Samantha Jéssica Lopes Sousa

Desempenho clínico precoce de cimentos resinosos em restaurações de cerâmicas vítreas em dentes posteriores vitais de adultos: Uma revisão sistemática e meta-análise

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Trabalho de Conclusão de Curso apresentado ao Departamento de Odontologia da Faculdade de Ciências da Saúde da Universidade de Brasília, como requisito parcial para a conclusão do curso de Graduação em Odontologia

Orientadora: Profa. Dra. Fernanda Cristina Pimentel Garcia

Co-orientadora: Profa. Dra. Liliana Vicente Melo de Lucas Rezende

Brasília
2019

À Deus e à intercessão de Nossa Senhora, que estiveram sempre me guiando e amparando por toda essa caminhada. Familiares, namorado e amigos que foram meu alicerce. Eu sou nada sem vocês.

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Aos meus pais. Ao meu pai, todo meu amor. Eis aí meu grande herói. Que me perdoe pela rispidez, muitas vezes que cheguei em casa cansada e mal pude estar em seu abraço. Quero dar ao senhor o futuro que merece, pela vida dedicada ao trabalho, tão somente para fazer as minhas vontades. À minha mãe, toda a minha saudade. Já são quase dez anos que você foi morar com Jesus, mas eu ainda sinto que partilha comigo todas as minhas vitórias. Eu fecho os olhos e posso te sentir. E sempre será assim, pois bons conselhos permanecem além do tempo. Vocês sempre serão meu tudo.

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...agradecida em demasia.

EPÍGRAFE

“Não há lugar para a sabedoria onde não há paciência.”

Santo Agostinho

RESUMO

SOUSA, Samantha Jéssica Lopes. Desempenho clínico precoce de cimentos resinosos em restaurações de cerâmicas vítreas em dentes posteriores vitais de adultos: Uma revisão sistemática e meta-análise. 2019. Trabalho de Conclusão de Curso (Graduação em Odontologia) – Departamento de Odontologia da Faculdade de Ciências da Saúde da Universidade de Brasília.

Declaração do problema. Os dentistas eventualmente deparam com o questionamento acerca do melhor protocolo de cimentação adesiva para restaurações de cerâmicas vítreas em dentes posteriores. Atualmente, na literatura, existem poucos estudos de acompanhamento in vivo e nenhuma meta-análise incluindo ensaios clínicos, sobre este tópico clinicamente relevante, que merece uma investigação mais aprofundada.

Objetivo. O objetivo desta revisão sistemática foi analisar estatisticamente o desempenho clínico de restaurações posteriores em cerâmicas vítreas utilizando uma síntese descritiva que avalia a integridade do dente e da restauração sob diferentes protocolos de cimentação com cimentos resinosos autoadesivos ou convencionais.

Material e métodos. Foram consultadas as bases de dados eletrônicas Cochrane, LILACS, PubMed / MEDLINE, SciELO, Scopus e Web of Science para identificar ensaios clínicos relevantes. Pesquisas bibliográficas em literatura cinzenta e busca manual foram realizadas para encontrar referências adicionais. Restrições de linguagem, tempo ou idade do participante não foram estabelecidas. Integridade da restauração e integridade do dente foram os dois aspectos considerados para a meta-análise. As análises estatísticas foram realizadas por meio de software, no qual foram aplicados modelos de efeito fixo

ou aleatório com razões de risco e intervalos de confiança de 95%.

Resultados. Três ensaios clínicos prospectivos randomizados ou quasi-aleatorizados, publicados em inglês a partir de 2012, foram selecionados e analisados estatisticamente. As integridades do dente e da restauração foram avaliadas no tempo inicial e 1 ano após a intervenção restauradora. As análises estatísticas não mostraram diferenças significativas entre os grupos de intervenção e controle quanto à integridade do dente e da restauração.

Conclusões. Esta meta-análise não indicou diferenças clínicas na cimentação da cerâmica vítrea usando um cimento resinoso auto-adesivo ou convencional após o período de 1 ano de acompanhamento, visto que ambos os cimentos resinosos mostraram propriedades adequadas para a integridade dentária e da restauração.

IMPLICAÇÕES CLÍNICAS

Tradicionalmente, os sistemas convencionais são considerados o padrão ouro para a cimentação adesiva de restaurações cerâmicas. No entanto, observou-se que a utilização de cimentos resinosos autoadesivos pode reduzir a sensibilidade da técnica, a sensibilidade pós-operatória e o tempo clínico. Portanto, se os sistemas de cimentos resinosos convencional e autoadesivo apresentam o mesmo desempenho clínico, então seu uso deve ser considerado de acordo com critérios clínicos individuais.

ABSTRACT

SOUSA, Samantha Jéssica Lopes. Early clinical performance of resin cements in glass-ceramic posterior restorations in adult vital teeth: A systematic review and meta-analysis. 2019. Undergraduate Course Final Monograph (Undergraduate Course in Dentistry) – Department of Dentistry, School of Health Sciences, University of Brasília.

Statement of problem. Dentists must regularly determine the best adhesive cementation protocol for glass-ceramic restorations on posterior teeth. The authors are aware of few in vivo follow-up studies and no meta-analyses, including clinical trials, regarding this clinically relevant topic, which merits further investigation.

Purpose. The purpose of this systematic review and meta-analysis was to statistically analyze the clinical performance of glass-ceramic posterior restorations by using a descriptive synthesis based on the integrity of the tooth and restoration under different cementation protocols for self-adhesive or conventional resin cements.

Material and methods. The electronic databases Cochrane, LILACS, PubMed/MEDLINE, SciELO, Scopus, and Web of Science were used to identify relevant clinical trials. Non peer-reviewed literature searches and hand searching were performed to find additional references. Language, participant age, or time restrictions were not set. Restoration and tooth integrity were the 2 aspects considered for the meta-analysis. Statistical analyses were performed using a software program in which fixed or random effect models with risk ratios and 95% confidence intervals were applied.

