



Journal Homepage: -www.journalijar.com
**INTERNATIONAL JOURNAL OF
 ADVANCED RESEARCH (IJAR)**

Article DOI:10.21474/IJAR01/5256
 DOI URL: <http://dx.doi.org/10.21474/IJAR01/5256>



REVIEW ARTICLE

COMPOSITE RESIN OR COMPOMER FOR THE RESTORATION OF PRIMARY MOLARS: A SYSTEMATIC REVIEW.

Maha Moussa Azab¹, Dalia Mohamed Moheb², Osama Ibrahim El Shahawy² and Mervat Rashed³.

1. Ass. Lecturer, Department of Pediatric Dentistry, Faculty of Dentistry, Fayoum University.
2. Ass. Professor, Department of Pediatric Dentistry, Faculty of Dentistry, Cairo University.
3. Professor, Department of Pediatric Dentistry, Faculty of Dentistry, Cairo University.

Manuscript Info

Manuscript History

Received: 23 June 2017
 Final Accepted: 25 July 2017
 Published: August 2017

Key words:-

Composite, compomer, primary molars.

Abstract

The present systematic review was performed to evaluate the clinical performance of composite resin and compomer; when used in restoration of primary molars. Search in literature was performed in PubMed, Cochrane Library, Scopus, and Embase databases, up to the 30th of November 2016 to identify relevant studies. Randomized control trials evaluating both restorative materials; were exclusively included. In vitro studies, animal studies, case series, case reports, and cohort studies were excluded. From the 190 different screened articles; 4 experiments were included in the review. The current review concluded that the clinical performance of both composite resin and compomer restorations; is acceptable, indicating no superiority of either restorations. Although, further studies are required to develop stronger evidence.

Copy Right, IJAR, 2017, All rights reserved.

Introduction:-

Due to the controversy about the safety of using dental amalgam (1-4); efforts have been directed to try variable materials for the replacement of amalgam restoration even when esthetics is not the primal concern. Although, more than one restorative material was esthetically pleasant, the problem was usually related to the durability and longevity of variable restorations being compared to dental amalgam (5,6).

Of the variable restorative options available, there is no yet clear evidence about the superior restoration, and the choice is usually done depending on availability or personal preference of the dentist (7,8).

From the perspective of evidence-based dentistry, whenever applicable, randomized controlled trials have been considered the best approach for evidence research related to clinical practice (9).

Thus, the present review aimed to compare the clinical performance of composite with that of compomer when used in class I and class II restorations in primary molars. The null hypothesis was that there is no difference among restorative materials.

Materials and methods:-

Corresponding Author: - Maha Moussa Azab.

Address: - Ass. Lecturer, Department of Pediatric Dentistry, Faculty of Dentistry, Fayoum University.

This systematic review was carried out according to the Cochrane Collaboration methodology as described in the Cochrane Handbook for systematic reviews of interventions (10).

PICO question:-

Types of participants: Patients of either or both sexes, aged less than 14 years, with carious primary posterior tooth or teeth, without pulp involvement. Interventions: Primary molars with class I or II cavities that were restored with composite resin restoration. Control: Primary molars with class I or II cavities that were restored with compomer restoration. Outcome measures: Secondary caries is the primary outcome, marginal adaptation is the secondary outcome.

Information sources and search strategy:-

To identify relevant published studies; PubMed, Cochrane Library, Scopus, and Embase databases were searched up to the 30th of November 2016 to identify studies to be considered for this review. Reference lists of identified studies and relevant reviews were further examined in attempt to identify studies not identified during electronic search. The search strategy included appropriate keywords, and Mesh terms when applicable; combined with Boolean operators “AND”, “OR” and “NOT”.

