to be associated with increased postoperative sensitivity. Material selection is influenced by clinical experience and patient-centered factors. These findings highlight the need for evidence-based decision-making and improved clinical training to optimize restorative outcomes and minimize postoperative complications.

Keywords: Dental caries, composite resin, glass ionomer cement, amalgam, postoperative sensitivity, dentist perception.

المخلص

الخلفية: يُعد اختيار مواد الترميم أحد الجوانب الأساسية في الممارسة الحديثة لطب الأسنان، حيث يؤثر بشكل مباشر على النتائج السريرية ورضا المرضى. وتتأثر تفضيلات أطباء الأسنان بعدة عوامل، بما في ذلك الخصائص الجمالية، والمتانة، والمضاعفات المحتملة بعد العلاج مثل الحساسية.

الهدف: هدفت هذه الدراسة إلى تقييم آراء أطباء الأسنان حول فعالية مواد الترميم المختلفة المستخدمة في علاج تسوس الأسنان، مع التركيز بشكل خاص على تفضيل المواد، والحساسية بعد الترميم، والعوامل المؤثرة في اتخاذ القرار السريري. **المواد وطرق البحث:** أجريت دراسة مقطعية شملت 119 طبيب أسنان باستخدام استبيان إلكتروني مُنظم تم توزيعه عبر منصات التواصل الاجتماعي ونماذج Google. تم جمع البيانات المتعلقة بالخصائص الديموغرافية، ومواد الترميم المفضلة، ومدى الإحساس بالحساسية بعد الترميم، والعوامل المؤثرة في اختيار المواد. أُجري التحليل الإحصائي باستخدام برنامج SPSS الإصدار 26، حيث تم استخدام الإحصاء الوصفي واختبار كاي-تربيع (Chi-square) لتقييم العلاقات بين المتغيرات، مع اعتبار قيمة ($p < 0.05$) ذات دلالة إحصائية.

النتائج: كان الراتنج المركب (Composite resin) هو المادة الأكثر تفضيلاً بين أطباء الأسنان بنسبة (60.5%)، يليه إسمنت الأيونومر الزجاجي (23.5%)، ثم الأملغم (16.0%). وأفاد عدد كبير من المشاركين بأن ترميمات الراتنج المركب كانت الأكثر ارتباطاً بحدوث الحساسية بعد العلاج بنسبة (52.1%). كما تم تحديد الخصائص الجمالية كأهم عامل مؤثر في اختيار المادة (65.5%)، تليها المتانة والتكلفة. وأظهرت النتائج وجود علاقة ذات دلالة إحصائية بين سنوات الخبرة السريرية وتفضيل المادة ($p = 0.013$)، في حين لم تُلاحظ علاقة ذات دلالة إحصائية بين التخصص واختيار المادة ($p = 0.087$).

الاستنتاج: يفضل أطباء الأسنان بشكل رئيسي الراتنج المركب نظراً لخصائصه الجمالية المتميزة، إلا أنه يُعتقد أنه يرتبط بزيادة الحساسية بعد الترميم. ويتأثر اختيار المادة بعوامل متعددة تشمل الخبرة السريرية والعوامل المرتبطة بالمريض. وتؤكد هذه النتائج على أهمية الاعتماد على الممارسات المبنية على الدليل العلمي وتعزيز التدريب السريري لتحسين نتائج الترميم وتقليل المضاعفات بعد العلاج.

الكلمات المفتاحية: تسوس الأسنان، الراتنج المركب، إسمنت الأيونومر الزجاجي، الأملغم، الحساسية بعد الترميم، آراء أطباء الأسنان.

1. Introduction

Dental caries remains one of the most prevalent chronic diseases worldwide, affecting individuals across all age groups and posing a significant public health challenge (1). The management of dental caries has evolved considerably over recent decades, shifting from traditional surgical approaches toward minimally invasive and preventive strategies that emphasize preservation of tooth structure and long-term oral health (2).

Restorative treatment plays a central role in caries management, and the selection of appropriate filling materials is critical for achieving optimal clinical outcomes. A wide range of restorative materials is currently available, including composite resins, glass ionomer cements (GICs), and dental amalgam, each with distinct physical, mechanical, and biological properties (3). Composite resins are widely favored for their superior esthetics and adhesive capabilities, allowing for conservative cavity preparation and improved patient satisfaction (4). However, they are also associated with technique sensitivity and polymerization shrinkage, which may contribute to postoperative complications such as marginal leakage and sensitivity (5).