Results. Three prospective randomized or quasirandomized clinical trials, published in English from 2012 onward, were selected and statistically analyzed. The integrity of the tooth and

restoration was assessed at the baseline and 1 year after the restorative intervention. The statistical analyses did not show any significant differences between the intervention and control groups in terms of the integrity of the tooth and restoration.

Conclusions. This meta-analysis indicated no clinical differences in the ceramic cementation using a self-adhesive or conventional resin cement after the 1-year follow-up period because both resin cements showed adequate properties for tooth and restoration integrity.

CLINICAL IMPLICATIONS

Traditionally, conventional systems are considered the gold standard for adhesive cementation of ceramic restorations. However, attempts have been made to use self-adhesive resin cements to reduce technique sensitivity, postoperative sensitivity, and clinical time. Therefore, if both conventional and self-adhesive resin cement systems present the same clinical performance, then their use according to the criteria for individual clinical applications should be considered.

SUMÁRIO

ARTIGO CIENTÍFICO

Este trabalho de Conclusão de Curso é baseado no artigo científico: Sousa SJL, Poubel DLDN, Rezende LVML, Almeida FT, de Toledo IP, Garcia FCP. Early clinical performance of resin cements in glass-ceramic posterior restorations in adult vital teeth: A systematic review and meta-analysis. J Prosthet Dent. 2019 Apr 11. pii: S0022-3913(18)31176-4. doi 10.1016/j.prosdent.2018.12.006. [Epub ahead of print] Review. PubMed PMID: 30982625.
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FOLHA DE TÍTULO

Desempenho clínico precoce de cimentos resinosos em restaurações vítreas vitrocerâmicas em dentes vitais adultos: Uma revisão sistemática e meta-análise

Early clinical performance of resin cements in glass-ceramic posterior restorations in adult vital teeth: A systematic review and meta-analysis

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RESUMO

Desempenho clínico precoce de cimentos resinosos em restaurações de cerâmicas vítreas em dentes vitais adultos: Uma revisão sistemática e meta-análise

Resumo

Declaração do problema. Os dentistas eventualmente deparam com o questionamento acerca do melhor protocolo de cimentação adesiva para restaurações de cerâmicas vítreas em dentes posteriores. Atualmente, na literatura, existem poucos estudos de acompanhamento in vivo e nenhuma meta-análise incluindo ensaios clínicos, sobre este tópico clinicamente relevante, que merece uma investigação mais aprofundada.

Objetivo. O objetivo desta revisão sistemática foi analisar estatisticamente o desempenho clínico de restaurações posteriores em cerâmicas vítreas utilizando uma síntese descritiva que avalia a integridade do dente e da restauração sob diferentes protocolos de cimentação com cimentos resinosos autoadesivos ou convencionais.

Material e métodos. Foram consultadas as bases de dados eletrônicas Cochrane, LILACS, PubMed / MEDLINE, SciELO, Scopus e Web of Science para identificar ensaios clínicos relevantes. Pesquisas bibliográficas em literatura cinzenta e busca manual foram realizadas para encontrar referências adicionais. Restrições de linguagem, tempo ou idade do participante não foram estabelecidas. Integridade da restauração e integridade do dente foram os dois aspectos considerados para a meta-análise. As análises estatísticas foram realizadas por meio de software, no qual foram aplicados modelos de efeito fixo ou aleatório com razões de risco e intervalos de confiança de 95%.

Resultados. Três ensaios clínicos prospectivos randomizados ou quasi-aleatorizados, publicados em inglês a partir de 2012, foram selecionados e analisados estatisticamente. As integridades do dente e da restauração foram avaliadas no tempo inicial e 1 ano após a intervenção restauradora. As análises estatísticas não mostraram diferenças significativas entre os grupos de intervenção e controle quanto à integridade do dente e da restauração.
Conclusões. Esta meta-análise não indicou diferenças clínicas na cimentação da cerâmica vítrea usando um cimento resinoso auto-adesivo ou convencional após o período de 1 ano de acompanhamento, visto que ambos os cimentos resinosos mostraram propriedades adequadas para a integridade dentária e da restauração.

Implicações Clínicas

Tradicionalmente, os sistemas convencionais são considerados o padrão ouro para a cimentação adesiva de restaurações cerâmicas. No entanto, observou-se que a utilização de cimentos resinosos autoadesivos pode reduzir a sensibilidade da técnica, a sensibilidade pós-operatória e o tempo clínico. Portanto, se os sistemas de cimentos resinosos convencional e autoadesivo apresentam o mesmo desempenho clínico, então seu uso deve ser considerado de acordo com critérios clínicos individuais.

Palavras-chave

Cimentos dentários; cerâmicas; cimentação; porcelana dental; cimentos resinosos.

ABSTRACT

Early clinical performance of resin cements in glass-ceramic posterior restorations in adult vital teeth: A systematic review and meta-analysis

Abstract

Statement of problem. Dentists must regularly determine the best adhesive cementation protocol for glass-ceramic restorations on posterior teeth. The authors are aware of few in vivo follow-up studies and no meta-analyses, including clinical trials, regarding this clinically relevant topic, which merits further investigation.

Purpose. The purpose of this systematic review and meta-analysis was to statistically analyze the clinical performance of glass-ceramic posterior restorations by using a descriptive synthesis based on the integrity of the tooth and restoration under different cementation protocols for self-adhesive or conventional resin cements.

Material and methods. The electronic databases Cochrane, LILACS, PubMed/MEDLINE, SciELO, Scopus, and Web of Science were used to identify relevant clinical trials. Non peer-reviewed literature searches and hand searching were performed to find additional references. Language, participant age, or time restrictions were not set. Restoration and tooth integrity were the 2 aspects considered for the meta-analysis. Statistical analyses were performed using a software program in which fixed or random effect models with risk ratios and 95% confidence intervals were applied.

Results. Three prospective randomized or quasirandomized clinical trials, published in English from 2012 onward, were selected and statistically analyzed. The integrity of the tooth and restoration was assessed at the baseline and 1 year after the restorative intervention. The statistical analyses did not show any

significant differences between the intervention and control groups in terms of the integrity of the tooth and restoration.
Conclusions. This meta-analysis indicated no clinical differences in the ceramic cementation using a self-adhesive or conventional resin cement after the 1-year follow-up period because both resin cements showed adequate properties for tooth and restoration integrity.

