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Key Determinants of Oral and Dental Health Promotion in 6–12 years old Primary School Children: A Comprehensive Overview

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Abstract

Objectives: Children between 6 to 12 years are among the most important target groups for oral and dental health (O-DH) promotion programs due to high prevalence of dental caries. International organizations have strict recommendations regarding school-based implementation of oral health educational programs and preventive interventions as a low-cost, effective, and accessible approach for most children. Previous studies mainly evaluated a limited number of parameters involving development of oral diseases. However, dental caries remains as a health dilemma and is considered a silent epidemic. Thus, this study aimed to comprehensively identify and assess the factors affecting O-DH in 6– to 12–year-old elementary students.

Methods: A comprehensive search was carried out in PubMed and Scopus databases for articles published between 2014–2023 addressing influential factors on O-DH promotion using selected keywords. Following initial screening and removal of duplicates, the results were imported to EndNote.

Results: After assessing the title, abstract, and full-text, 31 eligible studies were included, and influential factors were extracted and categorized into 8 groups of oral health education, oral examinations and dental screening, healthy diet at home and school, exposure to fluoride in different forms and in sufficient amounts, tooth brushing and flossing, demographic factors, family socioeconomic status, and others.

Conclusion: The results highlighted the significant role of school, family and oral health team in O-DH promotion of students, indicating that a proper cooperation among the three would bring about ideal results. Thus, schools with the involvement of parents and teachers under the guidance of oral health team can pave the way for O-DH promotion of students, and have a positive impact on the community as well. Therefore, further attention should be paid to implementation of oral health promotion educational programs and preventive interventions for elementary students.

Keywords: Oral health; oral hygiene; health promotion; students; parents; teachers; primary school; children 6–12 years old

Introduction

Dental caries represents a prevalent non-communicable disease affecting individuals across all age groups worldwide. Its negative impact extends beyond the oral cavity, influencing both quality of life and imposing significant economic burden on families and societies. The consequences of dental caries and periodontal diseases can exacerbate systemic health issues alongside resulting physical, mental, and social challenges. Importantly, dental caries is a preventable condition, with opportunities for reversal during its early stages through effective preventive measures and proper oral hygiene practices. However, the global high prevalence of oral diseases detracts from overall quality of life and strains financial and human resources allocated for dental care.[1]

The multi-factorial nature of dental caries underscores the significance of various contributors to its development, including the frequent consumption of sugary foods, inadequate fluoride exposure, and irregular or improper tooth brushing habits.[2] Yet, mere awareness of these factors is often insufficient to catalyze sustainable behavior change among individuals. As such, it is essential to consider biological, behavioral, and socioeconomic determinants at individual, family, and community levels to achieve meaningful health outcomes.[3,4]

Given the complexity of factors influencing the incidence of dental caries, a holistic methodology in programming and policy formulation can effectively promote oral health within target populations. A comprehensive approach that addresses influential factors related to O-DH at multiple levels—including individual oral hygiene practices, parental beliefs, family dynamics, as well as aspects of ethnicity, culture, living conditions, and community health initiatives will be necessary. The dental healthcare system plays a critical role in enhancing O-DH outcomes.[5,6]

Dental caries predominantly manifests during childhood and adolescence across various socioeconomic strata, regardless of racial and ethnic background.[7] Estimates suggest that between 60% and 90% of school-aged children experience dental caries, which may significantly detract from their overall health and well-being.[8] Given that, dental caries can affect both primary and permanent teeth, evaluating the prevalence and severity of caries in children aged 6 to 12 is imperative for gaining insights into the health status of their dentition.

In light of the above statement, primary schools emerge as optimal environments for promoting O-DH among 6 to 12 years old children. The implementation of oral health education programs and preventive interventions in primary schools represents a cost-effective strategy aimed at this demography.[9,10] At the same time, this age group is conducive to the acquisition of healthy behaviors and the establishment of long-term lifestyle habits. Despite the high prevalence of

dental caries and the eruption of permanent teeth during this developmental phase, protective strategies for newly erupted, sound permanent teeth can be effectively employed within primary school settings nationwide.[11–14] Fostering collaboration between students, school health professionals, and parents, as well as enhancing communication with teachers and dental teams, can mitigate oral health disparities by facilitating appropriate preventive care for at-risk students. Such initiatives will create an environment conducive to oral health education for both students and their parents, ultimately advancing O-DH promotion, improving lifestyle choices, and enhancing O-DH status throughout adulthood.[15–18]

