

Parental perception of fluoridated tap water

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ABSTRACT

Purpose: The purpose of this study was to investigate parental knowledge and preference of tap water in a country where faucet water is fluoridated according to international standards and where the average percentage of dental caries in young children reaches up to approximately 73%. **Materials and Methods:** A cross-sectional perspective study was conducted at Hamad Medical Corporation, the only tertiary care and academic hospital in the state of Qatar. Parents of children older than 1 year of age were offered an interview survey. **Results:** A total of 200 questionnaires were completed (response rate = 100%). The mean age of participant children was 6 ± 4 years. One of the main findings in our study was that primary care physicians never discussed the topic of the best water choice for children in our community, as expressed by more than 86% of parents. More than two-third of parents used bottled water. The main concerns of why parents did not allow their children to drink tap water were taste (8.94%), smell (9.76%), concerns of toxins content (32.52%), and concerns that tap water might cause unspecified sickness (52.03%). Amid revealing participants that our tap water is safe and that fluorine can prevent dental caries, 33% of parents would use tap water due to its fluoride content. The study also showed that 65% of parents would allow their children to drink tap water if it is free from any toxic ingredients. **Conclusion:** Actions to augment fluoridated water acceptability in the developing world, such as focusing on safety and benefits, could be important in the disseminated implementation of the use of faucet water. Ultimately, a slump in the prevalence of dental caries among children will depend on the ability of pediatricians and dental professionals to institute evidence-based and preventive approach that can benefit oral health in childhood. These data will also allow us to propose the use of tap water safely in young children in the state of Qatar while simultaneously advocating awareness of oral health.

Keywords: Fluoride, oral health, pediatrics, tap water

Introduction

Dental caries is a major health issue in most developing and developed countries^[1] and is regarded as the most widespread chronic disease in childhood.^[2] More than 50% of elementary school children have at least one cavity or filling. Besides, children of low-income families have higher risk of having dental caries compared with their peers of higher economic status.^[3]

The prevalence of dental caries in Qatar is 73%,^[4] compared with 28% in the United States^[5] and 60% in Brazil.^[6] Dental treatment is pricey and can inundate the healthcare budget in some developing countries.^[7] Meanwhile, dental caries prevention action in a primary healthcare framework can distinctly reduce healthcare costs.^[8]

Fluoride in water supplies, toothpastes, and professionally applied are illustrious ways of preventing dental caries.^[9] Since its commencement in 1945, supplementing public water supplies with fluoride has resulted in decrease in dental decay,^[10] with some communities reporting 50%–60% fewer decays.^[11]

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There is a rising attempt to provide drinking water that has the confidence of consumers, taking into consideration its organoleptic properties and perceptions of its chemical contents.^[12] On a daily basis, parents choose the source of water their families drink,^[13] and there has been an increased tendency in consumer preference of bottled water over tap water.^[14]

Not much is known as of what kind of water children favor to drink and what perception their parents have toward their community tap water.^[13] Establishing and understanding what kind of water children prefer is crucial as behaviors and lifestyle concepts are often conveyed to adulthood.^[15]

Kahramaa, the main source of water supply in the State of Qatar, adopted the World Health Organization fluoride content guideline.^[16]

Pediatricians might be the singular attainable source of dental care to children who cannot afford a visit to the oral health professional.^[17] Therefore, it is pivotal that a pediatrician is abreast with the pathophysiology of dental caries and available fluorinated tap water, while synchronously providing education and prevention counseling of oral health during an office visit.^[18]

This study was aimed at describing parental knowledge and preference of tap water in a country where faucet water is fluoridated according to international standards and where the average percentage of dental caries in young children reaches up to approximately 73%. There are currently no studies in the state of Qatar and perhaps in the Middle East region tackling this oral health issue.

Materials and Methods

Study design, period, setting, and participants

A cross-sectional prospective study was conducted at Hamad Medical Corporation (HMC), the only tertiary care and academic hospital in the state of Qatar. Parents of children age 1 year of age and older and residents of Qatar were offered an interview survey. The research has been approved by HMC -Ethics Committee (Ref # 16025/16).

