



RESEARCH ARTICLE

Knowledge, Attitude, and Practice of Iranian General Practitioners, Pediatricians, and General Dentists Regarding Pediatric Oral Health

Razie Meshki¹, Mehrnoosh Khoshnevisan^{*1}, Kosar Hamzenia¹, Mohammad Salehiveisi²

*1*Department of Pediatric Dentistry, School of Dentistry, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

2 Department of Statistics, Faculty of Energy and Data Science, Behbahan Khatam Alanbia University of Technology, Behbahan, Iran

(Received: 2 February 2024

Accepted: 14 April 2025)

KEYWORDS

Knowledge Attitude
Professional
Practice
General
Practitioners
Pediatricians
Dentists

ABSTRACT: Oral health constitutes a crucial component of the holistic well-being of pediatric populations. Dental caries represents a prevalent and enduring pathological process that entails considerable immediate and prolonged repercussions. This cross-sectional study assessed the knowledge, attitudes, and practices of 175 general practitioners, 20 pediatricians, and 102 general dentists in Ahvaz, Iran, regarding pediatric oral health. Data were collected using a researcher-designed questionnaire covering demographics, knowledge, attitude, and practice. Kruskal-Wallis tests and Pearson's correlation coefficients ($\alpha=0.05$) revealed no significant differences in knowledge (mean scores of 7.69, 7.71, and 7.54 out of 10, respectively), attitudes (16.7, 16.86, and 17 out of 20), or practices (22.12, 20.57, and 22.50 out of 30) among the three groups ($P>0.05$). Furthermore, knowledge and practice were not significantly associated ($P>0.05$). The findings suggest generally high levels of pediatric oral health knowledge, positive attitudes, and sound practices among these practitioners in Ahvaz.

INTRODUCTION

Despite global improvement in oral health status, dental caries remains one of the most common chronic diseases of childhood. Pediatric oral health management focuses on preventing and diagnosing dental diseases in children, emphasizing the high incidence of dental caries and periodontal disease. Effective strategies include fluoride use, oral health education, and early diagnostic techniques for

timely intervention[1]. Primary tooth caries can adversely affect the physical development of growing children and their quality of life [2]. Early assessment of the oral health status of children can decrease the incidence of dental caries. Parents rarely take their young children for a dental visit; whereas, they are often in contact with pediatricians even before the birth of their children. Therefore, pediatricians can serve as a reliable source for the prevention and control

*Corresponding author: mehr.khoshnevisan@gmail.com

DOI: <https://doi.org/10.60833/jchr.2025.1200886>

of oral diseases in children [3]. The American Academy of Pediatric Dentistry emphasizes professional dental care started as early as 6 months old in all children for the detection of oral health risk factors [4]. Caries prevention should be started from the office of general practitioners and pediatricians because parents more frequently take their children for a visit to general practitioners and pediatricians compared with dentists [5]. General practitioners can provide screening services for early detection of dental caries, and refer the patients if required. Cooperation between medical and dental service providers can ensure the provision of oral healthcare for all children [6]. To achieve this goal, general practitioners and pediatricians should have sufficient knowledge about the infective nature of dental caries and its related risk factors for timely referral of patients for the required interventions [7].

Pediatricians can also have a special role in the creation of a positive attitude in parents towards oral health promotion of their children, the establishment of healthy habits early in their life, and adopting caries preventive measures, given that they have sufficient knowledge and optimal practice in this respect [8,9].

The significant contribution of pediatricians to preventive initiatives, particularly in the domain of oral health, has been overlooked in numerous nations, including Iran. Furthermore, there is a scarcity of published research addressing the level of involvement of pediatricians in preventive oral health initiatives[10]. To the best of the authors' knowledge, information about the knowledge, attitude, and practice of Iranian general practitioners and pediatricians about pediatric oral health is scarce. Considering the significance of this topic [6], this study aimed to assess the knowledge, attitude, and practice of Iranian general practitioners, pediatricians, and general dentists regarding pediatric oral health.