Prioritizing preventive strategies and oral health promotion programs, particularly in moderate- and low-income countries, represents an effective means to alleviate the burden of oral diseases and associated costs at both community and national levels. A 2012 survey conducted by the World Health Organization revealed that approximately 108 schools across 61 countries worldwide were implementing programs focused on preventive oral and dental health promotion.[19]

While several studies have been tailored to examine risk and influential factors affecting students' O-DH status in different contexts,[20,21] none have provided a comprehensive analysis encompassing multiple parameters. Given the variability in influential factors impacting O-DH promotion among students across distinct cultural, social, economic, and political frameworks, further investigation is warranted. Such research should facilitate evidence-based programming and enable a thorough understanding of factors critical to enhancing students' O-DH promotion. Because of the importance of having holistic and comprehensive approach in school-based oral health promotion programs, this study aimed to identify the most important influential factors and categorized them by identifying their role in O-DH promotion in 6-12 years old primary school children.

Method

Data for this overview study,[22] were collected via comprehensive searches of the PubMed and Scopus databases, utilizing targeted keywords including "Oral Health," "Oral hygiene," "Health promotion," "Parents," "Teachers," "Primary school," and "6-12 year old Children." The search strategy employed for PubMed is summarized in Table 1, while a comparable strategy was employed for Scopus, with minor adjustments in the filtering process.

Upon completion of the initial searches in the designated databases, relevant articles were extracted according to predefined inclusion criteria. These criteria comprised of English-language articles, with full text accessible, published between 2014 and 2023, and specifically addressing the impact of various factors on O-DH related behaviors in healthy students aged 6 to 12 years (excluding those with physical or mental disabilities). Following the application of these eligibility criteria and the removal of duplicates, a thorough assessment of the titles, abstracts, and full texts of the retrieved articles led to the inclusion of 31 papers in the study. The process of article selection, guided by the research strategies, is illustrated in Figure 1.

Table 1. **PubMed search strategy**

PubMed search strategy
((“oral health”[MeSH Terms] OR “oral hygiene”[MeSH Terms] OR “health promotion”[MeSH Terms]) AND (“population”[MeSH Terms] OR “schools”[MeSH Terms] OR “child”[MeSH Terms])) AND ((ffrft[Filter]) AND (meta-analysis[Filter] OR randomizedcontrolledtrial[Filter] OR review[Filter] OR systematic review[Filter]) AND (2014/1/1:2023/5/1[pdat]) AND (English[Filter]) AND (child[Filter]))

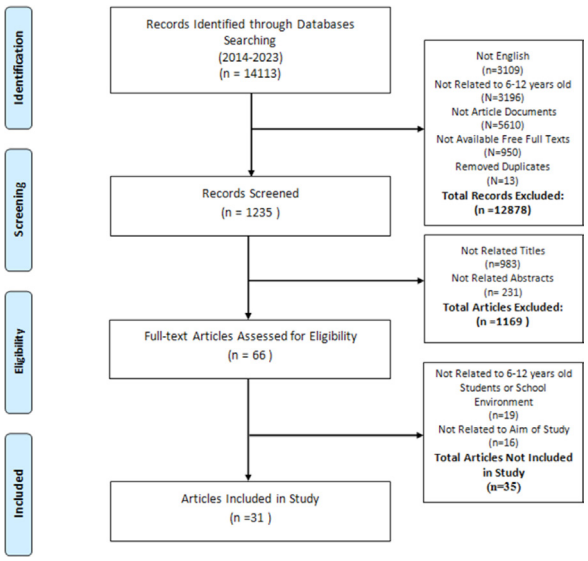

Fig. 1 **Flowchart showing the database search and selection process.**

Results

A systematic search of the PubMed and Scopus databases using the designated keywords identified 14113 publications released between January 2014 and April 2023. Following the application of inclusion criteria—specifically, limiting the search to articles published in English, focusing on a participant with age range of 6 to 12 years, and eliminating duplicates—a total of 1,235 articles remained. Subsequent assessment of titles and abstracts led to the inclusion of 66 studies. Ultimately, a detailed full-text review resulted in the selection of 31 articles for final consideration. The predominant study design among the included articles was cross-sectional (n = 11), followed by experimental studies (n = 8). Notably, the years 2019 and 2022 exhibited the highest publication frequency, with 7 and 6 articles respectively. A summary of the included studies is presented in Table 2.

