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Early childhood caries among pre-school children in rural areas

Osadolor OO[1], Osadolor AJ[2,3]

[1]Department of Child Dental Health, University of Nigeria Teaching Hospital, Enugu State, Nigeria
[2]Department of Public Health, National Open University of Nigeria
[3]Department of Oral and Maxillofacial Surgery, University of Benin Teaching Hospital, Edo State, Nigeria

Abstract

Background: Early childhood caries can occur and exist among children in slums areas, rural areas and under-served communities. Africa has countries with rural areas inhabited by diverse ethnic populations of pre-school children, with their parents and family members.
Method: An electronic literature search in Science direct and PubMed was done in January, 2024 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 early childhood caries among pre-school children in rural areas. The inclusion criteria was original (primary) research articles with accessible full text, related to early childhood caries among pre-school children in rural areas, carried out in Africa, published in English and in electronic databases. Original research articles related to early childhood caries among pre-school children in urban, semi-urban or sub-urban areas, hospital based studies, studies with participants selected from rural and urban or rural and semi-urban communities, review articles, systematic reviews, thesis or dissertations were excluded during screening.
Results: Three articles with accessible full texts were included as it was assessed to meet the aim of the review. The study designs of the included studies were cross-sectional study, randomized, controlled field trial and a case-control study respectively. The studies were carried out in rural areas of Uganda and Egypt respectively.
Conclusion: Early childhood caries has multifactorial aetiology. More studies from diverse ethnic population in Africa countries will fill the gaps in knowledge and add to the existing literature.

Keywords: Africa, Children, Early childhood, Rural, Studies

Introduction

Early childhood caries (ECC) according to the definition of The American Academy of Paediatric Dentistry (AAPD) is the presence of one or more decayed (non-cavitated or cavitated lesion), missing (due to caries), or filled tooth surfaces in any primary tooth in a child, 71 months of age or younger.[1-5] Early childhood caries is considered to be severe when there is presence of smooth-surface caries in children younger than three years of age, when there is presence of one or more cavitated, missing (due to caries), or filled smooth surfaces in primary maxillary anterior teeth for children ages 3 - 5 years or a dmft score ≥ 4 (for 3 years), a dmft score ≥ 5 (for 4 years) or a dmft score ≥ 6 (for 5 years).[3,6] Studies on early childhood caries had been reported from Spain,[7] Brazil,[8] Iran,[9] Poland,[10] Saudi Arabia,[11] Cambodia,[12] Sweden,[13] india[14] and other countries globally. In Africa, studies on early childhood caries had been reported from Tunisia,[15,16] Uganda,[17,18] Tanzania,[18,19] South Africa,[20] Egypt,[1,21-23] Kenya,[24,25] Nigeria[2,3,5,6,26] and other Africa countries. The aim of

Corresponding Author:
Obehi O. Osadolor
Department of Child Dental Health, University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu State, Nigeria.
osadolorobehi@yahoo.com

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this article is to review the available studies on early childhood caries among pre-school children in rural areas in Africa.

Literature search method

An electronic literature search in PubMed and Science direct was done in January, 2024 using the Population, Concept and Context framework.[27]

Population: Pre-school children

Concept: Early childhood caries among pre-school children in rural areas.

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

The keywords used were early childhood caries, rural, Sub-Saharan countries, pre-school children, Africa countries, primary teeth, African children and Africa. Search terms and keywords were combined by Boolean operators. The inclusion criteria were original (primary) research articles with accessible full text, related to early childhood caries among pre-school children in rural areas, conducted in Africa, published in English and in electronic databases. Original research articles related to early childhood caries among pre-school children in urban, semi-urban or sub-urban areas, hospital based studies and studies with participants selected from rural and urban or rural and semi-urban communities were excluded. Review articles, systematic reviews, thesis, viewpoints, books, letters, editorials, dissertations, book chapters, primary study without accessible full text, perspectives, and news related to early childhood caries among pre-school children in rural areas were excluded. Two independent investigators screened titles and abstracts of publications on early childhood caries among pre-school children in rural areas 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. Study data of the included articles were extracted and collated in a table, including study details (author(s), year of publication, study population, study location or country, study objectives, study design). All identified studies in Africa that met the inclusion criteria with accessible full text was included and if relevant data were missing, the authors of the articles were not contacted for additional information via e-mail and no specified time frame was used during the search.

