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Desempenho clínico de restaurações diretas com resina composta autoadesiva: uma revisão sistemática e meta-análise

Clinical performance of self-adhesive resin composite restorations: a systematic review and meta-analysis

Campo Grande – MS

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Resultado: _____

Campo Grande (MS), _____ de _____ de _____.

BANCA EXAMINADORA

_____

Prof. Dr. João Felipe Besegato – Faculdade de Odontologia da Universidade Federal de Mato Grosso do Sul / UFMS

_____

Profa. Dra. Andrea Freire Vasconcelos Eckelberg – Faculdade de Odontologia da Universidade Federal de Mato Grosso do Sul / UFMS

_____

Profa. Dra. Joissi Ferrari Zaniboni – Faculdade de Odontologia da Universidade Federal de Mato Grosso do Sul / UFMS

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RESUMO

O objetivo deste trabalho foi realizar uma revisão sistemática e meta-análise a fim de comparar o desempenho clínico de restaurações diretas em resina composta (RC) convencional ou bulk-fill com RC autoadesivas em dentes permanentes, independentemente do tipo de cavidade e estratégia adesiva utilizada. O desempenho clínico foi avaliado de acordo com os critérios da FDI (World Dental Federation) e do USPHS (United States Public Health Service). Após a aplicação das chaves de busca nas bases de dados (Medline/PubMed, Web of Science, Scopus, Embase, LILACS, The Cochrane Library, Base, Google scholar e OpenGray), 971 artigos foram identificados e 13 foram incluídos para análise. Um total de 486 participantes com idade entre 6 e 79 anos receberam 1159 restaurações, sendo 658 realizadas com RC convencional ou bulk-fill e 501 com RC autoadesiva. O período de acompanhamento variou de imediatamente após a restauração (baseline) até 60 meses. De maneira geral, os estudos revelaram que não houve diferença significativa para os desfechos de manchamento marginal, estabilidade de cor, fratura/retenção, adaptação marginal, desgaste, sensibilidade pós-operatória e recorrência de cárie, erosão e abrasão. Os estudos revelaram baixo risco de viés para a maioria dos domínios, no entanto, a certeza de evidência foi considerada baixa na maioria dos critérios avaliados. Considerando as limitações do estudo, pode-se concluir que a RC autoadesiva apresenta desempenho clínico satisfatório e comparável às RC convencionais ou bulk-fill. No entanto, a baixa certeza de evidência sugere que mais estudos clínicos são necessários para consolidar os achados desta revisão.

Palavras-chave: resina composta, restauração dentária permanente, revisão sistemática.

ABSTRACT

This study aimed to conduct a systematic review and meta-analysis to compare the clinical performance of direct restorations using conventional or bulk-fill resin composites (RC) with self-adhesive RCs in permanent teeth, regardless of cavity type or adhesive strategy employed. Clinical performance was assessed based on the FDI (World Dental Federation) or the USPHS criteria (United States Public Health Service). After applying the search strategy across databases (Medline/PubMed, Web of Science, Scopus, Embase, LILACS, The Cochrane Library, Base, Google Scholar, and OpenGray), 971 articles were identified, and 13 were included for analysis. A total of 486 participants aged 6 to 79 years received 1.159 restorations, of which 658 were performed with conventional or bulk-fill RCs and 501 with self-adhesive RCs. The follow-up period ranged from immediately after restoration (baseline) to 60 months. Overall, the studies revealed no significant differences in the outcomes: marginal staining, color stability, fracture/retention, marginal adaptation, wear, postoperative sensitivity, recurrence of caries, erosion, or abrasion. The studies demonstrated a low risk of bias for most domains; however, the certainty of evidence was considered low for most of the evaluated criteria. Considering the limitations of this study, it can be concluded that self-adhesive RCs exhibit adequate clinical performance comparable to that of conventional or bulk-fill RCs. Nonetheless, the low certainty of evidence suggests that further clinical studies are needed to consolidate the findings of this review.

Keywords: resin composite, dental restoration, systematic review

SUMÁRIO

DESEMPENHO CLÍNICO DE RESTAURAÇÕES DIRETAS COM RESINA COMPOSTA AUTOADESIVA: UMA REVISÃO SISTEMÁTICA E META-ANÁLISE[1]

CLINICAL PERFORMANCE OF SELF-ADHESIVE RESIN COMPOSITE RESTORATIONS: A SYSTEMATIC REVIEW AND META-ANALYSIS [1]

[1] Texto redigido e formatado de acordo com as normas da revista Journal of Dentistry (ISSN 1879-176X).

1 INTRODUÇÃO

A resina composta (RC) é o material de escolha para restaurações diretas em dentes anteriores e posteriores. Para tornar viável sua versatilidade de aplicação clínica, a RC deve cumprir diferentes requisitos físicos, mecânicos e biológicos [1,2]. No entanto, a restauração direta com RC apresenta-se como uma técnica restauradora sensível, envolvendo diferentes etapas, na qual o nível de habilidade do operador influencia no sucesso e longevidade do procedimento [3]. Além disso, adequado condicionamento ácido e controle da umidade dentinária, eliminação completa de solventes, correta aplicação do sistema adesivo e formação de uma camada híbrida estável e homogênea são desafios clínicos durante a execução de procedimentos adesivos [1,4-6], ao mesmo tempo que representam fatores cruciais para o estabelecimento de uma adesão adequada da RC aos substratos dentários [7].

Visando otimizar o tempo clínico, reduzir a sensibilidade da técnica e complexidade das etapas, RC autoadesivas vêm sendo introduzidas no mercado. Com a premissa de simplificação do procedimento restaurador, as RC autoadesivas não necessitam da aplicação prévia de um sistema adesivo sobre os substratos dentários [8]. Isto foi possível devido à incorporação de monômeros ácidos na composição das RC autoadesivas que promovem o autocondicionamento do substrato, dentre eles, o dimetacrilato de glicerol fosfato (GPDM), que apresenta acidez suave (pH = 1,9), metacrilatos carboxílicos (4-MET) e fosfato etil metacrilatos (BMEP) [6]. Além dos monômeros ácidos, a adição de monômeros de caráter hidrofílico, como o metacrilato de hidroxietila (HEMA), auxilia na infiltração da resina melhorando a umectabilidade da superfície para a adesão ao substrato dentinário. Dessa forma, os mecanismos envolvidos na adesão das RC autoadesivas aos substratos dentários são químicos, em que os monômeros ácidos se ligam à hidroxiapatita da estrutura

dentária, e também micromecânica, onde a RC se une às fibrilas colágenas e à *smear layer* da dentina [9]. De acordo com a literatura, a primeira RC autoadesiva comercializada foi a Vertise Flow (Kerr), a qual combinava éster de ácido fosfórico etacrilato e dimetacrilato de glicerofosfato (GPDM) como monômeros funcionais [10].

As RC podem ser encontradas em diferentes viscosidades. Quanto maior a quantidade de partículas de carga do material (volume), maior será a sua viscosidade, melhorando as propriedades físico-mecânicas e maior resistência ao desgaste das RC. Entretanto, RC menos viscosas (fluidas) são de grande valia para melhorar a adaptação às paredes da cavidade e para o preenchimento de pequenas cavidades [11], sendo uma das formas de apresentação das RC autoadesivas [9]. A respeito da técnica de inserção, as RC do tipo bulk-fill diferem das RC convencionais por possuir maior profundidade de polimerização, devido à sua maior translucidez, o que permite a sua inserção em incremento único de até 4-5 mm de espessura [12]. Atualmente, RC autoadesivas do tipo bulk-fill também são comercializadas [13,14].

Entretanto, o desempenho das RC autoadesivas, independentemente da forma de apresentação, ainda é permeado de questionamentos e apresenta limitações que devem ser relevadas. Um estudo [15] evidenciou que as RC autoadesivas não apresentaram desempenho adequado em relação à resistência de união, microinfiltração e resistência ao cisalhamento. Além disso, foi demonstrado por uma revisão sistemática [16] que RC fluidas convencionais aplicadas no modo “condiciona e lava” obtiveram adaptação marginal superior às RC fluidas autoadesivas. Também foi observado que restaurações com RC autoadesiva do tipo bulk-fill apresentaram resultados estéticos inferiores às RC bulk-fill convencionais em relação ao brilho de superfície, cor, translucidez e coloração marginal [13,14]. Ademais, observou-se que restaurações com RC autoadesivas promoveram discretas alterações no complexo dentinopulpar, indicando reversibilidade do processo inflamatório frente às agressões do procedimento restaurador adesivo [17]. No que diz respeito à sensibilidade pós-operatória, pacientes que receberam restaurações com RC autoadesivas relataram dor leve principalmente no período de 15 dias após o procedimento, diminuindo com o passar do tempo [6]. No entanto, estudos clínicos demonstraram que o desempenho de RC fluidas autoadesivas é semelhante ao

das RC fluidas convencionais, [9,16,18], sendo indicada como um material alternativo para a restauração direta de dentes permanentes [13,14,16].

De maneira geral, as RC atuais possuem propriedades mecânicas e biológicas adequadas para uso clínico. No entanto, situações clínicas envolvendo alto estresse mastigatório podem levar à fratura da restauração, bem como o seu desgaste [1]. Portanto, qualquer material restaurador definitivo deve possuir propriedades suficientes para manter-se funcional na cavidade bucal por um longo período de tempo. Embora os estudos laboratoriais forneçam informações valiosas sobre as características físicas e mecânicas dos materiais restauradores, os ensaios clínicos são o desenho de estudo preferível para avaliar de fato a longevidade dos materiais frente a condições clínicas reais [19], sendo indispensável para a validação clínica de todo e qualquer novo produto.

Com base na falta de consenso da literatura, faz-se necessário identificar o desempenho das RC autoadesivas a fim de auxiliar o cirurgião-dentista na escolha de um material restaurador com propriedades estéticas, funcionais e biológicas adequadas para uso clínico seguro e eficaz. O objetivo desta revisão sistemática e meta-análise foi comparar o desempenho clínico de restaurações diretas em RC convencional ou bulk-fill com RC autoadesivas em dentes permanentes, independentemente do tipo de cavidade e estratégia adesiva utilizada.

2 MATERIAIS E MÉTODOS

2.1 Protocolo e registro

Esta revisão sistemática foi conduzida de acordo com as diretrizes do Reporting Items for Systematic Review and Meta-Analyses (PRISMA) [20] e seguiu as recomendações do *Cochrane Handbook for Systematic Reviews of Interventions*. O protocolo foi devidamente registrado no International Prospective Register of Systematic Reviews (PROSPERO) sob o número de registro CRD42024502834.

2.2 Critérios de elegibilidade

Uma pergunta PICOS de pesquisa foi formulada com base na população (P), intervenção (I), controle/comparação (C), resultados/desfechos (O) e

desenho/tipo de estudo (S). Sendo assim, definiu-se a pergunta PICOS como “Restaurações diretas em resina composta autoadesiva apresentam desempenho clínico superior em comparação às restaurações diretas em resina composta convencional ou bulk-fill?”. A população (P) considerada foram pacientes que necessitavam de restaurações diretas em resina composta em dentes permanentes, independentemente da localização da cavidade. A intervenção (I) avaliada foram restaurações diretas em resina composta autoadesiva, enquanto a comparação (C) considerada foram restaurações diretas em resina composta convencional ou bulk-fill, independentemente da estratégia adesiva utilizada. O desfecho (O) principal avaliado foi o desempenho clínico de acordo com os critérios da FDI (World Dental Federation) e do USPHS (United States Public Health Service). Os tipos de estudo considerados foram ensaios clínicos randomizados (ECR).

Ensaios clínicos não randomizados, estudos observacionais, relatos de caso, estudos piloto, estudos laboratoriais e envolvendo animais e resumos de congresso ou consensos foram excluídos, assim como estudos que avaliaram restaurações em dentes decíduos, cimentos resinosos autoadesivos e o uso de resinas compostas para o selamento de cicatrículas e fissuras e colagem de bráquetes ortodônticos.

2.3 Bases de dados e estratégia de busca

Uma pesquisa bibliográfica foi realizada nas bases de dados PubMed, Web of Science, Scopus, Embase, The Cochrane Library e LILACS, assim como na literatura cinza nas bases Google Scholar, Base e OpenGray. Dois revisores independentes (JFB e AFVE) conduziram as buscas de artigos sem restrições de idioma ou ano de publicação.

As estratégias de busca foram criadas utilizando palavras-chave relevantes para a pergunta de pesquisa. A estratégia de busca final foi exportada e as duplicatas foram removidas utilizando um gerenciador de referências Rayyan QCRI.

A tabela 1 descreve a estratégia de busca aplicada em cada base de dados e o respectivo número total de estudos recuperados antes da remoção de duplicatas.

Tabela 1. Estratégia de busca realizada em cada base de dados.