MATERIAL AND METHODS

This cross-sectional study involved 175 general practitioners, 20 pediatricians, and 102 general dentists working in both the private and public sectors in Ahwaz

City, Iran, in 2022. The ethics committee of Ahwaz Jundishapour University of Medical Sciences approved the study protocol (IR.AJUMS.REC.1401.078).

Sample size:

The sample size was calculated to be 278 using the sample size calculation formula for the comparison of multiple means assuming $\alpha=0.01$, study power of 90%, mean knowledge score of 60 for general practitioners, 62 for pediatricians, and 74 for general dentists with an overall mean of 65 and total variance of 17 according to a pilot study.

Selection of the participants:

The list of active members of the Ahwaz Medical Council including general practitioners, pediatricians, and general dentists practicing in private and public sectors in Ahwaz City was obtained from the Ahwaz Medical Council (<https://membersearch.irimc.org/specialty/city>), yielding 1121 members, including 692 general practitioners, 396 general dentists, and 33 pediatricians. According to the required sample size of 278, a total of 175 general practitioners, 102 general dentists, and 20 pediatricians were selected by stratified random sampling from the list.

Data collection:

A researcher-designed questionnaire according to previous studies [2,11] was used for data collection, which included 4 sections of demographic information, knowledge questions, attitude questions, and practice questions, scored by using a Likert scale. Correct answers to knowledge questions were scored 1 while incorrect or "I do not know" answers were scored 0. The "I agree" responses to attitude questions were scored 1 while "I disagree" or "no opinion" answer choices were scored 0, except for questions 1, 2, 7, and 16, which were negative questions, and "I disagree" answers were scored 1. The "always", "sometimes", "rarely", and "never" answers to practice questions were scored 3, 2, 1, and 0 points, respectively. Accordingly, the total knowledge score could range from 0 to 10, the total attitude score could range from 0 to 20 with higher scores indicating a more positive

attitude, and the total practice score could range from 0 to 30, with higher scores indicating better practice.

The questionnaires were administered to the participants after they had given their informed consent.

Validation of the questionnaire:

The content validity of the knowledge part of the questionnaire with 10 items was confirmed by the experts. The questions were evaluated and confirmed by the oral health experts in three rounds of evaluation. The reliability of the knowledge part of the questionnaire was evaluated by using the Kuder–Richardson formula, which was found to be 0.758, showing its relatively optimal reliability. The content validity of the attitude part of the questionnaire with 20 items was confirmed by the oral health experts following three rounds of evaluation. The reliability of the attitude part of the questionnaire was assessed by calculation of Cronbach's alpha, which was found to be 0.759 indicating relatively optimal reliability. The content validity of the practice part of the questionnaire with 10 items was confirmed by the oral health experts following three rounds of evaluation. The reliability of the practice part of the questionnaire was assessed by calculation of Cronbach's alpha, which was found to be 0.766 indicating relatively optimal reliability.

Statistical analysis:

The normal distribution of data was evaluated by the Kolmogorov-Smirnov test. Due to the non-normal distribution of knowledge, attitude, and practice scores, the three groups were compared in this regard by the Kruskal-Wallis test. The relationship between the variables was analyzed by Pearson's correlation coefficient. All statistical analyses were carried out using SPSS version 23 (SPSS Inc., IL, USA) with $P < 0.05$ as statistically significant.

RESULTS

Demographics:

Table 1 presents the demographic information of the participants. Of all 297 participants, 133 (44.8%) were females and 164 (55.2%) were males. The mean age was 42.12 years for general practitioners, 45.8 years for pediatricians, and 36.8 years for general dentists.

Table 2 shows the sources of information of the three groups of participants about pediatric oral health.

Knowledge:

Table 3 presents the responses of the three groups to knowledge questions. The results showed significant differences in the responses of the three groups to questions 1 ($P=0.000$), 3 ($P=0.004$), 4 ($P=0.000$), 7 ($P=0.002$), 9 ($P=0.001$), and 10 ($P=0.014$). The highest knowledge score belonged to the item "Repeated intake of sugary substances is a risk factor for the development of oral and dental conditions," and 99.3% of the participants correctly responded to this question. The lowest knowledge score belonged to the question "Breastfeeding is a risk factor for the development of oral and dental conditions," and only 8.8% of the respondents correctly responded to this question. However, the total mean score was calculated to be 7.71 for pediatricians, 7.69 for general practitioners, and 7.54 for general dentists out of 10, indicating no significant difference among the three groups as shown by the Kruskal-Wallis test ($P=0.854$).