Results

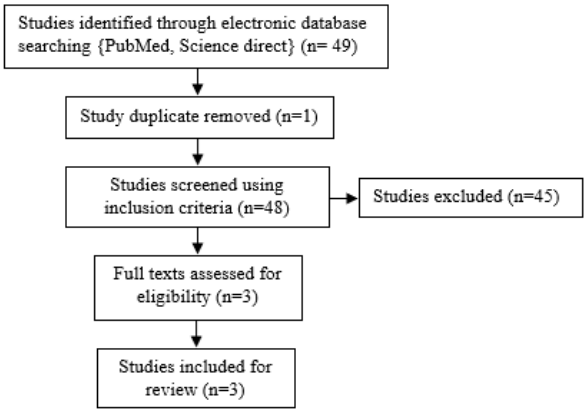

Figure 1: Flowchart of articles process

Table 1: Summary of identified study on early childhood caries among rural pre-school children in Africa countries

Author/Year of publication	Study population	Study design	Study objective	Country of study
Musinguzi et al,[17] 2019	3–5-year-old	Cross-sectional study	To determine the prevalence and treatment needs for Early Childhood caries among 3–5-year-old nursery school children in a rural community in Rukungiri District, Uganda.	Uganda
Abdellatif et al,[23] 2023	Children 4 years and younger	A randomized, controlled field trial	To compare two interventions of 38% Silver Diamine Fluoride (SDF) combined with 5% sodium fluoride (NaF) varnish versus 38% SDF to arrest early childhood caries lesions, and assess whether the arrest rate was affected by baseline lesion severity measured by International Caries Detection and Assessment System (ICDAS II).	Egypt
Attia et al,[1] 2024	3 to 5 years old	A case-control study	To assess the risk indicators associated with early childhood caries in rural areas in Alexandria, Egypt.	Egypt

Forty nine articles were identified; one duplicate was removed during screening. Abstract and full text was screened using inclusion criteria by two independent investigators. Forty five articles were excluded because they did not meet the inclusion criteria. Three articles with accessible full texts were included as they were assessed to meet the aim of the review. The study designs of the included studies were randomized, controlled field trial, cross-sectional study, and case-control study respectively. The studies were conducted in rural areas of Uganda and Egypt respectively

Discussion

Dental caries is a biofilm mediated, diet modulated/sugar driven, multifactorial, dynamic[28] oral disease. The prevalence of early childhood caries varies from country to country and region to region[28] as a result of various socio-cultural and multifactorial factors. In Uganda, the prevalence of early childhood caries among 3-5 years old rural pre-school children was 48.6%,[17] with a prevalence of 11.6%, 18.5% and 18.5% among 3-, 4-, and 5-year old children, respectively.[17] Early childhood caries was seen more in males than females[17]. The finding of 48.6% was greater than previous report of 3.7% among 6-36 months old children in Tanzania,[18] greater than previous report of about 25.2%[21] among 1-3 years rural Egyptian pre-school children and less than 54.5%[13] among 18-36 months old rural children in Cambodia and 52%[16] among 1-5 year old children in rural area in Tunisia respectively. This variation could be as a result of the differences in age of the study participants as early childhood caries is a multifactorial dynamic oral disease that occurs over a period of time.

Early childhood caries is a multifactorial oral disease[1-3,5,6] that involves a susceptible tooth surface, fermentable carbohydrates, cariogenic microorganisms[5] (*Streptococcus mutans, Lactobacili spp*) and a period of time. Risk factors[1-3,6] associated with early childhood caries initiation and progression include socio-demographic factors like age, parents' level of education, parents' occupation and child birth rank. Biological factors[1] like salivary pH, buffering capacity of saliva, saliva flow rate, re-mineralising ions present in saliva, saliva viscosity and dietary factors like breast/bottle feeding, night feeding, frequency of intake of sugary snacks, and oral-health related behaviours[1] like frequency of tooth brushing, oral hygiene practices, dental visits and use of fluoride containing toothpaste.

A study from Egypt reported that age, mother's education, frequency of daily sugary snacks, night feeding, and oral health status are possible risk factors for early childhood caries in rural areas[1]. This finding reflects the multifactorial factors associated with the initiation and progression of early childhood caries. Another study from Egypt reported[23] that combination of 38% Silver Diamine Fluoride (SDF, (44,800 ppm) with 5% sodium fluoride (NaF, 22 600 ppm) varnish had better arrest of early childhood caries lesions than use of 38% Silver Diamine Fluoride (SDF) alone and the difference was significant in moderate carious lesion (assessed using International Caries Detection and Assessment System criteria) but not advanced carious lesions. Silver diamine fluoride[29] and fluoride varnish are among the non- invasive methods (like use of calcium and phosphate containing re-mineralising agent like casein phosphopeptide-amorphous calcium phosphate) for managing early lesion of early childhood caries and fluoride is among the World Health Organization model list of essential[30] medicine for children.

Conclusion

Early childhood caries is a significant public health problem with multifactorial aetiology. Rural community based oral health awareness (targeting parents, family members and guardians) programme/activities on the benefits of reducing intake of cariogenic diets like biscuits among pre-school children, twice daily tooth brushing of teeth with fluoride containing toothpaste (smear (0.1mg fluoride) for children under 3 years, or pea (0.25mg fluoride) size for 3-6 years old children) by the parents/guardians, reduction of nocturnal breastfeeding and bottle feeding habits and improvement of oral health seeking behaviour of the parents could reduce the prevalence of early childhood caries among children in rural areas. Africa has about 3000 ethnic groups with various socio-cultural practices and beliefs. More studies from diverse rural ethnic population in Africa will fill the gaps in knowledge and add to existing literature.

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Conflicts of interest
There are no conflicts of interest.

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