Clinical Implications

Traditionally, conventional systems are considered the gold standard for adhesive cementation of ceramic restorations. However, attempts have been made to use self-adhesive resin cements to reduce technique sensitivity, postoperative sensitivity, and clinical time. Therefore, if both conventional and self-adhesive resin cement systems present the same clinical performance, then their use according to the criteria for individual clinical applications should be considered.

Keywords

Dental cements; ceramics; cementation; dental porcelain; resin cements.

INTRODUCTION

To satisfy the esthetic and functional requirements in restorative dentistry, cements, cementation techniques, bonding systems, and bonded glass-ceramics have been developed and have become popular.[1] To ensure adequate resistance and esthetics, a product is needed between the tooth and the ceramic restoration.[2] Cements are necessary to provide good marginal adaptation and for ensuring the retention of the restoration. Moreover, they also contribute to the maintenance of the porcelain margin and original color of the restoration.[2]

Adhesive cementation can be achieved using resin cements,[3,4] which are typically modified composite resins with a higher fluidity to improve flow during cementation.[5] Conventional cementation methods based on dentin and enamel adhesives, besides exhibiting varying results depending on the technique, also require multiple application steps and are time-consuming.[6,7] Self-adhesive cements have a straightforward application technique and are designed to overcome the limitations of conventional resin cements by combining the favorable characteristics of different cements into a single product.[8] The sensitivity of the adhesive technique was improved by simplifying the application procedure. This single-step technique has eliminated the prior application of an adhesive system or other pretreatments.[6-17] However, these cements have limited conditioning potential because they can only superficially interact with the dentin.[12,18-20] Self-adhesive resin cements are unable to create a distinct hybrid layer[3,10,12,21] due to their high viscosity, which hinders deep penetration of the resin.[20] According to the manufacturers, as the removal of the smear layer is not required, postoperative sensitivity is not expected. Mild inflammatory pulp responses were observed when self-adhesive resin cements were used, whereas moderate responses were observed for

conventional methods.[22] In addition, there is some evidence that the material is able to release fluoride.[8,23.]

Previous studies have reported no significant difference in the bonding effectiveness of self-adhesive and conventional systems when the correct protocol is used.[24,25] However, owing to the lack of long-term scientific evidence, most dentists remain apprehensive about the indications for and long-term response to self-adhesive resin cements.[26]

With respect to the technique itself, adhesive cementation can be considered more difficult as it is more time-consuming and requires improved moisture control in comparison with water-based cementation.[1] Posterior crowns exhibit higher fracture rates than anterior crowns, and indirectly bonded restorations in molars exhibit higher failure rates than those in premolar crowns.[27] The clinical success and reliability of the ceramic systems are directly related to the mechanical integrity of their constituent materials and bond strength at the ceramic/adhesive interface.[28]

Therefore, the purpose of this systematic review and meta-analysis was to analyze the clinical performance of glass-ceramic posterior indirect restorations using resin cements. The null hypothesis was that no difference would be found between the self-adhesive resin cements and conventional adhesive resin cements in terms of both the tooth and restoration integrity.

MATERIAL AND METHODS

This systematic review was developed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist[29] and was registered at the International Prospective Register of Systematic Reviews (PROSPERO)[30] under the number CRD42018086472.

Randomized clinical trials in which the main goal was to evaluate the clinical performance of self-adhesive cements compared with conventional resin cements for glass-ceramic indirect posterior restorations were included. There was no restriction with respect to language, participant age, or time.

Studies were excluded based on the following criteria: zirconia restorations; nonvital teeth, or those with root canal treatments or fiber posts; implants; indirect restorations' clinical performance related to orthodontic traction; direct restorations; studies that exclusively compared conventional resin cements or self-adhesive resin cements and in which both the control and intervention groups referred to a single type of resin cement; letters; reviews; book chapters; conference abstracts; personal opinions; descriptive studies; retrospective studies; case reports; and case series.

Studies were screened using a search strategy adapted for the following electronic databases: Cochrane Central Register of Controlled Trials, LILACS, PubMed (MEDLINE), SciELO, SCOPUS, and Web of Science. Hand searches were performed on the reference lists to identify additional studies. In addition, non peer-reviewed literature was searched by screening the title and abstracts of the first 150 hits (filtered by "relevance") using Google Scholar. Duplicate studies were excluded using EndNote Web[31] and Rayyan[32] software programs. The search was conducted on January 10, 2018.

The study selection followed 3 steps. First, 2 investigators (S.J.L.S., D.L.N.P.) screened the titles of the studies that appeared to meet the inclusion criteria. In the second phase, the same reviewers independently read the abstracts of potentially relevant articles. Finally, they independently read the full text of the selected articles and excluded those that did not meet the inclusion criteria. Disagreements in any of the 3 steps were resolved by discussion and mutual agreement among the reviewers. If no consensus was reached, a third author (L.V.M.L.R.) was consulted to reach the final decision.

The first investigator (S.J.L.S.) collected the following data from the selected articles: study characteristics (author(s), country of publication, year of publication, study design, and objectives), population characteristics (the total number of participants, the total number of restorations evaluated, sample size, mean age), intervention characteristics (follow-up period, intervention and group sizes, pretreatment and material used), and result characteristics (main results and statistical analyses). The second author (D.L.N.P.) examined all the retrieved information for the analysis. The corresponding authors of the article were contacted when important data were not described in the studies in an attempt to retrieve the missing information.

The risk of bias of the selected studies was assessed using the Meta-Analysis of Statistics Assessment and Review Instrument (MAStARI).[33] Randomized or quasirandomized controlled trials were considered, including judgments regarding sequence generation, blinding of participants, allocation concealment, and other bias sources. The risk of bias was described as high, moderate, or low. Two reviewers assessed the risk of bias independently (S.J.L.S., D.L.N.P.), and differences were resolved in consultation with a third investigator (L.V.M.L.R.). Table 1 shows the criteria for clinical evaluation of the treatments used by the 3 studies.

