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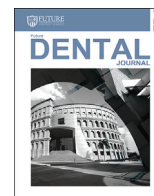
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Success of Early Childhood Caries After Treatment with Silver Diamine Fluoride Compared to conventional Glass Ionomer Restoration. A Systematic Review

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ABSTRACT

Aim: To compare the success rate regarding esthetics, parenteral satisfaction, and oral health related quality of life (OHRQoL) after treatment of early childhood caries with Silver Diamine Fluoride (SDF) compared to conventional Glass ionomer Restoration (CGI). **Materials and Methods:** We conducted a systematic review following PRISMA statement by searching on the following electronic databases: PubMed, Cochrane. **Results:** From the studies included in this systematic review, two studies showed significant difference in color stability between SDF and CGI. Two studies showed no significant difference in parental satisfaction with either SDF or Glass Ionomer. Regarding the Oral Health Related Quality of Life, two studies showed no significant difference with both materials. **Conclusion:** The use of SDF is a more conservative way to treat early childhood caries than the drill and fill way using glass ionomer. SDF causes discoloration and is less color stable than the GIC, it is recommended to use SDF followed by delayed restoration with GIC or resin composite for best esthetics and conservatism. Every effort should be directed towards parents' education on the importance of non- invasive treatment.

1. INTRODUCTION

Dental caries has many clinical symptoms such as pain and discoloration. It also has social, psychological and economic effects on the child's family. ¹

In primary teeth a specific form of caries is considered a highly prevalent disease and is named early childhood caries (ECC). This disease is a worldwide burden for the children and their families. This disease has important causative factors: dietary sugars, wrong feeding habits, poor parental education, socioeconomic conditions, and low family income. Traditionally, dental tissue destruction occurred while removing tooth decay, but minimally invasive procedures including the use of silver diamine fluoride (SDF) and glass ionomer restorations (GI) are now considered among many new alternative treatment options. ²

Treatment with SDF which is considered a non-invasive treatment is growing more popular by the day. However, SDF has a major disadvantage, the black staining after caries arrest. Even though this black staining is also a sign of caries arrest, it is still unaesthetic and may not be acceptable to parents. ¹

Therefore, comparison between the success of conventional glass ionomer versus that of SDF in terms of oral health related quality of life (OHRQoL), color change and parental satisfaction was evaluated.

2. MATERIALS AND METHODS

PRISMA checklist for reporting systematic reviews and meta-analysis was used as a guide for this systematic search.

In order to develop the search strategy of this study, a focused question was first formulated.

PICO model:

P: Unsatisfactory esthetics associated with early childhood caries management

I: Management using SDF

C: Conventional Glass Ionomer restoration

O: Success (OHRQoL, color and parent satisfaction).

Search Strategy:

The search was conducted using two electronic databases: PubMed, and Cochrane, for each database detailed search was performed aiming to find articles evaluating the success of treatment of early childhood caries with SDF compared to Conventional Glass Ionomer regarding (OHRQoL), color and parental satisfaction.

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The main search terms used for this systematic search are:

PubMed: (parental satisfaction) AND (esthetics) AND (teeth) AND (childhood) OR (SDF) AND (glass ionomer)

Cochrane: (Caries) AND (childhood) AND (SDF) OR (glass ionomer) AND (esthetics) AND (parental satisfaction) AND (teeth).

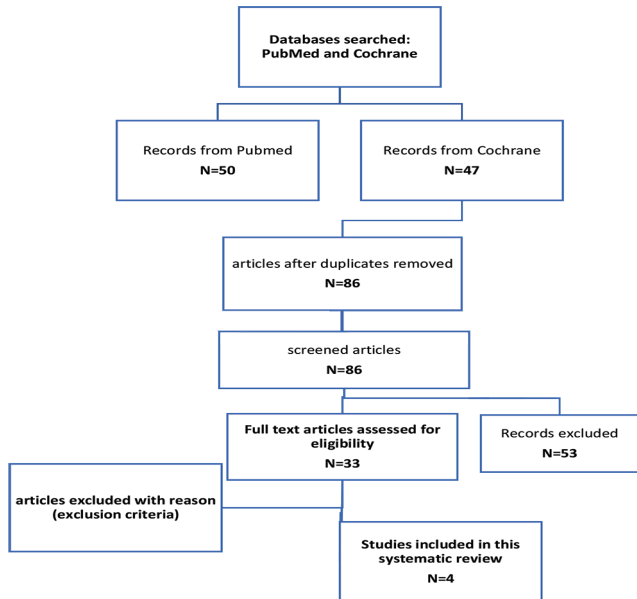


Figure (1) — PRISMA

Eligibility Criteria

1. *Inclusion criteria:*

- Studies on Early childhood caries in primary dentition.
- Studies on Treatment with SDF and Glass ionomer Cement.
- Studies measuring success of treatment through Parental Satisfaction.
- Studies measuring success of treatment through Color stability.
- Studies measuring success of treatment through (OHRQoL).

2. *Exclusion Criteria*

- Studies on Prevention using SDF.
- Studies measuring bond Strength.
- Studies conducted on Young Permanent teeth.
- Systematic reviews or reviews in general.

Data Extraction:

Data collection was then performed, the information assessed included patient characteristics (age) / Intervention with SDF/ Control with Glass ionomer /Success measured by (OHRQoL), color change and Parental satisfaction. (table1).

