

Smile! Silver Diamine Fluoride (SDF) can Make it Easy

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Introduction


Dental caries remains the most common childhood disease, despite studies around the world showing a decline in the incidence and prevalence among 5- and 12-year-olds. Globally, the prevalence of dental caries ranges from 49% to 83% across different countries. In India, a comprehensive *National Health Survey (2004)* reported caries prevalence is 51.9% in children at 5 -years of age and 53.8% in 12 years aged children.² Based on the report submitted by the Global Burden of Disease, Dental Caries is still an unresolved oral health problem, having more than two billion people enduring the repercussions of this very much preventable condition worldwide.³ Untreated caries in children adversely impacts the dental health-associated quality of life, leading to pain, abscess, and systemic complications like fever and lymphadenopathy.⁴

In normal dental settings treating children is always a challenge for a pediatric dentist and not everyone can afford the expenses of advanced behavioural management techniques such as sedation. Around some time ago only available therapy for dental caries would be to use the 'drill and fill' approach. It is a technically irreversible and symptomatic management approach. With time there has been a tremendous improvement in dentistry following extensive research in cariology and dental materials. The dynamics involved with dental caries are much clearer now, and there is a shift to Minimal Intervention Dentistry which involves the 'biological' or 'medical' strategies in treating a carious lesion.⁵ The focus of this newer concept lies in the early diagnosis and prevention of caries, followed by minor invasive procedures. The treatment is directed to a medical model which involves the elimination of the caries by treating the etiology and reducing the risk factors. Regardless of the surgical model claims to be preventive by removing the fissures prone to caries, new lesions can still develop on a freshly prepared and caries-free surface. On the contrary, the surgical model makes the tooth weak since a large portion of natural tooth structure is lost, also dental caries is a never-ending process and there is always a risk of secondary caries around the

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margin of the restorations.⁶ Introduction of Minimal Intervention Dentistry (MID) has caused a paradigm shift in the management of dental caries, especially in children. Minimal intervention dentistry (MID) involving procedures like the atraumatic restorative technique, silver diamine fluoride and the Hall Technique could potentially contribute to reducing the global burden of untreated caries since they are cost-effective in the long term.³ Also, there is significant evidence that carious lesions can be arrested at any stage, even when cavitated.

Silver diamine fluoride (SDF) has received significant appreciation in dentistry due to recent FDA regulatory approval in the USA and for being an effective cariostatic agent in young population and specially-abled patients.⁷ SDF is not new in dentistry, dentists have been using it in concentrations between 10% and 38% in Brazil, Argentina, China, Japan, and other countries since the late 1960s. SDF has the uniqueness to address the epidemic of untreated early childhood caries, particularly in situations where conventional management cannot be performed for young patients.⁸ In India, we have observed promising results with SDF use in dental practice for the last 7-10 years.

Silver diamine fluoride (SDF), a clear alkaline liquid having a pH of 10, contains 24.4% to 28.8% (weight/volume) silver and 5.0% to 5.9% fluoride. 38% SDF is the more commonly used concentration which consists of 44,800 ppm F and 253,870 ppm Ag. The mechanism of action involves the antimicrobial activity of silver and Fluoride's remineralizing properties.

There is a plethora of evidence in dental literature reporting its effectiveness in reducing cariogenic bacteria including *Streptococcus mutans* and its remineralization of dental hard tissues. 38% SDF has been found to arrest approximately 70% of carious lesions in both primary and permanent dentitions in a study done on school children.⁹ A high quality of evidence has reported that SDF results in caries arrest 89% higher than other materials or placebo.¹⁰ Also, the lowest fraction of caries arrest and caries prevention reported with SDF is 96% and 70% respectively.¹¹ A single application of Silver diamine fluoride (SDF) referred to as "silver-fluoride bullet" is reported to be better than quarterly applications of 5% NaF varnish in pediatric patients.^{9,11,12} Reapplication may be necessary to sustain arrest. SDF is a treatment of choice in cavitated lesions in children presenting with behavioural or medical management challenges, and in children with high caries risk.¹³ The treatment does not require expensive equipment or support infrastructures such as piped water and electricity, and any non-dental professional such as dental hygienists, nurses or primary health care providers can apply it safely under guidance. The introduction of SDF in the currently constituted caries management approach is supported by updated AAPD recommendations (2018) to improve dental care at an individual level.¹² Since SDF provides an economical, easy and highly efficient nonsurgical option to conventional restorative dental procedures, it can also support the dental public health community in focusing on dental caries reduction in at-risk populations.

SDF was recognized by the WHO in 2021 as one of the most efficient, harmless, and affordable dental medicaments for treating both adults and children with urgent medical needs.¹⁴ SDF therapy is routinely not followed by many dentists despite the recommendations based on proven benefits and data to support its efficacy. The most common reason is a lack of information and training and some misconceptions related to its safety. A recent review on silver diamine fluoride (SDF) concluded that topical application of SDF is safe and not associated with any pulpal damage or adverse reaction.^{9,10} One drop of SDF is sufficient to treat six carious teeth, and the amount of fluoride present in one drop of SDF is almost half that of the smallest unit dose used to apply fluoride varnish. The only disadvantage with SDF is detectable permanent black staining that is an evidence of caries arrest on treated lesions. This dark discolouration can be masked with restorations or crowns.^{11,12} Although the effectiveness of SDF in arresting carious lesions is well known, we do not have any uniform guidelines about the number and timings of applications for cariostatic activity. Also, regarding the consistency and endurance of the caries arrest with SDF, we lack solid scientific information.

Conclusion

SDF is a productive, affordable, and child-friendly management approach. It has the potential to play a significant role in global anti-caries programmes that adhere to the WHO Millennium Goals and enhance oral health in children, if it is widely adopted and used judiciously.

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