

Prevalence of Dental Caries in Different Ages among Children in Saudi Arabia; Systematic Review

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ABSTRACT

Background/objective: Children's dental health has become a key issue in Saudi Arabia due to the growth in caries prevalence among school children there. Understanding caries experience is crucial for Saudi Arabian policymakers to develop intervention targets and enhance oral health. As consequently, a comprehensive research was conducted to investigate the prevalence of dental caries in Saudi children.

Method: For pertinent information, PubMed, Web of Science, Science Direct, Cochrane Library, and Google Scholar were scoured in-depth. The Rayyan QRCI was employed throughout this thorough procedure.

Results: our study article included 11 studies, in which the prevalence of dental caries among children in Saudi Arabia was explained. The main parameters like age, sex, no. of participants and areas were obtained. Clinical studies were required to determine the prevalence of caries in different areas in Saudi Arabia particularly among children.

Conclusion: The review summarized that the prevalence rates in Saudi Arabia were high, but the mean dental caries prevalence during the latest decade was determined to be lower than the preceding two decades, with minimal volatility in the prevalence rate.

Keyword: Caries, Dental, Children, DMFT, Prevalence, Saudi Arabia.

Introduction

Good dental health is essential for overall health and well-being. It is the absence of conditions that impair a person's ability to eat, talk, smile, and maintain their psychosocial well-being. These conditions include those that cause oral and face discomfort, mouth and throat cancer, dental infections and ulcers, periodontal disease, caries, and tooth loss. Dental caries is one of the earliest and most frequent human illnesses [1].

According to the Dental Association of America, tooth caries is a "biofilm-mediated, multifactorial, sugar-driven and dynamic disease that causes modal demineralization and re-mineralization of oral solid tissues." [2]. various strategies have been implemented in recent decades to avoid tooth decay and additional oral health concerns in different communities across the world.

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Notwithstanding considerable efforts, it remains a global public health concern that affects a large portion of the global populace [3]. Despite tooth caries is avoidable, the incidence leftovers from top to toe in school-aged kids [4]. Dental caries is especially dangerous in youngsters because damaged tooth structure is more vulnerable even after restoration. Additionally, poor dental health has an influence on children's development [5]. When chewing is uncomfortable for toddlers, their growth and nutrition may suffer. Older children who experience dental discomfort may miss school or become distracted. When young individuals are unhappy or humiliated by the sight of their teeth, they may interact with their classmates and society less. Throughout life, success and productivity may be impacted by dental caries' impacts on development and the development of the body, social/emotional system, and mind of children [6]. According to the organization for world health (2012) study on Proper dental hygiene, dental caries affects 60%e80% of broods globally, and almost 100% of adults. [7]. several research have been undertaken in KSA to evaluate the frequency of cavities in teeth; the majority of them indicated that caries are prevalent in both kids and adults. A comprehensive analysis was conducted, for instance, by Al Agili et al. in 2013 to determine the occurrence of teeth caries in Saudi Arabia from 1988 to 2010 [8]. They determined that Seventy percent of pupils in elementary school had caries in their long-term dental health, whereas 80% had dental caries cavities in their initial dentition. Deteriorated missing filled teeth (DMFT) on average were 3.34, another review indicated that the permanent dentition has a significant level of dental caries. They likewise discovered that the mean DMFT in the primary dentition is 5.38 [9]. Alike results were made through AlAnsari et al. (2014), they found that the mean DMFT of the permanent dentition in adults was 7.35, whereas the mean DMFT of the primary dentition in adults was 7.34 [10]. Prevalence of caries is decreasing mostly in countries that have implemented public health initiatives that use programs for institute healthiness and institute sealants to reduce dental caries. Dental caries used to be prevalent in the United Kingdom (UK). Though, by implementing the framework of oral health, the frequency of dental cavities in particular and oral health in general, began to alter considerably [6]. Dental caries prevalence was substantially greater in Saudi Arabia areas than in European nations. Meanwhile the establishment within the scope of health, the frequency of dental caries has increased in

