

Comparative analysis of the clinical performance of Bulk Fill and Fiber-reinforced resins: A systematic review in restorative dentistry

Análisis comparativo del desempeño clínico de las resinas Bulk Fill y reforzadas con Fibra: Una revisión sistemática en odontología restaurativa

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DOI: <https://doi.org/10.58995/redlic.rmic.v3.n2.a110>

How to cite:

Herrera Carangui, N. C., González Ortiz, A. I., Urgiles Urgiles, C. D., & Urgiles Esquivel, C. E. (2025). Comparative analysis of the clinical performance of bulk-fill and fiber-reinforced composites: A systematic review in restorative dentistry. Multidisciplinary Journal of Contemporary Research, 3(2).463–491
<https://doi.org/10.58995/redlic.rmic.v3.n2.a110>

Article Information

Received: 18-02-2025

Accepted: 20-04-2025

Published: 01-07-2025

Editor's Note

REDLIC remains neutral regarding jurisdictional claims in published messages and institutional affiliations.

Editorial

Latin American Editorial Network for Contemporary Research (REDLIC)
www.editorialredlic.com

Funding Sources

The research was conducted using the authors' own resources.

Conflicts of Interest

No conflicts of interest are declared.



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Abstract

Dental restorative materials are organic-mineral materials used in dental procedures. The use of Bulk Fill resins is associated with monobloc techniques, reducing clinical time. On the other hand, fiber-reinforced resins have good mechanical properties such as higher resistance to occlusal forces due to their mechanical properties. **Materials and methods:** A descriptive research with a quantitative approach was carried out, following the PRISMA statement, resulting in an initial 245 documents, inclusion and exclusion criteria were applied, 13 documents were selected to be included for the study. **Results:** Examining the success rate, clinical performance and difficulties in application, the results showed that Bulk Fill resin restorations have a success rate of more than 95% between 6 months and 5 years, its complications included lack of adaptation, marginal staining, microleakage, etc. On the other hand, reinforced resins show a high success rate, fatigue resistance of 87%, identifying non-catastrophic fractures as complications. **Conclusions:** The two resin systems have presented good clinical performance so their use is recommended, limiting the research the lack of literature on fiber-reinforced resins for being a new element in restorative dentistry.

Keywords: Bulk fill resin, fiber -reinforced resin, composite resins, clinical effectiveness, restorative dentistry.

Resumen

Los materiales de restauración dental son de naturaleza orgánico-mineral que se emplean en procedimientos dentales. El empleo de resinas Bulk Fill está asociado a las técnicas de monobloque, reduciendo el tiempo clínico. Por otro lado, las resinas reforzadas con fibra presentan buenas propiedades mecánicas como mayor resistencia a fuerzas oclusales por sus propiedades mecánicas. **Materiales y métodos:** Se llevó a cabo una investigación descriptiva con un enfoque cuantitativo, siguiendo la declaración PRISMA, dando como resultado inicial 245 documentos. Se

aplicaron los criterios de inclusión y exclusión, y se seleccionaron 13 documentos que se incluirán para el estudio. **Resultados:** Examinando la tasa de éxito, el rendimiento clínico y dificultades en la aplicación, los resultados mostraron que las restauraciones con resina Bulk Fill presentan una tasa de éxito de más del 95% entre 6 meses y 5 años, sus complicaciones incluyeron falta de adaptación, tinciones marginales, microfiltraciones, etc. Por otro lado, las resinas reforzadas muestran una tasa de éxito alta, resistencia a la fatiga del 87%, identificando como complicaciones fracturas no catastróficas. **Conclusiones:** Los dos sistemas resinosos han presentado un buen desempeño clínico, por lo que su uso es recomendado, limitando la investigación la falta de literatura de las resinas reforzadas con fibra por ser un elemento nuevo en la odontología restaurativa.

1. Introduction

Dental restoration materials are of organic-mineral nature that are used in dental procedures (1). These materials replace several properties of the dental structure, such as color, which improves the functional and aesthetic aspects that have been negatively affected by different microorganisms and other agents that can cause the destruction of the piece and a restorative treatment may be necessary (2,3).

