

Effect of mother's knowledge of oral health in preventing early childhood caries among preschool children: a systematic review

Mohammad Hassan Hamrah (✉ hassanhamrah@gmail.com)

Department of Pediatric Dentistry, school of Dentistry, Tehran University of Medical Sciences, Tehran, Iran. <https://orcid.org/0000-0003-3967-0127>

Sara Ghadimi

Department of Pediatric Dentistry, school of Dentistry, Tehran University of Medical Sciences, Tehran, Iran.

Saeedeh Mokhtari

Department of Pediatric Dentistry, school of Dentistry, Tehran University of Medical Sciences, Tehran, Iran.

Maryam Khosrozadeh

Department of Pediatric Dentistry, school of Dentistry, Tehran University of Medical Sciences, Tehran, Iran.

Mojgan Kargar

Department of Pediatric Dentistry, school of Dentistry, Tehran University of Medical Sciences, Tehran, Iran.

Firoozeh Alipour

Department of Pediatric Dentistry, school of Dentistry, Tehran University of Medical Sciences, Tehran, Iran.

Mohammad Hussain Hamrah

Curative Clinic, Andkhoy, Afghanistan.

Toba Dahi

Faculty of Dentistry, Abantlzzet Baysal University, Bolu Turkey

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Abstract

Objective: To review current models and scientific evidence on the influence of mother's knowledge of oral health behaviors on their preschool children's oral health.

Method: MEDLINE, EMBASE and Scopus databases were searched for articles published between January 2009 and December 2019 on mother's oral health behavior.

Results: A total of 324 citations were retrieved, with 17 articles finally included in the analysis. The studies utilized various methods, including text messaging, phone conversation, of which motivational interviewing method was more effective in their knowledge and behaviors about their preschool child's oral health.

Conclusion: Mother's knowledge has a direct effect influence on their preschool children's oral health. Oral health education programs aimed at preventive actions are needed to provide children not only with adequate oral health, but better quality of life. Special attention should be given to the entire family, concerning their lifestyle and oral health habits.

Introduction

Early childhood caries (ECC) is one of the most common chronic diseases of childhood. It is a public health problem that continues to affect infant and preschool children worldwide. ECC has a debilitating effect on development, speech, general health, and self-esteem, thus affecting the quality of life of children (1, 2).

There are multilevel influences on children's oral health at the individual, family and community levels. These family level influences are mediated mainly through parents and caregivers with whom preschool children spend most of their time (3). During this period of primary socialization, the establishment of routine dietary and health behaviors is directly and indirectly influenced by the knowledge on oral health (KOH), and on the attitudes, beliefs and practices of their parents and caregivers (4).

Since the 1900s, dental health education has been considered an important and integral part of dental health services and has been delivered to individuals and groups in settings such as dental practice, schools, the workplace, day-care and residential settings for older adults. The population as a whole has also been targeted using mass-media campaigns. The educational interventions used have varied considerably, from the simple provision of information to the use of complex programs involving psychological and behavioral change strategies. The goals of the interventions have also been broad, so that knowledge, attitudes, intentions, beliefs, behaviors, use of dental services and oral health status have all been targeted for change. These efforts are testimony to dentistry's long standing, and perhaps

pioneering concern with the prevention of oral disease via changes in knowledge, attitudes and behaviors and the adoption of healthier lifestyles (5).

Since 2000, substantial literature has emerged describing studies purporting to evaluate the effectiveness of various types and combinations of educational and behavior-modification techniques. Brown reviewed 57 such studies published between 1982 and 1992 and concluded that dental health education can result in improvements in dental health behaviors and in objective measures of oral health status but was less effective in changing attitudes and knowledge (6). Perhaps, the most important issue is the quality of the designs used in the studies themselves. In order to avoid bias, error and various threats to validity, only the results of randomized controlled trials are usually included in systematic reviews. Locker and Kay reviewed the literature and concluded that the quality of the evidence pertaining to the effectiveness of dental health education is poor (5).

Parents and caregivers can be considered gatekeepers for the oral healthcare of preschool children, therefore their oral health knowledge, beliefs, attitudes and behavior may directly, or indirectly, influence early childhood oral health. Traditional dental health education approaches with a main focus on improving parental oral health knowledge have not been effective in improving preschool children's oral health (5, 7). For instance, traditional generic recommendations such as 'brush your child's teeth twice a day and reduce consumption of sweet snacks and drinks' have had limited success in changing oral health practices (8). Behavior change techniques (BCT), including face-to-face counselling have been effective across primary healthcare (9). BCTs have been described as an 'observable, replicable and irreducible component of an intervention designed to alter or redirect causal processes that regulate behavior (10).