Attitude:

Table 4 shows the responses of the three groups to attitude questions. The results showed significant differences in the responses of the three groups to questions 1 ($P=0.029$), 2 ($P=0.001$), 3 ($P=0.026$), 7 ($P=0.000$), 8 ($P=0.021$), 11 ($P=0.000$), 15 ($P=0.000$), 16 ($P=0.000$), 19 ($P=0.000$), and 20 ($P=0.000$). However, the total mean score was calculated to be 16.86 for pediatricians, 16.70 for general practitioners, and 17.00 for general dentists out of 20, indicating no

Table 1. Demographic information of the participants

Variable	Category	General practitioners	Pediatricians	General dentists	Total
Gender	Female	(%24.9) 74	(%4.7)14	(15.2)45%	(% 44.8) 133
	Male	(%34)101	(%2)6	(%19.2)57	(% 55.2) 164
	Total	(%58.9)175	(%6.7)20	(%34.3)102	(% 100) 297
Age (yrs.)	35-25	(%8.1) 24	(%0.0)0	(%18.9)56	(% 26.9) 80
	45-35	(%30.6)91	(%3)9	(%8.8)26	(% 42.4) 126
	55-45	(%17.8)53	(%3)9	(%3.7)11	(% 24.6) 73
	65-55	(% 2.4)7	(% 0.7)2	(% 3.0)9	(% 6.1) 18
	Total	(% 58.9)175	(% 6.7)20	(% 34.3)102	(% 100) 297

Table 2. Sources of information of the three groups of participants about pediatric oral health

Sources Group	General practitioners	Pediatricians	General dentists
Journals	(%25.1) 44	(%10) 2	(%4.9) 5
Colleagues	(%4.6) 8	(%5) 1	(%2.9) 3
Educational courses	(%1.7) 3	(%5) 1	(%8.8) 9
Internet	(%3.4) 6	(%25) 5	(%5.9) 6
Congresses	(%0.6) 1	(%0) 0	(%1) 1
Three or more of the above	(%16) 28	(%15) 3	(%35.3) 36
None	(%2.3) 4	(%0) 0	(%2.9) 3

Table 3. Responses of the three groups to knowledge questions

Group	correct	Incorrect	I do not know	P value
1. Oral cavity anatomy is a risk factor for the development of oral and dental problems.				
General practitioners	<u>98.3%</u>	1.1%	0.6%	*0.000
Pediatricians	<u>95%</u>	5%	0%	
General dentists	<u>79.4%</u>	17.6%	2.9%	
Total	<u>91.6%</u>	7.1%	1.3%	
2. Repeated intake of sugary substances is a risk factor for the development of oral and dental conditions.				
General practitioners	<u>99.4%</u>	0.6%	0%	0.625
Pediatricians	<u>100%</u>	0%	0%	
3. Bottle feeding is a risk factor for the development of oral and dental conditions.				
General practitioners	<u>96%</u>	3.4%	0.6%	*0.004
Pediatricians	<u>100%</u>	0%	0%	
General dentists	<u>84.3%</u>	9.8%	5.9%	
Total	<u>92.3%</u>	5.4%	2.4%	
4. Breastfeeding is a risk factor for the development of oral and dental conditions.				
General practitioners	<u>5.1%</u>	94.3%	0.6%	*0.000
Pediatricians	<u>0%</u>	100%	0%	
General dentists	<u>16.7%</u>	76.5%	6.9%	
Total	<u>8.8%</u>	88.6%	2.7%	
5. Pacifier sucking is a risk factor for the development of oral and dental conditions.				
General practitioners	<u>93.7%</u>	3.4%	2.9%	0.826
Pediatricians	<u>100%</u>	0%	0%	
General dentists	<u>95.1%</u>	2.9%	2%	
Total	<u>94.6%</u>	3%	2.4%	
6. No toothbrushing during childhood is a risk factor for the development of oral and dental conditions.				
General practitioners	<u>98.9%</u>	1.1%	0%	0.889
Pediatricians	<u>100%</u>	0%	0%	
General dentists	<u>99%</u>	1%	0%	
Total	<u>99%</u>	1%	0%	
7.No access to fluoride is a risk factor for the development of oral and dental conditions.				
General practitioners	<u>95.4%</u>	1.7%	2.9%	*0.002
Pediatricians	<u>80%</u>	0%	20%	
General dentists	<u>92.2%</u>	4.9%	2.9%	
Total	<u>93.3%</u>	2.7%	4%	
8.Ectopic teeth are not a risk factor for the development of oral and dental conditions.				
General practitioners	<u>45.7%</u>	53.1%	1.1%	0.069
Pediatricians	<u>40%</u>	60%	0%	
General dentists	<u>61.8%</u>	38.2%	0%	
Total	<u>50.8%</u>	48.5%	0.7%	
9. Inappropriate nutritional habits are a risk factor for the development of oral and dental conditions.				
General practitioners	<u>40%</u>	32.6%	27.4%	*0.001
Pediatricians	<u>70%</u>	10%	20%	
General dentists	<u>51%</u>	13.7%	35.3%	
Total	<u>45.8%</u>	24.6%	29.6%	
10. Genetics is a risk factor for the development of oral and dental conditions.				
General practitioners	<u>97.7%</u>	0%	2.3%	0.014
Pediatricians	<u>100%</u>	0%	0%	
General dentists	<u>91.2%</u>	5.9%	2.9%	
Total	<u>95.6%</u>	2%	2.4%	