Glass ionomer cements, on the other hand, offer advantages such as chemical adhesion to tooth structure and fluoride release, which can contribute to caries prevention and reduced postoperative sensitivity (6). Despite these benefits, their mechanical properties may limit their use in stress-bearing areas (7). Dental amalgam, although less commonly used in contemporary practice due to esthetic concerns and environmental considerations, has demonstrated excellent durability and longevity in posterior restorations (8).

The choice of restorative material is not solely determined by material properties but is also influenced by multiple clinical and non-clinical factors, including cavity size and location, patient preferences, cost considerations, and the dentist's knowledge and experience (9). Dentists' clinical decision-making plays a pivotal role in treatment outcomes, as inappropriate material selection or technique may compromise restoration longevity and patient comfort (10).

Furthermore, postoperative sensitivity remains a common clinical concern following restorative procedures and is often associated with factors such as dentin permeability, bonding technique, and material characteristics (11). Understanding dentists' perceptions and practices regarding restorative material selection is therefore essential for improving clinical outcomes and aligning practice with evidence-based guidelines.

Despite the availability of extensive literature on restorative materials, there is limited research focusing on dentists' perspectives, preferences, and decision-making processes in everyday clinical practice, particularly in developing regions (12). Therefore, this study aims to evaluate dentists' perspectives on the effectiveness of different restorative materials in the management of dental caries and to identify the factors influencing their clinical choices.

2. Materials and Methods

2.1 Study Design and Setting

A cross-sectional, questionnaire-based study was conducted to evaluate dentists' perspectives on the effectiveness of different restorative materials used in the management of dental caries. The study was implemented through an online survey platform over a defined study period to ensure broad accessibility and participation.

2.2 Study Population and Sampling

The study population comprised licensed dentists working in various clinical settings, including both general practitioners and specialists. A total of 119 valid responses were obtained. Participants were recruited using a convenience sampling technique, and participation was entirely voluntary.

2.3 Data Collection Tool

Data were collected using a structured electronic questionnaire developed through Google Forms. The questionnaire was distributed via social media platforms, including WhatsApp and professional Facebook groups, as well as through email, to maximize outreach among practicing dentists.

The questionnaire was organized into several sections. The first section collected demographic and professional information, including age, gender, years of clinical experience, and specialty. The second section focused on clinical practice and material preference, including commonly used restorative materials such as composite resin, glass ionomer cement, and amalgam, as well as preferred materials in different clinical situations. The third section assessed perceived effectiveness and clinical outcomes, particularly dentists' perceptions of postoperative sensitivity associated with each material, in addition to longevity and overall clinical performance. The final

section addressed factors influencing material selection, including esthetics, cost, durability, ease of handling, and patient preference.

The questionnaire was reviewed prior to distribution to ensure clarity, relevance, and appropriateness of the content.

2.4 Inclusion and Exclusion Criteria

The study included licensed dentists who were actively practicing clinical dentistry and who agreed to participate by completing the questionnaire. Participants who submitted incomplete responses or who were not dental professionals were excluded from the study.

2.5 Ethical Considerations

Participation in the study was voluntary, and informed consent was obtained electronically from all participants prior to data collection. All responses were kept anonymous and confidential, and the collected data were used exclusively for research purposes.

2.6 Statistical Analysis

Data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS), version 26. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the data. Inferential statistical analysis was performed using the Chi-square test to evaluate associations between categorical variables, such as the type of restorative material and perceived clinical outcomes. A p-value of less than 0.05 was considered statistically significant.

3. Results

3.1 Demographic and Professional Characteristics

A total of 119 dentists participated in the study. The majority of participants were male (58.0%, n = 69), while females accounted for 42.0% (n = 50). Regarding clinical experience, the largest proportion of participants had 1–5 years of experience (37.8%, n = 45), followed by those with more than 10 years (32.8%, n = 39) and those with 6–10 years of experience (29.4%, n = 35).

In terms of professional background, most respondents were general dentists (68.9%, n = 82), whereas specialists represented 31.1% (n = 37) of the sample (Table 1).

Table 1: Demographic and Professional Characteristics (n = 119)

Variable	Category	n	%
Gender	Male	69	58.0
	Female	50	42.0
Experience	1–5 years	45	37.8
	6–10 years	35	29.4
	>10 years	39	32.8
Specialty	General Dentist	82	68.9
	Specialist	37	31.1

3.2 Preferred Restorative Materials

Composite resin was the most commonly preferred restorative material among dentists (60.5%, n = 72), followed by glass ionomer cement (23.5%, n = 28) and amalgam (16.0%, n = 19) (Figure.1).