Saudi citizens, particularly amongst children [9]. In the primary teeth, the frequency of caries ranged from 74% to 90% in children aged 6 to 7. It was 59- 80% in permanent teeth [10]. The environment in which children live and grow has been identified as a factor impacting their health behaviors. The socioeconomic position of a family is related to the occurrence of dental caries. The frequency and severity of dental caries are developed in families with low socioeconomic position and low educational levels because they often have less access to dental care, oral hygiene products, and information about oral hygiene [11]. Caries-free children had parents with better educational levels, were aware of longer preservation of their own dentitions, had smaller families, attended planned dental checkups, and ate less often in between snacks, according to Johnsen et al. [12]. Several studies have revealed that children of moms with greater educational degrees had better oral health. Eronat and Koparal [13] discovered a decreased level of dental caries in Turkish infants whose mothers were well educated. Similarly, decreased caries prevalence was documented in Jordanian children whose mothers had greater levels of education. A large family size has also been linked to an increased incidence of dental caries in children [14]. It is worth noting that SA began implementing several preventative methods in primary care facilities in 1993. The principal nationwide program covering each and every elementary school was established in 2005, and the MOH has been offering activities that promote dental health in schools ever since [15]. Though, no study has been conducted to offer an accurate assessment of caries of the teeth frequency throughout all KSA areas in order to determine the adjustments that have been made. A quantity of research on the frequency and harshness of pediatric caries have been conducted in Saudi Arabia. This review will contribute to a better knowledge the frequency of caries in Saudi Arabia. Also, this review will seek to uncover the causes for the disparity in the findings of research on dental caries prevalence in children.

Methods

PRISMA's recommended Reporting Items for Systematic Reviews and Meta-analysis standards were followed for this systematic investigation.

Study Design and Duration: The whole evaluation was finished in October 2023.

Search Technique: To locate the relevant studies, a thorough search was carried out using five important databases: EBSCO, Google Scholar, Web of Science, PubMed, and Science Straight. We limited the

language of our search to English while taking into account the specific needs of each database. The following keywords were converted into PubMed Mesh terms in order to find pertinent articles: "Caries, Teeth, Dental, Children Saudi Arabia, Prevalence." We used the Boolean operators "OR" and "AND" to match the required phrases. Publicly accessible content, human trials, and articles were all included in the English search results.

Selection standards: Qualities for inclusion, for our review, we took into account the following factors:

- Any research investigates the dental caries prevalence in Saudi Arabian children.
- Age limitations did not apply.
- Articles were freely available.

Exclusion criteria:

- Case studies, editor letters, and rebuttals to disputes were excluded.
- An alien tongues.

Obtain the info

Rayyan (QCRI) was used to extract duplicate results from the search algorithm output. Based on the combined search results, the scientists filtered and assessed the importance of the titles and abstracts employing a list of standards for inclusion and exclusion. The reviewers thoroughly assessed the manuscript that satisfies the conditions for approval. Following thorough deliberation, the authors proposed substitute dispute resolution techniques. The writers have access to the names, novelists, research year, republic, sex, age, participants, important results, and assumption of the studies.

Technique for Combining Data: Using data from related studies, summary tables were made to offer a qualitative synopsis of the main conclusions of the study. Once the material from the systematic review was acquired, the optimal technique for using the information from all of the included study papers was determined.

Risk of biased evaluation: For non-randomized trials of medicines, the efficacy of the research included was assessed employing the ROBINS-I risk of bias evaluation approach. Confounding, research participant selection, intervention classification, deviation from planned interventions, incomplete data, outcome assessment, and selecting the reported result were the seven subjects that were assessed.

Results

Search outcomes: 210 research papers were found after a comprehensive search, 60 of which were duplicates. Thirty-five papers were rejected after 150 research' titles and abstracts were screened. Just 65 of

the 115 papers that were investigated for retrieval could not be originate. After screening fifty documents for full-text review, thirty had been rejected since the research's conclusions were inaccurate, and nine were rejected as the populace kind was incorrect. There were eleven pertinent study papers included in this systematic review. An outline of the procedure for choosing studies is depicted in (Figure 1). Features of the studies that were covered. The studies that are included have their socio-demographic information reported in (Table 1). There were 11 studies in our results. They were all carried out in Saudi Arabia but in different regions. One in Al-Madinah [19], two in Riyadh [20,22], one in Abha [24], one in Dammam [23], one in Jeddah [18] and the other in different areas. Most of the research was done with children in mind with young age, only one study [24] conducted on youngsters at 15 to 17 ages. The clinical features of the involved reports are shown in (Table 2). It was possible to establish that the frequency of dental caries among youngsters ranged from 72% to 84% [19,20, 21,22,23,24]. The research also needed to explore methods for preventing and treating dental caries in kids. Furthermore, low socioeconomic position, gender, child age, parents' education, low maternal education, and school type are all risk factors for Early Childhood Caries [16, 25]. According to Kotha, Suni Babu et al. [16], children who attend public schools are at a higher risk of developing Early Childhood Caries. Another substantial risk factor was gender (male) [16, 21]. Mothers should urge their children to wash their teeth in the morning before they go to work and in the evening before they go to bed to minimize caries [18], since it was shown that early childhood caries was 27.4% [17].