The role of mothers in preventing dental caries starts when the child is in the mother's embryonic period. This can easily be prevented through early detection of oral health problems. Screening in early pregnancy and applying prompt treatment at the right time can prevent transmission of infection from mothers to child. Routine dental checkups during pregnancy and the use of fluorides and chlorhexidine have been found to be effective preventive strategies in inhibiting the transmission of cariogenic bacteria from mother to child (11).

The aim of this study is to systematically review scientific evidences relating to mother's knowledge in improving oral health of their children and ECC prevention.

Materials And Methods

Search strategy

We searched the MEDLINE (through PubMed), Embase and Scopus databases for articles published between January 2009 and December 2019 in English language. All records electronically identified were independently assessed by two authors, according to their titles, abstracts and/or keywords, and the full texts of all reports considered potentially relevant were obtained.

The keyword headings used were 'mother's knowledge', 'oral health', 'children', 'pre-school' and 'early childhood caries'. The reference lists from the retrieved papers were manually screened for relevant references.

Inclusion criteria

The articles retrieved were based on the following inclusion criteria:

- Studies that were conducted to determine the mother's knowledge, oral health, early childhood caries of preschool children and published in English language.
- Studies in which oral health was assessed.
- Clinical studies with full texts.

Exclusion criteria

We excluded studies based on the following criteria:

- Studies that assessed over or older preschool age.
- Studies which did not assess the oral health or preschool children.
- Conference abstracts, review articles, case reports, letters, editorials, unpublished data, articles without full texts, and non-English articles. (figure1)

Study selection

All retrieved articles from electronic as well as manual searches were entered into Endnote software (version X6, Thomson Reuters, New York, USA). Thereafter, duplicates were removed. Afterwards, two authors (M.H.H. and M.K.) independently reviewed the titles and abstracts of the retrieved studies for eligibility. Studies were then selected based on the predetermined inclusion and exclusion criteria. For any disagreements concerning the inclusion of studies, all authors agreed on a consensus based on factual evidence.

Data extraction

Data from each eligible study were extracted by M.H.H and M.K and checked by F.A and T.D The following information were obtained: author name, year of publication, method of follow-up, children's age, country, number of participants and main outcomes. Furthermore, they were summarized and presented in tables.

Results

The literature search yielded a total of 324 articles (Figure 1). A total of 91 duplicate references were removed. The remaining 233 studies were imported into Endnote library for further review. From these, 211 studies were excluded based on inclusion and exclusion criteria. The remaining 22 articles were

selected for a full-texts review, after which 5 studies were screened-out. The summary of data showing the characteristics of included studies is presented in table 1.

An intervention based on the principles of motivational interviewing method was more effective in reducing the number of surfaces affected by early childhood caries compared with conventional oral health education intervention (12).

It has been shown that mother's education level has a direct effect on children's oral health (13). Parents with limited health literacy also had significantly worse oral health status (OHS) and reported their children to have significantly worse oral health-related quality of life (14). Attempts at improving the knowledge and attitude in parents have a substantial impact on improving the oral health of next generation (15-17). The following points should be considered when interpreting the results of this review. The timing of the main outcome measurement (oral health) with respect to preschool children with mothers expressed that they were primarily responsible for their child's oral hygiene, and many noted that they felt they were important positive role models for their young children's oral hygiene.

There was concomitant and statistically significant increases in parents of children between 1 to 4 years (18). Mothers of toddlers lacked basic knowledge of oral health issues and practices to follow for the prevention of their children's caries (19).

Two studies used telephone contacts and text messaging to deliver oral health information. These methods had a positive effect on parent and caregiver's oral health knowledge and behaviors (20, 21). Also, text messaging and phone connect intervention were able to increase flossing behavior and oral health knowledge (22).

Furthermore, infant feeding habits and their mother's level of education were found to have significant effects on the development Oral health (23).