Base de dados	Estratégia de busca*	Resultados
PubMed	#1 ("composite resins"[MeSH Terms] OR resin composite restoration OR composite resin restoration OR direct resin composite restoration OR direct composite resin restoration OR restoration OR dental caries OR tooth decay OR dental decay OR caries OR carious) #2 ("self adhesive" OR "self bond*" OR self-adhesive restorative material OR self-adhesive flowable composite OR self-adhering flowable composite OR self-adhering flowable resin composite OR self-bonding resin composite OR self-bonding composite OR self-adhesive bulk-fill composite OR self-adhesive bulkfill composite) #3 (secondary caries OR postoperative sensitivity OR retention OR marginal discoloration OR marginal staining OR marginal adaptation OR anatomic form OR anatomical form OR anatomic contour OR surface texture OR surface luster OR surface lustre OR surface staining OR color match OR fracture) #4 ("clinical trial" OR "randomized clinical trial" OR randomized split-mouth design controlled study OR "randomized controlled trial" OR "controlled clinical trial" OR "RCT" OR "clinical study") #1 AND #2 AND #3 AND #4	479
Web of Science	#1 TS= (composite resin OR resin composite restoration OR composite resin restoration OR direct resin composite restoration OR direct composite resin restoration OR restoration OR dental caries OR tooth decay OR dental decay OR caries OR carious) #2 TS= (self-adhesive OR self-adhesive restorative material OR self-adhesive flowable composite OR self-adhering flowable composite OR self-adhering flowable resin composite OR self-bonding resin composite OR self-bonding composite OR self-adhesive bulk-fill composite OR self-adhesive bulkfill composite) #3 TS= (secondary caries OR postoperative sensitivity OR retention OR marginal discoloration OR marginal staining OR marginal adaptation OR anatomic form OR anatomical form OR anatomic contour OR surface texture OR surface luster OR surface lustre OR surface staining OR color match OR fracture) #4 TS=(clinical trial OR randomized clinical trial OR randomized split-mouth design controlled study OR randomized controlled trial OR controlled clinical trial OR RCT OR clinical study) #1 AND #2 AND #3 AND #4	129
The Cochrane Library	ID Search Hits #1 MeSH descriptor: [Composite Resins] explode all trees 2553 #2 (composite resin restoration):ti,ab,kw 1846 #3 (direct composite resin restoration):ti,ab,kw 236 #4 (restoration):ti,ab,kw 10921 #5 (dental caries):ti,ab,kw 7853 #6 (tooth decay):ti,ab,kw 635 #7 (dental decay):ti,ab,kw 617 #8 (caries):ti,ab,kw 9607 #9 (carious):ti,ab,kw 2599 #10 #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 20008 #11 (self-adhesive restorative material):ti,ab,kw 26 #12 (self-adhesive flowable composite):ti,ab,kw 16 #13 (self-adhering flowable composite):ti,ab,kw 24 #14 (self-adhering flowable resin composite):ti,ab,kw 19 #15 (self-adhesive bulkfill composite):ti,ab,kw 12 #16 #11 OR #12 OR #13 OR #14 OR #15 69 #17 (secondary caries):ti,ab,kw 2735 #18 (postoperative sensitivity):ti,ab,kw 3803 #19 (retention):ti,ab,kw 28318 #20 (marginal discoloration):ti,ab,kw 608 #21 (marginal staining):ti,ab,kw 276 #22 (marginal adaptation):ti,ab,kw 1189 #23 (anatomic form):ti,ab,kw 535 #24 (anatomical form):ti,ab,kw 809 #25 (anatomic contour):ti,ab,kw 49 #26 (surface texture):ti,ab,kw 413 #27 (surface luster):ti,ab,kw 61 #28 (surface staining):ti,ab,kw 1749 #29 (color match):ti,ab,kw 505 #30 (fracture):ti,ab,kw 24422	30

	#31 #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 61318 #32 #10 AND #16 AND #31 30	
SCOPUS	#1 (TITLE-ABS-KEY (composite resin OR resin composite restoration OR composite resin restoration OR direct resin composite restoration OR direct composite resin restoration OR restoration OR dental caries OR tooth decay OR dental decay OR caries OR carious)) #2 (TITLE-ABS-KEY "self-adhesive" OR "self-adhesive restorative material" OR "self-adhesive flowable composite" OR "self-adhering flowable composite" OR "self-adhering flowable resin composite" OR "self-bonding resin composite" OR "self-bonding composite" OR "self-adhesive bulk-fill composite") #3 (TITLE-ABS-KEY ("secondary caries" OR "postoperative sensitivity" OR retention OR "marginal discoloration" OR "marginal staining" OR "marginal adaptation" OR "anatomic form" OR "anatomical form" OR "anatomic contour" OR "surface texture" OR "surface luster" OR "surface lustre" OR "surface staining" OR "color match" OR fracture)) #4 (TITLE-ABS-KEY ("clinical trial" OR "randomized clinical trial" OR "randomized split-mouth design controlled study" OR "randomized controlled trial" OR "controlled clinical trial" OR "RCT" OR "clinical study")) #1 AND #2 AND #3 AND #4	20
LILACS (BVS)	("composite resins" OR "resin composite restoration" OR "composite resin restoration" OR "direct resin composite restoration" OR "direct composite resin restoration" OR "restoration" OR "dental caries" OR "tooth decay" OR "dental decay" OR "caries" OR "carious") AND ("self adhesive" OR "self bonding" OR "self-adhesive restorative material" OR "self-adhesive flowable composite" OR "self-adhering flowable composite" OR "self-adhering flowable resin composite" OR "self-bonding resin composite" OR "self-bonding composite" OR "self-adhesive bulk-fill composite" OR "self-adhesive bulkfill composite") AND ("secondary caries" OR "postoperative sensitivity" OR "retention" OR "marginal discoloration" OR "marginal staining" OR "marginal adaptation" OR "anatomic form" OR "anatomical form" OR "anatomic contour" OR "surface texture" OR "surface luster" OR "surface lustre" OR "surface staining" OR "color match" OR "fracture") AND ("clinical trial" OR "randomized clinical trial" OR "randomized split-mouth design controlled study" OR "randomized controlled trial" OR "controlled clinical trial" OR "RCT" OR "clinical study")	4
EMBASE	#1 'resin'/exp OR 'resin' OR 'resin composite restoration' OR 'composite resin restoration' OR 'direct resin composite restoration' OR 'direct composite resin restoration' OR 'restoration' OR 'dental caries' OR 'tooth decay' OR 'dental decay' OR 'caries' OR 'carious' #2 'self adhesive' OR 'self bonding' OR 'self-adhesive restorative material' OR 'self-adhesive flowable composite' OR 'self-adhering flowable composite' OR 'self-adhering flowable resin composite' OR 'self-bonding resin composite' OR 'self-bonding composite' OR 'self-adhesive bulk-fill composite' OR 'self-adhesive bulkfill composite' #3 'secondary caries' OR 'postoperative sensitivity' OR 'retention' OR 'marginal discoloration' OR 'marginal staining' OR 'marginal adaptation' OR 'anatomic form' OR 'anatomical form' OR 'anatomic contour' OR 'surface texture' OR 'surface luster' OR 'surface lustre' OR 'surface staining' OR 'color match' OR 'fracture' #4 'clinical trial' OR 'randomized clinical trial' OR 'randomized split-mouth design controlled study' OR 'randomized controlled trial' OR 'controlled clinical trial' OR 'rct' OR 'clinical study' #1 AND #2 AND #3 - 382	382
Google Scholar	"resin" AND "self adhesive" AND "clinical trial" filetype:pdf	100
Open Gray	"resin" AND "self adhesive"	49
Base	resin composite AND self adhesive AND clinical trial	143

*Todas as buscas foram realizadas em 17 de janeiro de 2024 e atualizadas em 14 de outubro de 2024.

2.4 Processo de seleção dos artigos

As referências encontradas após a estratégia de busca nas diferentes bases de dados foram selecionadas com a ajuda do gerenciador de referências Rayyan QCRI. Após a remoção de duplicatas, dois revisores independentes (JFB e AFVE) realizaram a leitura do título e resumo de cada estudo com o intuito de selecionar, de acordo com os critérios de inclusão e exclusão, os estudos a

serem lidos na íntegra. A leitura completa dos estudos selecionados foi realizada para determinar sua elegibilidade para inclusão nas análises qualitativas e quantitativas. Nos casos de diferenças nas escolhas entre os revisores que realizaram a revisão primária (JFB e AFVE), um terceiro revisor (JFZ) foi consultado e um consenso entre os três foi alcançado por meio de discussão. As razões para exclusão dos estudos lidos na íntegra foram coletadas.

2.5 Processo de coleta de dados

A extração de dados dos estudos incluídos foi realizada por três autores (JFB, AFVE e GLM) utilizando uma planilha do software Excel elaborada especialmente para esta revisão. Possíveis diferenças na coleta de dados entre os autores foram solucionadas em consenso. Os dados coletados incluíram autor/ano, país, periódico, tipo de estudo, tipo de resina composta autoadesiva e convencional ou bulkfill, número de pacientes e cavidades avaliadas, tipo de cavidade, períodos de acompanhamento, forma de isolamento do campo operatório, tempo de fotoativação e irradiância da unidade fotoativadora, critério utilizado para avaliação do desempenho, conclusão do estudo, decisão de inclusão na meta-análise e outras observações julgadas pertinentes e necessárias. A avaliação do desempenho clínico consistiu na análise de falhas em relação aos desfechos: manchamento marginal, estabilidade de cor, fratura/retenção, adaptação marginal, desgaste, sensibilidade pós-operatória e recorrência de cárie, erosão e abrasão.

2.6 Meta-análise

Os dados extraídos dos estudos elegíveis eram dicotômicos. A medida de efeito e para apresentação sumarizada dos resultados foi a diferença de risco (Risk Difference), sendo obtidos também os respectivos intervalos de confiança de 95%. Os modelos de efeitos aleatórios e método de Mantel-Haenszel foram utilizados. A heterogeneidade foi avaliada usando o teste T de Cochran e as estatísticas I^2. Análises de subgrupos foram realizadas considerando os diferentes períodos de acompanhamento. Análises de sensibilidade também foram conduzidas para investigar as razões para alta heterogeneidade sempre que detectadas. Os dados foram analisados utilizando o software Revman 5

(Review Manager versão 5.4.1, The Cochrane Collaboration, Copenhagen, Dinamarca).

2.7 Análise do risco de viés e da certeza da evidência

Dois revisores independentes (JFB e AFVE) avaliaram o risco de viés. A ferramenta de colaboração Revised Cochrane risk-of-bias tool for randomized trials (RoB 2) foi utilizada para a avaliação dos estudos. Os cinco domínios avaliados foram: viés decorrente do processo de randomização, desvios das intervenções pretendidas, viés devido à falta de dados de resultados, viés na mensuração do desfecho e viés no relato dos desfechos.

O nível de certeza da evidência foi avaliado utilizando o método GRADE (Grading of Recommendations Assessment, Development and Evaluation) por meio da ferramenta online GradePRO (https://gdt.gradepro.org/). A abordagem GRADE para ECRs é iniciada considerando a evidência como alta e aborda cinco possíveis razões para rebaixamento da certeza da evidência: risco de viés, inconsistência, evidência indireta, imprecisão e viés de publicação [21]. Cada um desses critérios foi avaliado como tendo “nenhuma limitação”, “limitações sérias” ou “limitações muito sérias” para categorizar a certeza da evidência para cada desfecho em alta, moderada, baixa ou muito baixa.

Risco de viés incerto ou alto e estimativas de efeito imprecisas e/ou alta heterogeneidade reduziram a certeza da evidência nos critérios de risco de viés e inconsistência, respectivamente. Além disso, a sobreposição dos intervalos de confiança na linha de efeito nulo e o número de participantes <300 levaram ao rebaixamento da certeza de evidência no critério de imprecisão [22].

3 RESULTADOS

3.1 Identificação e seleção dos estudos

As buscas nas bases de dados resultaram um total de 971 artigos. O número de artigos nas bases de dados individuais foi: Medline/PubMed (n = 479), Web of Science (n = 50), Scopus (n = 26), Embase (n = 382), LILACS (n = 4), The Cochrane Library (n = 30), Base (n = 143), Google scholar (n = 100), OpenGray (n = 49). Após a remoção das duplicatas, um total de 865 artigos

foram considerados para a avaliação do título e resumos. Destes, 16 artigos foram considerados para leitura na íntegra (Figura 1).

Após a leitura completa, três estudos foram excluídos das análises. O primeiro estudo [23] foi excluído por não apresentar todos os dados no artigo, visto que os mesmos foram expressos em forma de gráficos de linha, impossibilitando a extração e análise de dados. O segundo estudo [24] foi excluído pois as resinas compostas autoadesivas foram utilizadas em associação a um sistema adesivo. O terceiro estudo [25] foi excluído pois não relata o número total de restaurações em cada follow-up dificultando a extração de dados (Tabela 2).

A figura 1 ilustra as fases de identificação, seleção e inclusão dos estudos, enquanto a tabela 2 detalha as razões pelas quais três (3) estudos foram excluídos da revisão sistemática.

Figura 1. Fluxograma ilustrando as fases de identificação, avaliação e inclusão dos estudos.

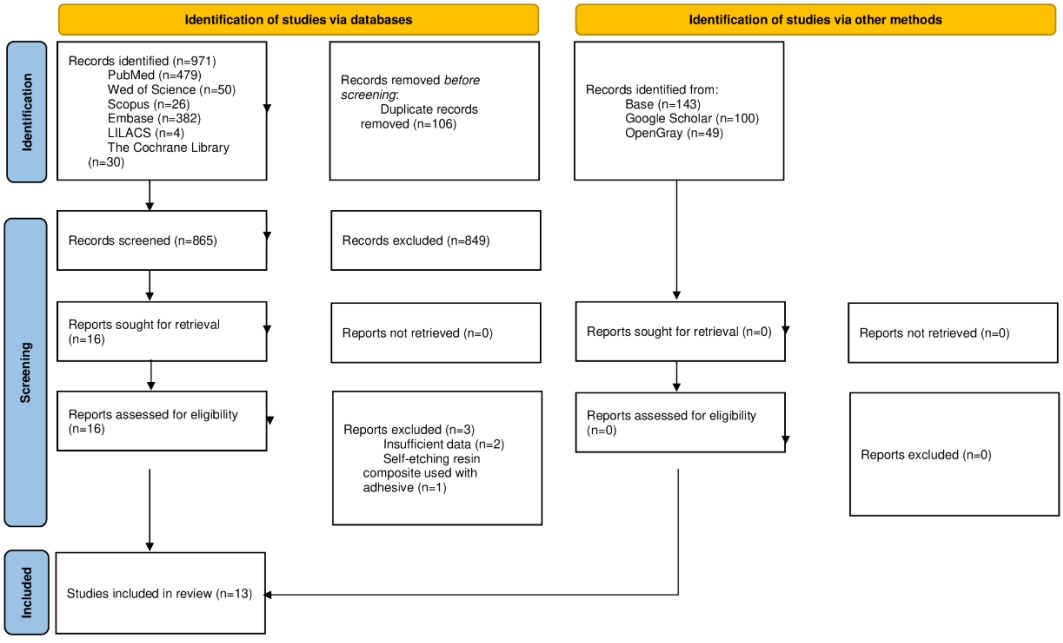


Tabela 2. Lista de estudos excluídos (e razões para exclusão) após leitura completa.

#	Estudo	Título da publicação	Razão para exclusão
1	Kalola et al, 2022	Comparative clinical evaluation of a self-adhering flowable composite with conventional flowable composite in Class I cavity: An in vivo study	Dados insuficientes: estudo apresentou os dados em formato de gráfico, impossibilitando a extração dos mesmos.
2	Peskersoy et al, 2022	The effect of flowable composite resins on periodontal health, cytokine levels, and immunoglobulins	Delineamento do estudo: avaliou as restaurações com resina autoadesiva utilizando sistema adesivo.
3	Maj et al, 2020	A comparative clinical study of the self-adhering flowable composite resin Vertise Flow and the traditional flowable composite resin Premise Flowable	Dados insuficientes: não relata o número total de restaurações em cada follow-up, impossibilitando a extração de dados.

3.2 Característica dos estudos incluídos

Treze (13) estudos [15-30] foram incluídos para as análises qualitativas e quantitativas, sendo todos do tipo ECR (ensaios clínicos randomizados). A tabela 3 sumariza as características dos estudos incluídos após leitura completa.

O estudo mais antigo foi publicado em 2015 e os mais recentes em 2024. Em relação ao país de origem dos autores, onze (11) estudos foram conduzidos por pesquisadores dos continentes asiático ou africano, e dois (2) do continente europeu. Três (3) estudos apresentaram autores de mais de um país.