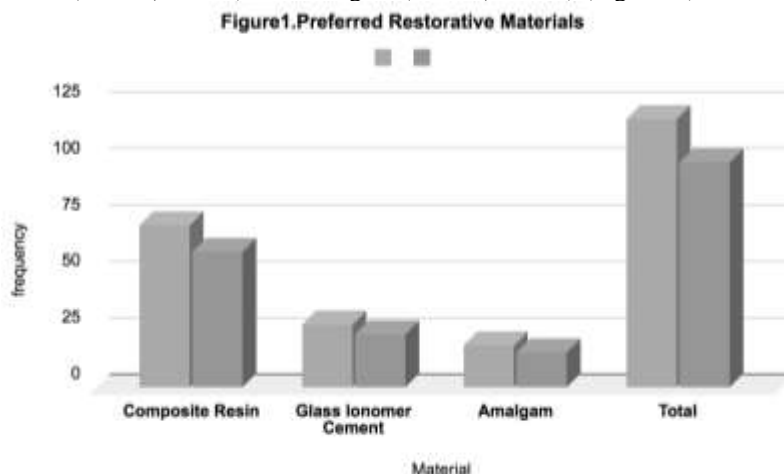


Figure. 1: Preferred Restorative Materials (n = 119)

3.3 Perception of Postoperative Sensitivity

A total of **52.1% (n = 62)** of dentists reported that composite restorations were most frequently associated with postoperative sensitivity, compared to amalgam (**26.1%, n = 31**) and glass ionomer cement (**21.8%, n = 26**) (Figure.2).

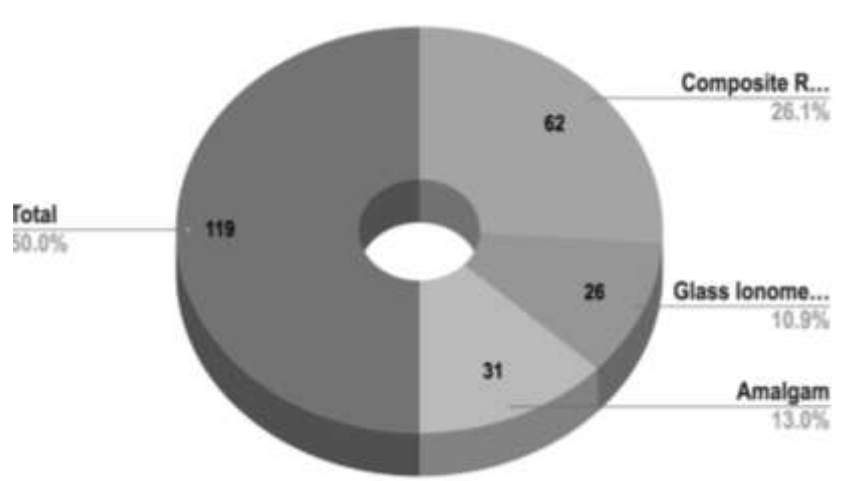


Figure.2: Material Associated with Postoperative Sensitivity (n = 119)

3.4 Factors Influencing Material Selection

Esthetics was identified as the most influential factor in material selection (**65.5%, n = 78**), followed by durability (**52.9%, n = 63**), cost (**38.7%, n = 46**), and ease of handling (**34.5%, n = 41**) (Table 2).

Table 2: Factors Influencing Material Selection (n = 119)

Factor	n	%
Esthetics	78	65.5
Durability	63	52.9
Cost	46	38.7
Ease of Handling	41	34.5

3.5 Association Between Experience and Material Preference

A significant association was observed between years of clinical experience and preferred restorative material ($\chi^2 = 12.67$, $df = 4$, $p = 0.013$). Dentists with more than 10 years of experience demonstrated a higher preference for amalgam, whereas those with fewer years of experience showed a greater preference for composite resin (Table 3).

Table 3: Material Preference by Years of Experience (n = 119)

Experience	Composite n (%)	GIC n (%)	Amalgam n (%)	Total
1–5 years	34 (75.6)	8 (17.8)	3 (6.6)	45
6–10 years	22 (62.9)	8 (22.9)	5 (14.2)	35
>10 years	16 (41.0)	12 (30.8)	11 (28.2)	39

3.6. Association Between Specialty and Material Selection

General dentists demonstrated a higher preference for composite resin (**65.9%**), whereas specialists showed a more balanced distribution across the three restorative materials (Table 6). However, the association between specialty and material preference was not statistically significant ($p = 0.087$).

Table 4: Material Preference by Specialty

Specialty	Composite n (%)	GIC n (%)	Amalgam n (%)	Total
General Dentist	54 (65.9%)	18 (22.0%)	10 (12.1%)	82
Specialist	18 (48.6%)	10 (27.0%)	9 (24.4%)	37

3.7. Dentists' Perceived Effectiveness

Most dentists rated composite restorations as highly effective (**68.1%**), compared to GIC (**55.0%**) and amalgam (**61.3%**).