One study was based on data from the Norwegian mother and child cohort study conducted by the Norwegian Institute of Public Health and by the public dental services. A total of 1095 children were followed from pregnancy to the age of 5 years. Questionnaires regarding oral health behavior were completed by the parents at 1.5 and 5 years of age. Clinical and radiographic examination of the children was performed at the age of 5 years. Multiple logistic regression shows that having caries at 5 years old is associated with brushing the teeth less than twice daily at 1.5 years old (OR = 2.1, CI = 1.3–3.6) and being offered sugary drinks at least once a week (OR = 1.8, CI = 1.1–2.9) when controlled for family characteristics and oral health behavior at 5 years of age (24). Oral hygiene and care level of vulnerable-children of incarcerated-mothers were significantly poorer. Prison caregivers had poor knowledge and attitude of dental health matters (25). It was observed that disparities by maternal education reinforce investments in education (26). Mothers need to be educated and encouraged that they are a key factor in improving the oral health habits of their children (27). Mothers expressed that they were primarily responsible for their child's oral hygiene, and many noted that they felt they were important positive role models for their young children's oral hygiene. Mothers would often model brushing their own teeth (28).

It has been suggested that mother's sense of coherence (SOC) could be a psychosocial determinant of the oral health related quality of life (OHRQoL) of their preschool children (29).

Discussion

The results of this review showed a reduced ECC incidence in preschool children whose mothers received prenatal oral health care. ECC is a multifactorial disease with complex socioeconomic, genetic, oral hygiene behaviors, and bacterial and diet factors that affect its risk (30, 31). *Streptococcus mutans* and more recently, *Candida* species have been implicated as potential major etiological microorganisms that may be involved in the initiation and development of ECC (32, 33).

This study focused on maternal level knowledge regarding oral health, especially since mothers play crucial roles in educating their preschool children. However, an attempt was also made to increase the awareness of not only mothers but also health professionals regarding the importance of the early prevention of dental and oral diseases in children. Through pre and postnatal health education, mothers' education level had a direct effect on children's oral health (13) and attempts at improving the knowledge and attitude in parents have a substantial impact on improving the oral health of next generation (15).

In the reviewed studies, we found that text messaging and phone connect intervention was able to increase flossing behavior and oral health knowledge. Additionally, among participants from a private practice, using this method increased the use of mouthrinse. Mothers' behaviors with respect to their children also changed; more text group mothers than control group mothers reported trying to improve their child's oral health behaviors and decreasing their child's candy, and sugary snack intake. The use of mobile technology (text messages, video messages, voice calling, and the Internet) to provide health care (mHealth) has been applied to improve the practicality, rapidity, and precision of diagnostic tests; monitor specific medical conditions; improve medication adherence; send appointment reminders; and deliver medical test results (22).

The dental environment of a young child is affected by a complexity of factors that include the mother's and/or caregiver's dental knowledge, attitudes, beliefs and practices, all of which affect the child's oral condition (34). Feeding habits are said to be of primary importance in the etiology of dental caries at any age, but even more so among preschool children (35).

Participants who received MI (Motivational Interviewing) showed improved knowledge across a wider range of knowledge items (correct amount of toothpaste, supervised brushing position, fluoride varnish, and safest time to give sugary foods and drinks) compared to those who received traditional dental health education DHE. Importantly knowledge of the importance of fluoride varnish application also has practical implications for preventive strategies as this clinical intervention is effective in reducing ECC separately and in combination with fluoride toothpaste (36, 37). The reduction in prevalence of early childhood caries (ECC) following an MI intervention reported in Asian families in Canada, was largely attributed to a greater uptake of fluoride varnish by those families (38) possibly due to the parents attaching greater value to professional preventive care. Mother's education level additionally indicates

knowledge of oral health. In other words, mother's oral health knowledge was correlated with their education level. For instance, the dietary choice for children could be affected if their mothers knew about the role of bacteria and sugar in dental caries. Sweet food habits commence at preschool age (39).

Parents and caregivers can be considered gatekeepers for the oral healthcare of preschool children, therefore their oral health knowledge, beliefs, attitudes and behavior may directly, or indirectly, influence early childhood oral health. Traditional dental health education approaches with a main focus on improving parental oral health knowledge have not been effective in improving preschool children's oral health (21).

Social, economic and environmental factors play a substantial role in shaping people's behavior and translating this knowledge into positive health choices and practices (40). In addition, the results of this study highlighted some general trends that were not always statistically significant but yet are worth noting. The first was a general lack of weakness in the knowledge, attitude and practice in infant oral health-related areas such as the timing for the first dental visit, the ideal timing to initiate tooth brushing for children, as well as nighttime bottle feeding. Better infant oral health-related trends, however, were observed with younger caregivers and caregivers of children under 1 year. This is possibly due to higher educational levels among the younger group. Additionally, younger parents have generally better computer/internet literacy and would therefore have wider access to a variety of oral health-related knowledge. The second observed trend was that mothers, compared to other caregivers, were generally more knowledgeable, had better attitude, but did not necessarily have better practices (41).

