



Parents' acceptance of minimal intervention procedures for dental caries management in children: a scoping review

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Abstract

Purpose In recent years, minimal intervention procedures (MIPs) for treating dental caries in children have stood out as an innovative method. Nevertheless, the treatment decision should be based on scientific evidence, professional expertise, and parents' preference/acceptance. Evaluating the acceptance of MIPs by parents is an essential factor, but little information is available on what guides this preference.

Methods This scoping review aims to synthesize the evidence on parents'/caregivers' acceptance of MIP for managing cavitated caries lesions in children. A search was performed in the PubMed, Cochrane Library, Lilacs and Google Scholar databases with no restriction on date or language.

Results A total of 19 articles were selected (6 clinical trials, 1 longitudinal and 12 cross-sectional studies). The application of silver diamino fluoride (SDF) was the most commonly evaluated procedure ($n = 17$), followed by the atraumatic restorative technique (ART) and the Hall Technique (HT). The acceptance of MIPs ranged from 1.4% to 100%, and the application of SDF was better accepted in posterior teeth and in uncooperative children. ART had better aesthetic acceptance than HT.

Conclusion Application of SDF, Hall Technique and ART was well accepted by parents/caregivers. However, a gap remains in the literature regarding the acceptance of other procedures. Therefore, further studies in this area will contribute toward a better understanding of the opinion of parents/caregivers, and thus improve caries lesion management in children.

Keywords Dental caries · Child · Preschool · Dental care · Tooth · Deciduous · Review

Introduction

Dental caries management has changed over time and is now founded on a better understanding of the mechanism of disease development. Since the publication of the first policy statement on minimal intervention dentistry (MID), the approach to caries lesions has developed to include non-invasive, micro invasive, and minimally invasive strategies that aim to preserve tooth structure that can be remineralized (WHO 2016). The minimally invasive procedures (also known as minimal intervention procedures) (MIPs) recommended in the guidelines and policies for caries lesions management include the application of silver diamine fluoride (SDF) in cavitated lesions, fissure and pit sealants,

non-restorative approaches, and restorations using different techniques and materials, such as atraumatic restorative treatment (ART) with glass ionomer cement, and the Hall Technique (HT) (Corrêa-Faria et al. 2020).

The efficacy of MID-based procedures has been investigated in an increasing number of clinical studies and reviews (BaniHani et al. 2022). An umbrella review evaluated 18 systematic reviews on the management of caries lesions in primary teeth using these procedures and confirmed the efficacy of SDF application, selective removal of carious tissue, and HT and ART techniques in halting the progression of lesions (BaniHani et al. 2022). Results on the effectiveness of MID-based procedures are important for making decisions regarding treatment options and should be considered together with the professional's experience (Rønneberg et al. 2017), and the preference, values and needs of the patient and his family (Jayaraman and Mallineni 2022). However, the number of studies on parents'/caregivers' perception toward MIPs for caries lesion management in children is still limited.

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The evaluation of caries lesion treatment options by patients/caregivers, and their involvement in the decision-making process is an emerging need in pediatric dentistry (Ladewig et al. 2018). Patient-reported outcome measures (PROMS), or outcomes reported by the children's caregivers, are increasingly sought in clinical trials because they allow related therapies to be evaluated by the people with the greatest interest in the treatment (Mendes et al. 2020). Outcomes, such as parent/caregiver acceptance and preference for a certain MIP, have recently been investigated in clinical trials and observational studies, and the results have been summarized in both scoping (Magno et al. 2019) and systematic reviews (Sabbagh et al. 2020; Hu et al. 2022). These reviews have evaluated what guides the acceptance of SDF in primary teeth (Magno et al. 2019; Sabbagh et al. 2020), as well as HT (Hu et al. 2022). The literature has a gap regarding parent/caregiver acceptance of other MIPs and offers a synthesis allowing a comparative evaluation of the acceptance of these procedures, indicated for managing caries lesions in children.

To map and synthesize the scientific evidence on the acceptance of the different MPIs it is desirable to conduct a scoping review. This type of review differs from the systematic one in that it allows the elaboration of a broader question related to heterogeneous topics (Tricco et al. 2018; Munn et al. 2018). From this design, it will be possible to verify and synthesize the literature on the different MIPs.

The aim of this study was to use a scoping review to map and synthesize the evidence on parents' and caregivers' acceptability of MIPs for managing cavitated caries lesions in children and to identify the variables that may affect acceptability.