The evaluation of the included studies indicated that the school environment, family dynamics, and health team involvement significantly influence the promotion of oral health among primary school students. Based on this comprehensive review of the existing literature, influential variables related to students' O-DH were extracted and organized into eight distinct categories. This categorization was conducted separately for the family, school, and health team contexts, with consensus achieved among dental public health specialists. Given that children aged 6 to 12 years predominantly spend their time in home and school settings, the integration of an oral health team within the school environment is essential for fostering collaboration among these three domains. The oral health team bears the primary responsibility for

Table 2. **Summary of the included articles in this overview after literature search and selection process**

No.	First author; country (Ref#)	Year	Type of study	Study aims	Outcomes (Domain of influential factors on students' oral health)	Group type
1	Maciel, I. P. Brazil[23]	2023	Cross-sectional	Evaluatation of the impact of the family structure on the oral health status children	1. Oral Health Education 2. Family Socioeconomic Status 3. Toothbrushing & Flossing	Family
2	Chen, Z. China[24]	2023	Cross-sectional	Investigatation of prevalence and associated factors of dental caries among school children aged 6–8 years	1. Oral Examination & Dental Screening 2. Healthy Diet at Home & School 3. Toothbrushing & Flossing 4. Demographic Factors	School/ Family
3	Chen, L. China[25]	2023	Cohort	Examination of combined effect of pit and fissure sealant application and oral health education on oral health status	1. Oral Health Education 2. Healthy Diet at Home & School 3. Demographic Factors	School/ Family
4	Babaei, A. Iran[26]	2023	Randomized controlled trial	Monitor the oral health of school children aged 6–7 years old following the implementation of an oral health promotion program	Oral Health Education	Family
5	Zarabadipour, M. Iran[27]	2022	Semi-experimental	Evaluatation of the effects of oral hygiene training on dental plaque index in 9-year-old children	1. Oral Health Education 2. Exposure to Fluoride in Different Forms & in Sufficient Amounts 3. Toothbrushing & Flossing	School/ Family/ Dental team
6	Tahani, B. Iran[28]	2022	Quasi-experimental	Investigatation the effect of an Oral Health Promoting School model on children's oral health	Oral Health Education	School/ Family/ Dental team
7	Sowmiya Sree, R. A. India[29]	2022	Experimental	Assessing the effectiveness of parental participation in prevention-focused school dental health program	1. Oral Health Education 2. Exposure to Fluoride in Different Forms & in Sufficient Amounts 3. Toothbrushing & Flossing	School/ Family/ Dental team
8	Singh, R. India[30]	2022	Cross-sectional	Determinatation of the knowledge, attitude, and practice of parents toward the oral health of school-going children	1. Oral Health Education 2. Oral Examination & Dental Screening 3. Healthy Diet at Home & School 4. Toothbrushing & FlossingOthers	School/ Family/ Dental team
9	Sanaeinasab, H. Iran[31]	2022	Randomized controlled trial	Examination of the effects of an educational program based on a Health Belief Model to improve oral health behaviors of elementary school children	Oral Health Education	School/ Family/ Dental team
10	Akera, P. Uganda[32]	2022	Systematic review & meta-analysis	Evaluatation of the effectiveness of primary school-based interventions in improving oral health among children	1. Oral Health Education 2. Oral Examination & Dental Screening 3. Healthy Diet at Home & School 4. Exposure to Fluoride in Different Forms & in Sufficient Amounts 5. Toothbrushing & Flossing 6. Others	School/ Family/ Dental team
11	Wei, C. T. Taiwan[33]	2021	Quasi-experimental	Evaluation the efects of health-promoting school strategy on plaque control and behavior change in high-caries school children	1. Oral Health Education 2. Oral Examination & Dental Screening 3. Healthy Diet at Home & at School 4. Exposure to Fluoride in Different Forms & in Sufficient Amounts 5. Toothbrushing & Flossing 6. Others	School/ Dental team

(Continued)

Table 2. **Summary of the included articles in this overview after literature search and selection process — Continued**