Discussion

Dental caries is now seen as one of the most serious public health issues confronting the Kingdom. This investigation unequivocally demonstrates that dental caries is a significant issue for the oral health of Saudi Arabian youngsters. Especially for the very young. Dental caries is common crossways KSA, however the frequency varies by region. Since, it was discovered that the frequency of dental caries was lower in nations surrounding Saudi Arabia. Al-Mutawa et al. (2006) from Kuwait discovered a 0.18 prevalence of dental cavities in kids between the ages of twelve and fourteen, while Ali (2016) discovered a 0.52 incidence of dental cavities in kids between the ages of twelve and sixteen. Al-Ismaily et al. (1996) discovered a 0.58 frequency of dental caries among children aged 12 years in Oman. The frequency of dental caries in Qatar

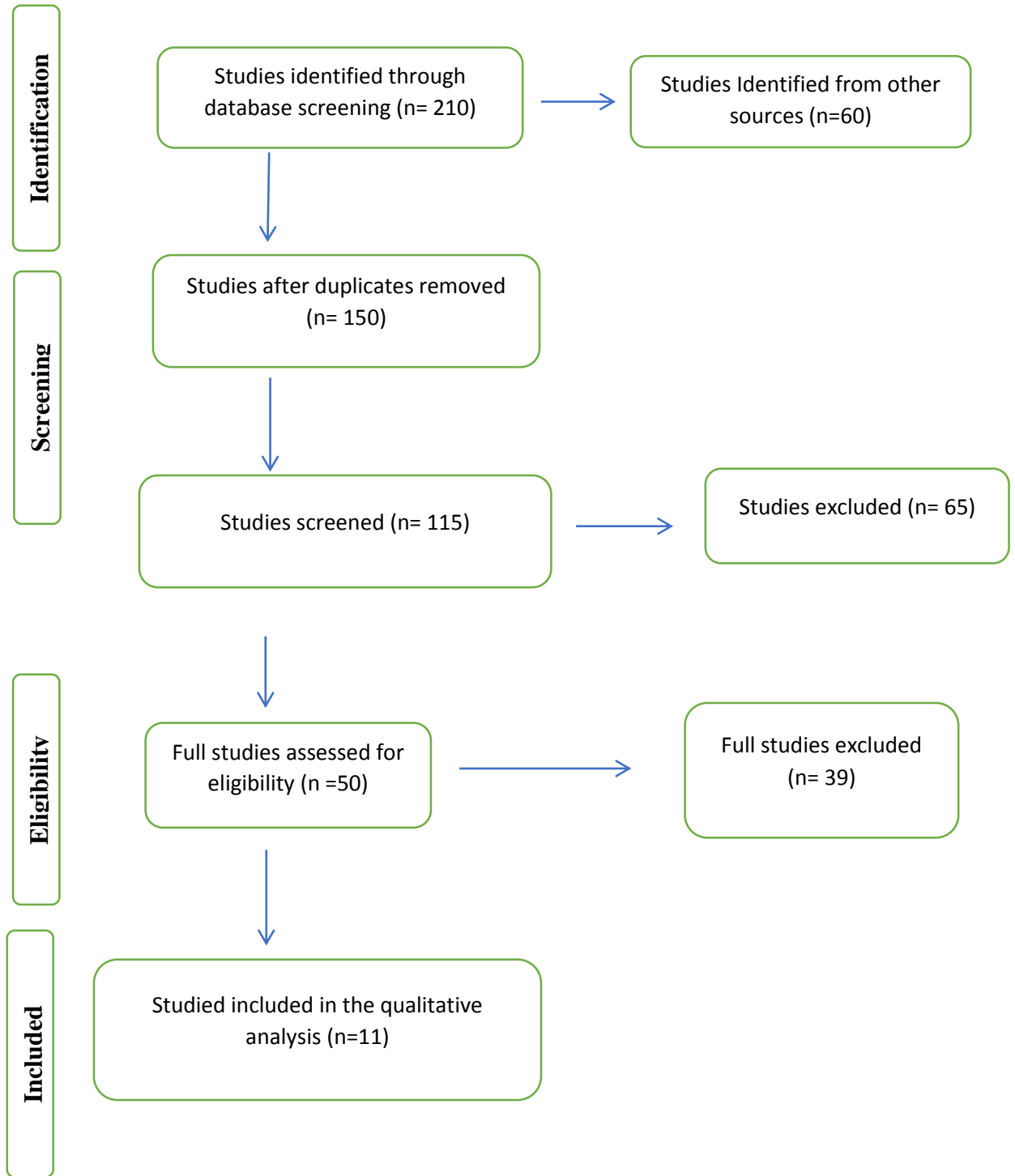


Figure 1: PRISMA flowchart summarizes the study selection process.

