

SILVER DIAMINE FLUORIDE: A REVIEW

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ABSTRACT

BACKGROUND

The burden of untreated dental caries among African children is high. Silver diamine fluoride (SDF) is a simple, non-technique sensitive intervention to stop the progression of active untreated carious lesion in primary teeth among children. Silver diamine fluoride (SDF) 38% solution contains 44,800 ppm fluoride ions and its stains teeth after use.

METHOD

An electronic literature search in Web of science, Scopus, PubMed, Google Scholar, African journal online, Researchgate and Google was done in May,2023. Search terms and keywords were combined by Boolean operators. Two independent investigators (research assistants) screened titles, abstracts and full text of publications. The inclusion criteria were original research articles, case report, case series related to silver diamine fluoride (human studies) conducted in African region and in electronic databases.

RESULTS

Ten articles were included as they were assessed to meet the aim of the review. The study design of the articles were four invitro studies, three randomized controlled clinical trial, one randomized clinical trial, one split-mouth, self-controlled clinical trial and one split-mouth, randomized controlled clinical study. 90 % of the studies identified was conducted in Egypt, while 10 % of the studies was conducted in Nigeria.

CONCLUSION

Studies on silver diamine fluoride (SDF) identified in African countries were few and restricted to few countries. Silver diamine fluoride can be used as an intervention for active and progressing untreated carious lesion in primary teeth among children though it stains teeth after use. More studies from the diverse ethnic population in Africa will contribute to the existing literature

KEYWORDS

Africa, Children, Fluoride, Silver Diamine Fluoride, Studies.

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INTRODUCTION

Silver diamine fluoride (SDF) is a colourless alkaline solution that contains ammonia, silver, and fluorine with a pH value between 9 and 10.1. It is a topical solution with increasing application and acceptance in some countries as the silver ion can inhibit bacterial growth and dentine collagen degradation.¹ The fluoride ion has antimicrobial effects on cariogenic bacteria and can help in remineralisation of dental hard tissues by the formation of fluorapatite on the tooth surface.² Silver diamine fluoride (SDF) 38% solution formulation contains 44,800 ppm fluoride ions, 25% silver ions and 5% fluoride ions dissolved in an 8% ammonia solution, there could be variations according to the manufacturer. Ammonia acts as the solution's concentration stabilizer as the solution is unstable and sensitive to light. The various applications of silver diamine fluoride include to arrest carious lesions in primary teeth and young permanent teeth, to prevent pit and fissure caries in young permanent teeth, to manage dentinal hypersensitivity,¹ to prevent secondary caries, for treatment of inaccessible carious lesions, for treatment of unco-operative children with multiple active carious lesions, for silver modified atraumatic restorative treatment technique, for treatment of carious lesions in children with special health care needs and many others in the literature. Silver diamine fluoride therapy or treatment is simple, non-aerosol-generating, painless, non-invasive, requires simple armamentarium and can be done in resource-poor settings with minimal support. It causes dark staining³⁻⁴ of the carious tooth tissues, as a result of precipitation of silver phosphate.⁵ Gingival irritation, mucosal irritations and metallic taste are possible disadvantages of the solution. Considering the various applications, advantages and disadvantages of silver diamine fluoride in the literature; and the diverse ethnic groups with various cultures, socio-cultural beliefs and practices in the African region. The aim of this article is to review the available studies on silver diamine fluoride in Africa.

LITERATURE SEARCH METHOD

An electronic literature search in Web of Science, Scopus, PubMed, Google Scholar, African Journal Online, ResearchGate and Google was done in May, 2023. The keywords used were silver diamine fluoride, silver fluoride diamine, diamine silver fluoride, Africa countries, African region, Africa continent, African population, African people, African children, African adolescents and Africa. Search terms and keywords were combined by Boolean operators. Two independent investigators (research assistants) screened titles and abstracts of publications on silver diamine fluoride studies, and potential references to identify which studies met the inclusion criteria of this literature

review. Information was extracted from the abstracts and full texts of articles regarding the location of the research and the main content. The inclusion criteria were original research articles, case reports, case series related to silver diamine fluoride (human studies) conducted in the African region and in electronic databases, while review articles, systematic reviews, viewpoints, books, letters, editorials, book chapters, perspectives, and news related to silver diamine fluoride were excluded. Study data of the included articles were extracted and collated in a table, including study details (author(s), year of publication, study location or country, study design). All identified studies in Africa were included and if relevant data were missing, the authors of the articles were contacted for additional information via e-mail. No specified time frame was used during the search, any additional studies in the African region identified from the reference lists of published papers were retrieved from the web using Google Scholar and Google search engines.

