Review Article

LESION STERILISATION AND TISSUE REPAIR OF PRIMARY TEETH

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ABSTRACT

BACKGROUND

Lesion sterilization and tissue repair is also known as non-instrumental endodontic therapy. It involves the use of combination of antibiotics drugs on infected pulp tissue and root canals after getting access to the root canal orifices of the primary teeth. Various combination of antibiotics had been used by some dentists with macrogol , polyethylene glycol, propylene glycol, normal saline or sterile water as the solvent or vehicle used.

METHODS

An electronic literature search in Science direct and Google was done in December, 2023 using the Population, Concept and Context framework. Search terms and keywords were combined by Boolean operators. Two independent investigators screened titles and abstracts of publications on lesion sterilization and tissue repair of primary teeth. Original research articles, case report, case series with accessible full text were included for review, while review articles, systematic reviews, viewpoints, books, letters, thesis, editorials, book chapters, dissertations and perspectives were among articles excluded during screening.

RESULTS

One case report was identified from Morocco, a case series from Nigeria and randomized controlled trial from Egypt respectively

CONCLUSIONS

Lesion sterilization and tissue repair or non-instrumental endodontic therapy can be a treatment option for primary teeth with infected pulp and root canals .More studies from diverse ethnic population in Africa countries will fill the gaps in knowledge and add to the existing literature.

KEY WORDS

Africa, Antibiotics paste, Children, Lesion sterilization, Tissue repair

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LESION STERILISATION AND TISSUE REPAIR OF PRIMARY TEETH

The pain associated with infections involving the pulp and root canals of primary teeth can affect the quality of life of children.1-2 When clinical oral conditions of primary teeth like irreversible pulpitis or dentoalveolar abscess are untreated,1 it can affects eating practices ,1 lead to loss of play and school hours among children2. There are treatment options3 for treating primary teeth with infected pulp and root canals. Lesion sterilization and tissue repair3-4 can be a treatment option among other options like tooth extraction (with placement of space maintainer if it involves early extraction of primary molars) or pulpectomy. Primary teeth especially the primary molars are considered a natural and convenient space maintainer4 for prevention of undesirable effects associated with the early extraction of primary molars, like loss of arch length, 4loss of space or insufficient space for erupting premolars and mesial tipping or drifting of the permanent molars. Treatment options3 like pulpectomy or lesion sterilization and tissue repair for infected root canals and pulp tissue of primary molars teeth are encouraged to prevent the consequences4 associated with the early extraction of primary molars before its physiological exfoliation .Lesion sterilization and tissue repair (LSTR) involves the use of antibacterial drugs for disinfection of dentinal, pulpal, and periapical lesions5 and promotion of tissue repair by natural tissue healing process. It is also known as non-instrumental endodontic therapy (NIET) with the use of combination of antibiotics drugs for the treatment of the polymicrobial4 nature and microbial load of root canal infections5 after getting access to the root canal orifices. Studies on lesion sterilization and tissue repair had been reported from Bosnia and Herzegovina6, India7 and other countries3. The aim of this article is to review the available studies on lesion sterilization and tissue repair of primary teeth among children in Africa countries.

METHOD

An electronic literature search in Science direct and Google was done in December, 2023 using the Population, Concept and Context framework.8

Population: Children

Concept: Lesion sterilization and tissue repair of primary teeth among children

Context: Studies carried out in Africa continent, published in English language and in electronic databases

The keywords used were lesion sterilization, primary teeth, deciduous teeth, tissue repair, Africa countries, sub-Saharan Africa, sub-Saharan countries, African children and Africa. Search terms and keywords were combined by Boolean operators. Two independent investigators screened titles and abstracts of publications on lesion sterilization and tissue repair of primary teeth among children studies, and potential references to identify which studies met the inclusion criteria of this review. Information was extracted from the full texts of articles regarding the location of the research and the main content. The inclusion criteria were original research articles, case report, case series with information on lesion sterilization and tissue repair of primary teeth among children carried out in Africa countries, published in English language and in electronic databases. While review articles, systematic reviews, viewpoints, books, letters, thesis, editorials, book chapters, dissertations, perspectives, and news related to lesion sterilization and tissue repair of primary teeth among children were excluded. Original research articles, case report, case series without accessible full text was also excluded. Original research articles involving teeth (in-vitro studies) were also excluded. Study data of the included articles were extracted and collated in a table, including study details (author(s), year of publication, study design, study location or country, study participants, study objective, antibiotics combination used) . No time frame was used during the search and all identified studies in Africa countries that met the inclusion criteria and had accessible full text were included. If relevant data were missing, the authors of the articles were not contacted for additional information via e-mail. Any additional studies carried out in Africa continent, identified from the reference lists of published papers were retrieved from the web using Google scholar.

RESULTS

Twenty six articles were identified during literature search; four duplicates were removed during screening. Abstract and full texts were screened using inclusion criteria by two independent investigators .Eighteen articles were excluded because they did not meet the inclusion criteria. Four articles with accessible full text were included as they were assessed to meet the inclusion criteria. One case report was reported from Morocco, a case series from Nigeria and randomized controlled trial from Egypt respectively.

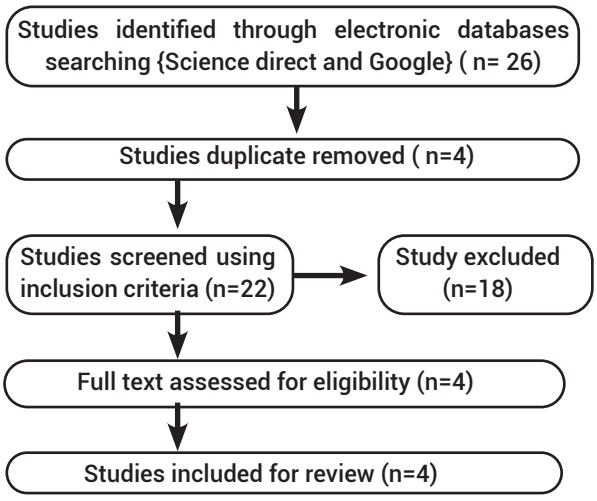

Figure 1: Flowchart of articles process

Table 1: Summary of identified case study on lesion sterilization and tissue repair of primary teeth among children in Africa countries.