The search string for PubMed were as follows, (((((((Tooth, Deciduous[MeSH Terms]) OR deciduous teeth[Text Word]) OR deciduous molars[Text Word]) OR primary teeth[Text Word]) OR primary molars[Text Word]) OR baby teeth[Text Word]) OR milk teeth[Text Word])) AND (((((((((((composite resins[MeSH Terms]) OR composite resin[Text Word]) OR composite resins[Text Word]) OR composite restoration[Text Word]) OR composite restorations[Text Word]) OR composite resin restoration[Text Word]) OR composite resin restorations[Text Word]) OR dental composite[Text Word]) OR dental composites[Text Word]) OR composite filling[Text Word]) OR Composite fillings[Text Word]) OR Composite filling material[Text Word]) OR Composite filling materials[Text Word])) AND (((((((compomers[MeSH Terms]) OR compomer[Text Word]) OR compomers[Text Word]) OR polyacid modified composite resin[Text Word]) OR polyacid modified composite resins[Text Word])).

The eligibility criteria were as follows:-

Inclusion Criteria:-

1. Randomized controlled trials comparing the clinical performance of composite resin and compomer class I and class II restorations in primary molars.
2. Follow up for at least 12 months.
3. There was no language restriction.

Exclusion criteria:-

1. In vitro and animal studies.
2. Case reports or case series.
3. Studies carried on permanent teeth or anterior teeth.
4. Studies carried on pulp treated teeth.
5. Studies where composite or compomer were used as atraumatic restorative treatment, and minimal intervention treatment.
6. Studies where chemico-mechanical caries removal techniques were used.

Screening and selecting:-

The titles of the articles resulted from the electronic search were screened first followed by the abstracts. Articles with eligible titles and abstracts were read in full text to confirm they are meeting the eligibility criteria. Disagreements at each stage were resolved through discussion among authors.

Quality assessment (Risk of bias of individual studies):-

The Cochrane risk of bias tool was used to evaluate risk of bias of included studies (11). Discussions among authors were used to reach consensus in case of disagreements.

A study was classified as having low risk of bias if it had: no selection bias regarding random sequence generation, and allocation concealment; no performance bias regarding unawareness of participants and personnel about the type of intervention; no detection bias regarding unawareness of examiners about the type of intervention; no

reporting bias regarding avoiding selective reporting; no attrition bias regarding complete outcome data regarding number of participants and follow-up period. If any of these criteria was at unclear risk, the study was considered to have unclear risk of bias. If any of these criteria was at high risk, the study was considered to have high risk of bias (10).

Results:-

Searching databases yielded 190 different articles. After screening of titles and abstracts, 9 articles were suggested for full text reading (12-20). Based on full texts reading, 4 articles (12-15) were excluded with reasons (Table 1). no additional articles were revealed as a result of hand searching of the reference lists. Consequently, 5 studies were identified eligible for inclusion in this systematic review (16-20). Of the 5 articles, 2 of which (17,18) described the same trial with different follow-up time. After combining these studies, 4 clinical studies remained.

Table 1:- Studies excluded with reasons, after full-text reading.

Study	Reason for exclusion
(HSE & WEI., 1997) (12)	Include class V restorations with no clear data for each class
(Attin <i>et al.</i> , 1998) (13)	Papers reporting the same study. Involve endodontic treated teeth and retreated teeth
(Attin <i>et al.</i> , 2000) (14)	
(Attin <i>et al.</i> , 2001) (15)	

Data extraction:-

Study design, evaluation periods, and location of experiments:-

All 4 studies were split mouth randomized control trials, with evaluation periods ranging from 18 months (20), 24 months (16,17,19), to 48 months (18), two experiments were conducted in brazil (16-18), and two in turkey (19,20).

Type of cavities:-

Two studies were conducted exclusively on class II cavities (19,20), and 2 studies were conducted on class I and class II cavities (16-18).

Rubber dam:-

All 4 studies used rubber dam during restoration placement (16-20).

Age range:-

All patients in all 4 experiments ranged between 3-9 years (16-20).