The information in the survey has been adopted from several sources^[12,13,15,19] and modified to meet our needs. The survey was validated by experts in the topic at our medical research center and by correlating the survey to published material. The questionnaire was composed of 15 items. These components addressed parents and children demographics, reasons why tap water or bottle water is preferred, knowledge and awareness of fluoride content in both bottle and tap water, and its prevention of dental cavities or caries. Answers to questions were displayed in Likert scale with “yes,” “no,” and “I do not know.” In addition, we had open-ended questions for parents to document any comments. The study was conducted between the period of February 10, 2016, and April 4, 2016. A statement of informed consent was read to participants, and an explanation of why the

study was being conducted was explained to parents. Prior to the initiation of the interview, a statement was read to participants informing them that their participation was voluntary and we confirmed that their answers would be anonymous and confidential. Parents did not receive monetary or nonmonetary compensation for participating in the project. We also informed them that the project received approval from HMC-Ethics Committee (Ref # 16025/16).

We enrolled 200 participants as a convenient sample since there are no similar studies to calculate the sample size or to extrapolate the correct number of patients needed. We included parents of children older than 1 year of age who come to the outpatient clinics for well child and sick visits. We also included children who were admitted to the inpatient wards. We excluded children with cerebral palsy or disabilities as oral intake could be a challenge.

Statistical analysis

Qualitative and quantitative data values were expressed as frequencies along with percentages and mean \pm standard deviation and median and range. Descriptive statistics were used to summarize demographic and all other characteristics of the participants. Associations between two or more qualitative or categorical variables were assessed using Chi-square test. For small cell frequencies, Chi-square test with continuity correction factor or Fisher’s exact test was applied. Pictorial presentations of the key results were made using appropriate statistical graphs. A two-sided *P* value <0.05 was considered to be statistically significant. All statistical analyses were done using statistical package SPSS, version 19.0 (IBM Corporation, Armonk, NY, USA).

Results

A total of 200 questionnaires were completed (response rate = 100%). The mean age of participant children was 6 ± 4 years. The sociodemographic factors are summarized in Table 1. One of the main findings in our study was that primary care physicians never discussed the topic of the best water choice for children in our community, as expressed by more than 86% of parents. More than two-thirds of parents used bottled water [Table 2]. The main concerns of why parents did not allow their children to drink tap water were taste (8.94%), smell (9.76%), concerns of toxins content (32.52%), and concerns that tap water might cause unspecified sickness (52.03%). When parents were asked whether they allow their children to drink tap water due to its fluoride content, 33% answered likely yes and yes, while 32% answered likely no and definitely no. The study also showed that 65% of parents would allow their children to drink tap water if it is free from any toxic ingredients. Additional information related to parental preference of fluoridated water is displayed in Figure 1. Finally, parent’s higher educational status and being in the medical field had statistically significant influence on the willingness to use tap water due its fluoride content ($P = 0.005$ and $P = 0.001$, respectively). The rest of the associations between sociodemographic factors and questions related to parental preference of fluoride varnish were not statistically significant ($P > 0.05$).

Discussion

This is the first study to assess parental knowledge and preference of fluoridated tap water in the state of Qatar and perhaps in the region. Most of our participants preferred bottled over tap water. Our results are different than a study conducted by Leavy *et al.*,^[15] where parents in the Pennsylvania area stated that 60% of children drank tap water at home. However, our participants' preferences

Table 1: Sociodemographic characteristics of participants

	Frequency (n)	Percentage (%)
Parental gender		
Male	62	31
Female	138	69
Parental age (years)		
20-29	66	33
30-39	77	38.5
Above 40	39	19.5
Less than 20	18	9
Parental education		
High school	40	20
Less than high school	23	11.5
Some college	33	16.6
College graduate	67	33.5
Postgraduate	37	18.5
Parental association with healthcare		
Yes	57	28.5
No	143	71.5
Children gender		
Male	104	52
Female	96	48

Table 2: Participants' source of drinking water

Source of drinking water	n (%)
Bottled	123 (61.5%)
Filtered	48 (24%)
Kahramaa	23 (11.5%)
Unfiltered	4 (2%)
Well water	2 (1%)

were in line with other studies,^[14,19] where bottled water was preferred over tap water in urban minority pediatric population in the United States.^[14] Sriraman *et al.*^[20] interviewed 194 parents in a study that delineated parental preferences and implications of fluoride exposure in children's drinking water. The investigation showed that 134 (69%) parents supplied their children bottled water either exclusively or with tap water. The judgment behind using bottled water included the following: apprehension of contaminants in tap water, flavor and/or smell of tap water, and availability of bottled water. Despite the attitude of drinking water, safety is found to be highly linked to bottled water use;^[21] several other studies have shown fluoride content in bottled waters to be very low.^[22-26]