RESULTS

19 articles were identified, eight duplicates were removed during screening. Abstract and full text were screened using inclusion criteria by two independent research assistants. One article was excluded because it was a systematic review. Ten articles were included as they were assessed to meet the aim of the review.

The ten articles included were four *in vitro* studies, three randomized controlled clinical trials, one randomized clinical trial, one split-mouth, self-controlled clinical trial and one split-mouth, randomized controlled clinical study. Nine of the studies were conducted in Egypt, North Africa, while one was conducted in Nigeria, West Africa.

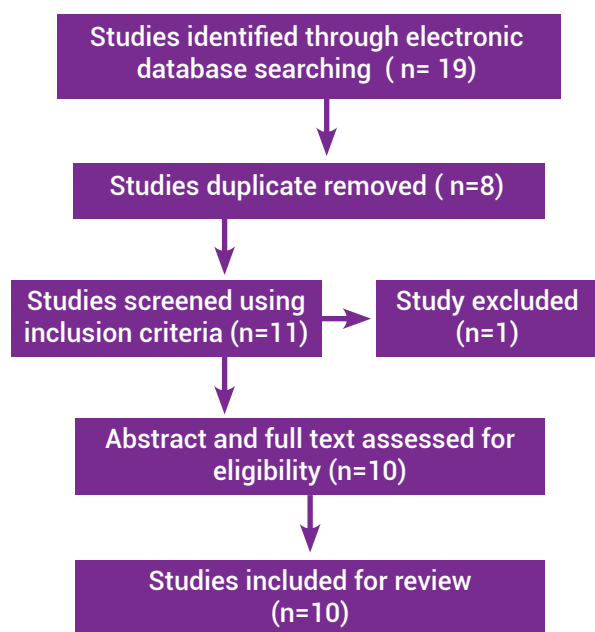


Figure 1: Flowchart of articles process

Table 1: Summary of identified studies on silver diamine fluoride in African region

S/N	Author/Year of publication	Study design	Country of study
1	Ghandour et al, ⁵ 2020	Randomized controlled clinical trial	Egypt
2	Abdullfattah et al, ⁶ 2021	Randomized clinical trial	Egypt
3	Saada et al, ⁷ 2021	Invitro study	Egypt
4	Azuoru et al, ⁸ 2022	Randomized controlled clinical trial	Nigeria
5	Abdellatif et al, ² 2022	Invitro study	Egypt
6	Moshen et al, ³ 2022	Invitro study	Egypt
7	Ammar et al, ⁹ 2022	Randomized controlled clinical trial	Egypt
8	Aly&Yousry, ⁴ 2022	Randomized controlled clinical study	Egypt
9	Bassam et al, ¹¹ 2022	Self-controlled clinical trial	Egypt
10	Mohammed&Ashrat, ¹⁰ 2023	Invitro study	Egypt

DISCUSSION

The level of untreated dental caries among African children¹² and adolescents are high. Silver diamine fluoride can be used as an intervention to stop the progression¹³ of active carious lesion and restore untreated carious teeth using the silver modified atraumatic restorative treatment technique. Silver diamine fluoride (SDF), also known as silver fluoride diamine or diamine silver fluoride is not available in most Africa countries,¹ and oral health practitioners, parents, caregivers, guardians and children may have concerns of the dark staining of teeth after it use. A formulation of 38% SDF with potassium iodide (KI),⁴ applied as a separate reagent, have been suggested by some researchers to reduce the staining effect of silver phosphate, by generating silver iodide, but silver iodide is photosensitive and can darken when exposed to light.

The armamentarium for silver diamine fluoride application¹⁰ is simple, the therapy is non- technique sensitive and it could be used in underserved and un-served children with active carious lesions.¹³ This review identified studies on silver diamine fluoride from two countries in African region and 90 % of the studies was from one country. One of the studies identified was a school based study, while four of the studies were hospital based studies. None of the studies identified were community based or rural community based studies. More studies from other countries in the region will guide recommendations on evidence based practice for silver diamine fluoride among African children.

CONCLUSION

Studies on silver diamine fluoride (SDF) in African countries are few and limited to few countries. Silver diamine fluoride can be used as an intervention for active and progressing untreated carious lesion in primary teeth among underserved or un-served children. More studies from the diverse ethnic population in Africa will contribute to the existing literature.

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None

CONFLICTS OF INTEREST

There are no conflicts of interest

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