

## Original Article

# Comparison of information provided by pediatricians regarding tooth eruption and the information available on the internet

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## ABSTRACT

**Background:** Most parents believe that teething is associated with some symptoms and commonly use Internet to gain more information about the health of their children. Pediatricians can also serve as a source of information for health-related requirements of parents. This study aimed to compare the information provided by pediatricians regarding tooth eruption and the information available in Persian-language websites.

**Materials and Methods:** This descriptive, analytical, cross-sectional study was performed in two phases. In the first phase, the questionnaire was designed by 85 pediatric pediatricians in Isfahan about children's dental eruption and internet resources. The second phase was the study of 22 Persian websites about children's tooth eruption using Google search engine and the keywords "tooth eruption," "tooth eruption symptoms." Then a checklist was prepared to evaluate the quality and completeness of the content. Data were analyzed by the Chi-square test and Fisher's exact test using SPSS ( $P < 0.05$ ).

**Results:** None of the retrieved websites had the health on the net code of conduct. The most common symptoms of teething reported by both pediatricians and websites included irritability, drooling, gingival tenderness, chewing tendency, decreased appetite and sleep disturbances. In non-pharmacological methods to control the symptoms related to tooth eruption in both groups, embracing the baby ( $P < 0.001$ ), using soft tooth ring ( $P = 0.049$ ) and chewing hard foods ( $0.016$   $P =$  significant). Use of oral pain medication ( $P = 0.01$ ) and sedatives and medications ( $P = 0.04$ ) were significant in the medication method.

**Conclusion:** None of the websites reviewed had a valid source code and author. Although websites cannot replace the instructions of pediatricians regarding growth and development of children and their teething, supplementary information can be acquired from high-quality websites because there seems to be no significant difference between these two information sources regarding tooth eruption symptoms and their management.

**Key Words:** Child, internet, pediatricians, tooth eruption

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## INTRODUCTION

Tooth eruption is a physiological process during which, the teeth break through the gums and appear in the oral cavity. The primary teeth erupt between 6 and

36 months of age.<sup>[1,2]</sup> Tooth eruption may be associated with several symptoms such as fever, inflammation

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of the covering mucosa, drooling, irritability, nasal discharge, sleep disturbances, diarrhea, chewing tendency, night time crying, and loss of appetite.<sup>[3-7]</sup> It is not known whether these symptoms are related to growth and development in general or are due to tooth eruption in particular.<sup>[8]</sup> Some recommendations have been offered to alleviate the discomfort associated with tooth eruption. Massaging the gingiva is the most commonly suggested nonpharmaceutical approach while oral analgesics and supplements (as a replacement to medications) are commonly suggested as pharmaceutical treatments for this purpose.<sup>[9-11]</sup>

Despite the growing scientific evidence, correct perceptions and beliefs regarding tooth eruption are still lacking.<sup>[12]</sup> Parents play a fundamental role in growth and development of their children and their knowledge level about oral health can profoundly impact on oral health status of their children. Parents increasingly use the Internet to obtain more information about the health of their children.<sup>[11,13,14]</sup> At present, Internet has greatly enhanced the accessibility of health and medical information.<sup>[15]</sup> However, this can cause complications as well, because a small percentage of the information acquired through the Internet has been confirmed by the respective specialists. Nonetheless, many people make decisions based on the information they find over the net. Moreover, the information available on the Internet may decrease the physician visits by patients, which can lead to adverse health consequences.<sup>[16,17]</sup> In 1995, 60 participants from 11 countries worldwide came together in a conference to find a solution to promote the quality and reliability of health-related information available on the Internet. They established the health on the net (HON) foundation to assess and confirm the accuracy of the contents of health-related websites. Websites that meet all 8 characteristics set by this foundation receive the certificate of approval and the related code.<sup>[13,15,18]</sup> Kozuch *et al.*<sup>[13]</sup> evaluated the quality of information available about tooth eruption on websites and prepared two checklists for this purpose. They reported that only 3 out of 16 English websites in the United States had the HON code. The most common suggestions for teething symptoms recommended by these websites included chewing on cold objects, massaging the gingiva and use of over-the-counter medications. Haznedaroglu and Menten.<sup>[15]</sup> reported that none of the websites evaluated in their study had

the HON code. Also, pharmaceutical therapy was not commonly recommended by the professional websites and those belonging to pediatricians.

Considering the gap of information on this topic in Iran, this study aimed to assess and compare the information provided by pediatricians regarding tooth eruption and the information available on the Internet in this respect.