Meta-analysis was performed using the RevMan 5.3 program,[34] where fixed or random effect models with risk ratios and 95% confidence intervals were applied. Although the selected studies analyzed several variables, for this meta-analysis, only the restoration integrity and tooth integrity were considered. For the data that were not suitable for the meta-analysis, a qualitative analysis was applied. Heterogeneity within the selected studies was evaluated by considering the following characteristics: clinical (participant differences, type of intervention, follow-up periods, and results of the studies), methodological (risk of bias, summary measures, and design of

the studies), and statistical (absolute and relative effects of the studies).

The quality of the evidence was assessed using the Grading of Recommendations, Assessments, Development and Evaluations tool (GRADE).[35,36] The parameters for this assessment were as follows: study design, publication bias, sample size, study limitations, imprecision, indirectness, inconsistency, and magnitude of absolute and relative effects. The quality of the evidence was reported as high, moderate, low, or very low.[36] This tool was created based on the evaluation table of the quality criteria of diagnostic accuracy (QUADAS) by Cochrane.[37]

RESULTS

In phase 1 of the study selection, 1657 citations were identified across the 6 electronic databases. The results from the non peer-reviewed literature search added 150 references; 11000 citations were identified using Google Scholar, but only 150 citations were considered for the analysis. After removing duplicate articles, 1019 citations remained. In phase 2, 1625 articles were excluded based on the titles. A thorough screening of 394 abstracts was then conducted, and 384 references were excluded. Hand searches from the reference lists did not identify any additional references. Thus, 10 articles remained for full-text reading. This process led to the exclusion of 7 articles. Finally, 3 studies[11,38,39] were selected for the synthesis. Figure 1 details the process of identification, inclusion, and exclusion of the studies.

Table 2 summarizes the characteristics of the included studies. These studies were published in English from 2012 onward. All the selected articles were either prospective-randomized or quasirandomized clinical trials, and the follow-up periods were mentioned in all the studies (mean: 18 months,

range: 12-24 months). Each study used a different system, and the results are described in Table 2.

The assessment of the risk of bias of the included studies in the review is detailed in Figure 2. The item was considered unclear in the case of missing or incomplete information. Question 5 (Were those assessing outcomes blind to the treatment allocation?) was judged unclear for all studies, and question 3 (Was allocation to treatment groups concealed from the allocator?) was unclear in 2 studies.[11, 38] Overall, the study by Emiroglu et al[38] presented a moderate risk of bias, whereas those by Taschner et al[11] and Vogl et al[39] presented a low risk of bias.

The study conducted by Taschner et al[11] did not show any statistically significant differences between the 2 groups for all variables at baseline (*P>.05*). After 1 year of follow-up, the control group (conventional resin cement) exhibited better results for the restoration integrity than the self-adhesive resin cement group (*P<.05*). After 24 months, reduced tooth integrity was observed for indirect restorations luted with self-adhesive resin cement when compared with the conventional approach, mainly because of slight enamel fractures at the occlusal margin (*P<.05*). In the study by Emiroglu et al,[38] over the observation period of 1 year, the control and intervention groups exhibited no statistically significant differences regarding restoration and tooth integrity (*P>.05*).

Vogl et al[39] reported no significant differences for tooth integrity within each group separately or between the groups over time. For the material fracture and retention criteria, the conventional resin cement group showed better results than the self-adhesive resin cement group in all periods of evaluation. According to the results of the present meta-analysis, this difference was not statistically significant (*P>.05*) for the 12-month assessment but was for the 18-month assessment (*P=.02*).

The 3 selected studies were considered suitable for a meta-analysis because they used similar methodologies, leading to reduced chances of misinterpretation. Restoration and tooth

integrity were assessed at baseline and 1 year after the restorative intervention. The data analysis did not reveal statistically significant differences between conventional and self-adhesive resin cements in terms of the restoration integrity (Fig. 3) or tooth integrity (Fig. 4).

The quality of the evidence from the outcomes assessed by the GRADE system was assigned as low and very low, suggesting less confidence in the estimated effect. This indicates that the true effect can be substantially different from the estimated effects (Table 3). Explanations for the limited quality of evidence are listed in Table 3. The main factors responsible for classification into low and very low quality were the inconsistency and imprecision of the studies.

DISCUSSION

Based on this study, the null hypothesis was accepted as no difference was observed between the self-adhesive and conventional resin cements for both tooth and restoration integrity in a 1-year follow-up. However, the present study focused on the evaluation of only these 2 variables in glass-ceramic posterior single-unit restorations.[11, 38, 39]

Regarding the results of the studies included, in 2 of them, there were no significant differences between the self-adhesive and conventional resin cements.[11, 39] Only 1 study displayed better results for conventional resin cements in comparison with self-adhesive ones based on clinical performance. This difference might be partially explained by the fact that treatments were compared using different thermal cycles of the luting agent.[38]

In the forest plot, the results of the study by Emiroglu et al[38] were omitted in the Alfa 2 and Bravo subgroups owing to the inconsistent data and unclear results (Figs. 3, 4). Similarly, the

results of the study by Vogl et al[39] in the Bravo subgroup for the 1-year assessment of the restoration integrity (Fig. 3B) and of the study by Taschner et al[11] in the Alfa 1 subgroup at the baseline for the tooth integrity (Fig. 4A) were omitted because they did not present estimable results. Only 1 study[11] yielded favorable results for conventional resin cements, while was in the Bravo subgroup for the 1-year assessment of the restoration integrity (Fig. 3B). These results do not indicate that the conventional resin cement had the best performance because no other studies in the same subgroup were used for comparison.

Other clinical parameters were evaluated by the studies included in this review. However, the meta-analysis or relevant grouping of these parameters was not possible because of different clinical protocols and follow-up periods. The follow-up periods of the studies were 12,[38] 18,[39] and 24 months,[11] and these short follow-up periods represent a major limitation. Thus, the quality of evidence was evaluated to be low or very low.