Material and methods

The scoping review was reported following PRISMA guidelines (Tricco et al. 2018). The study involved the following steps: (1) formulation of the research question; (2) identification of relevant studies; (3) selection of studies; (4) data mapping; (5) grouping, synthesis and reporting of results (Levac et al. 2010). The protocol was registered at the Open Science Framework in December 2022 (<https://osf.io/ujdk3> <https://doi.org/10.17605/OSF.IO/4XNCQ>).

The CoCoPop (condition, context and population) acronym was used to formulate the research question: "To what extent do parents/caregivers accept MIPs for managing cavitated caries lesions in children?" The condition investigated was the use of MIPs to manage cavitated caries lesions in deciduous teeth. The context was the acceptance of MIPs by parents/caregivers, who constituted the population in reference.

Relevant studies on the subject were searched in PubMed, Lilacs, Cochrane Library, OpenGrey through the Dans Easy Archive and Google Scholar electronic databases. The search strategy was developed using terms indexed in the Medical Subject Heading (MeSH) and synonyms and was adapted to each electronic database (Table 1). The search made no restriction to date or language of publication of the studies. The reference lists of the included articles were consulted to identify relevant studies.

The references were managed using Rayyan software (Rayyan—Intelligent Systematic Review) (Ouzzani et al. 2016). Duplicate articles were removed, and the others were evaluated by three researchers, independently and in two stages. In the first stage, the title and abstract of each article were read, and the eligibility criteria, applied. Next, the full text of the articles included in the previous stage was

Table 1 Search strategy

Database	Strategy
PubMed	Dental caries [Mesh] OR "Dental decay" [Title/Abstract] OR "Early childhood caries" [Title/Abstract] OR ECC [Title/Abstract] OR "Tooth decay" [Title/Abstract] OR "Carios lesion" [Title/Abstract] OR Dental atraumatic restorative treatment [Mesh] OR "atraumatic restorative treatment"[Title/Abstract] OR Silver diamine fluoride [Mesh] OR "diamine silver fluoride" [Title/Abstract] OR "silver diamine fluoride"[Title/Abstract] OR "Stainless steel crowns" [Title/Abstract] OR "Hall technique" [Title/Abstract] OR "Hall crown*" [Title/Abstract] OR "preformed metal crown*" [Title/Abstract] OR "non-restorative cavity control"[Title/Abstract] OR "resin infiltration"[Title/Abstract] OR "ICON system" [Title/Abstract] OR "minimal intervention dentistry"[Title/Abstract] OR "minimal intervention"[Title/Abstract] OR "biological treatment*" [Title/Abstract] OR "biological approach*" [Title/Abstract] OR Ultraconservative [Title/Abstract] OR Excavation* [Title/Abstract] OR "caries removal" [Title/Abstract] OR Sealing [Title/Abstract] OR pit and fissure sealants [Mesh] OR Selective [Title/Abstract] OR "Non-selective" [Title/Abstract] OR "non-restorative caries" [Title/Abstract] OR "Non-operative caries" [Title/Abstract] AND ((parents [MeSH] OR parents [Title/Abstract] OR parent [Title/Abstract] OR Parent–Child Relations [Mesh] OR parental [Title/Abstract] OR mothers [MeSH] OR mothers [Title/Abstract] OR mother [Title/Abstract] OR fathers [MeSH] OR fathers [Title/Abstract] OR father [Title/Abstract])) AND ((child [MeSH Terms] OR child [Title/Abstract] OR children [Title/Abstract] OR childhood [Title/Abstract] OR child, preschool [MeSH Terms] OR preschool [TIAB] OR preschools [TIAB] OR pediatrics [MeSH Terms] OR pediatrics [Title/Abstract] OR pediatric [Title/Abstract] OR "paediatrics" [Title/Abstract] OR paediatric [Title/Abstract]) AND (Accepting [tiab] OR acceptance [tiab] OR Patient acceptance of health care [Mesh])

read and evaluated on the inclusion and exclusion criteria. Disagreements among the evaluators were resolved by consensus. The inclusion criteria of the articles were: observational studies (cross-sectional, case-control and cohort) and intervention studies (clinical trials) that investigated the acceptance of parents/caregivers toward the MIPs indicated for managing cavitated carious lesions in deciduous teeth. Guidelines, editorials, case reports, qualitative studies, reviews, animal studies, and in vitro studies were excluded.