## MATERIALS AND METHODS

This descriptive, analytical, cross-sectional study included two phases. The first phase involved assessment of the knowledge level of pediatricians practicing in Isfahan city about tooth eruption using a self-administered questionnaire with open-ended and close-ended questions. The second phase involved assessment of the information available on Persian language websites regarding tooth eruption, which were retrieved by using the Google search. Two checklists were filled out.

### First phase

The inclusion criteria were pediatricians practicing in private offices or clinics in Isfahan city with more than 1 year of work experience, who willingly signed informed consent forms for participation in the study. Those with incomplete questionnaires were excluded from the study. Participation of pediatricians in this study was voluntarily and they were ensured about the confidentiality of their information.

A list of all pediatricians practicing in Isfahan city was obtained from the Medical Council of Iran. The researcher presented to the office of pediatricians and handed them the questionnaires. Sampling was census and a minimum of 80 pediatricians were required for this study to have 95% confidence interval and maximum error of 0.11. For further accuracy, 85 pediatricians were enrolled. The researcher presented to all private offices (at their peak hours mainly in the afternoon) and teaching hospitals (at their peak hours mainly in the morning) of Isfahan city in spring and summer of 2019. Data were collected using a self-administered questionnaire with one open-ended and five close-ended questions. The questionnaire was designed in Persian language based on previously published articles regarding tooth eruption and some online sources.<sup>[5,6,19,20]</sup> The final questionnaire had four parts.

The first part asked for demographic information of pediatricians and had six questions regarding

age (years), gender (male/female), work experience (<5 years, between 5 and 10 years, and >10 years), the attending university, graduation year, and type of practice (private office, teaching hospital, faculty member of university, other) of pediatricians.

The second part included one open-ended question regarding the time of eruption of the first primary tooth.

The third part included questions to assess the knowledge level of pediatricians regarding the signs and symptoms of tooth eruption. This part included two questions. The first question was one single question while the second question comprised of 23 separate questions.

The fourth part included questions to assess the strategies recommended by the pediatricians to treat the signs and symptoms of tooth eruption in children. This part had three questions. The first question was one single question. The second question comprised of seven separate questions and the third question included five separate questions.

#### *Validity and reliability of the questionnaire*

In order to ensure the face validity and content validity of the questionnaire, it was administered among 5 pediatricians who were faculty members of Isfahan University of Medical Sciences. To assess its content validity, the selected 5 pediatricians evaluated the questions and scored them in terms of relevance using the following scoring system:

1. Highly relevant
2. moderately relevant
3. poorly relevant or irrelevant

Moreover, they were requested to express their opinion regarding each question. The questions that were scored 2 or 3 were deleted or modified according to the opinion of the experts. Next, the content validity ratio (CVR) was calculated using the formula below:

$$CVR = \frac{nE - N/2}{N/2}$$

Where nE is the number of experts that gave the score of N/2 to the respective question regarding its degree of relevance, and N is the total number of experts. The questions with a CVR <0.42 were excluded. Next, the opinion of the experts regarding the face validity of the questionnaire was asked. For easy comprehension, the questionnaire was administered

among 15 participants as pilot. The Cronbach's alpha was calculated to ensure the reliability of the questions after the pilot study, which was found to be 0.84 and indicated acceptable reliability.

#### **Second phase**

The Persian websites regarding tooth eruption were searched using the Google search. The inclusion criteria were (I) Persian language, (II) providing information regarding the children and parents' health, and (III) websites with Alexa traffic rank of 10,000 or lower. The exclusion criteria were duplicate sites, duplicate links, information based on question and answer, and weblogs or websites with similar contents.

The searched keywords included "tooth eruption," "teething," "symptoms of tooth eruption/teething," and "tooth eruption/teething in children." After a primary search by the Alexa traffic rank, the retrieved websites were evaluated and 31 websites that met the inclusion criteria remained in the study. Alexa was first designed by Brewster Kahle and Bruce Gilliat in 1996, which is a website analyzing the traffic of other websites and ranking them based on the number of visitors. The Alexa rank is based on the total visits of a website in the past 3 months by users who have installed the Alexa toolbar on their browser. In other words, Alexa calculates the (I) accessibility and (II) frequency of visits of each webpage on a daily basis. The Alexa score is determined based on the abovementioned two factors. A website shown as the first 50 or 100 most visited websites in its region (for example Iran) has a high commercial value.<sup>[21]</sup> Eventually, 22 websites that met the eligibility criteria were evaluated. Some of the websites had several pages and for easier assessment, their most recent topics were reviewed. In order to assess the validity of the site, the first checklist was filled out. Next, the second checklist was filled out based on the contents of the website regarding tooth eruption.