Failures observed in the glass-ceramics include fractures and debonding. Fractures are associated with insufficient ceramic thickness resulting from the occlusal adjustment performed after insertion.[39] Debonding is the loss of adhesion between the dentin and the luting material, which arises from problems during the luting procedure. These problems include insufficient wetting of the hard tooth tissue using the adhesive and contamination of the hard tooth tissue prior to luting.[39] Bonding effectiveness has been reported as an important factor affecting restoration longevity.[7]

Conventional resin cements are considered the gold standard for adhesive luting of ceramic restorations. However, self-adhesive resin cements have become popular, mainly because of reduced technique sensitivity, reduced postoperative sensitivity (owing to the lack of acid pretreatment), and reduced clinical treatment time.[8,30-32] In this meta-analysis, no difference was observed between the conventional and self-adhesive systems in terms of clinical performance for a follow-up period of 1 year. Thus, if both the systems exhibit the same clinical

performance, the selection of the material can be based on the specificities of each restoration and/or on the preference of the dentist.

This systematic review had limitations. Only a few studies with small sample sizes were included; however, all studies were randomized clinical trials, which provide the best evidence for comparing different types of intervention. Another limitation was that the included articles compared self-adhesive and conventional resin cements from different brands. Results with better precision might have been obtained if the cements of the same brand had been used. Finally, future studies presenting appropriate methodological rigor, using comparisons of homogeneous samples and with longer observation periods, are required to confirm the data collected in this meta-analysis.

CONCLUSIONS

Based on the studies included in this meta-analysis, the following conclusions were drawn:

1. No clinical differences were found in the ceramic cementation using self-adhesive resin cements and conventional resin cements within a 1-year follow-up period.
2. Both cement types showed adequate properties for tooth and restoration integrity.

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TABLES

Table 1. Criteria for clinical evaluation of individual studies

Taschner et al, 2012, Germany	**Emiroglu et al, 2015, Turkey**	**Vogl et al, 2016, Germany**	**Description**
Alfa 1	Alfa 1	Clinically very good	Perfect
Alfa 2	Alfa 2	Clinically good	Slight deviations from ideal performance; correction possible without damage to tooth or restoration
Bravo	Bravo	Clinically sufficient	Few defects; correction impossible without damage to tooth or restoration. No negative effects expected
Charlie	Charlie	Clinically unsatisfactory	Severe defects, prophylactic removal for prevention of severe failures
Delta	Delta	Clinically poor	Immediate replacement necessary

Table 2. Characteristics of included articles

Study characteristics			Population characteristics			Intervention characteristics	
Author, year, country[a]	**Study design**	**Objective**	**Total of participants (*n*)**	**Total of restorations evaluated or sample size (*n*)**	**Age mean (year)**	**Follow-up period (months)**	**Clinical parameters**
Taschner et al, 2012, Germany	RCT*	To compare clinical performances of 2 different cementation procedures to lute IPS empress inlays and onlays.	30	83 (70 inlays/13 onlays) (47 premolars/36 molars)	39	24	Tooth and inlay integrity
Emiroglu et al, 2015, Turkey	QRCT**	To evaluate clinical performances of inlays and onlays luted with 2 different resin cements, mixed at different temperatures, and to evaluate marginal adaptation of restorations.	50	100 (18 inlays/82 onlays) (16 premolars/84 molars)	33	12	Tooth and restoration integrity
Vogl et al, 2016, Germany	RCT*	To evaluate clinical performance of partial ceramic crowns (PCCs) inserted with new universal adhesive, where corresponding luting material used in self-etch or selective etch approach is compared with self-adhesive universal luting material.	48	144 (144 partial ceramic crowns or onlays) (42 premolars/102 molars)	48	18	Tooth integrity, fracture of material, and retention

Abbreviations:
* RCT: Randomized Clinical Trial;
** QRCT: Quasirandomized Clinical Trial.

Table 2. Characteristics of included articles

Study characte-ristics	**Intervention characteristics**						**Results**	
Author, year, country[a]	**Intervention (*n*)**	**Pretreatment in the intervention group**	**Material used in the intervention group**	**Control (*n*)**	**Pretreatment in the control group**	**Material used in the control group**	**Main results**	**Statistical analysis**
Taschner et al, 2012, Germany	Self-adhesive dual-resin cement (43)	None	RelyX Unicem (3M, ESPE, Germany)	Conventional dual-resin cement (40)	Etch with 35% phosphoric acid followed by water rinse.	Syntac Classic and Variolink II low (Ivoclar-Vivadent, Liechtenstein)	Conventional systems showed better results than self-adhesive cements	Mann-Whitney U-test, Cohen's Kappa test
Emiroglu et al, 2015, Turkey	Self-adhesive dual-resin cement (50)	None	G-Cem Automix (GC Corp, Japan)	Conventional dual-resin cement (50)	Etch with 37% phosphoric acid gel followed by rinsing.	Syntac Classic and Variolink N high (Ivoclar-Vivadent, Liechtenstein)	Conventional systems showed better results than self-adhesive cements	Kaplan-Meier algorithm, Chi-Square test
Vogl et al, 2016, Germany	Self-adhesive-dual resin cement (48)	None	RelyX Unicem 2 (3M, ESPE, Germany)	Conventional dual-resin cement (48)	Etch with 37% phosphoric acid gel followed by rinsing.	Scotchbond Universal and RelyX Ultimate (3M, ESPE, Germany)	Conventional systems showed better results than self-adhesive cements	Kaplan-Meier algorithm, Chi-Square test