*Statistically significant.

*Statistically significant.

Table 4. Responses of the three groups to attitude questions

Group	I agree	I disagree	No opinion	P value
1.Bottle-feeding at night is ok.				
General practitioners	5.1%	<u>93.1%</u>	1.7%	*0.029
Pediatricians	0%	<u>85%</u>	15%	
General dentists	3.9%	<u>89.2%</u>	6.9%	
Total	4.4%	<u>91.2%</u>	4.4%	
2.Breast-feeding should be stopped and replaced with bottle feeding at 1 year of age.				
General practitioners	6.3%	<u>93.1%</u>	0.6%	*0.001
Pediatricians	0%	<u>100%</u>	0%	
General dentists	7.8%	<u>82.4%</u>	9.8%	
Total	6.4%	<u>89.9%</u>	3.7%	
3.Maternal diet affects the oral health status of the child.				
General practitioners	<u>94.9%</u>	2.3%	2.9%	*0.026
Pediatricians	<u>90%</u>	10%	0%	
General dentists	<u>86.3%</u>	3.9%	9.8%	
Total	<u>91.6%</u>	3.4%	5.1%	
4.Oral health is part of parental care.				
General practitioners	<u>99.4%</u>	0%	0.6%	0.625
Pediatricians	<u>100%</u>	0%	0%	
General dentists	<u>99%</u>	1%	0%	
Total	<u>99.3%</u>	0.3%	0.3%	
5.Medical record of patients should have oral health information such as the date of last dental visit, its reason, and type of received treatment.				
General practitioners	<u>99.4%</u>	0%	0.6%	0.858
Pediatricians	<u>100%</u>	0%	0%	
General dentists	<u>101%</u>	0%	1%	
Total	<u>99.3%</u>	0%	0.7%	
6.Treatment of primary teeth is imperative.				
General practitioners	<u>98.9%</u>	0.6%	0.6%	0.708
Pediatricians	<u>100%</u>	0%	0%	
General dentists	<u>98%</u>	2%	0%	
Total	<u>98.7%</u>	1%	0.3%	
7.Iron drops cause dental caries.				
General practitioners	86.3%	<u>13.7%</u>	0%	*0.000
Pediatricians	50%	<u>50%</u>	0%	
General dentists	41.2%	<u>55.9%</u>	2.9%	
Total	68.4%	<u>30.6%</u>	1%	
8.Pediatricians should perform oral examination.				
General practitioners	<u>98.3%</u>	0.6%	1.1%	*0.021
Pediatricians	<u>100%</u>	0%	0%	
General dentists	<u>90.2%</u>	5.9%	3.9%	
Total	<u>95.6%</u>	2.4%	2%	
9.Routine dental visits are important to prevent oral and dental diseases.				
General practitioners	<u>100%</u>	0%	0%	0.146
Pediatricians	<u>100%</u>	0%	0%	
General dentists	<u>98%</u>	2%	0%	
Total	<u>99.3%</u>	0.7%	0%	
10.Gingival inflammation (gingivitis) is preventable.				
General practitioners	<u>97.7%</u>	1.7%	0.6%	0.868
Pediatricians	<u>100%</u>	0%	0%	
General dentists	<u>99%</u>	1%	0%	
Total	<u>95.6%</u>	99%	1%	
11. Oral and dental disorders and malocclusions are preventable.				
General practitioners	76.6%	17.1%	6.3%	*0.000