#### **First checklist**

According to Kozuch *et al.*,<sup>[13]</sup> the first checklist was used to assess the validity of the site, its relevance to the topic, credibility of the author, references and resources, complete content regarding tooth eruption, date of most recent update of the page or website, date of most recent update of the content regarding tooth eruption, and having the HON code. The HON code toolbar is used to determine the current status of the site and sets some guidelines and principles to publish

high-quality, targeted and clear information. To assess the quality, accuracy and content validity of a website, it needs to meet 8 criteria including having educated authors, educational value of contents, confidentiality, providing citations, fairness and honesty, availability, financial support and advertisement policy. If a website meets all the 8 criteria, it is considered reliable and receives the respective code. In this checklist, credibility of the author according to the HON code means that the author works in the health care field. His/her specialty should be mentioned. If he/she is not working in the healthcare field, it needs to be clearly stated in the website. Also, time of publication and relevant references and citations are imperative. For online citations, the respective link should be provided and guide the reader to an accredited article or textbook.<sup>[18]</sup>

### Second checklist

This checklist classified the website content regarding tooth eruption including time of tooth eruption, symptoms (drooling, loss of appetite, etc.) and management of symptoms (pharmaceutical therapy, nonpharmaceutical therapy and supplements) according to Schmitt and some other studies.<sup>[4,5,7,22]</sup>

Data were analyzed using SPSS version 22 statistics is powerfull statistical software platform (IBM Company, New York, USA). The frequency, percentage and measures of central dispersion such as mean and standard deviation were reported and the related tables and diagrams were also drawn. Level of significance was set at 0.05.

## RESULTS

The mean age of pediatricians was  $46.99 \pm 9.79$  years and they mostly had over 10 years of work experience. According to the information provided by the pediatricians, the minimum age of tooth eruption was 4–9 months and 58.8% of the pediatricians stated that tooth eruption was associated with some symptoms only in some cases. Irritability (94%), drooling (91.8%), gingival tenderness (89.3%), chewing tendency (87.1%), decreased or increased appetite (76.5%) and sleep disorders (52.9%) were the most commonly reported symptoms. They mostly recommended nonpharmaceutical therapy such as cuddling and playing with the child, massaging the gingiva and chewing on soft cold teething rings. Oral analgesics such as acetaminophen or ibuprofen were the most commonly prescribed pharmaceuticals.

Of 22 websites that evaluated in this study, none of them had HON code. The home page of 18 websites had been updated July 2019, and one website had been last updated June 2019. Three websites did not provide any information regarding the date of their last update. The date of updating the tooth eruption content was sometime between 2011 and 2013 in three websites, between 2016 and 2017 in 5 websites and between 2018 and 2019 in 11 websites. Three websites did not disclose the date of last update of tooth eruption content. Only 7 websites had a credible author and 5 had credible references. Tables 1 and 2 report the contents of the second checklist.

The most commonly reported symptoms of tooth eruption in 21 websites included increased salivation and drooling (85.7%), gingival itching, inflammation or pain (80.9%), irritability and restlessness (76.1%), high chewing tendency (76.1%), and decreased or increased appetite (61.9%). Chewing on soft and cold teething rings (80%) and massaging the gingiva (65%) were the most common strategies suggested for management of symptoms by all 20 websites. Comparison of tooth eruption symptoms mentioned by the pediatricians and websites revealed significant differences only in bad temper, irritability and continuous crying [ $P < 0.001$ , Table 3].

Comparison of nonpharmaceutical strategies for management of tooth eruption symptoms revealed significant differences between pediatricians and websites in cuddling ( $P < 0.001$ ), use of soft teething rings ( $P = 0.049$ ), and chewing on hard foods ( $P = 0.016$ ) [Table 4].

Comparison of pharmaceutical methods for management of tooth eruption symptoms suggested by pediatricians and websites revealed significant differences in use of oral analgesics ( $P = 0.01$ ), and tranquilizers and sleeping pills ( $P = 0.04$ ) [Table 5].