Assessment criteria:-

Two experiments (16-18) used United States Public Health Service USPHS criteria while the other two (19,20) used World Dental Federation FDI criteria

Study outcomes results:-

Both primary and secondary outcomes were reported in all four included experiments (16-20).

In Pascon *et al.*, 2006 (16); for the marginal adaptation outcome, after 24 months, 41% of the composite group; developed crevice to be caught by a blunt explorer, while 31% and 27% of the 2 compomer groups had similar crevices. Statistically significant differences were found between one compomer group and composite resin group at the 12-month recall for marginal adaptation ($p=0.04$), and between the other compomer group and composite group at 12-month recall for secondary caries ($p=0.03$), where compomer showed better performance in both cases.

In Dos Santos, *et al.*, 2009 and Dos Santos *et al.*, 2010 (17,18); although results were not very clearly displayed; authors stated that in composite resin group; 11 out of 44 (25%) failed due to recurrent caries and marginal adaptation, while in compomer group ($n=51$); 2 class I cases failed due to recurrent caries and marginal adaptation, and 6 class II cases failed due to recurrent caries. The authors equally recommend the use of both materials.

In Sengul & Gurbuz, 2015 (19); failure due to recurrent caries was 2.5 % for composite resin, 7.5 % for giomer and 11.1% for compomer groups, while failure due to marginal adaptation was 5.5% for composite resin, 5.6% for giomer and 19.4% for compomer groups.

In Bektas Donmez et al., 2016(20); for the composite resin group; after 12 months 7% of cases showed recurrent caries, they were repaired and remained caries free for the 18 months follow up but other 7% got recurrent caries, while the compomer group showed no cases of recurrent caries along the 18 months follow up period of the study. For the marginal adaptation outcome; the composite resin group 34.5 % showed detectable gaps after 18 months while for the compomer group; only 10 % showed detectable gaps after 18 months. the authors concluded that the clinical performance of compomer is superior to resin composite