No total, 1159 cavidades foram avaliadas, sendo 658 restauradas com RC convencional ou bulk-fill e 501 com RC autoadesiva em 486 participantes com idade entre 6 e 79 anos. O período de acompanhamento variou de imediatamente após a restauração (baseline) até 60 meses (5 anos). Seis (6) estudos avaliaram restaurações de classe I [9,18,26-29], três (3) de classe II [13,14,30], dois (2) de classe I e II [31,32] e dois (2) estudos avaliaram restaurações de cavidades de classe V [19,33]. A maioria dos ECR (7) realizou o procedimento restaurador exclusivamente sob isolamento absoluto do campo operatório, enquanto três (3) deles realizaram sob isolamento relativo [18,19,27]. Outros três (3) estudos realizaram o isolamento relativo na impossibilidade de isolamento absoluto [13,14,28].

A RC autoadesiva mais avaliada foi a Vertise™ Flow (Kerr) em 4 estudos, seguida das resinas Surefil One™ (Dentsply Sirona) e Fusio™ Liquid Dentin (Pentron), cada uma sendo avaliada por 3 estudos. A resina Constic (DMG) foi avaliada em apenas um estudo. Dois estudos não forneceram a marca comercial

da RC autoadesiva avaliada, pois eram resinas experimentais. As RC utilizadas como grupo controle foram RC convencionais em 8 estudos ou RC bulk-fill em 5 estudos. Com relação à viscosidade das mesmas, 7 eram de alta viscosidade e 6 de baixa viscosidade (fluídas).

Em relação ao tempo de fotoativação das RC e irradiância emitida pela unidade fotoativadora, apenas sete (7) estudos apresentaram ambas as informações. O tempo variou de 20 a 40 segundos, enquanto a irradiância variou de 800 a 1250 mW/cm². Um estudo não forneceu nenhuma informação sobre tempo e irradiância utilizadas [33]. Todos os ECR seguiram as orientações do fabricante para a aplicação dos materiais restauradores, a fim de evitar discrepâncias em relação à técnica restauradora e padronizar o procedimento clínico.

Para avaliação do desempenho clínico das restaurações, seis (6) utilizaram o critério FDI e sete (7) o critério USPHS.

Tabela 3. Características dos estudos incluídos após leitura completa (n=13).

ID do estudo	Autor e ano	País	Periódico	Resina composta autoadesiva	Resina composta convencional ou bulk-fill	Número de pacientes e cavidades	Tipo das cavidades	Follow-up	Isolamento do campo operatório	Tempo de fotoativação; irradiância do aparelho	Critério de avaliação
	Estudos clínicos										
ID1	Albelasy et al, 2024	Egito e EUA	Journal of Esthetic and Restorative Dentistry	Surefil One™ (Dentsply Sirona)	Tetric® PowerFill (Ivoclar Vivadent)	32 pac. 64 cav.	Classe I e II	7 dias; 6 meses; 12 meses; 24 meses	Abs.	20 – 30 seg.	FDI
ID2	AlHumaid et al, 2018	Arábia Saudita e Egito	The Journal of Contemporary Dental Practice	Fusio™ (Pentron)	Tetric® Flow (Ivoclar Vivadent)	20 pac. 40 cav.	Classe V	Baseline; 1 semana; 6 meses; 12 meses; 18 meses	Abs.	Não cita	USPHS
ID3	Çelik et al, 2015	Turquia	The Journal of Adhesive Dentistry	Fusio™ Liquid Dentin (Pentron)	G-ænial (GC)	19 pac. 80 cav.	Classe V	Baseline; 6 meses	Rel.	1000 mW/cm²	FDI
ID4	Cieplik et al, 2022 (1)	Alemanha	Clinical Oral Investigations	Experimental	Filtek™ One Bulk Fill (3M)	30 pac. 60 cav.	Classe II	Baseline; 6 meses; 12 meses	Abs. ou rel.	40 seg; 1250 mW/cm²	FDI
ID5	Cieplik et al, 2022 (2)	Alemanha	Journal of Dentistry	Experimental	Filtek™ One Bulk Fill (3M)	30 pac. 60 cav.	Classe II	24 meses; 36 meses	Abs. ou rel.	40 seg; 1250 mW/cm²	FDI
ID6	Ellithy et al., 2024	Egito	Journal of Esthetic and Restorative Dentistry	Surefil One™ (Dentsply Sirona)	Filtek™ One Bulk Fill (3M)	32 pac. 64 cav.	Classe II	Baseline; 6 meses; 12 meses	Abs.	40 seg.; 1250 mW/cm²	FDI
ID7	Ibrahim et al, 2023	Índia e Egito	Brazilian Dental Science	Fusio™ Liquid Dentin (Pentron)	Filtek™ Bulk Fill Posterior (3M)	20 pac. 40 cav.	Classe I	Baseline; 6 meses; 12 meses; 18 meses	Abs.	850-1200 mW/cm²	USPHS

ID do estudo	Autor e ano	País	Periódico	Resina composta autoadesiva	Resina composta convencional ou bulk-fill	Número de pacientes e cavidades	Tipo das cavidades	Follow-up	Isolamento do campo operatório	Tempo de fotoativação; irradiância do aparelho	Critério de avaliação
ID8	Maghaireh et al, 2023	Jordânia	Journal of Dentistry	Surefil One™ (Dentsply Sirona)	Filtek™ Bulk-Fill Posterior Restorative (3M)	83 pac. 166 cav.	Classe I e II	24 horas; 7 dias; 30 dias	Abs.	20 seg.; 1200 mW/cm²	USPHS
ID9	Oz et al, 2020	Turquia	Acta Stomatologica Croatica	Vertise™ Flow (Kerr)	Luxa Flow (DMG)	25 pac. 65 cav.	Classe I	7 dias; 12 meses; 24 meses; 36 meses; 48 meses; 60 meses	Rel.	1200 mW/cm²	FDI
ID10	Oz et al, 2021	Turquia	The Journal of Adhesive Dentistry	Constic (DMG)	Tetric® N-Flow (Ivoclar Vivadent)	28 pac. 114 cav.	Classe I	Baseline; 6 meses; 12 meses; 24 meses	Rel.	20 seg.; 1200 mW/cm²	USPHS
ID11	Sabbagh et al, 2017	Líbano	International Journal of Dentistry	Vertise™ Flow (Kerr)	Premise™ Flowable (Kerr)	34 pac. 68 cav.	Classe I	7 dias; 6 meses; 12 meses; 24 meses	Abs. ou rel.	20 seg.; 800 mW/cm²	USPHS
ID12	Shaalan et al, 2018	Egito	Journal of Conservative Dentistry	Vertise™ Flow (Kerr)	Filtek™ Z350 XT Flowable (3M)	18 pac. 36 cav.	Classe I	7 dias; 6 meses	Abs.	20 seg.	USPHS
ID13	Shaalan et al, 2021	Egito	Contemporary Clinical Dentistry	Vertise™ Flow (Kerr)	Filtek™ Z350XT Flowable (3M)	18 pac. 36 cav.	Classe I	7 dias; 24 meses	Abs.	20 seg.	USPHS

Abreviações: pac – pacientes; cav – cavidades; abs – absoluto; rel – relativo; FDI – World Dental Federation; USPHS – United States Public Health Service.

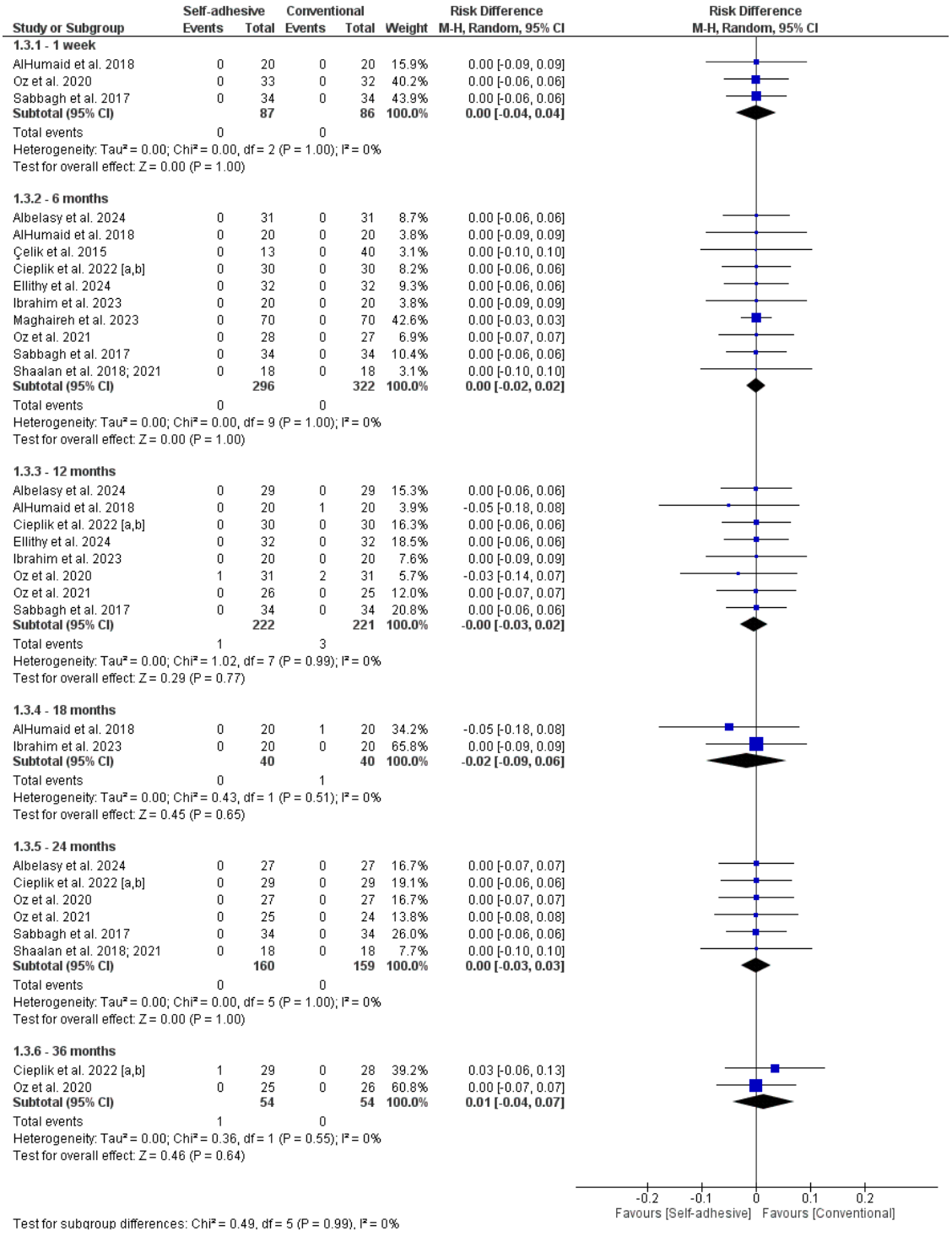
3.3 Meta-análise

Foram observadas falhas em ambos os tipos de RC (convencionais ou bulk-fill e autoadesivas) ao longo do tempo. As falhas foram descritas em três diferentes grupos: falhas estéticas (manchamento marginal e estabilidade de cor); falhas funcionais (fratura/retenção, adaptação marginal e desgaste); e falhas biológicas (sensibilidade pós-operatória e recorrência de cárie, erosão e abrasão).

De modo geral, a meta-análise evidenciou que não houve diferença significativa entre as cavidades restauradas com RC convencional ou bulk-fill e RC autoadesiva, independentemente do desfecho analisado e do período de acompanhamento ($P \geq 0,18$).

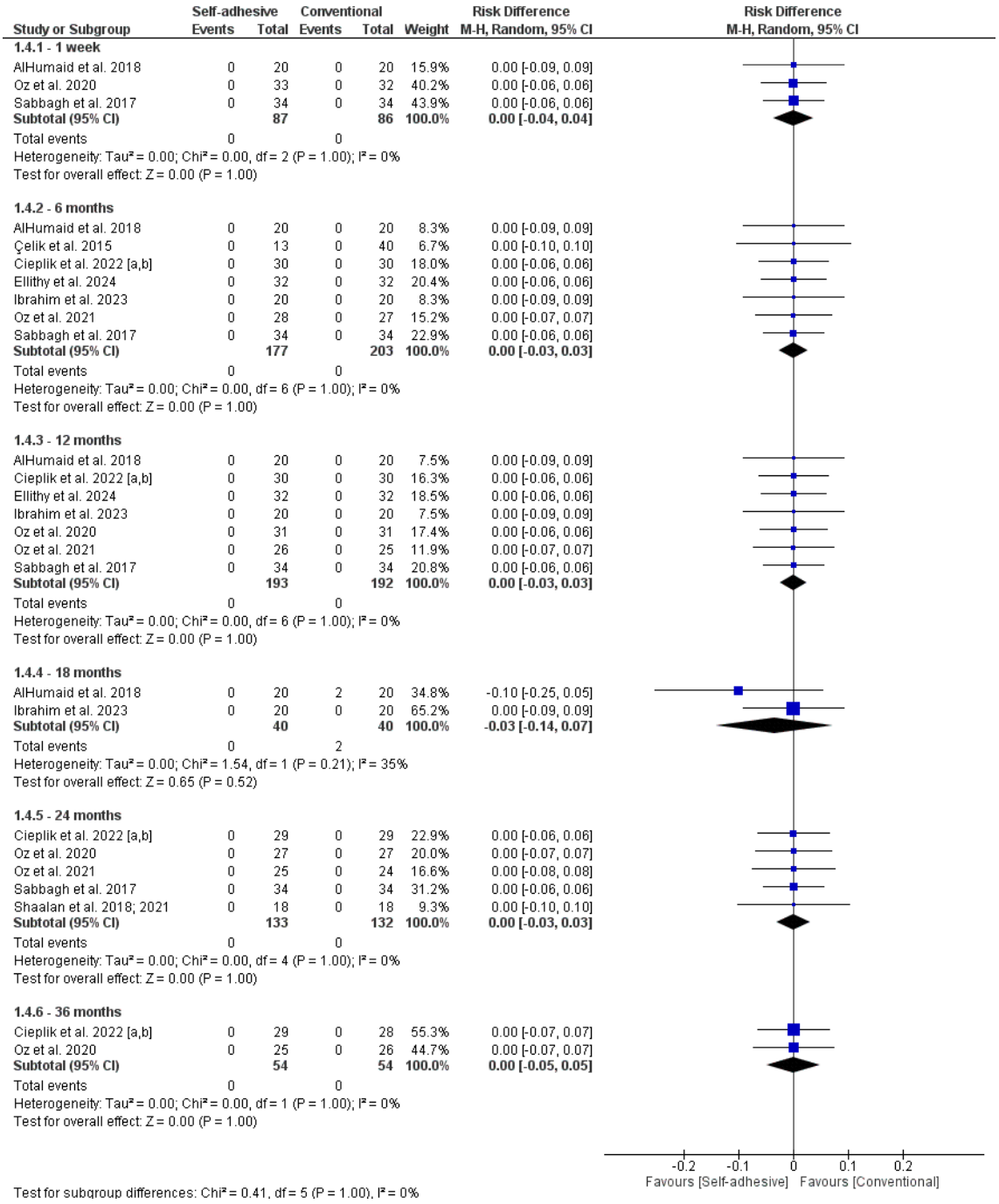
Os resultados da subanálise para manchamento marginal mostraram que não houve diferença significativa entre os materiais ao longo do tempo. Nenhuma falha foi identificada nos períodos de 1 semana, 6 meses e 24 meses ($P = 1,00$; $I^2 = 0\%$). Entretanto, após 12, 18 e 36 meses de acompanhamento, falhas ocorreram para ambos os materiais ($P \geq 0,64$). Especificamente nos períodos de 18 e 36 meses observa-se menor número de estudos e, consequentemente, indivíduos e restaurações avaliadas (Figura 2).