Information was extracted from the included articles and then synthesized in a table and text. Details about the study (authors, year, and country of publication), method (study design), participants (number of participants, relationship with the child, age of the children), the MIPs investigated, method of evaluation of acceptance, results on acceptance, associated factors, and conclusion were extracted. When relevant information was not available in the articles, it was requested from the authors by email.

Results

Study selection

The search in the electronic databases resulted in 952 articles and was conducted in January 2023. After the removal of the duplicates, 920 were submitted to the title and abstract evaluation stage. A total of 869 documents were excluded because they did not evaluate the caregivers' acceptance of MIPs for caries lesion management in primary teeth, and 51 were read in full. Of these, 16 were included in the scoping review. A consultation of the reference list of the articles identified 9 documents, 3 of which were included. In the end, 19 articles were included (Fig. 1).

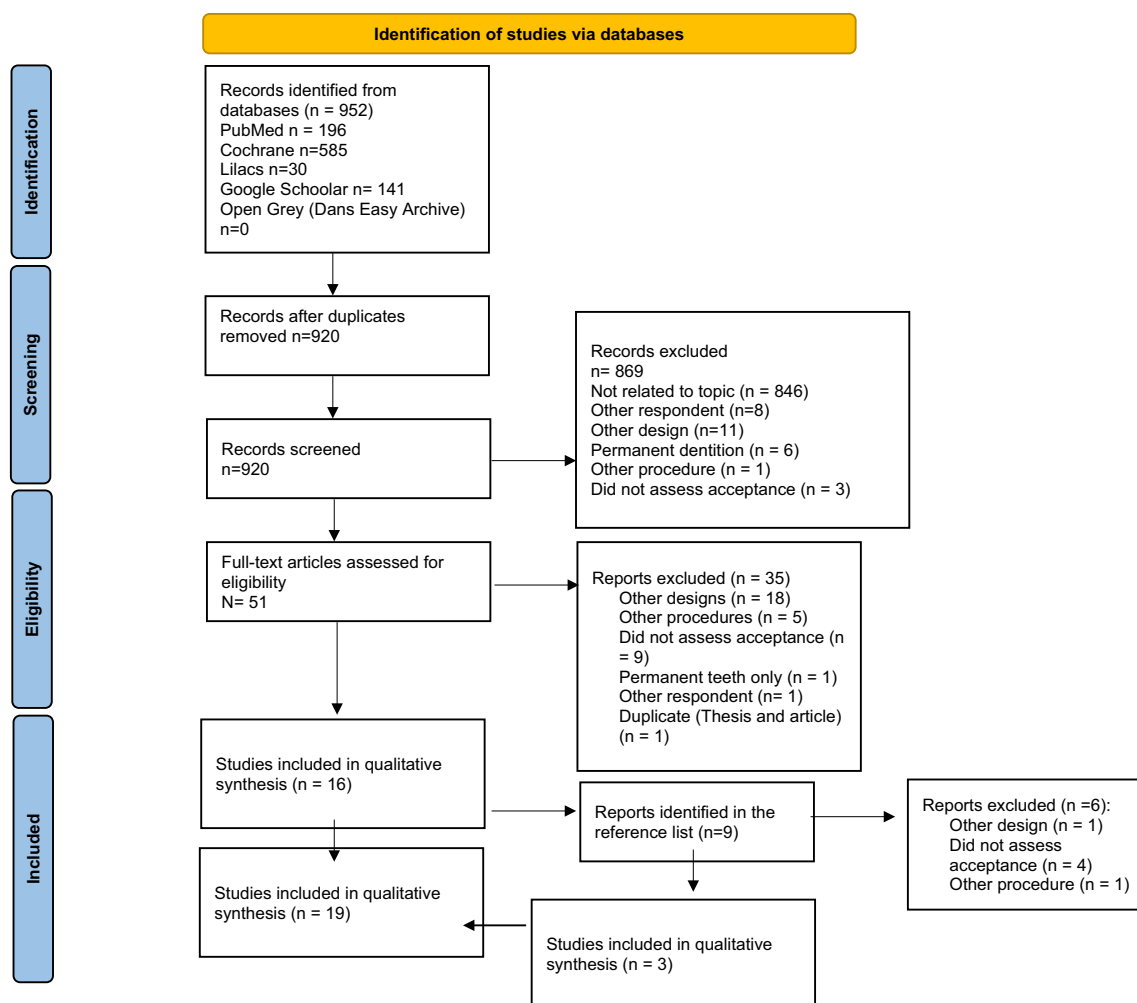


Fig. 1 PRISMA 2020 flow diagram for updated systematic reviews which included searches of databases, registers and other sources