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Table 1: Socio-demographic characteristics of the included participants.

Study	Area	Study design	No of participants	Age	Gender	Period of study
Adam, Tasneem R et al. 2022 [15]	Saudi Arabia	Meta-analysis	56,327 children	5 - 15 years	NA	January 1996 and October 2019
Kotha, Suni Babu et al. 2022 [16]	the Middle East region	systematic review	14,479 children	≤6 years	NA	from January 1, 1960 to December 31, 2020
Al-Haj Ali et al. 2021 [17]	Eastern Saudi Arabia	cross-sectional study	241 children	≤71 months of age	58.9 % boys	between January and April 2020
GUDIPANENI ET AL. 2020 [18]	northern border region of the KSA,	cross-sectional study	250 children	138 kids in the 3–5-year-old age group, 112 kids were in the 6–7-year	154 boys	August 2017 and March 2018
A. Aqeeli et al. 2021 [19]	Al-Madinah	cross-sectional oral health survey	1,000 schoolchildren	9-12year old	39.9% were girls	NA
Al-Rafee et al. 2019 [20]	Riyadh region	NA	1,986 school children	6 years old 12 years old 15 years old	NA	NA
Omar El Meligy et al. 2019 [21]	Jeddah	cross-sectional	563 children	6-13 years old	46.5% boys 53.3% girls	NA
Yousef H. Al-Dlaigan et al. 2016 [22]	Riyadh	NA	388 children	3 to 5 years- old	184 boys and 204 girls	NA
Farooqi et al. 2015 [23]	Dammam	cross-sectional study	711	397 children between the age of 6-9 years, and 314 between the age 10-12 years	NA	from February to May 2014
Alshahrani, Ibrahim et al. 2018 [24]	Abha	cross-sectional study	3411 male secondary school	15–17-year	NA	form 2013
Al Agili, Dania Ebrahim et al. 2013 [25]	Saudi Arabia	cross-sectional study	NA	NA	NA	From 1988

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Table 2: Clinical characteristics and outcomes of the included studies.

Study	Mean DMFT	Prevalence according to type of teeth	Prevalence according to area	Other outcomes
Adam, Tasneem R et al. 2022 [15]	NA	The overall incidence of dental caries was 84% among 5-7 year old children and 72% among 12-15 year old kids.	Abha (93%) and Eastern Province (73%), respectively, had the greatest and lowest frequency of dental caries.	NA
Kotha, Sumi Babu et al. 2022 [16]	NA	NA	In the Middle East, the frequency of early childhood caries ranged from 26.50 to 99%. In their 2000 investigation in Riyadh, Saudi Arabia, they found the highest ECC incidence of 99%. In a study conducted in Tabuk, Saudi Arabia, the lowest frequency was 26.50%, with a mean DMFT of 1.17. In the United Arab Emirates, the prevalence ranged from 41 to 83%.	Risk factors were identified as socio-demographic variables, dietary factors, dental hygiene practises, feeding practises, oral bacteria, and healthcare system-related factors.
Al-Haj Ali et al. 2021 [17]	4.39	NA	ECC was discovered in 27.4% of the individuals.	NA
GUDIPANENI ET AL. 2020 [18]	NA	NA	The prevalence of untreated dental caries is 94.2% in the 3-5 year old age group and 26.7% in the 6-7 year old age group.	Children brushing twice daily had a lower prevalence of untreated dental caries than those brushing once daily.
A. Aqeeli et al. 2021 [19]	1.43 ± 1.73	Caries was found in 70.4% of primary teeth and 56.6% of permanent teeth.	Caries prevalence was 85.1%, with 76.1% untreated caries.	Caries severity was much greater among males, Saudis, low-income households, and students in public schools.
Al-Rafee et al. 2019 [20]	at 6 years was 1.4.	NA	At 6 years, the overall caries prevalence was 85.77%, 64.98% at 12 years, and 71.35% at 15 years.	Both the rate and severity of caries were greater in rural regions than in urban ones.
Omar El Meligy et al. 2019 [21]	2.41	The frequency of caries in primary teeth was 59.7%. Caries was found in 68.6% of permanent teeth.	NA	Males showed considerably greater caries prevalence than females. In the case of primary teeth, the younger age groups exhibited a considerably greater prevalence of dental caries than the older age groups..
Yousef H. Al-Dlaigan et al. 2016 [22]	3.4	NA	69% of children had dental caries	Less caries was detected in children whose parents worked, and the difference was statistically significant, regardless of whether the moms had a high or low educational level. An increased number of family members appeared to have a statistically significant incidence of dental caries.