In the current context, the use of Bulk Fill resins is associated with monoblock techniques (2). These techniques involve the application of resinous materials that can reach thicknesses of 4 to 5 mm (4). The advantage of using this type of resins lies in the reduction of clinical time required in the dental office due to the specific application technique used (2,4). The chemical composition of Bulk Fill resins includes polymerization groups and plasticizing monomers (5). In addition, due to the translucency characteristics of these resins, they result in the reduction of the filler content and contribute to a more efficient polymerization process (6,7).

Bulk Fill resins are primarily used in posterior restorative procedures, particularly in the treatment of Black class I and II cases, in which the “C” factor is greater and it is possible to control to some extent the shrinkage resulting from polymerization (7). However, it should be noted that these resins have been shown to exhibit higher wear rates and lower hardness compared to conventional composite resins (6,8). Therefore, it is not advisable to use them in situations where the tooth is subjected to high tensile loads (8,9).

In contrast, the field of fiber-reinforced dental resins (posterior everX) is characterized by the development of materials incorporating fibrous fillers or microfibers (10). These materials serve several functions, including transmitting loads and stresses from the affected teeth to the resinous material, thereby conferring increased strength to the tooth structure (10,11). The primary objective of FRCs is to reproduce dentin-

like properties, thereby improving the effectiveness of the restorative process and preventing future failures (11).

The application of new fiber-reinforced resins may be beneficial in a variety of clinical situations, such as the reinforcement of fractured teeth, where higher restorative strength is required (12). Due to its specific composition, this type of resin promotes durability, as it allows a greater amount of healthy dental tissue to be preserved (11). The success of fiber-reinforced resins directly depends on factors such as the composition, distribution, quantity, and adhesion of the fiberglass particles within the tooth structure (11,12).

The growing diversity of materials and techniques currently available on the market has led to a lack of consensus regarding the optimal choice for each specific clinical case. This lack of clarity poses a significant challenge in the decision-making process for dental professionals, as they must determine the most appropriate material to ensure clinical efficacy. Therefore, the field of modern dentistry has greatly benefited from the advancement and implementation of novel technologies, including a range of dental resins that offer diverse options for restorations. Among these alternatives, bulk-fill resins and fiber-reinforced resins have gained prominence due to their ability to simplify procedures and increase the longevity of restorations. However, choosing between these two technologies remains a difficult task for dentists.

The absence of a comprehensive systematic review analyzing the clinical performance of bulk-fill composites and fiber-reinforced composites has created a knowledge gap. This gap hampers dentists' ability to make decisions based on sound scientific evidence, potentially leading to suboptimal outcomes in terms of stability, longevity, and patient satisfaction with restorations. Clarity is needed for dentists when selecting the appropriate material for each case; this will significantly contribute to improving standards in restorative dentistry practice, thereby promoting the quality of patient care and the effectiveness of dental procedures.

Therefore, the primary objective of this study is to conduct a comprehensive and comparative systematic review of the clinical performance of bulk-fill composites and fiber-reinforced composites in restorative dentistry, enabling dentists and oral health professionals to have a comprehensive understanding of the clinical benefits and limitations of both technologies.

Materials and methods

This research is descriptive with a quantitative approach, carried out through a Systematic Review of the Literature (RSL), for which the PRISMA statement for RSL was strictly followed (13–16) for example in a matrix converter, the maximum voltage transfer ratio will be limited if one or more input lines is at a reduced voltage. Control techniques to compensate the effect of unbalanced voltage supply for matrix converters allow for a limited output voltage and power capabilities, which depends on the level of unbalance. This paper proposes the utilization of the clamp capacitor, which is normally needed to protect a Direct Power Converter (DPC).

Research question

What is the clinical effectiveness associated with dental restorations using bulk fill resins compared to fiber-reinforced resins in patients requiring restorative dentistry procedures?

PICO Question

- P (Population): Adult patients requiring dental restorations on permanent teeth.
- I (Intervention): Bulk Fill resins used in dental restorations.
- C (Comparison): Fiber-reinforced resins in dental restorations.