Study characteristics

The studies were conducted in the United Arab Emirates (1), Pakistan (1), Syria (1), Saudi Arabia (4), India (4), Singapore (1), the United States (4), Egypt (2) and Brazil (1). The cross-sectional design was the most frequent ($n = 12$), followed by clinical trials ($n = 6$) and longitudinal studies ($n = 1$). The number of participants ranged from 26 in a longitudinal study (Chaurasiya and Gojanur 2021) to 546 in a cross-sectional study (Kumar et al. 2019). In the clinical trials, the number of participants ranged from 30 (Clemens et al. 2018) to 100 (El-Ghandour et al. 2021). The interventions compared in these trials were ART versus application of SDF (El-Ghandour et al. 2021; Ali et al. 2021), ART versus HT (Araújo et al. 2020), HT versus restoration with resin-modified glass ionomer cement (Thakkar and Jawdekar 2022), and SDF versus conventional restoration (Cleary et al. 2022).

Parent/caregiver acceptance of MIPs was assessed mainly by using a 4- to 5-point Likert scale (Ali et al. 2021; Alshammari et al. 2019; Asif and Guranathan 2020; Bagher et al. 2019; Bassam et al. 2022; Clemens et al. 2018; El-Ghandour et al. 2021; Hu et al. 2020; Thakkar and Jawdekar 2022; Walia et al. 2022). In most studies on the acceptance of SDF application, parents/caregivers were questioned after observing photographs of treated teeth that evidenced the blackening of the tooth structure (Akshitha et al. 2022; Alshammari et al. 2019; Asif and Guranathan 2020; Bagher et al. 2019; Crystal et al. 2017; Salim et al. 2021), and a video (Hu et al. 2020). In 3 cross-sectional studies, parents/caregivers were presented with different scenarios related to the management of the child's behavior toward dental care (Crystal et al. 2017; Akshitha et al. 2022; Walia et al. 2022).

In 7 clinical trials (Clemens et al. 2018; El-Ghandour et al. 2021; Araujo et al. 2020; Ali et al. 2021; Chaurasiya and Gojanur 2021; Bassam et al. 2022; Cleary et al. 2022), acceptance was assessed immediately after treatment (Araujo et al. 2020; Bassam et al. 2022) or in follow-up sessions at 2-week (Clemens et al. 2018; El-Ghandour et al. 2021; Ali et al. 2021) to 12-month intervals (Cleary et al. 2022). The acceptance of parents/caregivers was based on criteria related to the child, such as comfort (Ali et al. 2021), discomfort caused by the procedure (Araújo et al. 2021), pain caused by the procedure (Clemens et al. 2018; Asif and Guranathan 2020), duration of the session (Ali et al. 2021), aesthetic aspect (Alshammari et al. 2019; Ali et al. 2021; Cleary et al. 2022; El-Ghandour et al. 2021; Almarwan et al. 2021; Akshitha et al. 2022; Asif and Guranathan 2020; Bassam et al. 2022), ease in performing the procedure (Clemens et al. 2018; Asif and Guranathan 2020), taste of the product (Clemens et al. 2018; El-Ghandour et al. 2021), how well the restoration could protect the tooth (Araújo et al. 2020), and understanding why treatment is needed (Araújo et al. 2020).

The percentage of acceptance of MIPs ranged from 1.4% (Walia et al. 2022) to 100% (Chaurasiya and Gojanur 2021). In the studies that evaluated SDF application, the acceptance of parents was investigated according to the location of the teeth (Almarwan et al. 2021; Bagher et al. 2019; Bassam et al. 2022; Crystal et al. 2017; Salim et al. 2021; Wajahat et al. 2022; Walia et al. 2022), and to the behavior of the children (Akshitha et al. 2022; Ali et al. 2021; Bagher et al. 2019; Walia et al. 2022). The acceptance of SDF application to anterior teeth ranged from 28.7% (Akshitha et al. 2022) to 57.5% (Ali et al. 2021), versus 55.2% (Almarwan et al. 2021) to 97.5% (Ali et al. 2021) for posterior teeth. In one study, more than 90% of the participants considered SDF application unacceptable for either anterior or posterior teeth (Alshammari et al. 2019).