Pediatricians	<u>55%</u>	30%	15%	
General dentists	<u>52%</u>	38.2%	9.8%	
Total	<u>66.7%</u>	25.3%	8.1%	
12. Pediatricians play an important role in the prevention of oral diseases.				
General practitioners	<u>96.6%</u>	2.3%	1.1%	0.27
Pediatricians	<u>100%</u>	0%	0%	
General dentists	<u>92.2%</u>	2.9%	4.9%	
Total	<u>95.3%</u>	2.4%	2.4%	
13. The best time for initiation of toothbrushing of children by their parents is right after the eruption of their first primary tooth.				
General practitioners	<u>93.1%</u>	3.4%	3.4%	0.62
Pediatricians	<u>90%</u>	10%	0%	
General dentists	<u>93.1%</u>	3.9%	2.9%	
Total	<u>92.9%</u>	4%	3%	
14. Nocturnal breast/bottle-feeding can cause dental caries.				
General practitioners	<u>91.4%</u>	6.9%	1.7%	0.523
Pediatricians	<u>95%</u>	0%	5%	
General dentists	<u>94.1%</u>	3.9%	2%	
Total	<u>92.6%</u>	5.4%	2%	
15. General practitioners should perform oral clinical examination.				
General practitioners	<u>85.7%</u>	9.1%	5.1%	*0.000
Pediatricians	<u>90%</u>	10%	0%	
General dentists	<u>53.9%</u>	39.2%	6.9%	
Total	<u>75.1%</u>	19.5%	5.4%	
16. Early childhood caries is only seen in bottle-fed children.				
General practitioners	81.1%	<u>14.3%</u>	4.6%	*0.000
Pediatricians	60%	<u>40%</u>	0%	
General dentists	18.6%	<u>72.5%</u>	8.8%	
Total	58.2%	<u>36%</u>	5.7%	
17. Untreated early childhood caries can adversely affect general health.				
General practitioners	<u>97.7%</u>	0.6%	1.7%	0.760
Pediatricians	<u>100%</u>	0%	0%	
General dentists	<u>96.1%</u>	2%	2%	
Total	<u>97.3%</u>	1%	1.7%	
18. Cariogenic bacteria may be transmitted from mother to child.				
General practitioners	<u>80%</u>	14.9%	5.1%	0.453
Pediatricians	<u>70%</u>	25%	5%	
General dentists	<u>84.3%</u>	9.8%	5.9%	
Total	<u>80.8%</u>	13.8%	5.4%	
19. White spots on teeth may be an early sign of caries.				
General practitioners	<u>90.3%</u>	4%	5.7%	*0.000
Pediatricians	<u>70%</u>	5%	25%	
General dentists	<u>81.4%</u>	13.7%	4.9%	
Total	<u>85.9%</u>	7.4%	6.7%	
20. Fruit juices and drinks containing carbohydrate are bad for the teeth.				
General practitioners	<u>98.9%</u>	1.1%	0%	*0.000
Pediatricians	<u>80.0%</u>	0%	20%	
General dentists	<u>94.1%</u>	1%	4.9%	
Total	<u>96%</u>	1%	3%	
*Statistically significant				

significant difference among the three groups as shown by the Kruskal-Wallis test ($P=0.849$).