Figura 2. Gráfico de floresta (*forest plot*) da subanálise para o desfecho manchamento marginal de acordo com os diferentes períodos de acompanhamento.



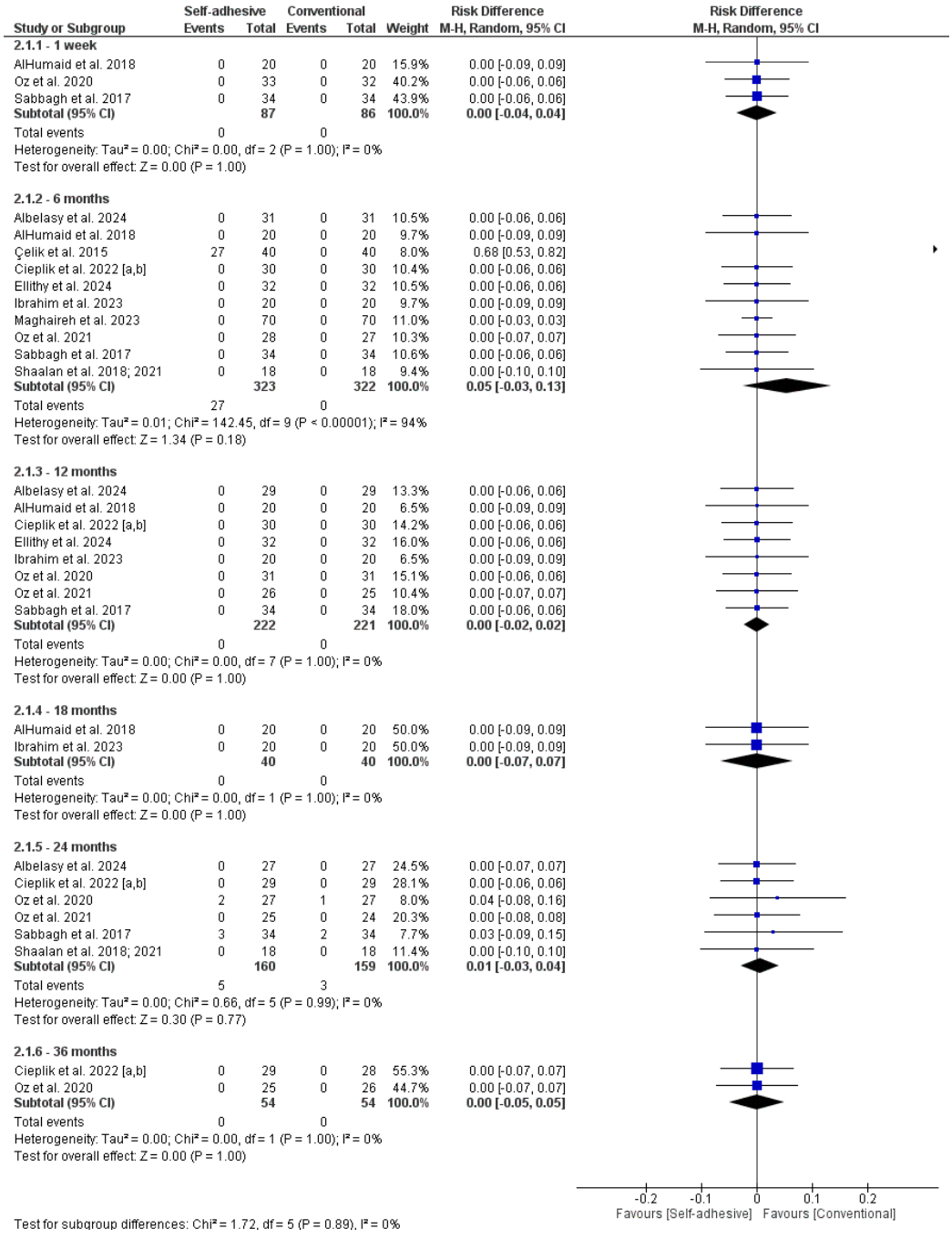
Para a subanálise de estabilidade de cor, foram encontrados resultados semelhantes, com (P=1,00; RR=0,00) na maioria dos períodos de avaliação, exceto após 18 meses (P = 0,52; RR: 0,03; IC: -0,14 – 0,07) (Figura 3).

Figura 3. Gráfico de floresta (*forest plot*) da subanálise para o desfecho estabilidade de cor de acordo com os diferentes períodos de acompanhamento.



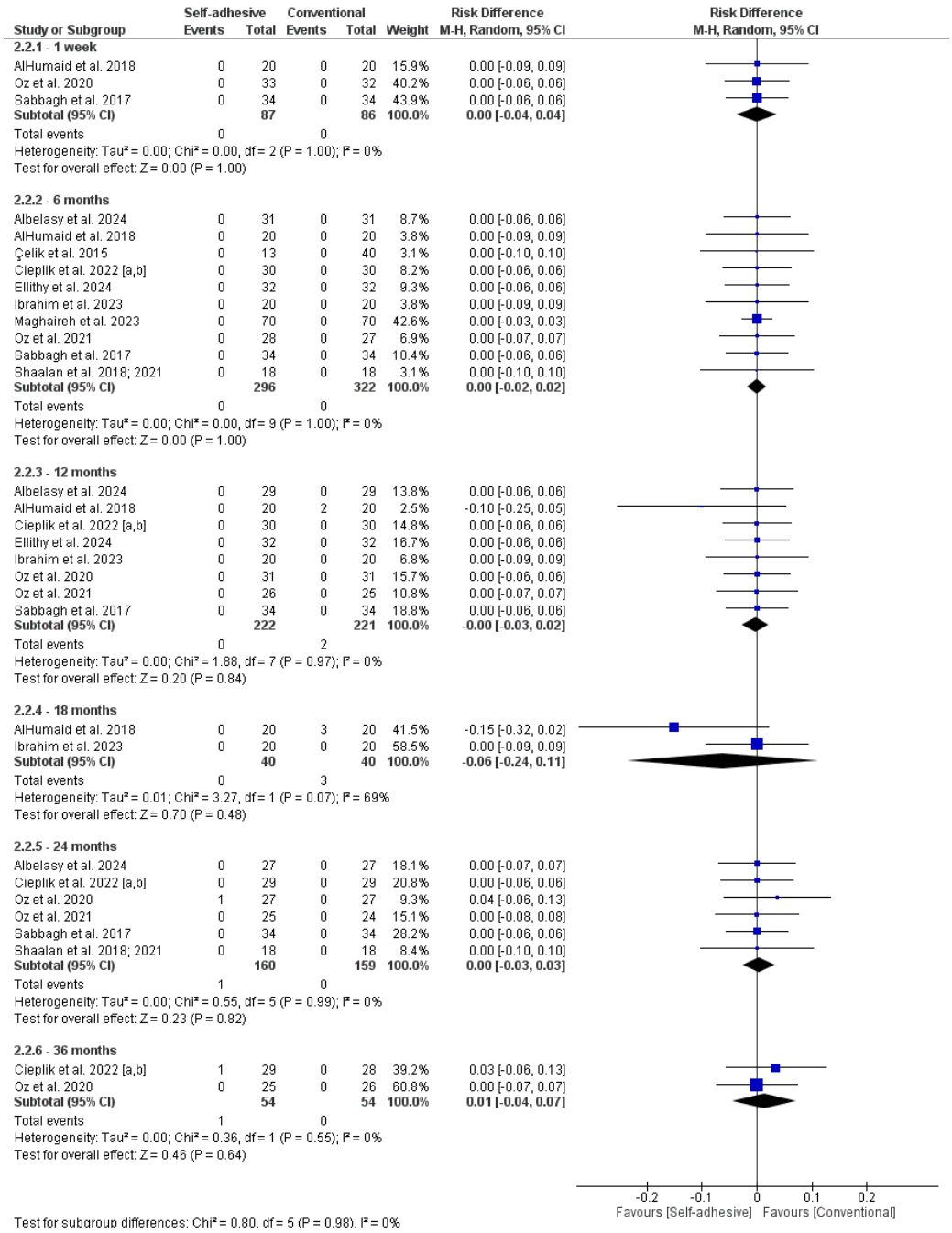
Na subanálise para o desfecho fratura/retenção, não foi observada diferença significativa entre os materiais (P ≥ 0,18). No entanto, após 6 meses de acompanhamento, período no qual maior número de estudos foram comparados, um estudo evidenciou evidenciam grande número de falhas para as RC autoadesivas (27 de 40) (P = 0,18; RR: 0,05; IC: -0,03 a 0,13) (Figura 4).

Figura 4. Gráfico de floresta (*forest plot*) da subanálise para o desfecho fratura/retenção de acordo com os diferentes períodos de acompanhamento.



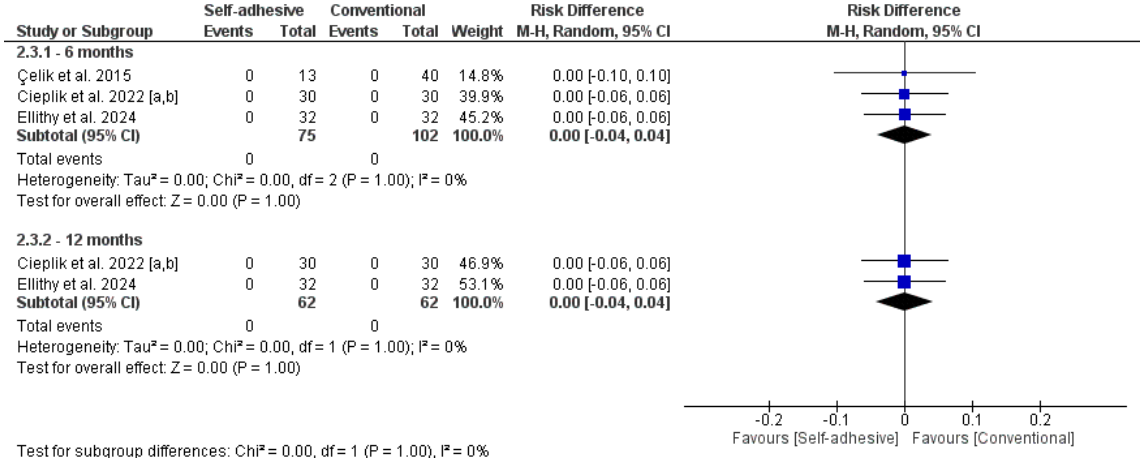
Os resultados para a subanálise adaptação marginal não revelaram diferenças significativas (P ≥ 0,48). Alta heterogeneidade entre os estudos (I^2 = 69%) foi detectada no período de 18 meses (Figura 5).

Figura 5. Gráfico de floresta (*forest plot*) da subanálise para o desfecho adaptação marginal de acordo com os diferentes períodos de acompanhamento.



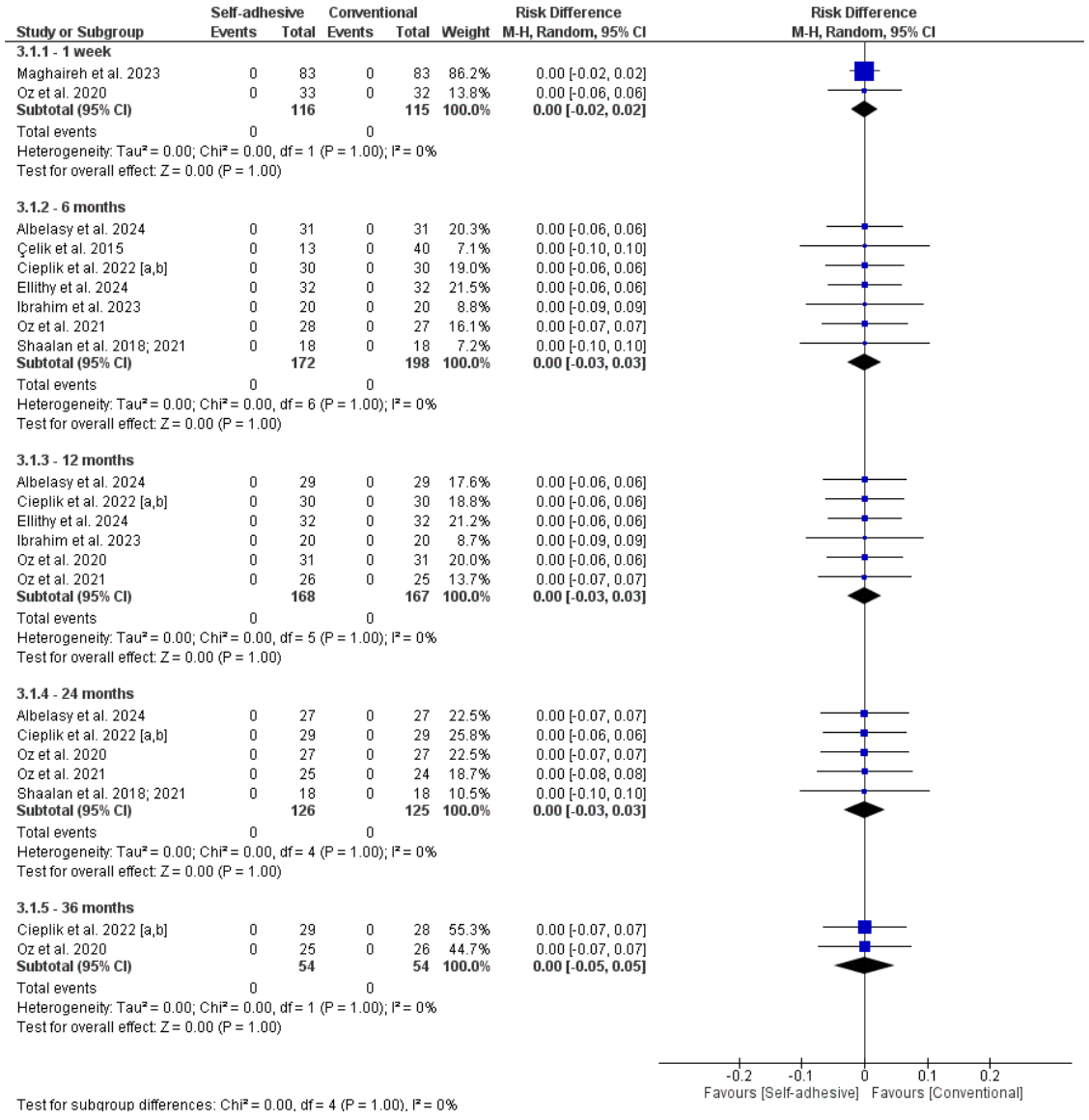
A subanálise para o desfecho desgaste mostrou resultados semelhantes entre os materiais em 6 e 12 meses de acompanhamento (P = 1,00; RR: 0,00; IC: -0,04 a 0,04), com nenhuma falha identificada para ambas as RC (Figura 6).