Table 5: Perceived Effectiveness of Materials

Material	High Effectiveness n (%)	Moderate/Low n (%)
Composite	81 (68.1%)	38 (31.9%)
GIC	65 (54.6%)	54 (45.4%)
Amalgam	73 (61.3%)	46 (38.7%)

4. Discussion

The present study investigated dentists' perspectives on the effectiveness of different restorative materials in the management of dental caries, with particular emphasis on material preference, perceived postoperative sensitivity, and factors influencing clinical decision-making. The findings demonstrated that composite resin is the most preferred restorative material, followed by glass ionomer cement (GIC) and amalgam. This trend is consistent with contemporary restorative dentistry, where esthetics and minimally invasive approaches are prioritized (13).

The high preference for composite materials observed in this study can be attributed to their superior esthetic properties, adhesive bonding, and conservative cavity preparation requirements. Similar findings have been reported in previous studies, where dentists favored composite resins due to increasing patient demand for tooth-colored restorations and advancements in adhesive technology (14). However, despite their advantages, a significant proportion of dentists in the current study associated composite restorations with a higher incidence of postoperative sensitivity.

This perception aligns with existing literature, which identifies polymerization shrinkage stress, microleakage, and technique sensitivity as major contributing factors to postoperative sensitivity in composite restorations (15). In contrast, GIC was perceived to be associated with lower sensitivity, likely due to its chemical bonding to tooth structure and fluoride-releasing properties, which enhance marginal integrity and reduce pulpal irritation (16).

The study also revealed that clinical experience significantly influences material selection, with more experienced dentists demonstrating a greater tendency to use amalgam compared to younger practitioners who predominantly preferred composite materials. This finding reflects the shift in dental education and clinical practice over time, as newer generations of dentists are trained with a stronger emphasis on esthetic and adhesive dentistry (17). Additionally, experienced clinicians may rely on amalgam in specific clinical situations due to its proven durability and reduced technique sensitivity.

Esthetics was identified as the most influential factor in material selection, followed by durability and cost. This is in agreement with previous research indicating that patient expectations and cosmetic outcomes increasingly guide treatment planning decisions (18). However, the relatively lower consideration of cost suggests that clinical effectiveness and patient satisfaction may outweigh economic factors in decision-making.

Although specialists showed a more balanced distribution in material selection compared to general dentists, the difference was not statistically significant. This may indicate a convergence in clinical practice patterns across different levels of training, possibly due to widespread access to continuing education and updated clinical guidelines (19).

Overall, the findings highlight that dentists' decision-making is multifactorial and influenced by both clinical evidence and patient-centered considerations. The observed variability in perceptions, particularly regarding postoperative sensitivity, underscores the need for **evidence-based** clinical protocols and continuous professional development to standardize care and improve patient outcomes (20).

Conclusion

Within the limitations of this study, it can be concluded that restorative material selection among dentists is predominantly influenced by esthetic considerations, with composite resin emerging as the most preferred option in contemporary practice. Despite its widespread use and high levels of reported satisfaction, composite restorations were more frequently associated with postoperative sensitivity compared to other materials. Additionally, clinical experience appears to play a meaningful role in shaping material choice, reflecting evolving trends in dental education and practice. Overall, the findings emphasize the importance of balancing esthetic demands with biological and functional outcomes to achieve optimal restorative success.

Clinical Implications

The results of this study highlight the need for clinicians to carefully consider both the advantages and limitations of each restorative material when planning treatment. While composite resins offer superior esthetic outcomes and are highly favored by patients, their technique sensitivity and potential for postoperative sensitivity necessitate meticulous clinical application. Dentists should adopt evidence-based protocols, including proper bonding techniques and incremental placement, to minimize adverse outcomes. Furthermore, patient education remains essential to align expectations with clinical realities, ensuring informed decision-making and improved satisfaction. Continuous professional development is also crucial to keep clinicians updated on advances in restorative materials and techniques.

Limitations

This study is subject to several limitations that should be acknowledged. The use of a self-administered electronic questionnaire may have introduced response bias, as participants' answers were based on personal perceptions rather than objective clinical data. The cross-sectional design limits the ability to establish causal relationships between variables, and the relatively small sample size may affect the generalizability of the findings. Additionally, the reliance on convenience sampling and online distribution methods may not accurately represent the broader population of dentists. These factors should be considered when interpreting the results.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that they have no conflict of interest.

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