In countries such as Australia, dental caries in children decreased between the late 1970s and the late 1990s, with the average decayed, missing, and filled deciduous teeth (DMFT) declining. However, since 1998, the DMFT has increased by 24% possibly due to elevated consumption of nonfluoridated commercial bottled water, among other reasons.^[27-29]

Extensive availability of bottled water and occupied lifestyle have raised worries in countries such as the United States and Australia around the declined dental health benefits of nonfluoridated bottled water replaced for fluoridated tap water.^[30,31]

One of the tasks of parents is to acquaint children to a diversity of tastes in food and drink selections at a young age so that they may establish the knowledge and skills to confirm what optimum for promoting their health is.^[32]

Although fluoridation of water has been in use for many decades to protect dental health, investigations have shown that a substantial level of misunderstanding lingers about its impact and purpose.^[33,34]

Several studies have shown that a large number of individuals have worries regarding fluoridation.^[35-37] Mork and Griffin^[38] conducted a study to investigate the perception of safety and

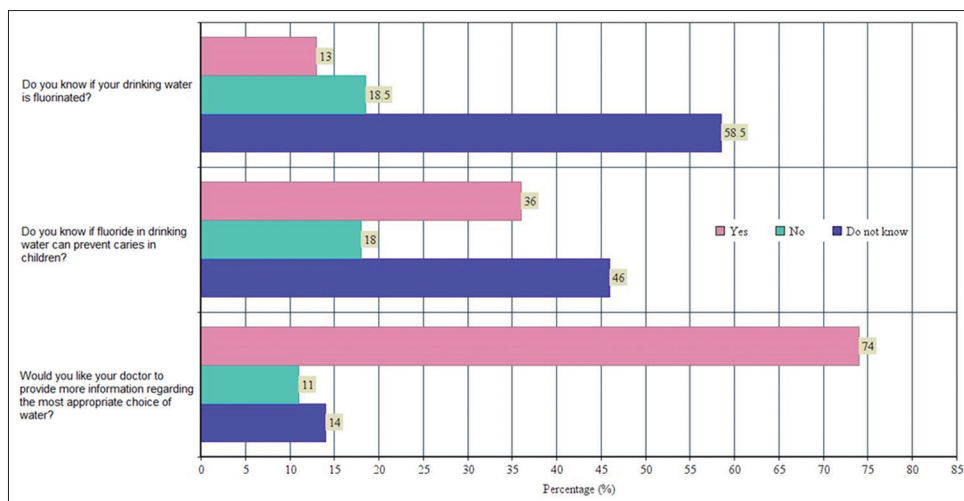


Figure 1: Additional information related to parental preference of fluorinated water

benefit of community water fluoridation in the United States. Approximately 50% of respondents strongly agreed/agreed that community water fluoridation was safe, while 31.5% were neutral and 13.2% disagreed/strongly disagreed. Moreover, almost one-third of the participants reported that community water fluoridation had no health benefit, while 57% perceived some benefit and 15.5% reported great benefit.

Misreport and unproven concerns regarding water fluoridation are crucial public health issues since the initiation of fluoridation very often counts on the outcome of community consultation, or more directly on a consensus.^[39] Moreover, ambient supports, such as supplying clean cold water in many places such as schools and junior sporting clubs, are crucial facilitators that can promote drinking tap water and hence dental health promotion.^[40]

The contingency to augment parent awareness of the benefits of tap water and advocate the well-documented preventative aftermath of fluoride are recommended.^[41,42]

Community knowledge of preventive oral health-related interventions, including water fluoridation, is a main public health aim,^[34,43] because of their extensive effect on communities and their impact in decreasing oral health discrepancies among children.^[43] Studies have shown that public awareness of dental diseases has a direct effect on the acquisition of public health results, such as water fluoridation.^[34,44]