Practice:

Table 5 displays the responses of the three groups to practice questions. Significant differences were observed among the groups for questions 1 ($P = 0.003$), 3 ($P < 0.001$), 4 ($P = 0.002$), 5 ($P < 0.001$), 6 ($P < 0.001$), 7 ($P < 0.001$), 8 ($P < 0.001$), and 9 ($P = 0.009$). The highest mean practice score (2.63/3) was for “acquiring more information about prevention of oral diseases,” while the lowest (1.58/3) was for “prescribing vitamin D for children.” Total mean scores (out of 20) were 20.57 for pediatricians, 22.12 for general practitioners, and 22.50 for general dentists, with no significant difference observed among the groups (Kruskal-Wallis test, $P = 0.184$).

Effect of knowledge and attitude on practice:

Pearson’s correlation coefficient showed a weak significant direct correlation between attitude and practice ($r=0.18$, $P=0.002$), and also attitude and knowledge ($r=0.375$, $P<0.001$); however, knowledge and practice had no significant correlation ($r=0.02$, $P=0.72$).

DISCUSSION

This study assessed the knowledge, attitudes, and practices of Iranian general practitioners, pediatricians, and dentists regarding pediatric oral health. The results showed that the knowledge level of all three groups was good and above average, and the three groups had no significant difference in this respect.

The participants demonstrated high levels of knowledge about pediatric oral health, with mean scores of 7.69 for general practitioners, 7.71 for pediatricians, and 7.54 for general dentists out of a possible 10. The attitude scores were also high, with general practitioners scoring 16.7, pediatricians 16.86, and general dentists 17 out of 20. This positive attitude is essential for promoting better oral health

practices among children. The mean practice scores were 22.12 for general practitioners, 20.57 for pediatricians, and 22.50 for general dentists out of 30. Despite the high knowledge and attitude scores, the practice of oral health care was less consistent, particularly among pediatricians and general practitioners. Over 90% of participants recognized the importance of initiating tooth brushing after the eruption of the first primary tooth, reflecting good awareness of essential practices. While knowledge was high, the actual practice of discussing dietary habits and performing oral examinations was lower, with only 15% of pediatricians and 21% of general practitioners providing tooth-cleaning instructions. Overall, the study highlights a gap between knowledge and practice, indicating a need for improved implementation of oral health practices among healthcare providers.

The results of previous studies have been controversial in this regard, such that Imtiaz et al, [12], Haghighikhan et al, [13], and Bozorgmehr et al. [14] reported unfavorable knowledge levels of pediatricians about pediatric oral health. Gambhir et al, [15] also reported poor knowledge of general practitioners about oral health. However, Oliverous-villarico et al. [16] reported the optimal knowledge level of pediatricians and Alshatri et al. [17] showed the optimal knowledge level of family physicians about oral health. Variations in the reported results can be due to differences in baseline information, continuing education programs, and personal attitudes of individuals in different populations. In the present study, all three groups were well aware of the factors causing oral and dental problems, and 96% of general practitioners, 100% of pediatricians, and 84% of general dentists were well aware of the role of bottle-feeding in the development of dental caries. In the study by Alshatri et al, [17] 75.4% of general practitioners knew that falling asleep during bottle-feeding would lead to dental caries, and 75% of the pediatricians in a study by Indira et al. [18] knew that bottle-feeding is a risk factor for early childhood caries. A high percentage of the participants in a study by Vafayi and Zarandi were also aware of this fact. Though, only 8.8% of the participants were aware of the role of breastfeeding in dental caries, and the knowledge of pediatricians in this

regard was significantly lower than others. A high percentage of participants in the studies by Vafayi and Zarandi [2] and Indira et al, [18] also disagreed with this statement. Thus, knowledge enhancement about the adverse effects of nocturnal breastfeeding on oral health seems necessary.

All three groups had a relatively high (positive) attitude towards oral health in the present study, which was in line with the results of previous studies [16]. Maternal dietary habits can significantly affect the dietary habits and oral health of children, which was acknowledged by over 90% of the participants in the present study; the same results were reported in previous studies as well [19]. In the current study, 100% of the pediatricians were well aware of their critical role in the oral health promotion of children, which was close to the values reported by Poornima et al, [11] (91%) in this regard, and the findings of Lewis et al, [20].