Figura 6. Gráfico de floresta (*forest plot*) da subanálise para o desfecho desgaste de acordo com os diferentes períodos de acompanhamento.



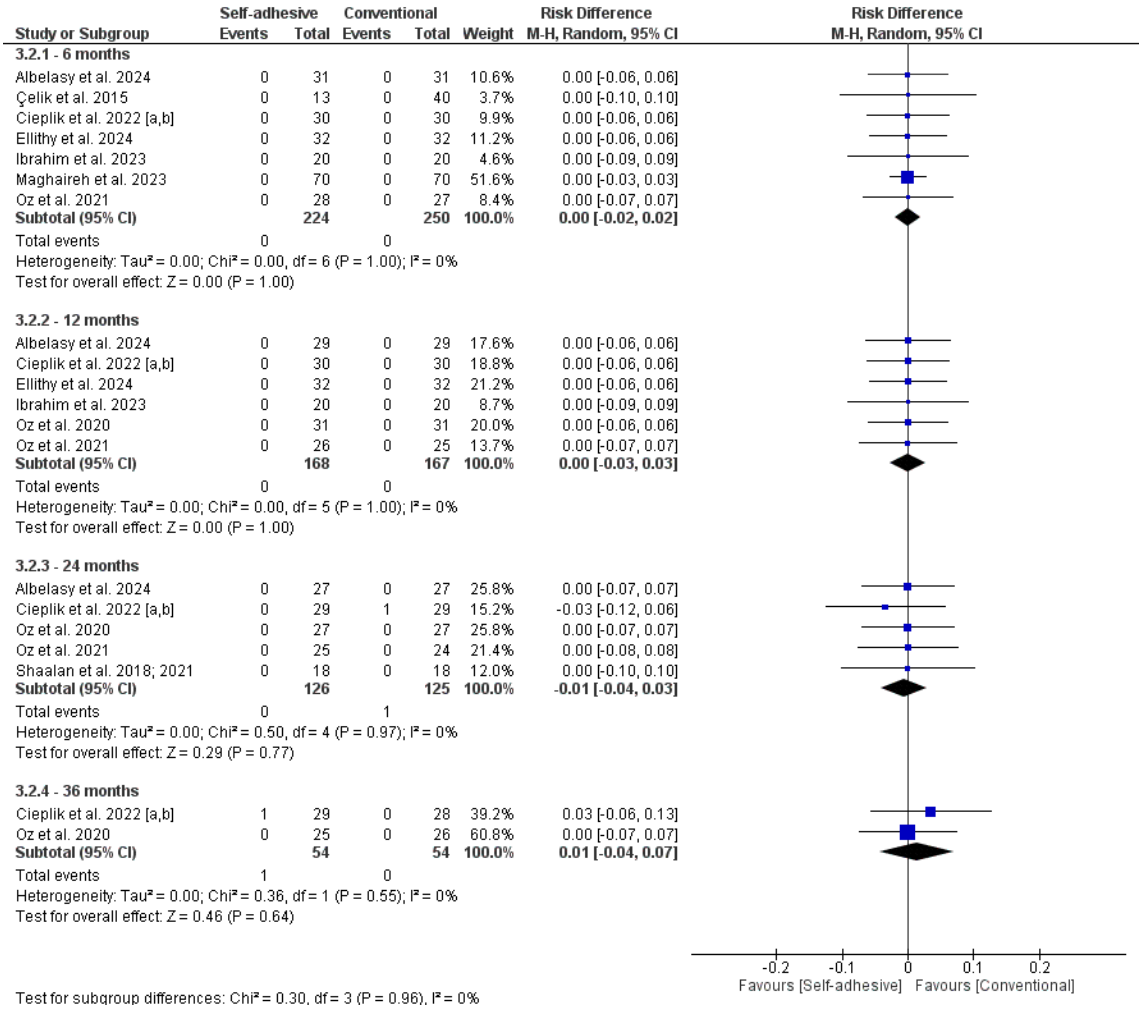
Acerca da sensibilidade pós-operatória, não houve eventos relatados para nenhum dos materiais independentemente do período de acompanhamento avaliado (P = 1,00; RR: 0,00; IC: -0,02 – 0,05) (Figura 7).

Figura 7. Gráfico de floresta (*forest plot*) da subanálise para o desfecho sensibilidade pós-operatória de acordo com os diferentes períodos de acompanhamento.



Por fim, quanto à recorrência de cárie, erosão e abrasão, uma subanálise não mostrou diferença significativa entre RC convencional ou bulk-fill e RC autoadesiva (P ≥ 0,64). No entanto, uma falha foi identificada em 24 meses para a RC convencional (P = 0,77; RR: -0,01; IC: -0,04 – 0,03), e uma falha para a RC autoadesiva em 36 meses (P = 0,64; RR: 0,01; IC: -0,04 a 0,07) (Figura 8).

Figura 8. Gráfico de floresta (*forest plot*) da subanálise para o desfecho recorrência de cárie, erosão e abrasão de acordo com os diferentes períodos de acompanhamento.

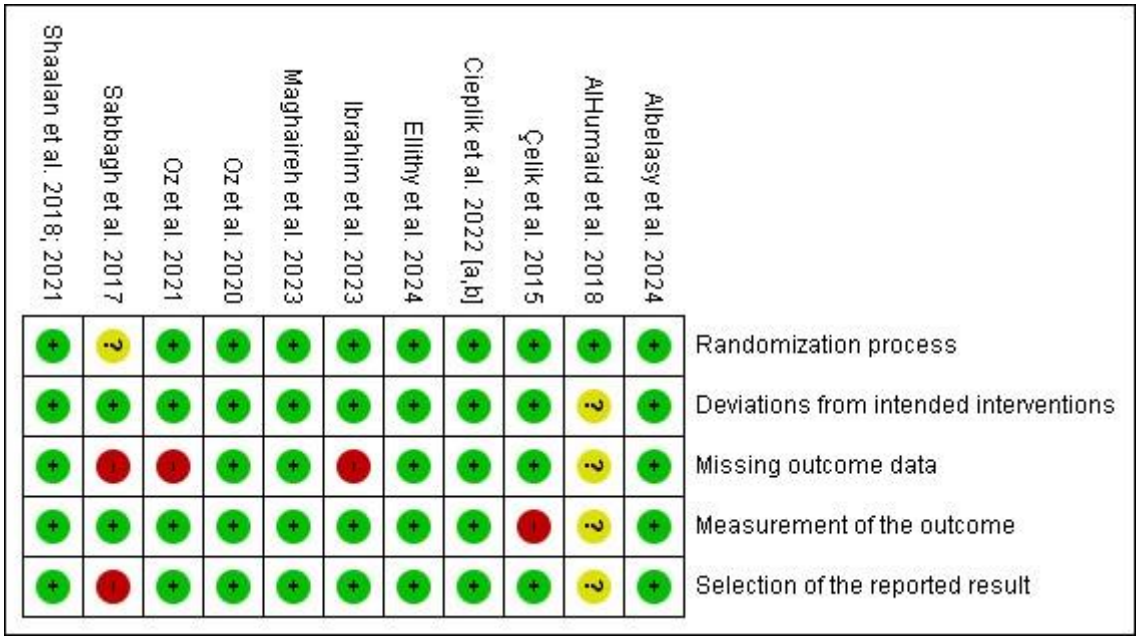


3.4 Análise do risco de viés e da certeza da evidência

A avaliação do risco de viés revelou que a maioria dos ECR possuem baixo risco para as variáveis analisadas (Figuras 9 e 10). Alto risco de viés foi mais frequente no domínio relacionado à falta de dados de resultados [26-28], enquanto baixo risco de viés se fez mais presente nos domínios de processo de randomização e de desvios das intervenções pretendidas (Figuras 9 e 10).

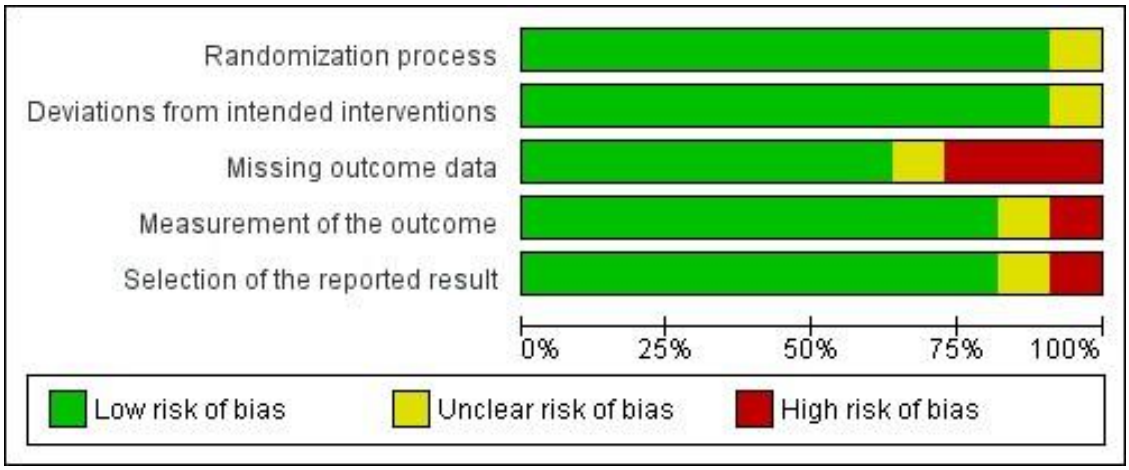
Alguns dos estudos apresentaram todos os domínios com baixo risco de viés [9,13,14,18,29-32]. Entretanto, um ECR foi julgado, em 4 dos 5 domínios analisados, como risco incerto de viés [33].

Figura 9. Avaliação individual do risco de viés dos estudos incluídos de acordo com a ferramenta de colaboração *Revised Cochrane risk-of-bias tool for randomized trials* (RoB 2).



1: viés decorrente do processo de randomização; 2: viés devido a desvios das intervenções pretendidas; 3: viés devido à falta de dados de resultados; 4: viés na mensuração do desfecho; 5: viés no relato dos resultados.

Figura 10. Porcentagem da classificação do risco de viés dos estudos incluídos em cada domínio de acordo com o julgamento dos autores



A tabela 4 apresenta a análise da certeza da evidência de acordo com a ferramenta GRADE para cada um dos desfechos e follow-up avaliados. De modo geral, a certeza da evidência foi considerada baixa para todos os desfechos.

Tabela 4. Análise da certeza de evidência dos artigos incluídos de acordo com a ferramenta GRADE (Grading of Recommendations Assessment, Development and Evaluation).

Desfechos Follow-up	Nº de participantes (estudos)	Certeza da evidência (GRADE)	Efeito relativo (IC 95%)
Manchamento marginal follow-up: 1 semana	173 (3 RCTs)	⊕⊕◯◯ Baixo[c]	**RD 0.00** (-0.04 to 0.04)
Manchamento marginal follow-up: 6 meses	618 (10 ECRs)	⊕⊕◯◯ Baixo[d]	**RD 0.00** (-0.02 to 0.02)
Manchamento marginal follow-up: 12 meses	443 (8 ECRs)	⊕⊕◯◯ Baixo[d]	**RD 0.00** (-0.03 to 0.02)
Manchamento marginal follow-up: 18 meses	80 (2 ECRs)	⊕◯◯◯ Muito baixo[e,f]	**RD -0.02** (-0.09 to 0.06)
Manchamento marginal follow-up: 24 meses	319 (6 ECRs)	⊕⊕◯◯ Baixo[b,c]	**RD 0.00** (-0.03 to 0.03)
Manchamento marginal follow-up: 36 meses	108 (2 ECRs)	⊕⊕◯◯ Baixo[e,g]	**RD 0.01** (-0.04 to 0.07)
Estabilidade de cor follow-up: 1 semana	173 (3 ECRs)	⊕⊕◯◯ Baixo[b,d]	**RD 0.00** (-0.04 to 0.04)
Estabilidade de cor follow-up: 6 meses	380 (7 ECRs)	⊕⊕◯◯ Baixo[b,d]	**RD 0.00** (-0.03 to 0.03)
Estabilidade de cor follow-up: 12 meses	385 (7 ECRs)	⊕⊕◯◯ Baixo[b,d]	**RD 0.00** (-0.03 to 0.03)
Estabilidade de cor follow-up: 18 meses	80 (2 ECRs)	⊕◯◯◯ Muito baixo[e,f]	**RD -0.03** (-0.14 to 0.07)
Estabilidade de cor follow-up: 24 meses	265 (5 ECRs)	⊕⊕◯◯ Baixo[b,c]	**RD 0.00** (-0.03 to 0.03)
Estabilidade de cor follow-up: 36 meses	108 (2 ECRs)	⊕⊕⊕◯ Moderado[e]	**RD 0.00** (-0.05 to 0.05)
Fratura/retenção follow-up: 1 semana	173 (3 ECRs)	⊕⊕◯◯ Baixo[b,d]	**RD 0.00** (-0.04 to 0.04)