Conclusion

Results of this study show that mother's knowledge influences their preschool children's oral health. Oral health education programs aimed at preventive actions are needed to provide children not only with adequate oral health, but better quality of life. Special attention should be given to the entire family, concerning their lifestyle and oral health habits. Maternal education has a direct effect on children's dental decay experience which is independent of sweet food intake and other risk factors when estimated using marginal structural models. Sweet food intake is also considered as a risk factor in children's dental caries. This study was also able to show that oral hygiene status was a significant risk factor for ECC. Moreover, socio-cultural factors are likely to affect oral health beliefs. Children whose mothers were submitted to a dental visit based on motivational interviewing to improve knowledge showed lower caries incidence than those that attended a conventional oral health education. Motivational interviewing group approach greatly reduces the risk of caries among preschool children.

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Table

Mothers' sense of Coherence (SOC) and oral health related quality of life (OHRQoL)⁽¹⁾

Figures

First author and year	Method	Children's age	Country	Number of participants	Main outcomes
Dagon et al.2019	A maternal knowledge on oral health (KOH) questionnaire.	1-4 years	Israel	Children: 285 Mothers: 285	Mothers of children aged 1-4 years had meaningful gaps in knowledge about affect their children's oral health.
Finlayson et al. 2019	Interviews were conducted with mothers of children enrolled in the home visitor (HV).	Under 4 years old	USA	Children: 24 Mothers: 24	Mothers expressed that they were primarily responsible for their child's oral hygiene, and many noted that they felt they were important positive role models for their young children's oral hygiene. Mothers would often model brushing their own teeth.
Azimi et al. 2018	A validated questionnaire was used to examine maternal knowledge.	2-6 years	Iran	Children: 153 Mother :153	Attempts at improving the knowledge and attitude in parents have a substantial impact on improving the oral health of next generation
Al Salami et al.2018	Examined clinically by using an interview questionnaire.	Under 6 years old	United Arab Emirates	Children: 382 Mother:382 Study group: 128 control group: 254	Oral hygiene in control group was better compared with study group.
Feldens et al. 2018	the data collected via questionnaire home visit.	3 years old	Brazil	Children:435 Mother:435	Observed disparities by maternal education reinforce that investments in education.
Colvara et al.2018	Examiners using questionnaires and a clinical examination.	Under 6years old	Brazil	Children:320 Mother:320	An intervention based on the principles of motivational interviewing style was more effective in reducing the number of surfaces affected by early childhood caries compared with conventional oral health education intervention.
Ju et al. 2016	Face to face interview	0.5-5years	Australia	Children:1720 Mother:1720	Mothers' education level had a direct effect

		old			on children's oral health
Folayan et al. 2015	Household survey	0.5-6years old	Nigeria	Children:497 Mother:497	The oral health knowledge of mothers improved oral hygiene practices and reduced consumption of sugary snacks between meals by preschool children
Wigen et al. 2015	Pregnancy to the age of 5 years Questionnaires regarding oral health behavior	1.5-5 years old	Norway	Children:1095 Mother:1095	Parents encountering difficulties in establishing favorable oral health behavior in children's first years of life should receive special attention from health personnel.
Huebner et al. 2015	Intervention to help parents establish a routine of brushing their young children's teeth twice a day	1-4years old	USA	Children:67 Mother:67	There were concomitant and statistically significant increases over the study period in parents
Hashemian et al. 2015	Text messaging for 7days	0.5-7.0 years old	USA	Children:156 Mother:156	Text messaging represents a viable method to improve oral health behaviors and knowledge.
Naidu et al. 2015	Follow-up telephone contact and there were given questionnaires before the talk and four months later.	1.5 to 5 years	Trinidad and Tobago	Children:79 Mother:79 Test group 25 Control group 54	Delivering oral health information had a positive effect on parent/ caregiver oral health knowledge.
Brega et al. 2015	clinical trial aimed at reducing dental decay among preschoolers	3-5 years old	Navajo Nation	Children: 1016 Mothers: 1016	Parents with more limited health literacy also had significantly worse oral health status (OHS) and reported their children to have significantly worse oral health-related quality of life.
Chi et al.2014	Bilingual flipchart with Pre and Post Intervention survey	Under 6 years of age	USA	Children: 219 Mothers: 219	Delivering oral health information had a positive effect on parent caregiver oral health knowledge. follow-up telephone contact was also good Bilingual educational materials help improve the oral health.