Table (1): Materials and Methods

Author, year	Study design	Age	SDF	Glass Ionomer	Success		
					Color change	Parental satisfaction	(OHRQoL)
Jiang et al ¹ (2020)	RCT	Preschool children 3- 4 years	Yes	N/A	N/A	Yes	Yes
Zhi et al ² (2012)	RCT	Age 3-4 years	Yes	Yes	Yes	Yes	N/A
Ruff et al ³ (2022)	RCT	Average age of 8.7 years	Yes	Yes	N/A	N/A	Yes
Alsagob et al ⁴ (2022)	In-vitro	N/A	Yes	Yes	Yes	N/A	N/A

Risk of bias:

Four domains of bias were assessed. (table 2)

Table (2): Risk of Bias

Author, year	Selection Bias	Performance Bias	Detection Bias	Attrition Bias
Jiang et al ¹ (2020)	Yes	Yes	Yes	No
Zhi et al ² (2012)	No	Yes	No	Yes
Ruff et al ³ (2022)	Yes	No	No	Yes
Alsagob et al ⁴ (2022)	No	Yes	Yes	No

3. RESULTS

The final search resulted in a total of 97 articles. After removal of duplicates 86 articles were screened primarily by titles and abstracts, this gave 33 articles for secondary screening by full text evaluation, finally 4 studies met the inclusion criteria and so were included in this systematic review.

Table (3): Results

Results Author, year	Significant difference		
	Color Stability	Parental Satisfaction	(OHRQoL)
Jiang et al ¹ (2020)	N/A	No	No
Zhi et al ² (2012)	Yes	No	N/A
Ruff et al ³ (2022)	N/A	N/A	No
Alsagob et al ⁴ (2022)	Yes	N/A	N/A

Jiang et al¹ compared parental satisfaction and OHRQoL in three groups. The groups were a placebo group, an SDF group and a non-cariou group. Higher parental satisfaction scores were recorded in the caries-free group compared to SDF and placebo groups, but no significant difference was found between the SDF and placebo groups.

Over 90% of parents in the caries-free group never showed adverse effect on either the child or his family, this was related to *Early Childhood Oral Health Impact Scale* (C-ECOHis). 70% of the parents of children with decayed teeth reported that their children never had pain either in their teeth, mouth, or jaws, while 2.4% and 3.9% of the parents in SDF and placebo groups mentioned “often or very often pain”, respectively.

Zhi et al compared the color stability of arrested lesions after at 24 months of application of SDF and GI, they found that, regarding SDF all cases except one were black in color, while regarding GI most of the lesions were yellow/brown in color, and only half of the parents were satisfied with their childrens’ teeth.²

According to **Ruff et al**, comparison was studied between children with untreated decay receiving silver diamine fluoride and those receiving regular sealants and atraumatic restorations (ART) concerning oral health care quality of life. They found that those receiving regular sealants and ART showed enhancement in their oral health care quality of life.³

Finally, for **Alsagob et al**, after comparing between applications of SDF alone (group 1), SDF followed immediately by GIC or composite restorations (groups 2&3 respectively) and SDF followed by a delayed restoration with composite or GIC (groups 4&5 respectively) they concluded that, color change between baseline (BL) and till 4 weeks (T4), was statistically significant. In groups 4 and 5 compared to groups 1, 2, and 3, color change from baseline and till 4 weeks was statistically significantly lower. At T4, Groups 4 and 5 showed the least change in color from BL, and neither group 4 nor group 5 showed any better results in lack of color change from BL to T4. So, they concluded that applying SDF after two weeks showed significantly less discoloration compared to immediate application in caries-infected teeth.⁴

4. DISCUSSION

SDF is a non- invasive treatment for dental caries, it has preventive effects and acts as an arresting agent, but although it arrests dentine caries, it does not lead to an improvement in parental satisfaction because the cavity will still be there and not filled. That’s why every effort should be directed towards educating parents into accepting the non-invasive treatment and also applying a tooth-colored filling materials after SDF application in order to elevate the esthetics, the overall parental satisfaction as well as the OHRQoL.⁵

Concerning discoloration resin composite and GIC restorations gave the same results when used after SDF application in carious teeth; with immediate restoration after SDF application, resin composite was better than GIC, however, with delayed restoration after two weeks of SDF application, both materials gave the same results with less discoloration.⁴

When the use of SDF with arrested lesion is not accepted due to its taste or blackening flowable glass ionomer is an alternative especially for anterior teeth, but parental satisfaction is similar because parents are not concerned about the color of the arrested lesions. Application of flowable glass ionomer compared to SDF, is less costly, needs less skillful operator and shorter treatment time, so it is more practical to apply glass ionomer in dental clinics.

In children the degree of treatment complexity affects the *Early Childhood Oral Health Impact Scale* (ECOHis), endodontic treatment or tooth extraction show greater changes in ECOHis compared to non-invasive treatment. When we compare OHRQoL of children seeking dental treatment

and the general child population we will find poorer oral health and worse OHRQoL with the treated children.¹ All previous explained why children treated with SDF did not have elevated ECOHis scores after treatment.

OHRQoL improved following treatment with either SDF or sealants/ART, moreover SDF treatment did not lead to a worse impact on OHRQoL compared to ART/sealants. These results were consistent in multiple studies using SDF compared to alternative treatments (ART, fluoride varnish, or even placebo). SDF is more efficient as a pragmatic treatment for caries (applied in significantly less time and does not require the same degree of clinical skill) compared to ART.³

5. CONCLUSION

Under the limitations of the study, the following could be concluded:

- The use of SDF is a more conservative way to treat early childhood caries than the drill and fill way using glass ionomer.
- SDF causes discoloration and is less color stable than the GIC.
- It is recommended to use SDF followed by the delayed restoration with GIC or resin composite restoration to achieve the best esthetics as well as conservatism.
- The use of a tooth-colored restorative material after application of SDF is essential for the improvement of parental satisfaction.
- Every effort should be directed towards parents’ education on the importance of non- invasive treatment.

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