- O (Outcomes): Clinical effectiveness of restorations , measured by success rate, clinical performance and application difficulties.

Inclusion/exclusion criteria

The inclusion and exclusion criteria that documents must meet to be included in the systematic review are set out below.

- Only articles that are controlled studies, prospective studies and randomized clinical trials will be considered, excluding systematic reviews.
- Documents published in the last five years (2018 to 2022) will be included, with the possibility of considering the year 2023 even if it is not a fully completed year.
- Articles that do not deal with composite resins or are not relevant to the subject matter will be excluded.
- Papers that do not address restorative dentistry will be excluded.
- Articles in languages other than Spanish, English, or Portuguese are not considered for the study.
- Articles that are not empirical studies will be excluded.

Search strategies

The research was conducted in scientific databases such as Scopus, Web of Science, PubMed, and Scielo, between October 1 and 4, 2023. Table 1 shows the categorized key terms for the study (dental resin, restorative dentistry, comparison, and clinical efficacy), which will be used for systematic exploration. Table 2 presents the search strings, emphasizing that the keyword combination was carefully chosen to obtain non-zero results.

Table 1. Search string according to each category

Search terms	“Bulk Fill”, “Fibre -reinforced”, “Restorative Dentistry”, “Dental restorations”, “Long-term restorations”, “Dental restorative techniques”, “Dental restorative materials”, “Comparison”, “Evaluation”, “Comparison”, “Differences*”, “Vs*”, “Clinical effectiveness”, “Durability”, “Success rate”, “Restorative failure”, “Failure”, “Postoperative complications”, “Complications”.
Grouping themes	A. Dental resin
	B. Restorative odontalgia
	C. Comparison
	D. Clinical effectiveness
Search strings	A: (“Bulk Fill” OR “Fiber -reinforced”) B: (“Restorative Dentistry” OR “Dental restorations” OR “Long-term restorations” OR “Dental restorative techniques” OR “Dental restorative materials”) C: (“Comparison” OR “Evaluation” OR “Differences*” OR “Vs”) D: (“Clinical effectiveness” OR “Durability” OR “Success rate” OR “Restorative failure” OR “Failure” OR “Postoperative complications” OR “Complications”)

Table 2. Search equation according to each scientific database

Database	Search equation	Initial search
SCOPUS	SCOPUS = A+B+D TITLE-ABS-KEY(“Bulk Fill” OR “Fiber -reinforced”) AND TITLE-ABS-KEY(“Restorative Dentistry” OR “Dental restorations” OR “Long-term restorations” OR “Dental restorative techniques” OR “Dental restorative materials”) AND TITLE-ABS-KEY(“Comparison” OR “Evaluation” OR “Differences*” OR “Vs”) AND TITLE-ABS-KEY(“Clinical effectiveness” OR “Durability” OR “Success rate” OR “Restorative failure” OR “Failure” OR “Postoperative complications” OR “Complications”)	180

WoS	WoS = A+B+C	8
	TS=(“Bulk Fill” OR “Fiber -reinforced”) AND TS=(“Restorative Dentistry” OR “Dental restorations” OR “Long-term restorations” OR “Dental restorative techniques” OR “Dental restorative materials”) AND TS=(“Clinical effectiveness” OR “Durability” OR “Success rate” OR “Restorative failure” OR “Failure” OR “Postoperative complications” OR “Complications”)	
PubMed	PubMed = A+B+C+D	30
	(“Bulk Fill” OR “Fibre -reinforced”) AND (“Restorative Dentistry” OR “Dental restorations” OR “Long-term restorations” OR “Dental restorative techniques” OR “Dental restorative materials”) AND (“Comparison” OR “Evaluation” OR “Differences*” OR “Vs”) AND (“Clinical effectiveness” OR “Durability” OR “Success rate” OR “Restorative failure” OR “Failure” OR “Postoperative complications” OR “Complications”)	
Scielo	SCIELO = A+B+C	27
	(“Bulk Fill” OR “Fibre -reinforced”) AND (“Restorative Dentistry” OR “Dental restorations” OR “Long-term restorations” OR “Dental restorative techniques” OR “Dental restorative materials”) and (“Comparison” OR “Evaluation” OR “Differences*” OR “Vs”)	

Source: Own elaboration

Publication selection process

The initial search yielded 245 documents. After eliminating duplicates, inclusion and exclusion criteria were applied, yielding 59. After reviewing the titles, abstracts, and keywords to ensure article relevance, 13 documents were selected for inclusion in the study. The manuscripts were reviewed and discussed with a professor with expertise in the field and in the development of systematic reviews.