Acceptance of SDF application was associated with behavioral management problems (Bagher et al. 2019; Hu et al. 2020; Ali et al. 2021; Akshitha et al. 2022), pharmacological techniques indicated for behavior management (Chaurasiya and Gojanur 2021; Akshitha et al. 2022), and location of the teeth to be treated (Akshitha et al. 2022). Socioeconomic factors such as educational level (Crystal et al. 2017; Asif and Guranathan 2020; Walia et al. 2022), income (Crystal et al. 2017; Asif and Guranathan 2020), and treatment costs (Hu et al. 2020) were associated with the acceptance of SDF application.

When SDF was compared with ART, there was better acceptance for SDF regarding treatment duration and comfort (Ali et al. 2021). Acceptance in relation to the aesthetic aspect was similar for both treatments (Ali et al. 2021). In contrast, there was better acceptance of ART in relation to aesthetics than HT (Araújo et al. 2020). HT was investigated in only two of the 19 studies included (Araujo et al. 2020; Thakkar and Jawdekar 2022). When HT was compared with restorations using resin-modified glass ionomer cement, the mean acceptance rate for HT was higher (Thakkar and Jawdekar 2022). The information extracted from the articles has been summarized in Table 2.

Discussion

The objective of the scoping review was to synthesize the evidence on parent acceptance of MIPs for caries lesion management in children. There are a growing number of investigations on MIPs related especially to efficacy (BaniHani et al. 2022). Little is addressed concerning patient-reported outcomes (PRO), despite the emerging need for pertinent information (Ladewig et al. 2018).

The selected studies evaluated the acceptance of parents mainly toward using SDF. Only a few studies investigated the acceptance of ART (Araújo et al. 2020; El-Ghandour et al. 2021; Ali et al. 2021) and HT (Araújo et al. 2020;

Table 2 Summary of the results of the articles

Author, year, country	Study design	Participants	Procedures	Evaluating methodology	Treatment acceptance	Other results	Conclusions
Akshitha et al. (2022) India	Cross-sectional	300 parents of pre-school children	Silver diamine fluoride (SDF)	Questionnaire applied after enlightenments about SDF and observation of color photograph of SDF-treated anterior and posterior teeth	62.4% esthetically acceptable for posterior teeth; 28.7% for anterior teeth 21% acceptable for child with cooperative behavior and anterior teeth; 60.3% posterior teeth; 26.4% upset and anterior teeth, 57.6% posterior teeth; 30.7% cried and anterior teeth, 62.1% posterior teeth; 38% kicked or screamed and anterior teeth, 65.1% posterior teeth; 49.1% needed sedation and anterior teeth, 68.6% posterior; 62.6% general anesthesia needed and anterior teeth, 76.6% posterior teeth P < 0.05	No there was significant association among age, sex, schooling, occupation of parents and location of teeth. There was an association with the shortest duration of the procedure (p = 0.004)	The location of the tooth and the cooperation of the child affected the parents' acceptance of using SDF
Ali et al. (2021) Saudi Arabia	Randomized controlled clinical trial	80 children and parents	SDF and atraumatic restorative treatment (ART)	5-Likert scale applied to parents 2 weeks after the treatment. Acceptance evaluated without prior information to the respondents	Acceptance about: Treatment duration SDF 100%, ART 55%; Aesthetics of anterior teeth SDF 57.5%, ART 90%; Aesthetics of posterior teeth SDF 97.5%, ART 97.5% (p > 0.05); Treatment comfortability SDF 100%, ART 60% P < 0.05	Parental acceptance was higher for SDF than for ART, especially when considering the duration of the session and the child's comfort	

Table 2 (continued)