Table 3 GRADE assessment

No. of studies	Study design	Study limitations	Incon-sistency	Indirect-ness	Imprecision	Publication bias	Self-adhesive [intervention]	Conventional [comparison]	Relative (95% CI)	Absolute (95% CI)	Certainty
Restoration integrity – baseline											
3	RCT /QRCT	Serious[a]	Not serious	Not serious	Serious[b]	Not serious	323/423 (76.4%)	314/414 (75.8%)	**RR 1.00** (0.94 to 1.07)	**RD 0 fewer per 1.000** (from 46 fewer to 53 more)	⊕⊕◯◯ LOW
Restoration integrity – 1 year											
3	RCT /QRCT	Serious[a]	Serious[c]	Not serious	Serious[b]	Not serious	275/423 (65.0%)	266/414 (64.3%)	**RR 0.92** (0.72 to 1.18)	**RD 51 fewer per 1.000** (from 116 fewer to 180 more)	⊕◯◯◯ VERY LOW
Tooth integrity – baseline											
3	RCT /QRCT	Serious[a]	Not serious	Not serious	Serious[b]	Not serious	280/423 (66.2%)	274/414 (66.2%)	**RR 1.00** (0.89 to 1.12)	**RD 0 fewer per 1.000** (from 73 fewer to 79 more)	⊕⊕◯◯ LOW
Tooth integrity – 1 year											
3	RCT /QRCT	Serious[a]	Serious[d]	Not serious	Serious[b]	Not serious	323/423 (76.4%)	314/414 (75.8%)	**RR 0.94** (0.73 to 1.22)	**RD 46 fewer per 1.000** (from 167 fewer to 205 more)	⊕◯◯◯ VERY LOW

RCT: Randomized Clinical Trial; **QRCT:** Quasirandomized Clinical Trial; **CI:** Confidence Interval; **RR:** Risk Ratio; **RD:** Risk Difference.

Explanations

[a] *Studies were graded as having unclear risk of bias. Owing to insufficient data, no blinding of participants and examiners in study or no uncertainty in its implementation and/or uncertainty in process of randomization and blinding of random allocation of sample.*

[b] *Risk relative shows that no statistical difference observed between intervention and control (self-adhesive and conventional, respectively).*

[c] *Substantial heterogeneity (i^2 72%) groups.*

[d] *Moderate heterogeneity (i^2 53%)*

FIGURES

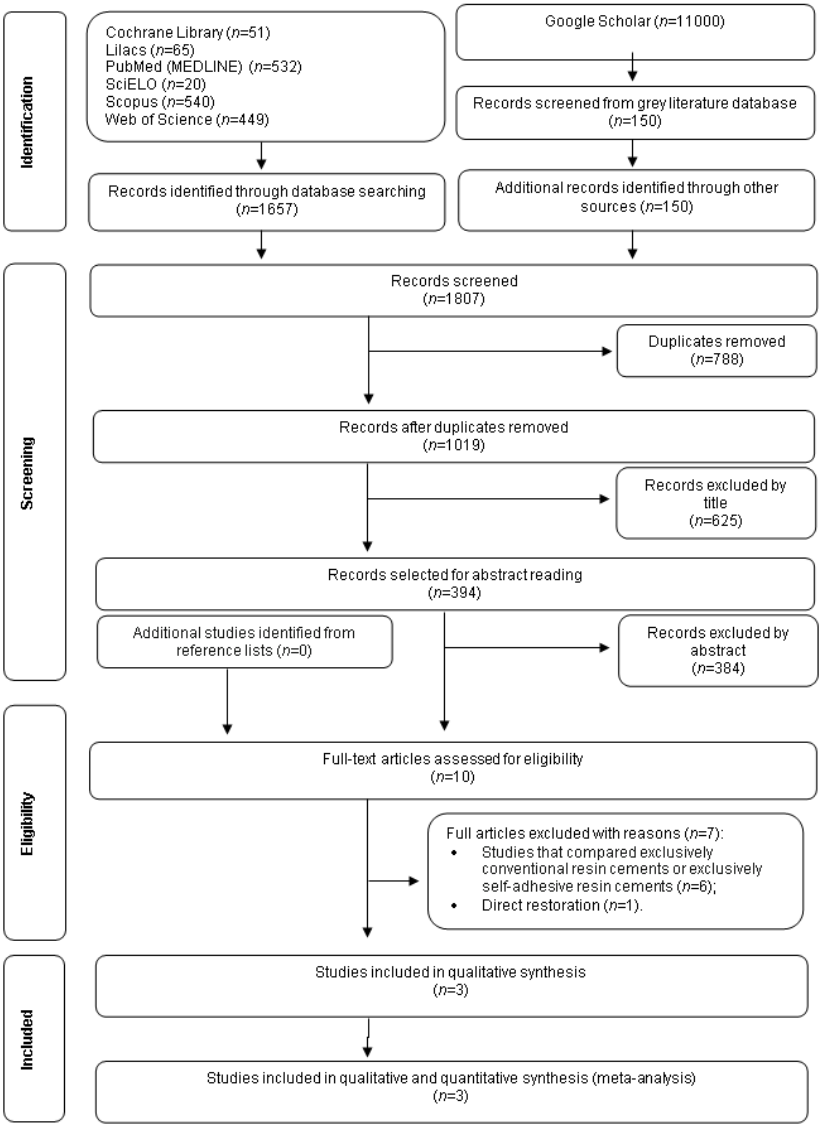

Figure 1. Flow diagram of search strategy and selection criteria.

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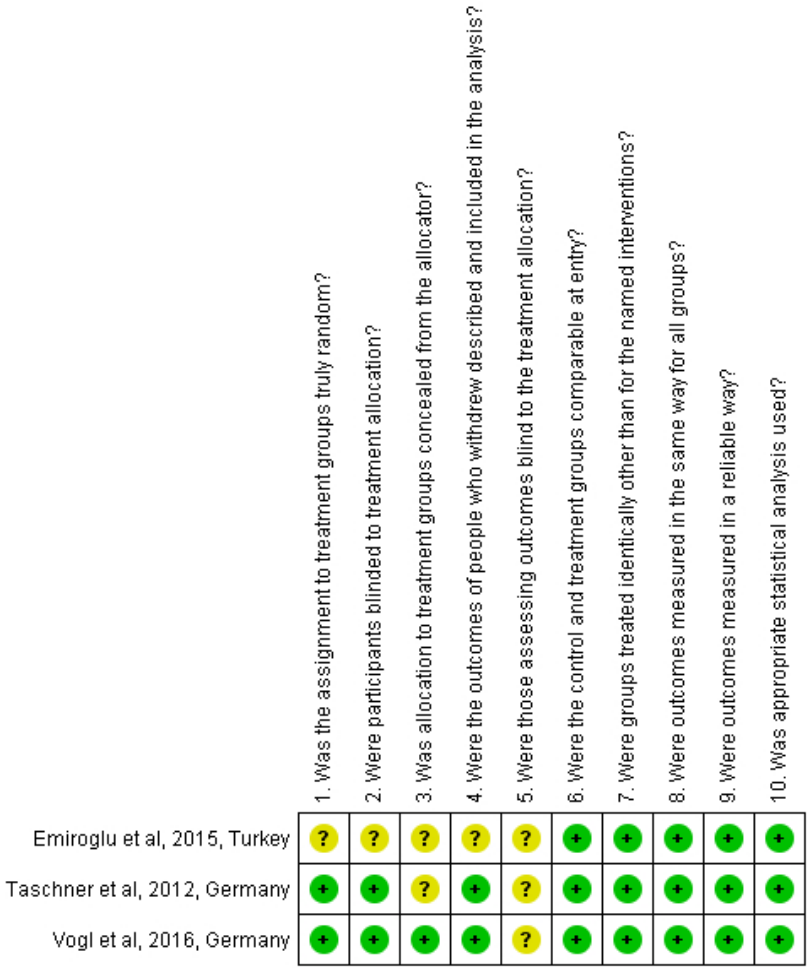