Desfechos Follow-up	№ de participantes (estudos)	Certeza da evidência (GRADE)	Efeito relativo (IC 95%)
Fratura/retenção follow-up: 6 meses	645 (10 ECRs)	⊕◯◯◯ Muito baixo[c,h,i]	**RD 0.05** (-0.03 to 0.13)
Fratura/retenção follow-up: 12 meses	443 (8 ECRs)	⊕⊕◯◯ Baixo[b,d]	**RD 0.00** (-0.02 to 0.02)
Fratura/retenção follow-up: 18 meses	80 (2 ECRs)	⊕⊕◯◯ Baixo[b,f]	**RD 0.00** (-0.07 to 0.07)
Fratura/retenção follow-up: 24 meses	319 (6 ECRs)	⊕⊕◯◯ Baixo[b,c]	**RD 0.01** (-0.03 to 0.04)
Fratura/retenção follow-up: 36 meses	108 (2 ECRs)	⊕⊕⊕◯ Moderado[b]	**RD 0.00** (-0.05 to 0.05)
Adaptação marginal follow-up: 1 semana	173 (3 ECRs)	⊕⊕◯◯ Baixo[b,d]	**RD 0.00** (-0.04 to 0.04)
Adaptação marginal follow-up: 6 meses	618 (10 ECRs)	⊕⊕◯◯ Baixo[b,c]	**RD 0.00** (-0.02 to 0.02)
Adaptação marginal follow-up: 12 meses	443 (8 ECRs)	⊕⊕◯◯ Baixo[b,c]	**RD 0.00** (-0.03 to 0.02)
Adaptação marginal follow-up: 18 meses	80 (2 ECRs)	⊕◯◯◯ Muito baixo[b,f,j]	**RD -0.06** (-0.24 to 0.11)
Adaptação marginal follow-up: 24 meses	283 (6 ECRs)	⊕⊕◯◯ Baixo[b,c]	**RD 0.00** (-0.03 to 0.03)
Adaptação marginal follow-up: 36 meses	108 (2 ECRs)	⊕⊕◯◯ Baixo[b,g]	**RD 0.01** (-0.04 to 0.07)
Desgaste follow-up: 6 meses	177 (3 ECRs)	⊕⊕◯◯ Baixo[b,c]	**RD 0.00** (-0.04 to 0.04)
Desgaste follow-up: 12 meses	124 (2 ECRs)	⊕⊕⊕◯ Moderado[b]	**RD 0.00** (-0.04 to 0.04)
Sensibilidade pós-operatória follow-up: 1 semana	231 (2 ECRs)	⊕⊕⊕◯ Moderado[b]	**RD 0.00** (-0.02 to 0.02)
Sensibilidade pós-operatória follow-up: 6 meses	370 (7 ECRs)	⊕⊕◯◯ Baixo[b,c]	**RD 0.00** (-0.03 to 0.03)

Desfechos Follow-up	№ de participantes (estudos)	Certeza da evidência (GRADE)	Efeito relativo (IC 95%)
Sensibilidade pós-operatória follow-up: 12 meses	335 (6 ECRs)	⊕⊕◯◯ Baixo[b,c]	**RD 0.00** (-0.03 to 0.03)
Sensibilidade pós-operatória follow-up: 24 meses	251 (5 ECRs)	⊕⊕◯◯ Baixo[b,c]	**RD 0.00** (-0.03 to 0.03)
Sensibilidade pós-operatória follow-up: 36 meses	108 (2 ECRs)	⊕⊕⊕◯ Moderado[b]	**RD 0.00** (-0.05 to 0.05)
Recorrência de cárie, erosão, abrasão follow-up: 6 meses	474 (7 ECRs)	⊕⊕◯◯ Baixo[b,c]	**RD 0.00** (-0.02 to 0.02)
Recorrência de cárie, erosão, abrasão follow-up: 12 meses	335 (6 ECRs)	⊕⊕◯◯ Baixo[b,c]	**RD 0.00** (-0.03 to 0.03)
Recorrência de cárie, erosão, abrasão follow-up: 24 meses	251 (5 ECRs)	⊕⊕◯◯ Baixo[b,c]	**RD -0.01** (-0.04 to 0.03)
Recorrência de cárie, erosão, abrasão follow-up: 36 meses	108 (2 ECRs)	⊕⊕◯◯ Baixo[b,g]	**RD 0.01** (-0.04 to 0.07)

Abreviações: ECR – ensaio clínico randomizado; IC – intervalo de confiança.

4 DISCUSSÃO

Os resultados da meta-análise evidenciaram que o desempenho clínico das RC autoadesivas foi comparável às RC convencionais ou bulk-fill, independentemente do período de acompanhamento avaliado.

Dentre os critérios utilizados para avaliar clinicamente o desempenho e eficácia de um tratamento restaurador, o critério FDI (World Dental Federation) e USPHS (United States Public Health Service) são os mais utilizados. Entretanto, o critério FDI é reconhecido por sua sensibilidade em identificar falhas de restaurações, sendo considerado mais adequado que o critério USPHS e tendo seu uso encorajado em estudos atuais [34].

De modo geral, o critério FDI avalia as restaurações em relação a 16 parâmetros, enquanto o USPHS o faz em relação a 8. No entanto, em ambos os critérios, a avaliação de todos estes parâmetros não é obrigatória, sendo possível a seleção de alguns a depender da necessidade do estudo [34]. Para

esta revisão, foram selecionados os 7 parâmetros mais apropriados e significativos para avaliar o desempenho clínico de uma restauração, sendo eles: manchamento marginal, estabilidade de cor, fratura/retenção, adaptação marginal, desgaste, sensibilidade pós-operatória e recorrência de cárie, erosão e abrasão. Possíveis falhas em tais parâmetros podem predizer falha de adesão do material restaurador à estrutura dentária e comprometem significativamente a qualidade da restauração, podendo culminar na necessidade de substituição da mesma [19].

Embora a execução de ensaios clínicos exija certa robustez metodológica e elevados custos financeiros, o período de acompanhamento avaliado é extremamente relevante para inferir a longevidade dos materiais/tratamentos. Nesta revisão sistemática, apenas um estudo ultrapassou o período de acompanhamento de 2 anos, com 5 anos de follow-up [18], e isso deve ser considerado como uma limitação. Este mesmo estudo demonstrou desempenho clínico semelhante entre RC autoadesiva e RC convencional após 60 meses de acompanhamento em cavidades Classe I minimamente invasivas, o que está de acordo com outros estudos que analisaram este tipo de cavidade [9,26-29,31].

Entretanto, um outro estudo [19] revelou desempenho clinicamente inaceitável da RC autoadesiva em lesões cervicais não cariosas após 6 meses da acompanhamento, levando à conclusão de que o tipo e localização da cavidade exercem influência sobre o sucesso da restauração, de modo que as formas macromecânicas de retenção podem ter melhorado o desempenho geral das RC autoadesivas [26], como em cavidades de classe I, enquanto que em lesões de classe V, o insucesso clínico das restaurações pode estar relacionado à falta de macroretenção mecânica e ligação fraca devido à instabilidade hidrolítica do monômero funcional (4-MET) e à menor capacidade de condicionamento da própria RC autoadesiva [19,26]. Ao mesmo tempo que, um estudo demonstrou que não houve diferenças significativas entre o desempenho clínico de uma RC autoadesiva fluida e uma RC convencional fluida para restaurações anteriores de Classe V durante um período de 18 meses [33]. Vale ressaltar que a grande maioria dos estudos avaliaram cavidades retentivas, Classe I (O) e pequenas Classes II [13,14,30-32], o que impede a validação da união da RC autoadesiva à estrutura dentária, uma vez que materiais restauradores sem características de união a esmalte e dentina apresentam

adequada retenção nesses tipos de cavidades [35]. Desta forma, mais estudos que avaliem cavidades não-retentivas são necessários para ratificar a adequada união da RC autoadesiva, visto que estudos prévios laboratoriais demonstraram inadequada resistência de união à estrutura dentária [15].

Nos estudos clínicos foram observadas falhas da RC autoadesiva em relação à adaptação marginal e descoloração marginal ao longo do tempo em comparação aos resultados imediatamente após a realização da restauração (*baseline*). Tal resultado pode ser explicado pelo fato de que a RC autoadesiva na sua forma fluida Vertise™ Flow (Kerr) com o monômero ácido GPDM, Fusio™ Liquid Dentin (Pentron) com o monômero 4-MET, Constic (DMG) com o monômero dihidrogenofosfato de etacrloxidecil (MDP), ou na forma bulk fill SABF (3M Oral Care) com metacrilato funcionalizado com ácido fosfórico e Surefil One™ (Dentsply Sirona) com o monômero bifuncional acrilato (BADEP) e ácido acrílico, é vulnerável à hidrólise devido à sorção adicional de água na interface entre a matriz resinosa e a partícula de carga, o que pode aumentar a degradação do material no ambiente bucal [9,13,14,26,31].

A alteração de cor da RC ao longo do tempo é de origem multifatorial, sendo dependente do tamanho e da distribuição das partículas de carga. Neste sentido, quanto maior o tamanho da partícula de carga da RC, maior a susceptibilidade do material à alteração de cor devido à hidrólise na interface carga-matriz [24]. Ademais, partículas nanométricas de sílica amorfa e partículas de vidro presentes na RC autoadesiva podem tornar sua superfície mais lisa, proporcionando um melhor acabamento após o polimento [33]. No entanto, foram observadas propriedades estéticas significativamente superiores de uma RC bulk-fill convencional em comparação a uma RC autoadesiva devido à ligeira degradação na interface adesiva, levando a pequenas imperfeições, fendas e acúmulo de pigmentos no interior das deficiências marginais [13,14].

O manchamento marginal de restaurações pode indicar inadequado selamento marginal e vias de acesso de fluídos orais e microrganismos no interior da interface adesiva. Uma das razões para o manchamento marginal em restaurações com RC autoadesiva pode estar relacionada a própria ausência de condicionamento com ácido fosfórico e aplicação de sistema adesivo na estrutura dentária [30], resultando em uma adesão mais fraca e em presença de

microfendas na interface dente/restauração, levando à maior susceptibilidade de manchamento marginal [36].

Em relação à sensibilidade pós-operatória, foi demonstrado que cavidades restauradas com RC autoadesiva exibiram resposta semelhante àquelas restauradas com RC convencional associada à sistemas adesivos autocondicionantes e convencionais [6, 25]. De modo geral, a sensibilidade pós operatória foi relatada em períodos de acompanhamento mais curtos, e desaparecendo ao longo do tempo.

Algumas limitações devem ser ponderadas nesta revisão sistemática. Fatores como a heterogeneidade nas características das cavidades a serem restauradas, os diferentes períodos de acompanhamento e a variação de marcas comerciais dos produtos podem influenciar as comparações inter-estudos. Portanto, recomenda-se a realização de novos ensaios clínicos randomizados bem conduzidos que limitem as variáveis de confusão dos resultados e com períodos de acompanhamento mais longos para que se tenha a confirmação dos resultados encontrados nesta revisão.

Por fim, a RC autoadesiva se mostra como um material restaurador promissor, podendo ser de grande valia para situações específicas, como atendimentos em odontopediatria ou para pacientes com necessidades especiais, onde existe uma maior dificuldade em relação ao manejo dos mesmos e a necessidade de menor tempo clínico e técnica restauradora menos sensível. Ademais, a RC autoadesiva pode ser uma opção viável para a restauração de cavidades conservadoras e com maior retenção mecânica. No entanto, é recomendável maior cautela quando da sua indicação em cavidades extensas de classe II ou classe V, onde precisa-se de uma ótima adaptação e adesividade do material.

5 CONCLUSÃO

Considerando as limitações desta revisão sistemática e meta-análise, conclui-se que o desempenho clínico de restaurações com RC autoadesivas é comparável ao de RC convencionais ou bulk-fill, independentemente do período de acompanhamento, tipo e localização da cavidade e critério avaliado. No entanto, ambos os materiais apresentaram degradação/falha ao longo do tempo. A certeza de evidência foi considerada baixa na maioria dos critérios avaliados,

indicando a necessidade de estudos clínicos bem conduzidos, com períodos de acompanhamento mais longos, a fim de validar os resultados desta revisão sistemática.

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We advise you to read our policy on conflict of interest statements, funding source declarations, author agreements/declarations and permission notes.

Funding sources

Authors must disclose any funding sources who provided financial support for the conduct of the research and/or preparation of the article. The role of sponsors, if any, should be declared in relation to the study design, collection, analysis and interpretation of data, writing of the report and decision to submit the article for publication. If funding sources had no such involvement this should be stated in your submission.

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants, scholarships and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, it is recommended to include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of generative AI in scientific writing

Authors must declare the use of generative AI in scientific writing upon submission of the paper. The following guidance refers only to the writing process, and not to the use of AI tools to analyse and draw insights from data as part of the research process:

- Generative AI and AI-assisted technologies should only be used in the writing process to improve the readability and language of the manuscript.
- The technology must be applied with human oversight and control and authors should carefully review and edit the result, as AI can generate authoritative-sounding output that can be incorrect, incomplete or biased. Authors are ultimately responsible and accountable for the contents of the work.
- Authors must not list or cite AI and AI-assisted technologies as an author or co-author on the manuscript since authorship implies responsibilities and tasks that can only be attributed to and performed by humans.

The use of generative AI and AI-assisted technologies in scientific writing must be declared by adding a statement at the end of the manuscript when the paper is first submitted. The statement will appear in the published work and should be placed in a new section before the references list. An example:

- Title of new section: Declaration of generative AI and AI-assisted technologies in the writing process.
- Statement: During the preparation of this work the author(s) used [NAME TOOL / SERVICE] in order to [REASON]. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the published article.

The declaration does not apply to the use of basic tools, such as tools used to check grammar, spelling and references. If you have nothing to disclose, you do not need to add a statement.

Please read Elsevier's author policy on the use of generative AI and AI-assisted technologies, which can be found in our GenAI Policies for journals.

Please note: to protect authors' rights and the confidentiality of their research, this journal does not currently allow the use of generative AI or AI-assisted technologies such as ChatGPT or similar services by reviewers or editors in the peer review and manuscript evaluation process, as is stated in our GenAI Policies for journals. We are actively evaluating compliant AI tools and may revise this policy in the future.

Preprints

Preprint sharing

Authors may share preprints in line with Elsevier's article sharing policy. Sharing preprints, such as on a preprint server, will not count as prior publication.

We advise you to read our policy on multiple, redundant or concurrent publication.

Use of inclusive language

Inclusive language acknowledges diversity, conveys respect to all people, is sensitive to differences, and promotes equal opportunities. Authors should ensure their work uses inclusive language throughout and contains nothing which might imply one individual is superior to another on the grounds of:

- age
- gender
- race
- ethnicity
- culture
- sexual orientation
- disability or health condition

We recommend avoiding the use of descriptors about personal attributes unless they are relevant and valid. Write for gender neutrality with the use of plural nouns ("clinicians, patients/clients") as default. Wherever possible, avoid using "he, she," or "he/she."

No assumptions should be made about the beliefs of readers and writing should be free from bias, stereotypes, slang, reference to dominant culture and/or cultural assumptions.

These guidelines are meant as a point of reference to help you identify appropriate language but are by no means exhaustive or definitive.

Reporting sex- and gender-based analyses

There is no single, universally agreed-upon set of guidelines for defining sex and gender. We offer the following guidance:

- Sex and gender-based analyses (SGBA) should be integrated into research design when research involves or pertains to humans, animals or eukaryotic cells. This should be done in accordance with any requirements set by funders or sponsors and best practices within a field.
- Sex and/or gender dimensions of the research should be addressed within the article or declared as a limitation to the generalizability of the research.
- Definitions of sex and/or gender applied should be explicitly stated to enhance the precision, rigor and reproducibility of the research and to avoid ambiguity or conflation of terms and the constructs to which they refer.