Results

Based on the analysis performed at each stage of the methodological exploration, the final count of approved scientific manuscripts was seven. A graphic representation of the study's complexities is shown in Figure 1.



Figure 1. Flowchart according to the PRISMA methodology. **Source:** The authors.

Table 3 shows in detail the summarized information from each article included in the study, distinguishing the success rate, times, clinical performance and difficulties in the application of restorative dentistry

procedures. Demonstrating that the success rate for Bulk Fill restorations was greater than 95% in all the studies analyzed, which were carried out over the course of 6 months (equivalent to 500 thermocycling cycles), up to 5 years of analysis, among some of the most visible complications shown in the studies were: lack of adaptation due to polymerization contraction, presence of stains at the marginal level, as well as microleaks, deterioration of the surface brightness due to wear and caries recurrence was found after a few months of restoration. On the other hand, in restorations with fiber-reinforced resin, marked complications such as the presence of non-restorable fractures were seen in a high percentage of analyzed pieces; however, in another study, its similarity to dentin property was highlighted, which is why the use of fiber-reinforced resin was preferred in the posterior sector.

Table 3. Determinants for the application of Bulk Fill and fiber-reinforced resin.

Título	Autores	Año	Periodo de evaluación	Tamaño muestral	tasa de éxito/fracaso	Desempeño clínico	Dificultades de aplicación
Randomized clinical split-mouth study on a novel self-adhesive bulk-fill restorative vs. a conventional bulk-fill composite for restoration of class II cavities – results after three years	Cieplik et al. (17)	2022	36 meses	60 restauraciones	TE=96,6%	Uso clínico recomendado.	Deterioro significativo en la adaptación marginal. Aumentos significativos en la tinción marginal
Thirty-six-month clinical evaluation of posterior high-viscosity bulk-fill resin composite restorations in a high caries incidence population: interim results of a randomized clinical trial	Almeida et al. (18)	2021	36 meses	138 restauraciones	TF=1,26%	No específica	No presenta

12-months Clinical Evaluation of Fiber Reinforced Bulk Fill Resin Composite versus Incremental Packing of Nanohybrid Resin Composite in Restoration of Deep Proximal Lesions of Permanent Molars: A Randomized Controlled Trial	Mennatallah et al. (19)	2022	12 meses	36 restauraciones	TE= 95%	No existe riesgo de fracaso	No presenta
A randomized, prospective clinical study evaluating effectiveness of a bulk-fill composite resin, a conventional composite resin and a reinforced glass ionomer in Class II cavities: one-year results	Balkaya et al. (20)	2019	12 meses	109 restauraciones	TE= 100%	Marcada supervivencia de las restauraciones	Cambios de color (2,8%). Decoloración marginal (5.5%). Mala adaptación marginal (5.5%).

Evaluation of micro-leakage in Class II composite restorations: Bonded base and bulk fill techniques	Feiz et al. (21)2021	6 meses (500 ciclos de termociclado)	60 restauraciones	No específica	Baja contracción de polimerización.	Alto nivel de micro-filtración al no utilizar una base cavitaria.
Optimization of large MOD restorations: Composite resin inlays vs. short fiber-reinforced direct restorations	Soares et al (22)	2018	No específica	45 restauraciones	TE= 87%	Resistencia a las pruebas de fatiga: 87% Propenso a agrietarse. Fracturas no catastróficas.
One-year clinical evaluation of bulk-fill flowable vs. regular nanofilled composite in non-carious cervical lesions	Canali et al. (23)	2019	12 meses	89 restauraciones	TF= 3,3% para la forma anatómica TF=2,2% para la adaptación marginal	Desempeños clínicos aceptables para la restauración de NCCL después de 1 año. Tinción marginal, sensibilidad postoperatoria y presencia de caries recurrente