Figure 2. Risk of bias summary. *Question mark* indicates unclear; *plus sign* indicates yes.

3. A)

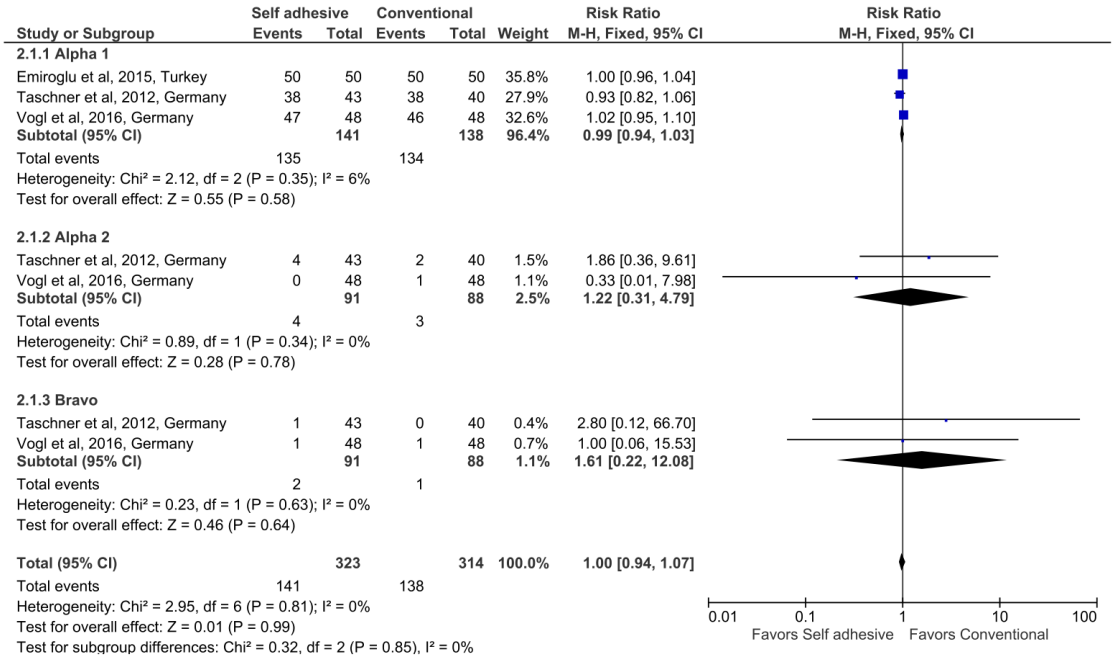

Figure 3. Forest plots of restoration integrity (95% confidence interval). A, Baseline.

3. B)

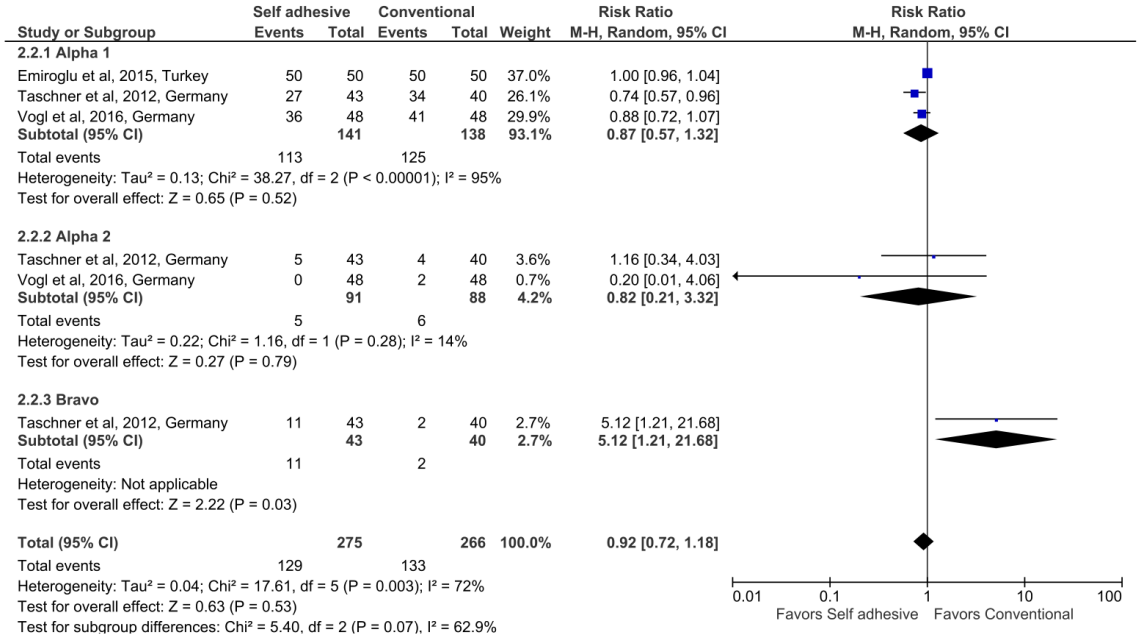

Figure 3. Forest plots of restoration integrity (95% confidence interval). B, After 1 year.