We advise you to read the Sex and Gender Equity in Research (SAGER) guidelines and the SAGER checklist (PDF) on the EASE website, which offer systematic approaches to the use of sex and gender information in study design, data analysis, outcome reporting and research interpretation.

For further information we suggest reading the rationale behind and recommended use of the SAGER guidelines.

Definitions of sex and/or gender

We ask authors to define how sex and gender have been used in their research and publication. Some guidance:

- Sex generally refers to a set of biological attributes that are associated with physical and physiological features such as chromosomal genotype, hormonal levels, internal and external anatomy. A binary sex categorization (male/female) is usually designated at birth ("sex assigned at birth") and is in most cases based solely on the visible external anatomy of a newborn. In reality, sex categorizations include people who are intersex/have differences of sex development (DSD).

- Gender generally refers to socially constructed roles, behaviors and identities of women, men and gender-diverse people that occur in a historical and cultural context and may vary across societies and over time. Gender influences how people view themselves and each other, how they behave and interact and how power is distributed in society.

Image manipulation

We accept that authors sometimes need to enhance images for clarity but any manipulation of images for the purpose of deception or fraud will be seen as scientific ethical abuse and will be dealt with accordingly.

Authors must adhere to this journal's policy for graphical images:

- No specific feature within an image may be enhanced, obscured, moved, removed or introduced.

- Adjustments of brightness, contrast, or color balance are acceptable if, and only as long as, they do not obscure or eliminate any information present in the original image.

- Nonlinear adjustments such as changes to gamma settings must be disclosed in the figure legend.

- We do not permit the use of generative AI or AI-assisted tools to create or alter images in submitted manuscripts. Please read our policy on the use of generative AI and AI-assisted tools in figures, images and artwork, which can be found in Elsevier's GenAI Policies for Journals.

To verify compliance with the above, this journal may send your images to a third-party service who screen for image irregularities. Our editors may ask you to provide original data or images if any questions arise as a result of the screening. The final decision as to whether images are acceptable will be taken by our editors.

Authors are encouraged to carefully check all images before submission and to connect all the data in any figures to the original, unprocessed data.

Jurisdictional claims

Elsevier respects the decisions taken by its authors as to how they choose to designate territories and identify their affiliations in their published content. Elsevier's policy is to take a neutral position with respect to territorial disputes or jurisdictional claims, including, but not limited to, maps and institutional affiliations. For journals that Elsevier publishes on behalf of a third party owner, the owner may set its own policy on these issues.

- Maps: Readers should be able to locate any study areas shown within maps using common mapping platforms. Maps should only show the area actually studied and authors should not include a location map which displays a larger area than the bounding box of the study area. Authors should add a note clearly stating that "*map lines delineate study areas and do not necessarily depict accepted national boundaries*". During the review process, Elsevier's editors may request authors to change maps if these guidelines are not followed.

- Institutional affiliations: Authors should use either the full, standard title of their institution or the standard abbreviation of the institutional name so that the institutional name can be independently verified for research integrity purposes.

Studies in humans and animals

Authors must follow ethical guidelines for studies carried out in humans and animals.

Studies in humans

Work which involves the use of human subjects should be carried out in accordance with the World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects.

Manuscripts should follow the International Committee of Medical Journal Editors (ICMJE) recommendations for the conduct, reporting, editing and publication of scholarly work in medical journals and aim to be representative of human populations in terms of sex, age and ethnicity. Sex and gender terms should be used correctly, as outlined by WHO (World Health Organization).

Manuscripts must include a statement that all procedures were performed in compliance with relevant laws and institutional guidelines and have been approved by the appropriate institutional committee(s). The statement should contain the date and reference number of the ethical approval(s) obtained.

Manuscripts must also include a statement that the privacy rights of human subjects have been observed and that informed consent was obtained for experimentation with human subjects.

This journal will not accept manuscripts that contain data derived from unethically sourced organs or tissue, including from executed prisoners or prisoners of conscience, consistent with recommendations by Global Rights Compliance on Mitigating Human Rights Risks in Transplantation Medicine. For all studies that use human organs or tissues, sufficient evidence must be provided that these were procured in line with WHO Guiding Principles on Human Cell, Tissue and Organ Transplantation. The source of the organs or tissues used in clinical research must be transparent and traceable. If your manuscript describes organ transplantation you must additionally declare within the manuscript that:

- autonomous consent free from coercion was obtained from the donor(s) or their next of kin.
- organs and/or tissues were not sourced from executed prisoners or prisoners of conscience.

Studies in animals

All animal experiments should comply with ARRIVE (Animal Research: Reporting of In Vivo Experiments) guidelines.

Studies should be carried out in accordance with Guidance on the operation of the Animals (Scientific Procedures) Act 1986 and associated guidelines, EU Directive 2010/63 for the protection of animals used for scientific purposes or the NIH (National Research Council) Guide for the Care and Use of Laboratory Animals (PDF) or those of an equivalent internationally recognized body.

The sex of animals, and where appropriate, the influence (or association) of sex on the results of the study must be indicated and a statement included in your manuscript that such guidelines as listed above have been followed.

Registration of clinical trials

Clinical trials must be registered in a public trials registry in accordance with International Committee of Medical Journal Editors (ICMJE) clinical trials guidelines and as a condition of publication in this journal.Purely observational studies, in which the assignment of the medical intervention is not at the discretion of the investigator, do not require registration.

Some key excerpts from the guidelines include:

- Trials must be registered at or before the onset of patient enrolment.
- The clinical trial registration number should be included at the end of the article abstract.
- A clinical trial is defined as any research study that prospectively assigns human participants, or groups of humans, to one or more health-related interventions to evaluate the effects of health outcomes.
- Health-related interventions include any intervention used to modify a biomedical or health-related outcome such as drugs, surgical procedures, devices, behavioural treatments, dietary interventions,

and process-of-care changes.
- Health outcomes include any biomedical or health-related measures obtained in patients or participants, including pharmacokinetic measures and adverse events.

Reporting on clinical trials

We recommend that authors follow CONSORT guidelines when presenting randomized controlled trials.

Authors must provide the CONSORT checklist at manuscript submission with an accompanying flow diagram illustrating the progress of patients through the trial, including recruitment, enrolment, randomization, withdrawal, completion and a description of the randomization procedure.

The equator network has guidelines covering CONSORT:

- Read the CONSORT guidelines.
- Follow the CONSORT checklist.

Clinical trial results

Authors must disclose all posting in registries of results of the same or closely related work.

We follow the International Committee of Medical Journal Editors (ICMJE) clinical trials guidelines. Editors will not consider results to be a prior publication if they have already been posted in the same clinical trials registry in which primary registration resides, as long as the results are presented in the form of a brief structured abstract (fewer than 500 words) or table.

Disclosing results in other circumstances, such as in an investors' meeting, for example, is discouraged and may jeopardise consideration of your manuscript by this journal.

Writing and formatting

File format

We ask you to provide editable source files for your entire submission (including figures, tables and text graphics). Some guidelines:

- Save files in an editable format, using the extension .doc/.docx for Word files and .tex for LaTeX files. A PDF is not an acceptable source file.
- Lay out text in a single-column format.
- Use spell-check and grammar-check functions to avoid errors.

We advise you to read our Step-by-step guide to publishing with Elsevier.

Double anonymized peer review

This journal follows a double anonymized review process which means author identities are concealed from reviewers and vice versa.To facilitate the double anonymized review process, we ask that you provide your title page (including author details) and anonymized manuscript (excluding author details) separately in your submission.

The title page should include:

- Article title
- Author name(s)
- Affiliation(s)
- Acknowledgements
- Declaration of Interest statement

- Corresponding author address (full address is required)
- Corresponding author email address

The anonymized manuscript should contain the main body of your paper including:

- References
- Figures
- Tables

It is important that your anonymized manuscript does not contain any identifying information such as author names or affiliations.

Read more about peer review.

Title page

You are required to include the following details in the title page information:

- Article title. Article titles should be concise and informative. Please avoid abbreviations and formulae, where possible, unless they are established and widely understood, e.g., DNA).
- Author names. Provide the given name(s) and family name(s) of each author. The order of authors should match the order in the submission system. Carefully check that all names are accurately spelled. If needed, you can add your name between parentheses in your own script after the English transliteration.
- Affiliations. Add affiliation addresses, referring to where the work was carried out, below the author names. Indicate affiliations using a lower-case superscript letter immediately after the author's name and in front of the corresponding address. Ensure that you provide the full postal address of each affiliation, including the country name and, if available, the email address of each author.
- Corresponding author. Clearly indicate who will handle correspondence for your article at all stages of the refereeing and publication process and also post-publication. This responsibility includes answering any future queries about your results, data, methodology and materials. It is important that the email address and contact details of your corresponding author are kept up to date during the submission and publication process.
- Present/permanent address. If an author has moved since the work described in your article was carried out, or the author was visiting during that time, a "present address" (or "permanent address") can be indicated by a footnote to the author's name. The address where the author carried out the work must be retained as their main affiliation address. Use superscript Arabic numerals for such footnotes.

Abstract

You are required to provide a concise and factual abstract which does not exceed 250 words. The abstract should briefly state the purpose of your research, principal results and major conclusions. Some guidelines:

- Abstracts must be able to stand alone as abstracts are often presented separately from the article.
- Avoid references. If any are essential to include, ensure that you cite the author(s) and year(s).
- Avoid non-standard or uncommon abbreviations. If any are essential to include, ensure they are defined within your abstract at first mention.

Keywords

You are required to provide 1 to 7 keywords for indexing purposes. Keywords should be written in English. Please try to avoid keywords consisting of multiple words (using "and" or "of").

We recommend that you only use abbreviations in keywords if they are firmly established in the field.

Highlights

You are encouraged to provide article highlights at submission.

Highlights are a short collection of bullet points that should capture the novel results of your research as well as any new methods used during your study. Highlights will help increase the discoverability of your article via search engines. Some guidelines:

- Submit highlights as a separate editable file in the online submission system with the word "highlights" included in the file name.
- Highlights should consist of 3 to 5 bullet points, each a maximum of 85 characters, including spaces.

We encourage you to view example article highlights and read about the benefits of their inclusion.

Graphical abstract

You are encouraged to provide a graphical abstract at submission.

The graphical abstract should summarize the contents of your article in a concise, pictorial form which is designed to capture the attention of a wide readership. A graphical abstract will help draw more attention to your online article and support readers in digesting your research. Some guidelines:

- Submit your graphical abstract as a separate file in the online submission system.
- Ensure the image is a minimum of 531 x 1328 pixels (h x w) or proportionally more and is readable at a size of 5 x 13 cm using a regular screen resolution of 96 dpi.
- Our preferred file types for graphical abstracts are TIFF, EPS, PDF or MS Office files.

We encourage you to view example graphical abstracts and read about the benefits of including them.

Tables

Tables must be submitted as editable text, not as images. Some guidelines:

- Place tables next to the relevant text or on a separate page(s) at the end of your article.
- Cite all tables in the manuscript text.
- Number tables consecutively according to their appearance in the text.
- Please provide captions along with the tables.
- Place any table notes below the table body.
- Avoid vertical rules and shading within table cells.

We recommend that you use tables sparingly, ensuring that any data presented in tables is not duplicating results described elsewhere in the article.

Figures, images and artwork

Figures, images, artwork, diagrams and other graphical media must be supplied as separate files along with the manuscript. We recommend that you read our detailed artwork and media instructions. Some excerpts:

When submitting artwork:

- Cite all images in the manuscript text.
- Number images according to the sequence they appear within your article.

- Submit each image as a separate file using a logical naming convention for your files (for example, Figure_1, Figure_2 etc).
- Please provide captions for all figures, images, and artwork.
- Text graphics may be embedded in the text at the appropriate position. If you are working with LaTeX, text graphics may also be embedded in the file.

Artwork formats

When your artwork is finalized, "save as" or convert your electronic artwork to the formats listed below taking into account the given resolution requirements for line drawings, halftones, and line/halftone combinations:

- Vector drawings: Save as EPS or PDF files embedding the font or saving the text as "graphics."
- Color or grayscale photographs (halftones): Save as TIFF, JPG or PNG files using a minimum of 300 dpi (for single column: min. 1063 pixels, full page width: 2244 pixels).
- Bitmapped line drawings: Save as TIFF, JPG or PNG files using a minimum of 1000 dpi (for single column: min. 3543 pixels, full page width: 7480 pixels).
- Combinations bitmapped line/halftones (color or grayscale): Save as TIFF, JPG or PNG files using a minimum of 500 dpi (for single column: min. 1772 pixels, full page width: 3740 pixels).

Please do not submit:

- files that are too low in resolution (for example, files optimized for screen use such as GIF, BMP, PICT or WPG files).
- disproportionally large images compared to font size, as text may become unreadable.

Figure captions

All images must have a caption. A caption should consist of a brief title (not displayed on the figure itself) and a description of the image. We advise you to keep the amount of text in any image to a minimum, though any symbols and abbreviations used should be explained.

Provide captions in a separate file.

Color artwork

If you submit usable color figures with your accepted article, we will ensure that they appear in color online.

Please ensure that color images are accessible to all, including those with impaired color vision. Learn more about color and web accessibility.

For articles appearing in print, you will be sent information on costs to reproduce color in the printed version, after your accepted article has been sent to production. At this stage, please indicate if your preference is to have color only in the online version of your article or also in the printed version.

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Please read our policy on the use of generative AI and AI-assisted tools in figures, images and artwork, which can be found in Elsevier's GenAI Policies for Journals. This policy states:

- We do not permit the use of Generative AI or AI-assisted tools to create or alter images in submitted manuscripts.
- The only exception is if the use of AI or AI-assisted tools is part of the research design or methods (for example, in the field of biomedical imaging). If this is the case, such use must be described in a reproducible manner in the methods section, including the name of the model or tool, version and extension numbers, and manufacturer.

- The use of generative AI or AI-assisted tools in the production of artwork such as for graphical abstracts is not permitted. The use of generative AI in the production of cover art may in some cases be allowed, if the author obtains prior permission from the journal editor and publisher, can demonstrate that all necessary rights have been cleared for the use of the relevant material, and ensures that there is correct content attribution.

Supplementary material

We encourage the use of supplementary materials such as applications, images and sound clips to enhance research. Some guidelines:

- Cite all supplementary files in the manuscript text.
- Submit supplementary materials at the same time as your article. Be aware that all supplementary materials provided will appear online in the exact same file type as received. These files will not be formatted or typeset by the production team.
- Include a concise, descriptive caption for each supplementary file describing its content.
- Provide updated files if at any stage of the publication process you wish to make changes to submitted supplementary materials.
- Do not make annotations or corrections to a previous version of a supplementary file.
- Switch off the option to track changes in Microsoft Office files. If tracked changes are left on, they will appear in your published version.

We recommend you upload research data to a suitable specialist or generalist repository. Please read our guidelines on sharing research data for more information on depositing, sharing and using research data and other relevant research materials.