Clinical evaluation of bulk-fill and universal nanocomposites in class II cavities: Five-year results of a randomized clinical split-mouth trial	Schoilew et al. (24)	2023	5 años	120 restauraciones	Tasa media de fallo anual: 1,6%	Rendimiento clínico y una supervivencia aceptable durante el período de observación de 5 años	Restauraciones mal adaptadas. Recambio de restauraciones por fallas.
Bulk-fill Composites Compared to a Nanohybrid Composite in Class II Cavities - A Two-year Follow-Up Study	Hoffmann et al. (25)	2021	24 meses	160 restauraciones	TE=92%	Estabilidad clínica.	Caries recurrentes. Fracturas de las restauraciones
Clinical Performance of Bulk-Fill Resin Composite Restorations Using the United States Public Health Service and Federation Dentaire Internationale Criteria: A 12-Month Randomized Clinical Trial	Almeida et al. (26)	2021	12 meses	138 restauraciones	TE=97.2% TF=1%	Rendimiento clínico satisfactorio.	Mala adaptación marginal. Rugosidad superficial. Recambio de restauraciones por fallas.

Flowable fiber-reinforced versus flowable bulk-fill resin composites: Degree of conversion and micro-tensile bond strength to dentin in high C-factor cavities	Harp et al. (27)	2022	No presenta	30 restauraciones	No especifica	Prefe-rencia de la resina reforzada con fibra en zonas con alto estrés.	No presenta.
Clinical time and postoperative sensitivity after use of bulk-fill (syringe and capsule) vs. incremental filling composites: A randomized clinical trial	Tardem et al. (28)	2019	No presenta	295 restauraciones	No especifica	Menor tiempo operatorio. Disminuye la sensibilidad posoperatoria con la técnica incremental tradicional.	Sensibilidad posoperatoria (4.6%)

Short-fiber Reinforced MOD Restorations of Molars with Severely Undermined Cusps	Pascal et al. (29)	2023	No presenta	36 restauraciones	TE= 100%	Restauraciones de bajo costo. Resina reforzada con fibra como complemento de incrustaciones CAD/CAM	Grietas por contracción
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Note: **TE:** Success rate . **TF:** Failure rate . **Source:** Prepared from the results of a systematic literature search.

The following table shows a comparison of clinical complications of Bulk Fill resin over time, ranging from 6 months (artificial aging) to 5 years of study. It shows that the most prevalent complications are microleaks, color changes, marginal staining, poor marginal adaptation, surface wear, recurrent caries, and surface roughness. It should be noted that there is no literature covering any clinical complications with fiber-reinforced resin because it is a new element and there is a lack of information (Table 4).

Table 4. Complications in the application of Bulk Fill resins over a period of 6 months to 5 years.

Complicaciones clínicas en la aplicación de resina Bulk Fill		
Título	Intervalo de tiempo	Complicaciones
Evaluation of microleakage in Class II composite restorations: Bonded base and bulk fill techniques	500 ciclos termociclado 6 meses de envejecimiento artificial	• Presencia de microfiltraciones al no emplear bases cavitarias en cavidades profundas antes de la aplicación de la resina Bulk Fill.
A randomized, prospective clinical study evaluating effectiveness of a bulk-fill composite resin, a conventional composite resin and a reinforced glass ionomer in Class II cavities: one-year results	12 meses	• Se evidenció cambios de color. • Zonas de decoloración marginal. • Mal adaptación marginal.
One-year clinical evaluation of bulk-fill flowable vs. regular nanofilled composite in non-carious cervical lesions	12 meses	• Tinciones marginales • Desgaste superficial de la resina. • Sensibilidad postoperatoria. • Mal adaptación marginal por lo tanto presencia de caries recurrente.