No.	First author; country (Ref#)	Year	Type of study	Study aims	Outcomes (Domain of influential factors on students' oral health)	Group type
12	Shakir, A. UK[34]	2021	Rapid review	Evaluatation of the effectiveness of school-based behavioural interventions to improve the oral health of children	1. Oral Health Education 2. Healthy Diet at Home & School 3. Exposure to Fluoride in Different Forms & in Sufficient Amounts 4. Toothbrushing & Flossing	School/ Family/ Dental team
13	Bramantoro, T. Indonesia[20]	2021	Systematic review	Evaluatation of influence of school-based oral health promotion programmes on oral health knowledge, behaviours, attitude, status, and quality of life of childre	1. Oral Health Education 2. Oral Examination & Dental Screening 3. Healthy Diet at Home & School 4. Toothbrushing & Flossing	School/ Family/ Dental team
14	Alraqiq, H. Libya[35]	2021	Cross-sectional	Assessing the prevalence of dental caries and factors associated with caries among children	1. Oral Health Education 2. Oral Examination & Dental Screening 3. Healthy Diet at Home & School 4. Family Socioeconomic Status 5. Others	School/ Family
15	Zacharias, S. Tanzania[36]	2019	Randomized controlled trial	Evaluatation of educating parents about children's tooth brushing supervision	Oral Health Education	Family
16	Pham, T. A. V. Vietnam[37]	2019	Cross-sectional	Determination of the factors related to dental caries	1. Oral Examination & Dental Screening 2. Healthy Diet at Home & School 3. Toothbrushing & Flossing 4. Family Socioeconomic Status	School/ Family
17	Karami, A. Iran[38]	2019	Quasi-experimental	Determination of the impact of Peer-Led Education comparing with the Teacher-led education approach about oral health behavior	1. Oral Health Education 2. Demographic Factors	School/ Family
18	Geetha Priya, P. R. India[21]	2019	Systematic review	Evaluatation of the effectiveness of school dental health education on the oral health status, oral health-related knowledge, and practice behavior of 6–12-year-old children	1. Oral Health Education 2. Healthy Diet at Home & School 3. Exposure to Fluoride in Different Forms & in Sufficient Amounts 4. Toothbrushing & Flossing	School/ Family/ Dental team
19	Bruzamolin, C. D. Brazil[39]	2019	Cross-sectional	Determination of the prevalence of dental caries in a population of 12-year-old schoolchildren and evaluatation of the association between dental caries and socioeconomic and educational variables	1. Demographic Factors 2. Family Socioeconomic Status 3. Others	Family
20	Bramantoro, T. Indonesia[40]	2019	Cross-sectional	Examination of the prevalence of dental caries and its associated factors among primary school children	1. Healthy Diet at Home & School 2. Toothbrushing & Flossing 3. Demographic Factors	Family
21	Alsumait, A. Kuwait[41]	2019	Cross-sectional	Evaluateation of the relationship between a school-based oral health prevention program and: 1) children's dental health status and oral health-related quality of life, and 2) mothers' oral health knowledge, attitude, practice, and OHRQoL	1. Oral Health Education 2. Oral Examination & Dental Screening 3. Exposure to Fluoride in Different Forms & in Sufficient Amounts	School/ Family/ Dental team
22	Qadri, G. Germany[42]	2018	Randomized controlled trial	Evaluatation of the effect of one and half years of an oral health promotion program in primary schools	Oral Health Education	School

(Continued)

Table 2. **Summary of the included articles in this overview after literature search and selection process — Continued**

No.	First author; country (Ref#)	Year	Type of study	Study aims	Outcomes (Domain of influential factors on students' oral health)	Group type
23	Melo, P. Netherlands[43]	2018	Semi-experimental	Evaluatation of the improvement in oral hygiene knowledge and behaviour in school children involved in Brush Day and Night programme	1. Oral Health Education 2. Exposure to Fluoride in Different Forms & in Sufficient Amounts 3. Toothbrushing & Flossing	School/ Family/ Dental team
24	Machry, R. V. Brazil[44]	2018	Cross-sectional	Verifying the influence of school environment and individual factors on oral health related quality of life	1. Demographic Factors 2. Family Socioeconomic Status	Family
25	Halawany, H. S. Saudi Arabia[45]	2018	Cross-sectional	Examination of the effectiveness of oral health intervention on the improvement in knowledge and self-reported oral health behavior among 6–8 year old female primary school children	1. Oral Examination & Dental Screening 2. Demographic Factors Family 3. Socioeconomic Status	Family
26	Al Bardaweel, S. Syria[46]	2018	Randomized controlled trial	Comparing between the traditional educational leaflets and E-applications in improving oral health knowledge, oral hygiene and gingival health in school children	Oral Health Education	School
27	Dickson-Swift, V. Australia[47]	2017	Scoping review	Providing a summary of the guidelines and programs available for toothbrushing in schools and early childhood settings	1. Oral Health Education 2. Oral Examination & Dental Screening 3. Healthy Diet at Home & School 4. Exposure to Fluoride in Different Forms & in Sufficient Amounts 5. Toothbrushing & Flossing	School/ Family/ Dental team
28	Wolff, M. S. USA[48]	2016	Semi-experimental	Describing an innovative public health intervention, targeting the oral health of children	1. Oral Examination & Dental Screening 2. Exposure to Fluoride in Different Forms & in Sufficient Amounts 3. Toothbrushing & Flossing	School/ Dental team
29	de Paula, J. S. Brazil[49]	2015	Cross-sectional	Evaluatation of the impact of socioeconomic status, home environment, and self-perception of health conditions on school children's dental caries experience	1. Oral Health Education 2. Demographic Factors 3. Family Socioeconomic Status	Family
30	Kumar, S. Australia[50]	2014	Systematic review	Conducting a systematic review of the published literature to assess the influence of parental Socio-Economic Status and home environment on children's OHRQoL	1. Demographic Factors 2. Family Socioeconomic Status	Family
31	Hsieh, H. J. Taiwan[51]	2014	Experimental	Evaluatation of the effect of pit-and-fissure sealant application on permanent first molars among school children	Oral Examination & Dental Screening	School/ Dental team