Author, year, country	Study design	Participants	Procedures	Evaluating methodology	Treatment acceptance	Other results	Conclusions
Almarwan et al. (2021) Saudi Arabia	Cross-sectional	212 parents of children from 1 to 12 years Only information on the primary dentition was extracted	SDF	Questionnaire with 5-Likert scale	35.8% anterior teeth 55.2% posterior teeth	Greater acceptance was observed when there was a history of toothache or inflammation ($p=0.019$)	Parental acceptance was higher when the child had a history of toothache and the tooth to be treated was posterior Most parents did not accept the treatment of carious lesions with the application of SDF
Alshammari et al. (2019) Saudi Arabia	Cross-sectional	222 parents	SDF	Questionnaire with introduction to the benefits, disadvantages, indications and contraindications of SDF and photographs after using SDF on the anterior and posterior primary teeth 5-point Likert scale	More than 90% of the participants considered SDF application unacceptable, both for anterior and posterior teeth. 3.2% of parents were neutral about SDF application to posterior teeth		
Araujo et al. (2020) Brazil	Randomized controlled clinical trial	Parents of children from 5 to 10 years old	ART and Hall Technique (HT)	Questionnaire about understanding the reason for restoration, appearance, tooth protection, child discomfort, dental team 5-point Likert scale	Need for restoration 95.5% ART, 95.8% HT Appearance 82.2% ART, 68.1% HT Tooth protection 100% ART, 93.6% HT Comfort 93.4% ART, 95.7% HT Friendly and helpful staff 100% ART, 95.7% HT		Parental acceptance of both techniques was high, although parents were more uncomfortable about the appearance of HT than ART

Table 2 (continued)

Author, year, country	Study design	Participants	Procedures	Evaluating methodology	Treatment acceptance	Other results	Conclusions
Asif and Gurunathan (2020) India	Cross-sectional	Parents of 60 children aged 2–5 years	SDF	Questionnaire 5-point Likert scale applied after parents observed photographs of anterior and posterior teeth treated with SDF	61.6% accepted	Lower acceptance among parents with higher income, only one child, higher schooling Pain-free: anterior teeth and posterior teeth 91.6%; Easy: anterior teeth 100%, posterior teeth 83.3%; discoloration acceptable 26.6% anterior teeth, posterior teeth 55%; interim treatment 56.6% in anterior and posterior teeth; alternative treatment 31.6% anterior teeth, 56.6% posterior teeth	In general, there was good acceptance from parents. There was greater acceptance for the application in posterior teeth than in anterior teeth
Bagher et al. (2019) Saudi Arabia	Cross-sectional	104 parents of children aged 12 years and younger	SDF	Questionnaire 5-point Likert scale applied after the presentation of pictures of cases of primary and permanent teeth diagnosed with caries before and after treatment using SDF	43.4% strongly not acceptable, 15.1% neutral; 1.9% acceptable	Acceptance was not associated with the sex of the child or parents, level of education, family income or history of toothache ($p > 0.05$) It was associated with tooth type: greater acceptance in posterior teeth (67.3%) than anterior teeth (35.5%); uncooperative children than cooperative ($p < 0.001$)	Acceptance was higher when the teeth were posterior and the children were not cooperative. Low acceptance overall and for anterior teeth

Table 2 (continued)

Author, year, country	Study design	Participants	Procedures	Evaluating methodology	Treatment acceptance	Other results	Conclusions
Bassam et al. (2022) Egypt	Self-controlled clinical trial *split mouth technique – anterior and posterior teeth	41 parents	SDF (anterior and posterior teeth)	5-point Likert scale for anterior and posterior teeth separately Evaluation performed after the application of SDF	Anterior teeth 53.7% Posterior teeth 60.9% ($p = 0.041$)	Acceptance among parents of girls was significantly lower than among parents of boys. There was no association with parental age, schooling, or family income	Most parents accepted the treatment. Acceptance was higher when the posterior teeth were treated
Chaurasiya and Gojaur (2021) India	Longitudinal (recall visits: 3 weeks, 3 months, 6 months and 12 months)	26 parents of children aged 2–5 years	SDF	Parents received information about SDF purpose, procedure advantages and disadvantages before evaluation of acceptability	100%		All the parents accepted SDF treatment
Cleary et al. (2022) United States	Randomized clinical trial	98 parents of children aged 2 to 10 years	SDF and restorative treatment (RT) under local anesthesia when necessary	Questionnaire applied at each visit (baseline, 3, 6, and 12 months)	At 6 and 12 months, there was no significant difference ($p > 0.05$) in parental acceptance among the treatments Values not shown	Most parents had no concern about the appearance of their children's teeth after treatment and were not dissatisfied with the pain	There was no difference in parental acceptance when comparing the treatment performed with application of SDF versus conventional restoration
Clemens et al. (2018) United States	Longitudinal (2–3 weeks of follow-up)	30 parents of children aged 2–5 years (awaited treatment under general anesthesia)	SDF	Prior to the study, participants were given information about SDF Acceptability was measured 2–3 weeks after SDF application Questionnaire with 4-items and 5-level Likert scale	Ease of application: 90% Comfort: 86.6% Pain free: 93.3% Acceptable taste: 86.6%	There was no association between the child's behavior and the parents' feelings about tooth discoloration ($p = 0.14$), pain ($p = 0.13$) or taste ($p = 0.12$). Perception of ease of application was correlated with discoloration ($p < 0.001$), absence of pain ($p = 0.02$) and taste ($p = 0.02$)	SDF application was well accepted by the parents