Video

This journal accepts video material and animation sequences to support and enhance your scientific research. We encourage you to include links to video or animation files within articles. Some guidelines:

- When including video or animation file links within your article, refer to the video or animation content by adding a note in your text where the file should be placed.
- Clearly label files ensuring the given file name is directly related to the file content.
- Provide files in one of our recommended file formats. Files should be within our preferred maximum file size of 150 MB per file, 1 GB in total.
- Provide "stills" for each of your files. These will be used as standard icons to personalize the link to your video data. You can choose any frame from your video or animation or make a separate image.
- Provide text (for both the electronic and the print version) to be placed in the portions of your article that refer to the video content. This is essential text, as video and animation files cannot be embedded in the print version of the journal.

We publish all video and animation files supplied in the electronic version of your article.

For more detailed instructions, we recommend that you read our guidelines on submitting video content to be included in the body of an article.

Research data

We are committed to supporting the storage of, access to and discovery of research data, and our research data policy sets out the principles guiding how we work with the research community to support a more efficient and transparent research process.

Research data refers to the results of observations or experimentation that validate research findings, which may also include software, code, models, algorithms, protocols, methods and other useful materials related to the project.

Please read our guidelines on sharing research data for more information on depositing, sharing and using research data and other relevant research materials.
For this journal, the following instructions from our research data guidelines apply.

Option B: Research data deposit, citation and linking

You are **encouraged** to:

- Deposit your research data in a relevant data repository.
- Cite and link to this dataset in your article.
- If this is not possible, make a statement explaining why research data cannot be shared.

Data statement

To foster transparency, you are encouraged to state the availability of any data at submission.

Ensuring data is available may be a requirement of your funding body or institution. If your data is unavailable to access or unsuitable to post, you can state the reason why (e.g., your research data includes sensitive or confidential information such as patient data) during the submission process. This statement will appear with your published article on ScienceDirect.

Read more about the importance and benefits of providing a data statement.

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Linking to the data underlying your work increases your exposure and may lead to new collaborations. It also provides readers with a better understanding of the described research.

If your research data has been made available in a data repository there are a number of ways your article can be linked directly to the dataset:

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- For some data repositories, a repository banner will automatically appear next to your published article on ScienceDirect.
- You can also link relevant data or entities within the text of your article through the use of identifiers. Use the following format: Database: 12345 (e.g. TAIR: AT1G01020; CCDC: 734053; PDB: 1XFN).

Learn more about linking research data and research articles in ScienceDirect.

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This journal enables the publication of research objects (e.g. data, methods, protocols, software and hardware) related to original research in Elsevier's Research Elements journals.

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Article structure

Article sections

Divide your manuscript into clearly defined sections covering all essential elements using headings.

Glossary
Please provide definitions of field-specific terms used in your article, in a separate list.

Acknowledgements
Include any individuals who provided you with help during your research, such as help with language, writing or proof reading, in the acknowledgements section. Include acknowledgements **only** in the **title page** since this journal follows a double anonymized peer review process. Do not add it as a footnote to your title.

Author contributions: CRediT
Corresponding authors are required to acknowledge co-author contributions using CRediT (Contributor Roles Taxonomy) roles:

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- Data curation
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- Funding acquisition
- Investigation
- Methodology
- Project administration
- Resources
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Not all CRediT roles will apply to every manuscript and some authors may contribute through multiple roles.

We advise you to read more about CRediT and view an example of a CRediT author statement.

Funding sources
Authors must disclose any funding sources who provided financial support for the conduct of the research and/or preparation of the article. The role of sponsors, if any, should be declared in relation to the study design, collection, analysis and interpretation of data, writing of the report and decision to submit the article for publication. If funding sources had no such involvement this should be stated in your submission.

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants, scholarships and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, it is recommended to include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Appendices

We ask you to use the following format for appendices:

- Identify individual appendices within your article using the format: A, B, etc.
- Give separate numbering to formulae and equations within appendices using formats such as Eq. (A.1), Eq. (A.2), etc. and in subsequent appendices, Eq. (B.1), Eq. (B. 2) etc. In a similar way, give separate numbering to tables and figures using formats such as Table A.1; Fig. A.1, etc.

References

References within text

Any references cited within your article should also be present in your reference list and vice versa. Some guidelines:

- References cited in your abstract must be given in full.
- We recommend that you do not include unpublished results and personal communications in your reference list, though you may mention them in the text of your article.
- Any unpublished results and personal communications included in your reference list must follow the standard reference style of the journal. In substitution of the publication date add "unpublished results" or "personal communication."
- References cited as "in press" imply that the item has been accepted for publication.

Linking to cited sources will increase the discoverability of your research.

Before submission, check that all data provided in your reference list are correct, including any references which have been copied. Providing correct reference data allows us to link to abstracting and indexing services such as Scopus, Crossref and PubMed. Any incorrect surnames, journal or book titles, publication years or pagination within your references may prevent link creation.

We encourage the use of Digital Object Identifiers (DOIs) as reference links as they provide a permanent link to the electronic article referenced.

Reference style

Indicate references by adding a number within square brackets in the text. You can refer to author names within your text, but you must always give the reference number, e.g., "as demonstrated [3,6]. Barnaby and Jones [8] obtained a different result ....".

Number references in the order they appear in your article.

Abbreviate journal names according to the List of Title Word Abbreviations (LTWA).

Examples:

Reference to a journal publication:

[1] J. van der Geer, T. Handgraaf, R.A. Lupton, The art of writing a scientific article, J. Sci. Commun. 163 (2020) 51 – 59. https://doi.org/10.1016/j.sc.2020.00372.

Reference to a journal publication with an article number:

[2] J. van der Geer, T. Handgraaf, R.A. Lupton, 2022. The art of writing a scientific article. Heliyon. 19, e00205. https://doi.org/10.1016/j.heliyon.2022.e00205.

Reference to a book:

[3] W. Strunk Jr., E.B. White, The Elements of Style, fourth ed., Longman, New York, 2000.

Reference to a chapter in a book:

[4] G.R. Mettam, L.B. Adams, How to prepare an electronic version of your article, in: B.S. Jones, R.Z. Smith (Eds.), Introduction to the Electronic Age, E-Publishing Inc., New York, 2020, pp. 281 - 304.

Reference to a website:

[5] Cancer Research UK, Cancer statistics reports for the UK. http://www.cancerresearchuk.org/aboutcancer/statistics/cancerstatsreport/, 2023 (accessed 13 March 2023).

Reference to a dataset:

[6] M. Oguro, S. Imahiro, S. Saito, T. Nakashizuka, Mortality data for Japanese oak wilt disease and surrounding forest compositions [dataset], Mendeley Data, v1, 2015. https://doi.org/10.1234/abc12nb39r.1.

Reference to software:

[7] E. Coon, M. Berndt, A. Jan, D. Svyatsky, A. Atchley, E. Kikinzon, D. Harp, G. Manzini, E. Shelef, K. Lipnikov, R. Garimella, C. Xu, D. Moulton, S. Karra, S. Painter, E. Jafarov, S. Molins, Advanced Terrestrial Simulator (ATS) v0.88 [software], Zenodo, March 25, 2020. https://doi.org/10.1234/zenodo.3727209.

Web references

When listing web references, as a minimum you should provide the full URL and the date when the reference was last accessed. Additional information (e.g. DOI, author names, dates or reference to a source publication) should also be provided, if known.

You can list web references separately under a new heading directly after your reference list or include them in your reference list.

Data references

We encourage you to cite underlying or relevant datasets within article text and to list data references in the reference list.

When citing data references, you should include:

- author name(s)
- dataset title
- data repository
- version (where available)
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- Spelling and grammar checks have been carried out.
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ANEXO II – Registro PROSPERO (International Prospective Register of Systematic Reviews)

Clinical performance of self-adhesive resin composites restorations in permanent teeth: a systematic review

Citation

João Felipe Besegato, Andrea Freire de Vasconcelos Eckelberg, Aryvelto Miranda Silva, Guilherme Loubet Melo, Joissi Ferrari Zaniboni. Clinical performance of self-adhesive resin composites restorations in permanent teeth: a systematic review. PROSPERO 2024 CRD42024502834 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42024502834

Review question

Do direct restorations placed with self-adhesive resin composite exhibit enhanced clinical performance compared to direct restorations placed with conventional or bulk-fill resin composite?

Searches

Detailed individual search strategies (MeSH terms, synonyms, and keywords related to the intervention for each of the following bibliographic databases will be developed: PubMed, Embase, Cochrane Central Register of Controlled Trials, Web of Science, Scopus, LILACS. The references cited in the included articles will be also checked for any references that could have been missed in the electronic database searches. A grey literature search will be undertaken using Google Scholar, OpenGrey, and Proquest. All references will be managed by Endnote software and duplicates will be removed. No restrictions on language or publication date will be applied.

Types of study to be included

Randomized clinical trials.

Condition or domain being studied

Resin composite (RC) is the material of choice for direct restorations in both anterior and posterior teeth. However, direct RC restoration is a sensitivity operative technique involving various steps, where the operator's skill level influences the success and longevity of the restoration. Additionally, proper acid etching, moisture control of dentin, complete solvent elimination, correct application of the adhesive system, and the formation of a stable and homogeneous hybrid layer are challenging for dental clinicians.

In an effort to optimize the operatory time, reduce the technique sensitivity, and simplify the restorative procedure, self-adhesive RCs have been used. Unlike conventional RCs, self-adhesive RCs do not require the prior application of an adhesive system. The incorporation of acidic monomers in self-adhesive RCs promotes substrate self-etching and the addition of hydrophilic monomers facilitates resin infiltration, enhancing surface wetting for effective adhesion to

dentin.

The adhesion mechanisms of self-adhesive RCs are both chemical bonding, with acidic monomers bonding to hydroxyapatite, and micromechanical interlocking, where the RC bonds to collagen fibers and the dentin smear layer. However, the clinical performance of self-adhesive RCs still raises questions and presents limitations that need to be considered to validate their efficacy as a direct restorative material.

Participants/population

Patients requiring direct resin composite restorations in permanent teeth, irrespective of cavity location.

Intervention(s), exposure(s)

Direct restorations placed with self-adhesive resin composites.

Comparator(s)/control

Direct restorations placed with conventional or bulk fill resin composites, regardless of the bonding strategy used.

Context

Inclusion: randomized clinical trials comparing the clinical performance of direct restorations placed with self-adhesive resin composites vs. placed with conventional or bulk-fill resin composite, regardless of the cavity location, viscosity of the resin composite, and bond strategy.

Exclusion: non-randomized clinical trials, observational studies, case reports, studies involving animals, laboratorial researches, studies evaluating indirect restorations, pit and fissures sealants, deciduous teeth, adhesive systems, and self-adhesive resin cements.

Main outcome(s)

Clinical evaluation of direct restorations according to modified USPHS criteria, FDI criteria, and others.

Additional outcome(s)

Postoperative sensitivity

Data extraction (selection and coding)

Two independent reviewers (JFB and AFVE) will select the included articles in two phases. Firstly (phase-1), the two reviewers will evaluate the titles and abstracts according the eligibility criteria; secondly (phase-2), they will view full-texts and select articles by the same criteria as phase-1; then, they will crosscheck all the information found. If disagreements arise, a third reviewer (JFZ) will participate before a final decision is made of both phases. If important data for the review are missing or unclear, an attempt will be made to contact the study corresponding author to resolve or clarify the problem.

Two independent reviewers (JFB and AFVE) will collect data from the selected articles. Once selected, they will

crosscheck the retrieved information with the third reviewer (JFZ). The information collected will be: author; type of

study; year of publication; country; characteristics of patients (sample size, gender and age); clinical characteristics. Any disagreement will be discussed between them.

Risk of bias (quality) assessment

Two reviewers (JFB and AFVE) will independently perform the methodological analysis of each included study.

The methodological quality of the included Randomized Clinical Trials (RCTs) will be evaluated by the Cochrane Collaboration's tool for assessing risk of bias (Cochrane ROB Tool 2.0). Briefly, the randomization and allocation methods will be classified as adequate, inadequate, or unclear, whereas the completeness of the follow-up period, blinding of examiners, selective reporting and other forms of bias will be coded as "yes/no" responses.

A summary of the overall strength of evidence available will be performed using "Grading of Recommendations Assessment, Development, and Evaluation" (GRADE). The strength of the evidence will be assessed based on the limitations in the study design, inconsistency, indirectness, imprecision, and publication bias. Grading and summary estimates will be presented in the Summary of Findings (SoF) tables produced via GRADEpro software.

Strategy for data synthesis

If a quantitative synthesis is appropriate, a meta-analysis will be performed using the 5.4.1 version of Review Manager software (Nordic Cochrane Center, Copenhagen, Denmark). Heterogeneity will be assessed using the Q test and I^2 statistics. A fixed or random-effect model will be applied, based on the heterogeneity values detected, and a value greater than 50% will be considered as an indicator of substantial heterogeneity between studies.

If quantitative synthesis is not appropriate by meta-analysis, alternative methods to demonstrate the results can be developed in GraphPad Prism software version 8.4.1 (GraphPad Software, La Jolla California USA) through structured graphics and statistical tests.

Analysis of subgroups or subsets

Follow-up periods, type of resin composite.

Contact details for further information

João Felipe Besegato

joao.besegato@ufms.br

Organisational affiliation of the review

Federal University of Mato Grosso do Sul

https://faodo.ufms.br/

Review team members and their organisational affiliations

Professor João Felipe Besegato. Federal University of Mato Grosso do Sul

Professor Andrea Freire de Vasconcelos Eckelberg. Federal University of Mato Grosso do Sul

Professor Aryvelto Miranda Silva. Federal University of Piauí

Mr Guilherme Loubet Melo. Federal University of Mato Grosso do Sul

Ms Joissi Ferrari Zaniboni. São Paulo State University

Type and method of review

Intervention, Systematic review

Anticipated or actual start date

01 December 2023

Anticipated completion date

01 October 2024

Funding sources/sponsors

No funding sources/sponsors

Conflicts of interest

None known

Language

English

Country

Brazil

Stage of review

Review Ongoing

Subject index terms status

Subject indexing assigned by CRD

Subject index terms

MeSH headings have not been applied to this record

Date of registration in PROSPERO

03 February 2024

Date of first submission

23 January 2024

Details of any existing review of the same topic by the same authors

No existing review.

Stage of review at time of this submission

The review has not started

Stage	Started	Completed
Preliminary searches	No	No
Piloting of the study selection process	No	No
Formal screening of search results against eligibility criteria	No	No
Data extraction	No	No
Risk of bias (quality) assessment	No	No
Data analysis	No	No

The record owner confirms that the information they have supplied for this submission is accurate and complete and they understand that deliberate provision of inaccurate information or omission of data may be construed as scientific misconduct.

The record owner confirms that they will update the status of the review when it is completed and will add publication details in due course.

Versions

03 February 2024

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