educating parents, teachers, and students, as well as for planning and implementing necessary preventive and promotional oral health strategies. Consequently, parents at home and teachers in schools can establish a supportive environment for the enhancement of students' O-DH, under the guidance of the health team professionals and with the collaboration of the school's parent-teacher committee as well as other relevant school authorities. Figure 2 illustrates the proposed model for the promotion of students' O-DH.

This comprehensive review of the literature identified several influential variables affecting students' O-DH status. These variables were categorized into eight distinct groups namely: oral health education, screening and dental examinations, tooth brushing and flossing practices, healthy dietary

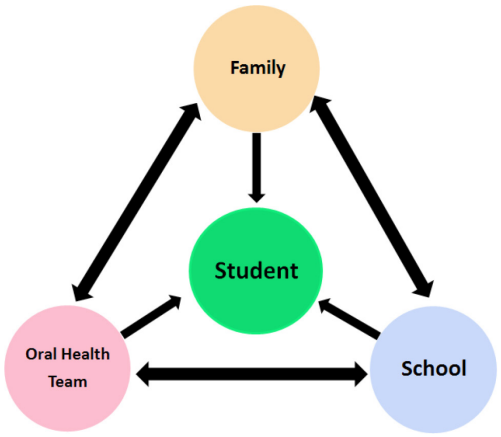

Fig. 2 **Proposed model for students' O-DH promotion showing the 3 main players.**

habits, exposure to fluoride in adequate forms and amounts, demographic factors, socioeconomic status, and additional influences. Each category is described as follows:

Oral Health Education

This category encompasses various educational initiatives aimed at enhancing awareness among parents, particularly mothers, regarding the promotion of O-DH. Effective strategies include the distribution of oral health educational leaflets and the utilization of brushing diaries to facilitate supervised brushing at home.[27,47] Teachers play a crucial role in improving students' sense of coherence regarding oral health, while training of school health workers and teachers through booklets or educational sessions is essential for disseminating oral hygiene instructions.[42,43] Various methods can be employed to provide oral hygiene instruction to students, including the distribution of informative booklets, pamphlets, and scrapbooks, as well as engaging them in activities such as puzzles and educational poster displays within the school environment.[26,32,46] Additionally, incorporating audiovisual tools, educational movies, games, group discussions, television campaigns, and participation in scientific societies can further reinforce oral health education.[32,45] It is also recommended that oral health educational programs be integrated into the school curriculum or timetable to ensure consistent exposure.[32] Instructions on correct tooth brushing and flossing techniques can be enhanced through the use of plaque disclosing agents and other audiovisual resources. An effective oral health team, comprised of hygienists, healthcare workers, dental students, and dentists, is critical for implementing all O-DH activities in school setting.[27,29,43] This team is responsible for demonstrating proper oral health self-care practices,[47] providing oral hygiene instruction, and organizing dental hospital tours for school children.[36]

Oral Examination & Dental Screening

This domain encompasses regular dental visits,[24,30,36] oral examinations and dental screening conducted by school health workers, teachers, or through self-directed assessments.[32,36] It involves informing parents of examination outcomes and recommending appropriate preventive or therapeutic services when necessary.[32] Additionally, it may include the provision of preventive dental services within schools, such as fluoride varnish and fissure sealant therapy with parental consent. Also teachers can encourage and promote regular oral health checkups among students.[20,25,32]