Clinical Performance of Bulk-Fill Resin Composite Restorations Using the United States Public Health Service and Federation Dentaire Internationale Criteria: A 12-Month Randomized Clinical Trial	12 meses	• Rugosidad superficial por desgaste. • Mal adaptación marginal. • Se tuvieron que hacer recambio de restauraciones por fallas presentes.
Bulk-fill Composites Compared to a Nanohybrid Composite in Class-II Cavities - A Two-year Follow-Up Study	24 meses	• Fracturas de las restauraciones. • Caries recurrentes por microfiltraciones.
Randomized clinical split-mouth study on a novel self-adhesive bulk-fill restorative vs. a conventional bulk-fill composite for restoration of class II cavities – results after three years	36 meses	• Adaptación marginal con deterioro significativo. • Tinción marginal.
Clinical evaluation of bulk-fill and universal nanocomposites in class II cavities: Five-year results of a randomized clinical split-mouth trial	5 años	• Mal adaptaciones en las restauraciones. • Necesidad de recambio de restauraciones por fallas.

Source: Prepared from the results of a systematic literature search.

Table 5 shows the advantages of using fiber-reinforced resin restorations, both in terms of their applications and disadvantages from a cost point of view.

Table 5. Fiber reinforced resin considerations.

Implications of fiber-reinforced resin	
Advantages	• Reconstruction of class IV cavities • Replacement of amalgam restorations. • Class I and II cavities with previous endodontic treatment. • Cavities where inlays are indicated.
Disadvantages	• High cost of resin. • It is necessary to use a conventional resin for the superficial portion of the restoration. • High cost of restorations.

Source: Prepared from the results of a systematic literature search.

Discussion

The results of this systematic review facilitate the recognition that restorations made with bulk-fill composites demonstrate acceptable clinical efficacy, with success rates exceeding 95% in most studies, reaffirming their suitability for restorative interventions in Class I and II cavities. However, recurrent complications, such as poor marginal adaptation, microleakage, marginal discoloration, surface roughness, and caries recurrence, were evident, especially in long-term evaluations. In contrast, restorations with fiber-reinforced composites, although less frequently analyzed in the academic literature, showed favorable clinical

performance in terms of mechanical properties and strength, and showed lower susceptibility to aesthetic or bond-related complications, although accompanied by a risk of non-repairable fractures. This divergence may be attributed to the structural similarity of fiber-reinforced resin to dentin, which could improve its functionality in regions subjected to high stress levels.

In this context, the study by Cieplik et al. (17) tooth-colored, self-adhesive bulk-fill restorative (SABF, 3M) indicates that the success rate of Bulk Fill restorations was 96.06% in a period analyzed of 36 months, in terms of biological properties the results were acceptable throughout the study, additionally significant deterioration in the surface brightness of the restorations could be observed, demonstrating a significant marginal staining during the course of the study, which is consistent with the study by Mennatallah et al. (19) in which it was observed that there was no risk of failure with respect to fractures, marginal integrity, color changes, surface texture, postoperative complications and recurrent caries, presenting a success rate of 95%, limiting this study the evaluation time was carried out in 12 months, so possible complications that may occur over time cannot be evaluated. On the other hand, Tardem et al. (28) of posterior restoration that used a universal adhesive, in a self-etch or selective enamel-etching technique, along with incremental or bulk-fill composites (presented in syringes or capsules) In his study he evaluated postoperative sensitivity after using Bulk Fill resins, giving a rate of 4.06% of presenting this complication.

In the study by Balkaya et al. (20) a survival rate of restorations based on Bulk Fill resins of 100% was determined after one year of analysis used in class II cavities, the complications that occurred in the study were in terms of marginal adaptation of the restorations (5.5%), color changes (2.8%) and marginal coloration in (5.5%). This shows a relationship with the study by Schoilew et al. (24), in which they observed failures on the part of the restorations, these had to be replaced and even thus they presented

poor adaptation in the restorations presenting an average annual failure rate of 1.6% , because this study was carried out over 5 years. Additionally, to these studies in class II cavities, Hoffmann et al. (25) add that, in their study carried out over 24 months, a success rate of 92% was presented, having as complications fractures of the restoration and recurrent caries are added to the clinical defects. Complementing the studies in class II, Feiz et al. (21) in his study used Bulk Fill resins subjected to thermocycling 500 cycles / 6 months of artificial aging, study in which it was possible to affirm that there is a high level of microfiltration when cavity bases are not used prior to restoration with Bulk Fill material.