One of the main findings in our study was that primary care physicians never discussed the topic of the best water choice for children in our community. Our parents raised a concern that even after assuring them that our tap water is safe and that its fluoride content can prevent dental caries, only one-third would allow their children to drink tap water. This information on water selection is beneficial for pediatric healthcare providers as trusty preachers. Since interaction with a primary care provider usually happens prior than a child's initial visit to a dentist, pediatrician or family medicine physician play a crucial role in promoting oral health in childhood. They must have a good fond of knowledge in oral health science and prevention, and in providing anticipatory guidance to families.^[45] The literature has shown that pediatricians perform substantial role in children's oral health matters.^[46,47] However, deficiency in contemporary knowledge and information as well as the adversity pediatricians face in referring patients for professional dental care are usually delineated as barriers to their effectiveness.^[48] Prakash *et al.*^[46] conducted a study outlining pediatricians' and family physicians' knowledge, practices, and training in childhood oral health. The study that included 237 pediatricians and 300 family physicians concluded that almost 25% of participants said they acquired no oral health training in medical school or residency. Moreover, only 1.8% of pediatricians and 0.7% of family physicians answered all questions related to knowledge of early childhood caries correctly. Plenty of resources are available on preventive dental health intervention and anticipatory guidance to

assist pediatricians.^[49,50] Conventional medical training does not coach physicians to alter the underlying conditions in populations that constitute poor health outcomes. Therefore, medical school graduates might portray limited interest in public health promotion and community engagement.^[51] Some physicians believe that advocacy is a community and not a professional task.^[52] However, professional advocacy has been listed within the commitments forming the American Medical Association's Declaration of Professional Responsibility.^[53]

Professional institutes and educators have refined programs to assist coaching medical students in advocacy roles.^[51] Despite these programs being relatively novice, investigators and counselors generally believe that promoting advocacy roles will comprise some changes to both undergraduate and graduate medical education, as well as the advancement of training aims and opportunities for physicians.^[54] The objective of the educators should be delivered in a clear, robust, and constant style for the development of an evidence-based and preventive approach that can benefit oral health in childhood.^[39]

This study has several strengths, especially both the quantitative and qualitative responses from parents included by us, which resulted in better understanding of the basic findings regarding oral health in general and parents' preference for tap water. This study is novice and unique in delineating parental perception in this topic. These findings will allow us to propose a comprehensive national educational program to promote the health and economic benefits of ingesting tap water in the state of Qatar. We will also work on a framework to allow oral health, including drinking tap water, to be part of documentation during the patient's visit to the primary care provider. This study has limitations. For instance, this study can be considered a pilot, and therefore we recommend that our investigation be replicated using a larger sample for better generalization. In addition, there could be a likelihood that there are specific characteristics associated with parental preferences that were not studied in this article or that power was not high enough for these appraisals.

Conclusion

Actions to augment fluoridated water acceptability in the developing world, such as focusing on safety and benefits, could be important in the disseminated implementation of the use of faucet water. Ultimately, a slump in the prevalence of dental caries among children will depend on the ability of pediatricians and dental professionals to institute an evidence-based and preventive approach that can benefit oral health in childhood. These data will also allow us to propose the use of tap water safely in young children in the state of Qatar while simultaneously advocating awareness of oral health.

Ethical approval

Hamad Medical Corporation-Ethics Committee (Ref # 16025/16).

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Disclosure

Data from the earlier stages of the study were presented in the 2016 American Academy of Pediatrics National Conference & Exhibition.

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Conflicts of interest

There are no conflicts of interest.

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Questionnaire

1. Parental gender

Male

Female

2. Parental age

<20 years

20–29 years

30–39 years

40 and above

3. Parental educational level

<High school

High school

Some college
College graduate
Postgraduate

4. Work in the healthcare field

Yes
No

5. Child's age

6. Child's gender

Male
Female

7. Has your doctor ever discussed the topic of best water for your children?

Yes
No
I do not recall

8. What is your source of drinking water?

Kahramaa
Well
Filtered
Unfiltered
Bottled

For bottled drinkers

9. Why your child does not drink tap water

It does not taste good
It has got a smell
It might contain toxins
It might cause sickness
Somebody already got sick by drinking tap water
Other ...

10. Do you know if your drinking water is fluorinated?

Yes
No
I don't know

11. Do you know if fluoride in drinking water can prevent caries in children?

Yes
No
I do not know

12. Would you use tap water due to its fluoride content?

Definite yes
Likely yes
Neutral
Unlikely
Definite no

13. Would you allow your children to drink tap water if it is free from any toxic ingredients

Definite yes
Likely yes
Neutral
Unlikely
Definitely no

14. Would you like your doctor to provide more information regarding the most appropriate choice of water?

Yes
No
I am not sure

15. Any comments