Author/Year of publication	Study participants	Study objective	Study design	Antibiotic combination used	Country of study
Hariri & Chhoul ,2017[9]	A 9 years old boy	To present the success of a clinical case treated by LSTR (lesion sterilization and tissue repair) after a clinical and radiographic follow-up of 18 months.	Case report	A combination of ciprofloxacin, metronidazole, and minocycline	Morocco
Saadoon et al,2019[10]	4-8 years old	To compare the clinical and radiographic success versus clinical success in necrotic primary molars treated by using lesion sterilization and tissue repair LSTR technique	A randomized controlled trial	A combination of ciprofloxacin, metronidazole, and cefixime	Egypt
Ayebameru et al,2021[4]	A 4-year-old boy, a 6-year-old girl,a 7-year-old girl	To evaluate the clinical outcome of endodontic treatment of infected primary teeth using triple antibiotic paste.	Case series	A combination of ciprofloxacin, amoxicillin and metronidazole	Nigeria
Kharadly et al,2022[11]	5-7 years old	To compare the success rate of pulp therapy of non-vital primary molars with inflammatory root resorption when treated using triple antibiotic mix or simvastatin as a component in the root filling material.	A randomized controlled trial	A combination of ciprofloxacin, metronidazole, and cefixime	Egypt

DISCUSSION

Lesion sterilization and tissue repair of primary teeth have various indications3 in paediatric dentistry. It is a non-instrumental endodontic therapy that targets the destruction of the microbial ecosystem5 in infected pulp and root canals. Various combination of antibiotics had been used by some dentists in the literature3 and with macrogol ,polyethylene glycol, propylene glycol, normal saline or sterile water used as the solvent or vehicle.3-5 Triple antibiotic paste (TAP)3-5,9 involves combination of three antibiotics, while double antibiotic paste (DAP)3 involves combination of two antibiotics with a solvent. Ciprofloxacin is a bactericidal antimicrobial agent belonging to fluoro-quinolone group4 which acts by inhibiting the DNA gyrase, metronidazole is also a bactericidal antimicrobial agent of Nitroimidazole4 compound active against obligate anaerobes, amoxicillin is a bactericidal antimicrobial agent belonging to the β-lactam group of penicillins,4 cefixime is a bactericidal antimicrobial agent belonging to the cephalosporins, while minocycline is a bacteriostatic antimicrobial agent which acts by inhibiting protein synthesis on the surfaces of ribosomes5 and it can stain teeth. Macrogol ,polyethylene glycol, propylene glycol ,normal saline or sterile water acts as a vehicle or solvent3-5,9 for better diffusion of the antibiotics medicaments into the dentinal tubules for better antimicrobial action.

In this review, we identified case report9 , case series4 and randomized controlled trial10-11 on lesion sterilization and tissue repair of primary teeth among African children from Morocco9 ,Nigeria4 and Egypt respectively. The case report from Morocco used a combination of ciprofloxacin, metronidazole and minocycline for the triple antibiotic paste and propylene glycol and macrogol as the solvent or ointment,9 the case series from Nigeria used a combination of ciprofloxacin, amoxicillin and metronidazole for the triple antibiotic paste and sterile water as the solvent to produce a freshly prepared paste consistency.4 The randomized controlled trial10-11 carried out in Egypt used a combination of ciprofloxacin, cefixime and metronidazole for the triple antibiotic paste with polyethylene glycol and propylene glycol11 as a vehicle and normal saline10 as solvent respectively. In the study from Egypt, clinical evaluation was carried out at 1 week postoperative, then at 3, 6, and 12 months while radiographic evaluation was carried out at 6 and 12 months using predetermined criteria (absence of pain ,absence of abnormal mobility , absence of swelling and fistula on clinical examination11. Absence or decrease of furcation radiolucency, absence or decrease of radicular radiolucency, absence of internal/external root resorption or other pathological changes on radiographic evaluation). The clinical success rate for use of triple antibiotic paste was 81.8% while the radiographic success rate was 63.6%

after 12 months follow up11. In another study from Egypt , clinical and radiographic evaluation10 was done using predetermined clinical and radiographic criteria at 3, 6 and 9 months respectively. The clinical success rate for use of triple antibiotic paste was 80% while the radiographic success rate was 96% after 9 months follow up10.

Studies on lesion sterilization and tissue repair of primary teeth will provide knowledge on the clinical and cost effectiveness of the procedure, it will provide knowledge on the combination and mixture ratio of antibiotics that are more effective and convenient to use for the patient as various combination of antibiotics had been used by some dentists in the literature.3 It will also provide knowledge on the clinical and radiographic success rate, failure rate and acceptability of the procedure by African parents and children. The studies identified in this review might not reflect the clinical and cost effectiveness of the procedure among diverse ethnic population of African children. Africa has about 3000 ethnic groups12. More studies from diverse ethnic population from Africa countries will guide clinical practices and evidence based recommendations on lesion sterilization and tissue repair of primary teeth among African children.

CONCLUSION

Lesion sterilization and tissue repair can be a treatment option for primary teeth with infected pulp and root canals. More studies from diverse ethnic population in Africa will provide knowledge on the radiographic and clinical success rate and cost effectiveness of the procedure among African children.

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