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Farooqi et al. 2015 [23]	NA	Caries was prevalent in roughly 78% of 6-9-year-old children and 68% of 10-12-year-old youngsters.	The overall frequency of dental caries teeth was 73.3% among all youngsters.	Daily tooth brushing showed a good effect on caries prevention, which was statistically significant for primary teeth caries.
Alshahrani, Ibrahim et al. 2018 [24]	4.3 ± 5.59	NA	The prevalence of dental caries was found to be 72.9% in the study population.	In all quadrants, the first permanent molar was the most often afflicted tooth by dental caries.
Al Agili, Dania Ebrahim et al. 2013 [25]	3.5	80% for primary dentition, 70% for permanent dentition in children	NA	There is a scarcity of representative data on the prevalence of dental caries in the Saudi Arabian population as a whole.

Among children from five to fifteen years old is 0.73 and 0.85 amongst youngsters aged from 12 to fourteen years [26]. The frequency of dental caries is covered in this methodical study in children residing in Saudi Arabia areas in detail. This research discovered high approximations of teeth caries prevalence and a rise in caries occurrence over the previous period. The International Dental Federation, the World Health Organization, and the Association for International Dental Research collaborated to develop the 2020 Global Goals for Oral Health [27]. Reducing the effect of teeth caries on people and civilization was one objective, as well as to create early detection, avoidance, and efficient handling options for dental caries. Inappropriately, majority of epidemiological studies have revealed that dental caries is still widespread among South African schoolchildren. Furthermore, untreated dental caries in young kids remains a considerable health burden in South Africa, implying that more special efforts and diverse preventative strategies are required if this objective is to be met. In 2007, The Saudi Arabian Standard Organization (SASO) implemented the Ministry of Health's guidelines for fluoride ions in main water supply networks in major cities, with the goal of reducing caries incidence from 90% to 50-60% [28]. A dental caries severity scale was developed by the WHO, based on DMFT readings. Readings between 0.0 and 1.1 were considered very low, 1.2-2.6 were low, 2.7-4.4 were moderate, 4.5-6.5 were high, and values over 6.6 were considered extremely severe [29]. Al Suwyed AS et al. [30] reported that although the mean DMFT in the UAE ranged from 3.07 to 10.9, with a prevalence of 41.5 to 99.4%, among KSA children, the DMFT varied from 0.9 to 8.6 with a frequency of 20.8 to 96%.

According to Al-Haj Ali et al. [17], the socio-demographic characteristics analyzed in the current analysis, other than the mother's job status, were not risk factors related with ECC. Alhabdan et al. [31] discovered that socioeconomic variables were not significantly linked to dental caries in Saudi schoolchildren. Children of working moms in general, and especially those working in education, were considerably more likely to have ECC than those of non-working mothers. Mahesh et al. [32] observed a similar conclusion, namely that children of working moms spent a significant portion of their day in daycares, where carers did not frequently conduct or oversee teeth brushing for children as part of their daily routine. It is also probable that those children's diets are more cariogenic in nature, with sugary foods and beverages being more frequently ingested as compared to children of non-working moms who are naturally served home-prepared meals. As a result, these possibilities should be communicated to working moms as part of oral health programs; working mothers should also be urged to brush their children's teeth before they leave to work and before the children go to bed. Another meta-analysis study found that Dental caries is 1.5 times more common in adults who do not brush their teeth once a day than in children who do [33]. Early caries prevention methods in newer broods can help to lessen the load of untreated dental caries. According to research which inspected the impact of untreated dental caries and its effects on Brazilian children's quality of life, the incidence of untreated dental caries was 64.6%, with 17.9% showing clinical sequelae of untreated dental caries. Untreated dental caries and its clinical repercussions have a significant impact on schoolchildren's quality of life. Furthermore, untreated dental caries might raise the likelihood of persistent successor tooth

development problems [34]. It is important to note this matter.

Conclusion

Delayed notice of indications of dental caries has a negative impact on their children's teeth and causes one to seek dental treatment later in the course of the illness. So, data analysis, particularly of socio-demographic characteristics, is required to develop effective Children's teeth caries is a community health concern. We discover that teeth caries in kids is a public health matter. We find that dental caries is prevalent among school-age Saudi Arabian children. More study is needed to develop methods for both treating and preventing dental caries in kids. Furthermore, investigations on continuing programs to assess the impact of programmes that promote oral health are required. It is also suggested that such studies be conducted every few years to provide an up-to-date picture of the population's oral health.

Conflict of Interest

None

Funding

None

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