Almeida et al. (26) In his study carried out over 12 months, he presents an overall success rate of 99.07% in which only a failed relationship of 0.93% based on Bulk Fill resin was detected. Among the difficulties that were observed were poor marginal adaptation and surface roughness, which complements his second study by Almeida et al. (18) Tetric EvoCeram BF (TBF; Ivoclar Vivadent developed over a time interval of 36 months in which a failure rate of 1.26% was obtained, which is mainly related to a poor adaptation of the restoration, which led to a recurrence of caries .

Regarding innovative restorations, Soares et al. (22) in his study determined the fatigue test survival of fiber-reinforced restorations to be 87%. A limitation of this study was the comparison of fiber-reinforced resins placed directly in cavities with inlay-type restorations. In contrast to the study by Harp et al. (27), the great adhesion capacity and its properties similar to dentin were exposed, which is why in this study the use of this reinforced resin is preferred in high stress areas, specifically in the posterior sector where occlusal forces are greater, as a complement to the study by Pascal et al. (29) leaving unsupported buccal and lingual enamel cusps. A short-fiber reinforced composite resin base (SFRC, everX Flow, GC) it is stated that fiber-reinforced resins are a good complement to

be placed together with CAD/CAM inlays, having a 100% success rate in their restorations.

While the findings underscore the advantageous clinical efficacy of fiber-reinforced composites in dental restorations, scrutiny of this material category is limited due to the limited available evidence, which can be attributed to its recent integration into restorative dentistry. This limitation emphasizes the need for long-term clinical studies that facilitate a more comprehensive evaluation of their performance in relation to variables such as marginal adaptation, fracture resistance, and caries recurrence, with the aim of establishing their efficacy and improving their application in diverse clinical settings.

Conclusions

dentistry today is mainly based on providing long-lasting treatments, therefore, the analysis of new restorative materials that are introduced in the field is essential, among one of the most used are Bulk Fill resins, which in studies have shown that it has a success rate of more than 95% in a study interval of 6 months to 5 years, although according to the analysis, it can show long-term complications, among the most prevalent are marginal maladjustments, superficial wear of the restorations and marginal discolorations; Despite this, its use is still recommended in deep cavities, more specifically in Black I and II cavities, another demonstrated benefit is that it reduces clinical time in the dental office.

Innovation in restorative materials has driven the development of composites that mimic the biomechanical properties of dental tissue, including fiberglass-reinforced resins. These materials have demonstrated a high clinical success rate and fatigue resistance close to 87%, justifying their increasing use in complex restorative procedures. Their ability to adequately distribute functional loads and occlusal stresses from dental structures to the restorative material represents a significant advantage in

the rehabilitation of Class I and II cavities in endodontically treated teeth, reconstructions with cervical margin elevation, replacement of amalgam restorations, and restorations in teeth with cusp destruction. However, as this is an emerging technology in restorative dentistry, limitations persist due to the limited clinical evidence available. Therefore, longitudinal studies are required to rigorously evaluate their clinical behavior, durability, and potential associated complications.

The innovation of restorative materials has seen the need to implement a material that resembles the biological characteristics of teeth, therefore, restorations with fiberglass reinforced resins are currently being used, which allow the transmission of loads and tensions from the affected teeth to the resinous material and as a result, the success of restorations in which a margin elevation is necessary, reconstruction of cavities I and II with endodontic treatments, cavities with amalgam replacement, and cavities where a destruction of cusps is seen. Its success rate is relatively high and they also have a fatigue resistance of 87%. However, being a new element in the restorative field, Further clinical studies are still needed to better establish the qualities, clinical performance, and potential complications that fiber-reinforced resins may present.

Contribution of the authors

NH: Idea, introduction, methodology, data collection, analysis of results, discussion, final review of the article.

AG: Idea, introduction, data collection, analysis of results, discussion, final revision of the article.

CUU: Data analysis, results analysis, discussion, final review of the article.

CUE: Data analysis, results analysis, discussion, final review of the article.

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