Khatri et al. 2014	Information was obtained by interventions about mothers' Sociodemographic factors mother child pairs	3-5 year old	India	388 mothers	Our results suggest that mother's SOC could be a psychosocial determinant of the OHRQoL ⁽¹⁾ of their preschool children.
Begzati et al. 2014	Dental visits were interviewed and data on maternal Knowledge.	Under 6years old	Kosovo	Children:664 Mother:664	Mothers need to be educated and encouraged that they are a key factor in improving the oral health habits of their children.
Ozer et al. 2011	Questionnaires were administered to the mothers of participating children to obtain oral health knowledge.	3-6 years old	Turkey	Children:225 Mother:225	Infant feeding habits and the mother's level of education were found to have significant effects on the development Oral health.

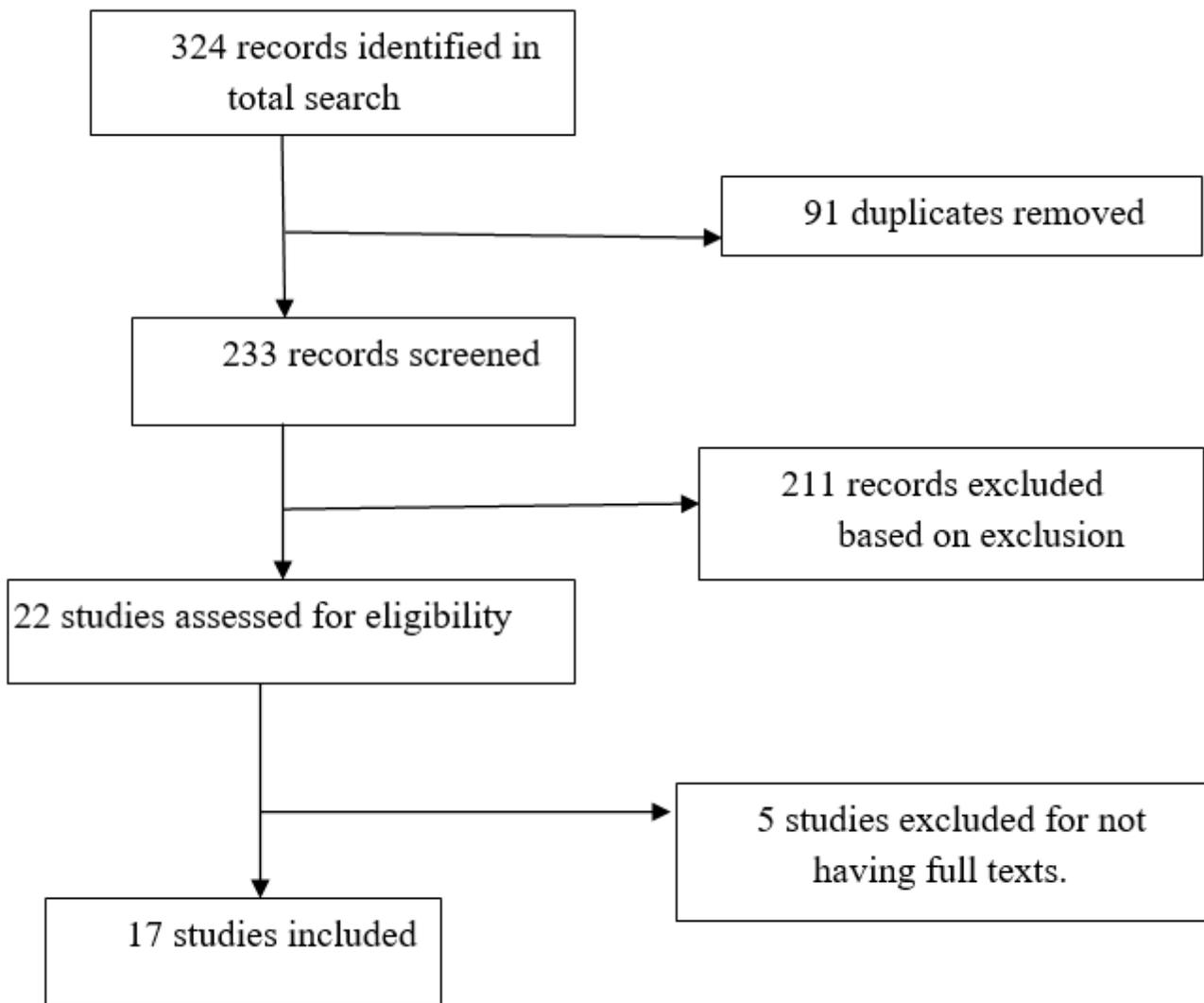


Figure 1

Literature search