## DISCUSSION

Pediatricians and websites are the two important sources of information related to health issues for the parents. Since pediatricians are the main source to obviate the

**Table 1: Checklist guideline**

Classification	Tooth eruption content
Time of eruption	Time of eruption, soonest time of eruption
Related symptoms	Drooling, decreased appetite, etc.
Management of symptoms	Pharmaceutical and non-pharmaceutical therapy

**Table 2: Second checklist**

Website address	Time of eruption	Tooth eruption symptoms	Management of symptoms
www.chetor.com	4 months	+	+
www.niniban.com	4 months	+	+
www.namnak.com	6 months	+	+
www.bartarinha.ir	6 months	+	+
www.fardanews.com	4 months	+	+
www.eghtesadenews.com	4 months	+	+
www.tabnak.ir	6 months	+	+
www.fa.wikipedia.org	6 months	+	+
www.setare.com	6 months	+	+
www.mashreghnews.ir	6 months	+	+
www.article.tebyan.net	6 months	+	+
www.ninisite.com	6 months	+	-
www.parsine.com	-	+	+
www.arga-mega.com	4 months	+	-
www.rasekhoon.net	6 months	+	+
www.isna.ir	-	+	+
www.farsnews.com	6 months	+	+
www.persiantv.com	-	+	+
http://www.irannaz.com	7 months	+	+
www.jamnews.com	-	+	+
www.tag.akaup.com	-	+	+
www.2nafare.com	-	-	+
Total	16 cases	21	20

**Table 3: Comparison of tooth eruption symptoms mentioned by pediatricians and websites**

Symptoms	Pediatricians (%)	Websites (%)	P
Bad temper, irritability and crying	79 (94)	16 (76.1)	0.0012
Increased salivation and drooling	78 (91.8)	18 (85.7)	0.395
Gingival complications	75 (89.3)	17 (80.9)	0.301
Chewing tendency	74 (87.1)	16 (76.1)	0.213
Decreased appetite	65 (76.5)	13 (61.9)	0.121
Sleep disorders	45 (52.9)	9 (42.8)	0.407

**Table 4: Comparison of nonpharmaceutical strategies for tooth eruption symptoms suggested by pediatricians and websites**

Strategy	Pediatricians (%)	Websites (%)	P
Cuddling	76 (92.7)	3 (15)	<0.001
Massaging the gingiva	68 (82.9)	13 (65)	0.075
Teething ring	46 (56.1)	16 (80)	0.049
Herbal medications	17 (20.7)	5 (25)	0.677
Chewing on hard food	13 (15.9)	8 (40)	0.016

health-related needs of parents, this study aimed to compare the information provided by pediatricians regarding tooth eruption and the information available on Persian-language websites. Most parents believe that tooth eruption is associated with some signs and symptoms. However, studies regarding the

information of health workers especially pediatricians regarding tooth eruption are not many.<sup>[23]</sup> In this study, pediatricians reported that the minimum age at the time of eruption of first primary tooth is between 5 and 6 months and they mentioned that tooth eruption is associated with some signs and symptoms only in some cases. The most common symptoms mentioned to be related to tooth eruption included bad temper, irritability, continuous crying, increased salivation and drooling, gingival pain, itching or inflammation, chewing tendency, decreased appetite, tendency to chew on hard foods, insomnia and sleep disturbances. Fever, diarrhea, lethargy, malaise, ear pain, infection or itching, hematoma, facial redness or rash, weight loss, vomiting, viral infections, stomachache, and nasal discharge were reported by <50% of the pediatricians. The majority of pediatricians recommended a combination of pharmaceutical and nonpharmaceutical treatment to manage the symptoms. Cuddling and playing with the child, massaging the gingiva and chewing on teething ring or a soft and cold toy were the suggested nonpharmaceutical treatments while oral analgesics were reported as the most commonly recommended pharmaceutical treatment. Barlow *et al.*<sup>[23]</sup> reported that the majority of participants in their study (in three groups of pediatricians, pedodontists and parents) believed that

**Table 5: Comparison of pharmaceutical methods for management of tooth eruption symptoms suggested by pediatricians and websites**

Methods	Pediatricians (%)	Websites (%)	P
Oral analgesics	46 (83.6)	11 (55)	0.01
Tranquilizers and sleeping pills	10 (18.2)	0	0.04
Dental gel	10 (18.2)	2 (10)	0.392
Topical gel lidocaine	6 (10.9)	4 (20)	0.0307
Benzocaine topical powder	4 (7.3)	1 (5)	0.727
Paracetamol topical powder	0	1 (5)	0.095