Healthy Diet at Home & School

This domain addresses the regulation of sugary food and beverage consumption both at home and in school settings.[20,25,39] It emphasizes the importance of limiting the frequency of purchasing and consuming sugary snacks. Furthermore, it involves educating students and parents on adopting healthy dietary practices[31,37] and advising the use of sugar-free products post-consumption.[32]

Exposure to Fluoride in Different Forms & in Sufficient Amounts

This domain includes the utilization of fluoridated toothpaste for oral hygiene practices,[28,40] the distribution of fluoridated toothpaste among students,[27,32,43] the use of fluoridated mouthwash in both home and school environments,[32] and the administration of fluoride varnish treatments biannually.[32]

Tooth Brushing & Flossing

This domain encompasses supervised tooth brushing activities conducted within the school environment,[26,27] the distribution of toothbrushes to students,[25,27,32] and the encouragement of regular tooth brushing twice daily at home under parental guidance.[23,39,43] It also emphasizes the importance of replacing toothbrushes as necessary,[30] practicing flossing after every meal or at least once before bedtime, and employing disclosing tablets or solutions post-brushing to evaluate plaque retention on dental surfaces.[32]

Demographic Factors

This domain examines various demographic variables, including the age and gender of students,[23,44] the educational attainment of parents—particularly mothers,[25,39,44] racial background,[44] and the number of family members residing in the household.[21]

Family Socioeconomic Status

This domain involves an assessment of several socioeconomic indicators, such as family income,[21,23,44] home ownership, living conditions (including space and available facilities),[21,23] the type of school attended (private versus public),[21] the district and geographical location of the school (whether upscale or deprived)[44] in addition to the family's capacity to afford dental care expenses.

Others

This domain encompasses several critical components that contribute to the oral health dynamics of students. These include the availability of a safe playground within the school environment, access to healthy drinking water that is sufficiently fluoridated, and both physical and temporal access to preventive care and therapeutic dental services, whether provided by public or private entities. Additionally, the integration of oral health services with general health programs is essential, as is the assessment of met and unmet oral health needs.

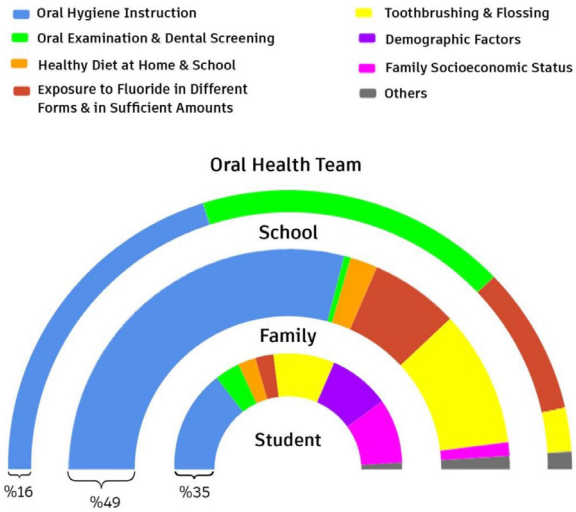

Fig. 3 **Schematic view of the frequency of variables affecting student' oral health (inner part: Family, middle part: School, and outer part: Oral Health Team.**

Figure 3 illustrates a schematic representation of the frequency and nature of various influential factors impacting the O-DH of students, as derived from the reviewed literature across three domains of family, school, and oral health team.

The analysis of these variables indicates that the school domain features the highest frequency of influential factors, followed by the family domain and subsequently the oral health team domain.

Within the school domain, the most prevalent influential factors, in descending order of frequency, include oral hygiene instruction, tooth brushing and flossing practices, and exposure to fluorides in various forms and adequate quantities. In the family domain, oral hygiene instruction was identified as the most frequent factor, followed by family socioeconomic status, demographic factors, and practices related to tooth brushing and flossing. Finally, within the oral health team domain, the leading influential variables affecting the O-DH of students include oral health instruction, oral examinations, dental screenings, and exposure to sufficient level of fluorides in multiple forms.

Discussion

This study aimed to evaluate the factors influencing O-DH among students aged 6 to 12 years old. A comprehensive analysis of 31 articles was conducted to identify and categorize these influential factors into various groups. Given that children within this age range spend the majority of their time in home and school environments, it is critical to consider the significant roles these settings play in promoting students' oral health.