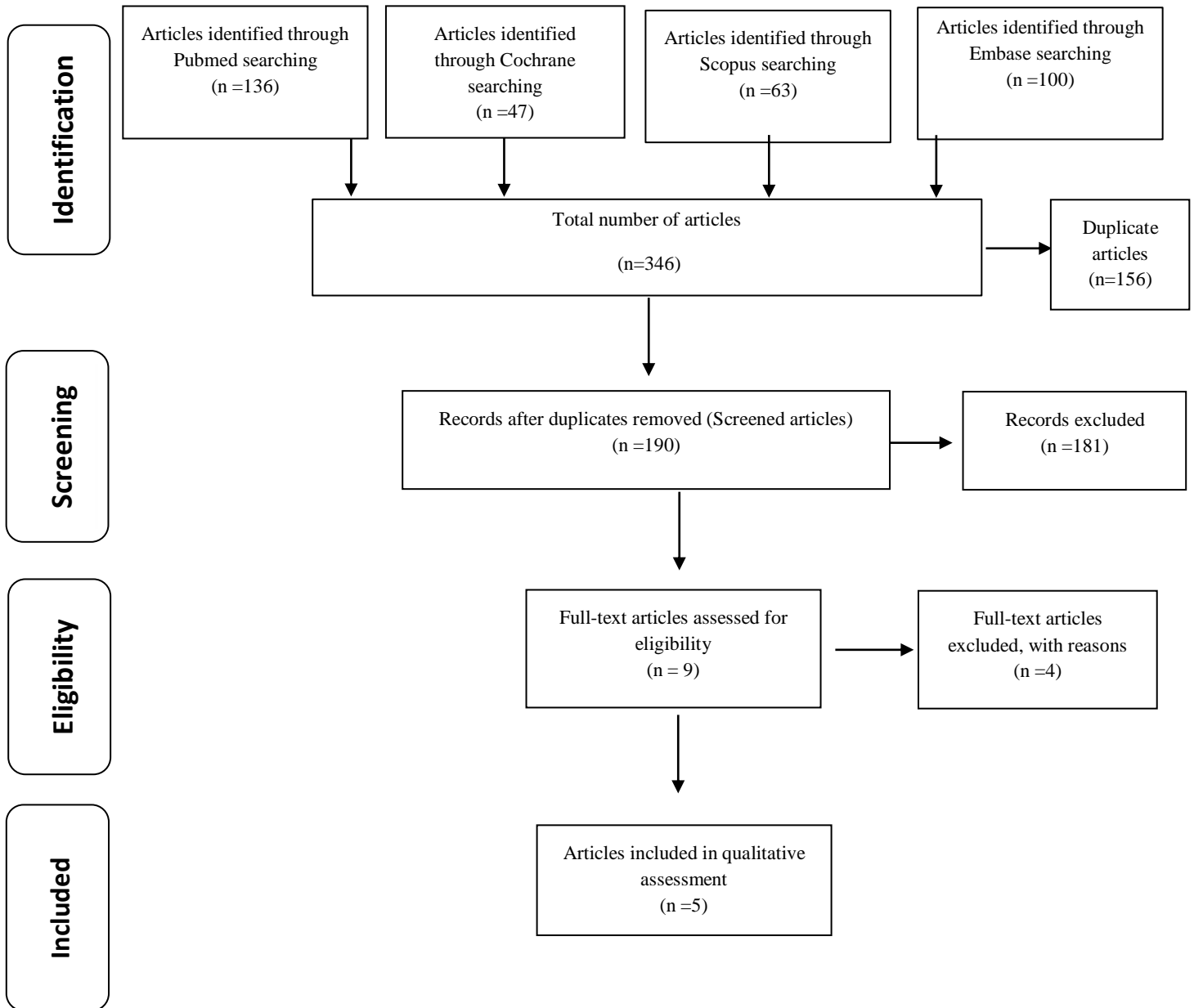


Fig 1:- PRISMA flow chart explaining the searching process.

Table 2:- Overview of the included studies and characteristics processed for data extraction.

Study	(Pascon et al., 2006) (16)	(Dos Santos, et al., 2009) and (Dos Santos et al., 2010) (17,18)	(Sengul & Gurbuz, 205) (19)	(Bektas Donmez et al., 2016) (20)
Country	Brazil	Brazil	Turkey	Turkey
Study design	Split mouth	Split mouth	For each patient, similar lesions were chosen to place the restorations.	Split mouth
Participants	30	48	41	31
Age (years)	4-9	3-9	5-7	4-7
Restorations	79	141	146	93
Class	Class I & II	Class I & II	Class II	Class II
Restorative Materials	Composite resin (Heliomolar), Compomer (F2000), Compomer (Dyract AP)	RMGIC (Vitremer), Compomer (Freedom), Composite Resin (TPH Spectrum)	Hybrid composite (Valux Plus), RMGIC (GC Fuji II LC), Compomer (Dyract AP), Giomer composite (Beautiful)	RMGIC (Photac-fil Quick), Compomer (Dyract eXtra), Composite (Esthet-X HD)
Bevel	No	Yes (not on gingival margins)	no	No
Rubber Dam	yes	yes	yes (placed after cavity preparation)	yes
Base/ liner in deep cavities	No	calcium hydroxide	NA	calcium hydroxide liner and light-cured glass ionomer cement
Follow up	6, 12, 18, 24 m	12, 24, 36, 48m	24 m follow-up period, including 3-m clinical and 6-m radiographical evaluation periods	6,12,18 m
Restorations at last follow up	60	114	146 One tooth shed at 2 m and was considered success	87
In vivo outcomes	USPHS criteria: - secondary caries - marginal adaptation - marginal discoloration - anatomic form - color match (CM)	USPHS criteria - secondary caries - marginal adaptation - cavo-surface discoloration - anatomic form - axial contour - proximal contact visible plaque index	FDI- criteria: esthetic, functional, and biological	FDI- criteria: esthetic, functional, and biological

RMGIC: Resin modified glass ionomer cement

Table (3):- Quality assessment.