Table 2 (continued)

Author, year, country	Study design	Participants	Procedures	Evaluating methodology	Treatment acceptance	Other results	Conclusions
Crystal et al. (2017) United States	Cross-sectional	120 parents	SDF	Photographs (treated teeth – before and after) were presented to the participants Questionnaire on aesthetics and acceptance. Different scenarios of child behavior were presented – cooperative, uncooperative behavior, need for sedation or general anesthesia. Separate issues for anterior and posterior teeth	53.6% posterior teeth 26.9% anterior teeth of cooperative children 68.5% posterior teeth 60.3% anterior teeth when general anesthesia was required	Acceptance was higher for posterior teeth and in cases of behavior management problems at the dentist Greater acceptance among younger parents, with lower income and lower schooling	Greater acceptance for SDF application in posterior teeth than in anterior teeth
El-Ghandour et al. (2021) Egypt	Randomized controlled clinical trial	100 parents of children aged 2–5 years	SDF versus atraumatic restorative treatment	Likert scale 2-week return evaluation Acceptability over aesthetics and taste	Acceptable taste: 100% SDF, 96% ART ($p=0.614$)		Parental acceptance of taste is similar for ART and SDF
Hu et al. (2020) Singapore	Cross-sectional	100 parents of children with autism (G1) and 200 parents of neurotypical children (G2)	SDF	An educational video on SDF was presented to the participants (use of SDF, composition and mechanism, procedure, effectiveness, concerns of SDF, photographs and indications) 5-point Likert scale Overall acceptance, aesthetic concerns, use of SDF as an alternative to general anesthesia, composition of SDF	Overall acceptance: G1 69%, G2 62% Anterior teeth G1 36%, G2 35% Posterior teeth G1 69%, G2 66%	Percentage of acceptance in specific situations: Avoidance of pain and infection: G1 82%, G2 82% Avoidance of treatment under general anesthesia: G1 78%, G2 74% Avoidance of anesthesia (injection): G1 78%, G2 67% Reduction in treatment costs: G1 65%, G2 55%	Parental acceptance was similar among the groups

Table 2 (continued)

Author, year, country	Study design	Participants	Procedures	Evaluating methodology	Treatment acceptance	Other results	Conclusions
Kumar et al. (2019) United States	Cross-sectional	546 parents	SDF	Questionnaire	79.5% accepted SDF treatment for their children	Association between acceptance and children's age (6 to < 9 years), parent's place of birth (born in United States)	Acceptance was high and associated with the child's age
Salim et al. (2021) Syria	Cross-sectional	258 parents	SDF	Questionnaire Perceptions of photographs of SDF-treated teeth	37.8%	Greater acceptance for posterior teeth, uncooperative children, history of toothache and higher number of decayed teeth	Acceptance was low
Thakkar and Jawdekar (2022) India	Randomized controlled clinical trial	60 parents	Hall technique versus resin-modified glass ionomer cement (RMGIC) restoration	Single question 5-point Likert scale	Mean 3.67 HT, 2.88 RMGIC		Greater acceptance for HT compared to RMGIC
Wajahat et al. (2022) Pakistan	Cross-sectional	197 parents	SDF	Questionnaire	65%	13.7% would accept the application in anterior teeth and 74.1% in posterior teeth	Application of SDF was acceptable for most participants

Table 2 (continued)

Author, year, country	Study design	Participants	Procedures	Evaluating methodology	Treatment acceptance	Other results	Conclusions
Walia et al. (2022) United Arab Emirates	Cross-sectional	370 parents of children aged 4–8 years	SDF	Evaluation of acceptance in scenarios: (1) child collaborates enough to restore the tooth; (2) some sign of non-cooperation, but the child allows the restoration to be carried out; (3) child does not collaborate enough to complete the restoration; (4) need for nasal sedation; (5) need for general anesthesia Likert Scale Evaluation for anterior and posterior teeth	Anterior teeth 1.4%; posterior teeth 36.7% Average acceptance in the different scenarios: Cooperative – anterior 1.2; upset but was cooperative 1.7; kicked or screamed 1.9; sedation required 2.3; general anesthesia required 3.1 Posterior teeth: Cooperative – anterior 1.5; upset but was cooperative 2.3; kicked or screamed 2.9; sedation required 3.1; general anesthesia required 3.8	Greater acceptance was observed among participants with lower educational level. Acceptance increased according to the barriers found in the management of child behavior	SDF was acceptable especially for treatment of posterior teeth