The findings indicated that, the oral health team is a pivotal group in guiding and facilitating O-DH promotion within the community, particularly for students aged 6 to 12, due to their professional expertise and leadership roles. It was established that, personal and social characteristics, along with financial, cultural, and environmental determinants, have significant implications for oral health status.[52] Specific individual factors—such as gender, genetics, geographical location, physical environment, and levels of parental income and education—combined with parental and peer relationships, exert substantial effects on health outcomes.

Access to healthcare services was also identified as an influential factor, although individuals often have limited direct control over their health outcomes.[53–55] The enhancement of oral health awareness through both theoretical and practical education concerning the importance of regular oral hygiene practices and routine dental check-ups is vital.[56] As many individual factors may be subject to change, it becomes necessary to optimize the environments in which students reside—home and school—to effectively promote their oral health.

Given that students predominantly occupy these two settings, it is essential for oral health teams to furnish teachers and school health professionals, as well as parents, with adequate information and guidance.[57,58] Such initiatives are likely to instill proper hygiene behaviors in students, which may then be reinforced at home and in school environments. Successfully implementing these strategies could significantly contribute to the control of common oral diseases, including dental caries and periodontal diseases, in the future. Therefore, based on the reviewed literature, the school, family, and oral health team were determined to have the most substantial impacts on students' O-DH, ranked in decreasing order of influence.

School

Schools represent an optimal environment for the enhancement of oral health knowledge, skills, behaviors, and the adoption of healthy lifestyles.[50] Access to preventive dental care for children during the academic year, alongside the establishment of communication networks among peers, mentors, teachers, families, and health professionals, significantly enhances the capacity of schools to promote oral health among children and their families, as well as the wider community.[18,59–62]

In the context of this study, the focus on identifying factors influencing oral health among students within the school setting revealed that schools accounted for 49% of the total factors identified, underscoring their crucial role. The review of literature indicates that effective oral health interventions in schools include oral health instruction, tooth brushing, flossing, and appropriate exposure to optimum level of fluoride in various forms. Additionally, the evidence suggests that oral health education within schools is relatively effective. Given that education is the primary responsibility of schools, oral and dental health topics should be integrated into the weekly curriculum. Possible strategies for promoting O-DH of children include the incorporation of educational materials related to oral and dental health into textbooks, instruction during tooth brushing sessions, dissemination of hygiene messages through multimedia (e.g., films, posters, booklets, pamphlets), and both theoretical and practical education for students, mentors, teachers, and parents facilitated by school authorities.[10,38,63–66]

Moreover, schools that demonstrate higher educational quality exhibit greater potential for the implementation of oral health promotion programs. This is attributed to superior health-related policies, improved physical and social environments, enhanced practical skills, effective social communication, and a range of school-based health-promoting activities.[67] Besides oral hygiene instruction, strategies such as supervised

tooth brushing with fluoridated toothpaste, fluoride varnish applications, promotion of balanced diets, and other school-based initiatives have been shown to reduce the prevalence of dental caries among children.[20,68,69]

In summary, the effectiveness of O-DH instruction to children is significantly enhanced when it is coupled with concurrent instruction for parents and teachers. Schools represent a viable, cost-effective, and accessible environment for achieving this objective.[70] Implementing the "common risk factor approach" have the potential to address widespread public oral health challenges.[71]

Family

The family constitutes the essential social unit that significantly influences individual health behaviors, particularly in the context of O-DH. It is imperative to initiate O-DH care prior to and sustain it soon after birth, emphasizing the necessity for cognitive and practical skills concerning oral hygiene in children. The role of parents or guardians is paramount in fostering these competencies.[72,73]

A comprehensive assessment of the literature indicates that familial involvement accounts for 35% of the factors identified in the promotion of oral health among primary school children. Key determinants include family socioeconomic status, tooth brushing and flossing practices, and demographic characteristics, listed in decreasing order of frequency. Parents serve as primary behavioral role models; hence, their positive attitudes and behaviors towards O-DH directly influence the oral health and hygiene practices of their children. Enhancing parental knowledge and self-efficacy regarding O-DH is critical for improving the quality of personal care that parents provide. Therefore, instructing parents on effective O-DH practices emerges as a rapid and effective strategy for achieving improved outcomes in this regard.[74]

Thus, O-DH of children and their quality of life may be improved by instructing correct tooth brushing to the parents and children, and emphasizing on supervision of the parents/guardians of children over their correct tooth brushing (which can be implemented by family tooth brushing of parents together with their children).[28]

The engagement of mothers is particularly vital, as they often represent the first line of care within the family unit and community regarding oral health promotion. Training focused on routine O-DH care, dietary habits, regular dental checkups, and preventive measures is essential for this demographic.