tooth eruption may cause swelling, inflammation and itching of gingiva, drooling, irritability, sleep disturbances and fever. Their results were in agreement with ours except for fever, which was reported to have a frequency <50% as a symptom of tooth eruption according to the opinion of the pediatricians. In both studies, a small number of pediatricians mentioned diarrhea as a symptom of tooth eruption. In the study by Wake and Hesketh,<sup>[22]</sup> only a small number of pediatricians believed that tooth eruption is associated with some symptoms. However, the symptoms reported by health workers in Australia including irritability, drooling, chewing tendency, sleep disorders, gingival inflammation and red cheeks were in line with our findings. Nonetheless, they also used paracetamol powder and tranquilizers to control symptoms. Oziegbe *et al.*,<sup>[24]</sup> in their study in Nigeria reported that <50% of pediatricians believed that tooth eruption was associated with symptoms and only some of them confirmed the presence of symptoms. Their results were in line with our findings. However, the most common symptoms were reported to be fever and diarrhea in their study and the suggested control measures were paracetamol, antibiotics and teething powder. Difference between our results and theirs in this respect can be due to some other factors because fever and diarrhea are the most common causes of morbidity and mortality in Nigeria. The symptoms reported by pediatricians in the study by Haznedaroglu and Mentis<sup>[15]</sup> were in line with our findings with the difference that fever, respiratory infections and diarrhea were also reported as common symptoms in their study. In contrast to our study, they reported that around 30% of pediatricians had no suggestion to control the symptoms while this rate was 3.5% in our study. The rest of the pediatricians had reported oral benzocaine in addition to teething ring.

Assessment of the websites revealed that none of them had HON code. Also, only 50% of them had updated their information regarding tooth eruption in the past 2 years. Less than 50% of them had a credible author or references. In the study by Kozuch *et al.*,<sup>[13]</sup> of 16 websites that were evaluated in their study, only three had HON code and only four had credible references. Nonetheless, the majority of the websites had a credible author. Regarding the educational content about tooth eruption, the minimum age of eruption was reported to be 5–6 months. Also, most websites reported the most common symptoms related to tooth eruption to be increased salivation, drooling, gingival itching or pain, irritability, bad temper, continuous crying, chewing tendency, decreased appetite and tendency to eat hard foods or liquids. None of the websites mentioned fever or severe diarrhea as the symptoms of tooth eruption. Use of a soft and cold toy and massaging the gingiva were recommended for nonpharmaceutical management of symptoms while oral analgesics were recommended for pharmaceutical management of symptoms by the websites. In a similar study, Kozuch *et al.*<sup>[13]</sup> reported symptoms and measures for their management similar to our study with the difference that most websites in their study had recommended the use of oral benzocaine. Haznedaroglu and Mentis<sup>[15]</sup> evaluated 62 websites and reported that none of them had HON code and <50% of them did not have an accredited author or references. The symptoms and measures to manage them in their study were similar to the information we collected from the websites.

Qualitative comparison of the websites and pediatricians revealed that bad temper, irritability, continuous crying, increased salivation, drooling, gingival itching, pain and inflammation, chewing tendency, decreased appetite, tendency to eat hard foods or liquids, and insomnia were the most common symptoms reported by both groups.

Diarrhea, lethargy, malaise, hematoma, weight loss, vomiting, respiratory infections, and nasal discharge were most commonly reported by pediatricians as symptoms of tooth eruption while fever and constipation were more commonly reported in websites as symptoms of tooth eruption. In order to decrease the symptoms related to tooth eruption, both groups preferred nonpharmaceutical therapy mainly by using teething ring or soft and cold toy and massaging the gingiva. Pediatricians also recommended cuddling and playing with the child as a strategy to manage

the symptoms, which had not been recommended by the websites. Regarding pharmaceutical therapy, both groups suggested the use of oral analgesics and none of them recommended antibiotics. In a similar study, Haznedaroglu and Mentis,<sup>[15]</sup> qualitatively compared the information provided by websites and pediatricians regarding the most common symptoms of tooth eruption and both groups mentioned drooling, sleep disturbances, painful gingiva, and chewing on objects such as teething ring, which were in agreement with our findings.

In general, it seems that although the Persian websites evaluated in this study had some shortcomings with regard to lacking HON code and absence of reliable authors and references, most of the symptoms they mentioned for tooth eruption were similar to those mentioned by pediatricians, and no significant difference was noted with regard to the suggested managements (pharmaceutical and nonpharmaceutical) between the two groups.

## CONCLUSION

Although websites cannot replace the instructions of pediatricians regarding growth and development of children and their tooth eruption, supplementary information can be acquired from a high-quality website because there seems to be no significant difference between these two information sources regarding tooth eruption symptoms and recommendations to control them.

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## Conflicts of interest

The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or nonfinancial in this article.

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