4. A)

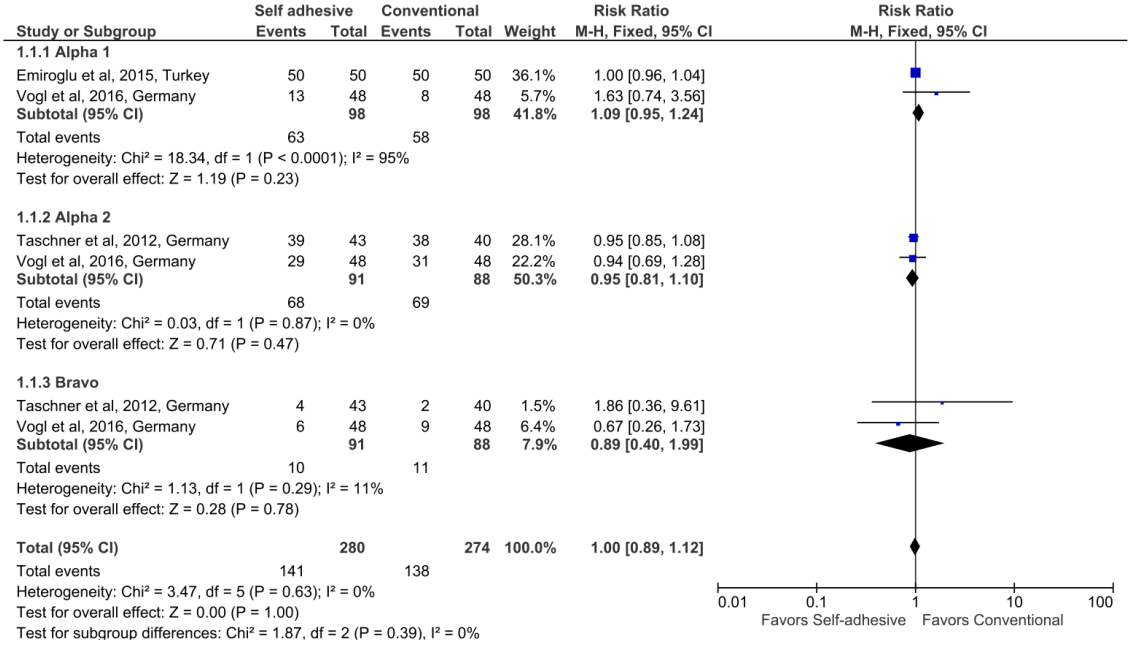

Figure 4. Forest plots of tooth integrity (95% confidence interval). A, Baseline.

4. B)

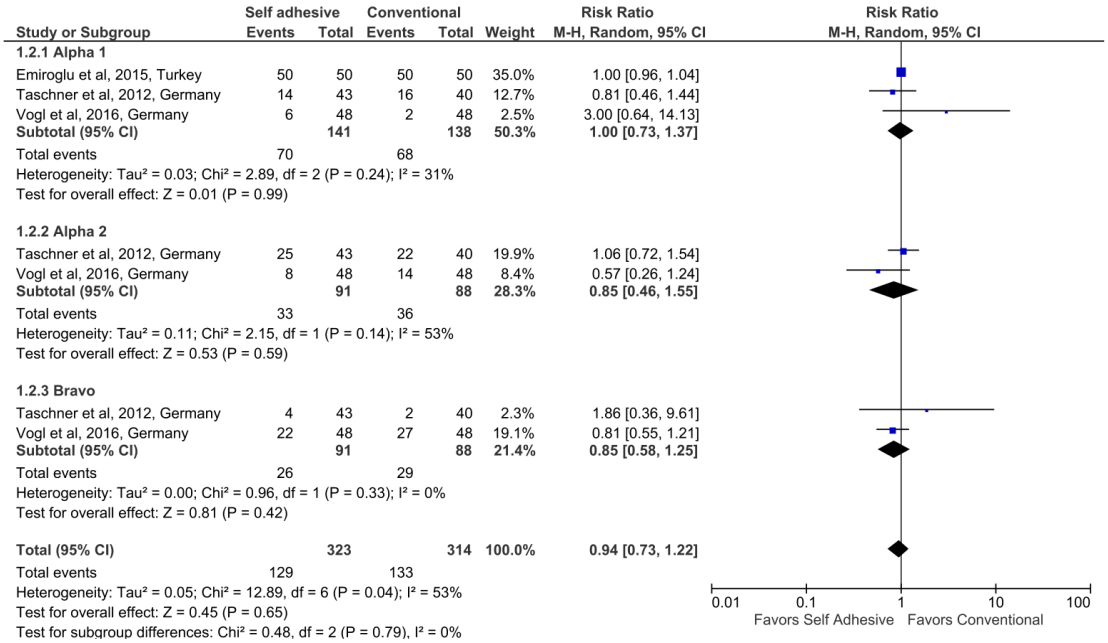

Figure 4. Forest plots of tooth integrity (95% confidence interval). B, After 1 year.

ANEXOS

APRESENTAÇÕES

Este trabalho foi apresentado nos seguintes eventos:

1. XXI Jornada Odontológica da Universidade de Brasília, em maio de 2018, onde foi premiado em primeiro lugar na categoria “revisões”;

2. I Seminário Internacional de Pesquisa em Saúde, em setembro de 2018;

3. 35ª Reunião Anual da Sociedade Brasileira de Pesquisa Odontológica, em setembro de 2018;

4. 24º Congresso de Iniciação Científica da UnB e 15º Congresso de Iniciação Científica do DF, Universidade de Brasília, em setembro de 2018, onde foi indicado a prêmio destaque e obteve menção honrosa.

ARTIGO ORIGINAL

Este trabalho de conclusão de curso resultou na publicação de um artigo, cujos direitos foram parcialmente cedidos à Elsevier, pela The Journal of Prosthetic Dentistry.

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