Study	Sequence generation	Allocation concealment	Performance bias	Detection bias	Attrition bias	Reporting bias	other
(Pascon et al., 2006) (16)	Low risk	Unclear risk	Low risk	Low risk	Low risk	Unclear risk	Low risk
Dos Santos, et al., 2009 and Dos Santos et al., 2010 (17,18)	Low risk	Low risk	Low risk	Low risk	Low risk	High risk	Low risk
Sengul & Gurbuz, 2015 (19)	Unclear risk	Unclear risk	low risk	Low risk	Low risk	Unclear risk	Low risk
Bektas Donmez et al., 2016 (20)	Low risk	Unclear risk	Low risk	Low risk	Low risk	Unclear risk	Low risk

Quality assessment:-

Was based on the estimated potential risk of bias (Table:3). Three studies showed unclear risk of bias (16,19,20), and one study showed high risk of bias (17,18).

Discussion:-

Selection of esthetic restorative material for primary posterior molars presents a confusing clinical situation. The current systematic review high lightened the present evidence on the clinical performance of two of the commonly used materials; composite resin and compomer; and the effect of using each material on secondary caries and marginal adaptation.

Composite resin and compomer restorations have become commonly used for the restorations of primary and permanent, anterior and posterior teeth. They are demanded by patients and parents to provide esthetic restorations for their children, and used by dentists due to their conservative approaches in cavity preparation and more than average physical and mechanical properties. Compomer restorations also benefits from the added advantage of fluoride release and caries inhibiting property (21).

The four experiments included evaluated 180 composite restorations and 170 compomer restorations.

Similarities and variables in studies was monitored, regarding the study design (parallel or split-mouth), the follow up periods, the type of cavity (class I or class II), the number, and age of the participating patients, the number of restorations placed, the use of rubber dam, presence of bevels in preparations.

The selection of outcomes in this review was done depending on the fact that failures in adhesive restorations occurs mainly due to secondary caries, then poor marginal adaptation (17,22,23).

Taking in consideration that none of the included studies showed (low risk of bias), and the fact that meta-analysis was not feasible due to the use of different criteria in studies and the results are displayed in different ways in different experiments; the results of the present systematic review show no clear superiority of one restoration to another regarding the selected outcomes.

This finding, may be due to the fact that recurrent caries and marginal adaptation failures may occur due to issues in bonding system, cavity design and practitioner's performance (22) rather than with the restorative material itself.

Conclusion:-

Within the limitation of the available literature; the current review concluded that the clinical performance of both composite resin and compomer restorations, in class I and class II cavities, in primary molars; is acceptable. However, the limited number and quality of studies is not providing a clear-cut evidence on the superiority of either materials. Further studies are required to develop that evidence, with more attention on study methodology in terms of elimination of risk of bias, clear display of results and adequate choice of investigating criteria.