Furthermore, a significant correlation exists between socioeconomic status and O-DH outcomes. Lower socioeconomic status is associated with a higher likelihood of poor oral health, attributed to increased risk factors.[6,75] Monthly family income plays a crucial role in determining hygienic practices, dietary choices, and access to preventive or therapeutic O-DH care. Additional influential factors include the type of school attended, residential area, and the level and type of health insurance coverage.[39,42,76,77]

The recommended practice of brushing teeth twice daily with fluoridated toothpaste, particularly following the eruption of the first permanent teeth around six years of age, is vital for the effective removal of microbial plaque. Parental supervision during tooth brushing is crucial for ensuring the use of correct techniques.[30] Family brushing practices can be implemented to allow children to learn from parental examples, while parents can provide guidance and correction as necessary.

Demographic factors such as age, gender, race, parental educational level, family size—particularly the role of mothers—and parental occupational status also emerge as critical determinants in oral health promotion. Several studies have evaluated these factors, reporting inconsistent findings regarding the influence of gender and age on O-DH promotion.[7,55,71,78,79] These discrepancies may be attributed to confounding variables and underlying cultural, ethnic, racial, and socioeconomic differences among studied populations. Evidence suggests that the educational attainment of parents, especially mothers, has a direct impact on children's self-care practices, hygiene habits, frequency of dental visits, and adherence to a healthy diet.[79–82]

Oral Health Team

In this study, the oral health team domain accounted for 16% of the total factors analyzed; therefore, it is crucial to emphasize the team's primary responsibility in developing strategic plans for the promotion of O-DH among students. A comprehensive programming approach should encompass both family and school environments to reinforce preventative measures in oral health, necessitating collaboration among parents, teachers, and school health personnel. Such cooperation will facilitate the integration of healthy lifestyle practices during the six years of primary education.[83] The age group of 6 to 12 years, corresponding to primary schooling and mixed dentition periods, is critical for initiating preventive care strategies aimed at preserving the integrity of both primary and permanent teeth and most especially the permanent dentition.[84] Routine oral screenings and dental examinations conducted by the oral health team, complemented by motivational efforts directed towards both children and parents, can significantly enhance the promotion of O-DH among students. Following the assessment of children's O-DH, referrals to dental professionals may be warranted for essential treatments, including restorative care or the extraction of residual roots from primary dentition.[83]

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Additionally, practical oral health instruction delivered through face-to-face demonstrations and hands-on practice is essential to highlight the importance of daily oral hygiene practices, including the duration and correct techniques of tooth brushing. Scientific evidence strongly supports the application of topical fluoride varnish biannually as an effective measure for enamel remineralization and also application of silver diamine fluoride (SDF) is effective in arresting caries in the primary dentition.[85,86]

Conclusion

Primary schools serve as optimal environments for facilitating access to vulnerable populations of children for the implementation of preventive and promotive oral health interventions. Evidence-based programs targeting oral health have demonstrated high efficacy and low costs, significantly impacting the O-DH promotion of children, their parents, and the broader community. These interventions may effectively address public dental health inequalities.

Therefore, it is concluded that an integrated approach involving the family, school, and oral health team is crucial for enhancing the O-DH of students. The roles, performances, and collaborations among these three entities are essential to the success of such initiatives. Under the leadership and guidance of oral health professionals, students, parents, and educators can be actively engaged in learning and practicing proper daily oral hygiene. This collaborative effort ensures that children receive supervision both at home and in school, fostering a healthy lifestyle and promoting their O-DH status.

For these preventive measures to be effectively implemented, it is imperative that policymakers provide the necessary legal support for all related activities. The successful adoption of healthy lifestyle practices regarding O-DH self-care during elementary school years is likely to normalize and imbed these behaviors in students, thereby enhancing their quality of life over the long term. Furthermore, the widespread implementation and popularization of this approach could reduce the need for dental treatments, lower associated treatment costs, and contribute to the emergence of a caries-free generation in the foreseeable future.

Acknowledgment

This study received ethical approval from the Ethics Committee of the Research Institute of Dental Sciences at Shahid Beheshti University of Medical Sciences, Tehran, Iran, under reference number IR.SBMU.DRC.REC.1400.093.

Conflicts of Interest

None.

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