Thakkar and Jawdekar 2022). The reason is that acceptance of these techniques by parents/caregivers is mostly affected by their aesthetic perception. Specifically, the aesthetic aspect is more questionable in relation to SDF than other MIPs. This hypothesis is strengthened by the observation that parental acceptance was related to the aesthetic aspect in practically all the studies investigated.

The definitive change in tooth color impacted the acceptance of the parents even after clarifications were given about the benefits and efficacy of SDF in the paralysis of caries lesions. The highest acceptance rate was observed when the treatment context involved problems of managing the child's behavior at the dentist. This result corroborates that observed in a systematic review published in 2020 (Sabbagh et al. 2020). However, this review included only eight studies that addressed the acceptance of SDF. Other MIPs were not investigated or compared.

The aesthetic perception was mentioned in the evaluations of HT acceptance. Although HT treatment is performed on posterior teeth, which are less visible than anterior teeth, the appearance of the HT outcome bothered the parents of Brazilian children, who accepted glass ionomer cement or composite resin restorations better (Araújo et al. 2020). In contrast, HT was better accepted than resin-modified glass ionomer cement restorations by parents of Indian children (Thakkar and Jawdekar 2022). In the last cited study, the question used to evaluate treatment acceptance was not detailed, thus precluding any indication of what factors caused parents to better accept HT. When comparing the acceptance means of HT versus ART, it can be observed that the numerical difference was not clinically relevant, hence leading to the conclusion that the acceptance of treatments was similar (Thakkar and Jawdekar 2022).

Acceptance of the MIP was assessed considering the parents' perception of images, videos, and observation of their child's teeth after treatment (Ali et al. 2021). In the post-treatment periods, the aspects evaluated included treatment duration (Ali et al. 2021), aesthetics/appearance (Araújo et al. 2020; El-Ghandour et al. 2021; Ali et al. 2021; Cleary et al. 2022), child comfort/discomfort (Clemens et al. 2018; Araújo et al. 2020; Ali et al. 2021), understanding why the treatment is needed (Araújo et al. 2020), taste (El-Ghandour et al. 2021) and pain (Cleary et al. 2022). Evaluation of acceptance after the procedure aroused doubts about the concept of acceptance adopted in the studies. According to the Health Sciences Descriptors (DECS) 2017, acceptance refers to the willingness to receive health services. Thus, it is expected that acceptance will be evaluated prior to the performance of the dental procedure. However, when considering that the study design involved clinical trials, an a posteriori evaluation would be a warranted avenue of investigation, justified by

the need to maintain randomization and avoid interference of the parents'/caregivers' preference in the allocation of children to the intervention groups. Perhaps, it would be more appropriate to evaluate satisfaction in these studies.

There are some limitations in the present scoping review. Participants in the studies included in the scoping review were approached in dental school clinics or in specialized services. The external validity of the findings of the primary studies was compromised since it did not represent other children who had dental needs and/or were treated with MIPs in private services or others. Another limitation involved the difficulty of comparing the concept of acceptance by parents of children from different countries and cultures. Cultural differences may affect the acceptance of treatment and the aesthetic perception of parents/caregivers. In future studies, it is recommended that primary studies be grouped according to geographic location and cultural similarity.

Evaluating the acceptance of MIPs by parents/caregivers is an important part of the decision-making process for pediatric dental treatment. However, this scoping review revealed that there is still little information available on the acceptance of these procedures and that the studies investigated tended to evaluate the acceptance mostly of SDF.

Conclusion

In general, it was observed that the application of silver diamine fluoride, Hall Technique and atraumatic restorative treatment are acceptable procedures for carious lesion management in children, although the evidence is still limited. A gap remains in the literature regarding the acceptance of other procedures. Therefore, further studies in this area will contribute toward a better understanding of the opinion of parents/caregivers, and thus improve caries lesion management in children.

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Declarations

Conflict of interest The authors declare that they have no conflicts of interest.

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