References:-

1. United State Department of Health and Human Services, Public Health Service. Dental amalgam. A scientific review and recommended Public Health Service strategy for research, education, and regulation: final report of Subcommittee on Risk Management. Washington, D.C.: Department of Health and Human Services, Public Health Service; January 1993.
2. FDI World Dental Federation and World Health Organization. Consensus statement on dental amalgam. FDI World 1995;4(4):9-10.
3. Widstrom E, Birn H, Haugejorden and Sundberg H. Fear of amalgam: dentists' experiences in the Nordic countries. *Int Dent J* 1992; 42:65-70.
4. FDI World Dental Federation. The amalgam story continues. FDI World 1994;3(4):13-6.
5. Soncini J, Maserejian N, Trachtenberg F, Tavares M and Hayes C. The longevity of amalgam versus compomer/composite restorations in posterior primary and permanent teeth Findings from the New England Children's Amalgam Trial. *J Am Dent Assoc.* 2007;138(6):763-72.
6. Duggal M, Tumba J and Sharma N. Clinical performance of a compomer and amalgam for the interproximal restoration of primary molars: a 24-month evaluation. *Br Dent J.* 2002; 193: 339-42.
7. Toh S and Messer L. Evidence-based assessment of tooth-colored restorations in proximal lesions of primary molars. *Ped Dent.* 2007; 29(1): 8-15.
8. Daou M, Tavernier B and Meyer J. Clinical evaluation of four different dental restorative materials: one-year results. *Schweiz Monatsschr Zahnmed.* 2008; 118(4): 290-5.
9. Mjor I. Controlled clinical trials and practice-based research in dentistry. *J of Dent Res.* 2008; 87:800.
10. Higgins J, Green S: Cochrane handbook for systematic reviews of interventions. Available at: <http://cochrane-handbook.org/>, Version 5. The Cochrane Collaboration; 2011.
11. Higgins J, Altman D, Gøtzsche P, Jüni P, Moher D, Oxman A, *et al.* The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *BMJ* 2011; 343: d5928.
12. Hse KM and Wei SH. Clinical Evaluation of Compomer in Primary Teeth: 1-Year Results. *J Am Dent Assoc.* 1997; 128(8): 1088-96.
13. Attin T., Opatowski A., Meyer C., Zingg-Meyer B., and Hellwig E. Clinical evaluation of a hybrid composite and a polyacid-modified composite resin in Class-II restorations in deciduous molars. *Clinic Oral Invest.* 1998; 2(3): 115-9.
14. Attin T, Opatowski A., Meyer C, Zingg-Meyer B, and Mönting J. Class II restorations with a polyacid-modified composite resin in primary molars placed in a dental practice: results of a two-year clinical evaluation. *Oper Dent.* 2000; 25(4): 259-64.
15. Attin T, Opatowski A, Meyer C, Zingg-Meyer B, Buchalla W, and Mönting, J. Three-year follow up assessment of Class II restorations in primary molars with a polyacid-modified composite resin and a hybrid composite. *Am J of Dent.* 2001; 14(3): 148-52.
16. Pascon F, Kantovitz K, Caldo-Teixeira A, Borges A, Silva T, Puppini-Rontani R, and Garcia-Godoy F. Clinical evaluation of composite and compomer restorations in primary teeth: 24-month results. *J Dent.* 2006; 34(6): 381-8.
17. Dos Santos M, Passos M, Luiz R, and Maia L. A randomized trial of resin-based restorations in class I and class II beveled preparations in primary molars: 24-month results. *J Am Dent Assoc.* 2009; 140(2): 156-66.
18. Dos Santos M, Luiz R, and Maia L. Randomised trial of resin-based restorations in Class I and Class II beveled preparations in primary molars: 48-Month results. *J of Dent.* 2010; 38(6): 451-9.
19. Sengul F and Gurbuz T. Clinical Evaluation of Restorative Materials in Primary Teeth Class II Lesions. *J Clin Pediatr Dent.* 2015; 39(4): 315-21.
20. Bektas Donmez S, Uysal S, Dolgun A, and Turgut M. Clinical performance of aesthetic restorative materials in primary teeth according to the FDI criteria. *Eur J Ped Dent.* 2016; 17(3): 202-12.
21. Garcia-Godoy F. Resin-based composites and compomers in primary molars. *Dent Clin North Am.* 2000; 44:541-70.
22. Hickel R, Kaaden C, Paschos E, Buerkle V, Garcia-Godoy F and Manhart J. Longevity of occlusally-stressed restorations in posterior primary teeth. *Am J Dent* 2005;18(3):198-211.
23. Goldberg J, Tanzer J, Munster E, Amara J, Thal F and Birkhed D. Cross-sectional clinical evaluation of recurrent enamel caries, restoration of marginal integrity, and oral hygiene status. *J Am Dent Assoc* 1981;102(5): 635-41.