According to the instructions of the American Academy of Pediatric Dentistry, tooth brushing should be started right after the eruption of the first primary tooth [4], which was acknowledged by over 90% of the participants in the current study. The same results were also reported in the study by Vafayi and Zarandi [2]. However, 60% of pediatricians in the study by Lewis et al. [20] were against this statement, and Goyal et al. [19] reported that only 35% of pediatricians in their study were aware of the correct time of initiation of tooth brushing for children. Such variations can be due to differences in educational curricula and post-graduation programs in different countries.

Also, 80% of the participants and 70% of the pediatricians were well aware of the role of mothers in the transfer of Streptococcus mutants to children during their first two years of life. This percentage was much lower in studies by Saleh et al [21]. White spot lesion is the first clinically detectable sign of caries development. At this step, the lesion can be managed non-invasively with fluoride therapy, oral hygiene instruction, and diet control [22]. Therefore, knowledge of healthcare workers in this regard is highly important to decrease the incidence of cavitated carious lesions. In the present study, over 80% of the participants were well aware

of this fact, which was in agreement with the results of Hadjipanayis et al, [23] (over 70% were aware) and in contrast to the findings of Garrocho-Rangel et al, [24] (mostly had limited knowledge) and Alshathri et al, [17] (35% were aware).

A noteworthy finding of the present study was that 86% of general practitioners and 50% of pediatricians believed that iron drops can cause caries. The same result was reported by Vafayi and Zarandi [2]. Iron deficiency anemia is the most common type of nutritional anemia worldwide and a health dilemma in developing countries. Nazari et al. [25] reported that almost 1/5 of Iranian children under the age of 6 years suffer from iron deficiency anemia. Iron supplementation is often prescribed by pediatricians; however, due to tooth discoloration, parents often believe that iron drop supplementation causes caries, and limit its consumption by their children. However, it has been demonstrated that iron supplementation has no adverse effect on teeth and can even prevent caries [26]. Thus, knowledge enhancement of healthcare workers and the public in this regard is imperative.

The present results showed good practice in all three groups with no significant difference. The results showed that over 60% of pediatricians and general dentists and less than half of general practitioners talk about diet and nutritional habits with their patients, but less than half of pediatricians and 20% of general practitioners perform oral clinical examination. In a study by Alshunaiber et al, [27] the majority of the participants acknowledged their role in the clinical oral examination but a smaller percentage performed it. Sezer et al. [28] reported that a small percentage of pediatricians performed oral clinical examinations for their patients. Another study reported a better practice by Saudi Arabian pediatricians [3]. Some other studies [16,18] reported that pediatricians had included clinical oral examination in their routine practice. In the current research, only 15% of pediatricians and 21% of general practitioners indicated that they provide tooth-cleaning guidance to parents. This suggests that despite their awareness of the importance of oral health, their actual practice in this area is

Table 5. Responses of the three groups to practice questions

Group	Always	Sometimes	Rarely	Never	P value
1. Do you provide patients with necessary instructions on dietary habits related to oral health?					
General practitioners	45.7%	53.1%	1.1%	0%	*0.003
Pediatricians	65%	30%	5%	0%	
General dentists	67.6%	31.4%	1%	0%	
Total	45.5%	44.1%	1.3%	0%	
2. Do you routinely perform oral clinical examinations for children?					
General practitioners	<u>20.6%</u>	70.9%	7.4%	1.1%	0.093
Pediatricians	<u>45%</u>	50%	0%	5%	
General dentists	<u>30.4%</u>	62.7%	5.9%	1%	
Total	<u>25.6%</u>	66.7%	6.4%	1.3%	
3. Do you teach correct tooth cleaning and oral hygiene practices to parents?					
General practitioners	<u>21.1%</u>	70.9%	6.9%	1.1%	*0.000
Pediatricians	<u>15%</u>	45%	40%	0%	
General dentists	<u>49%</u>	45.1%	5.9%	0%	
Total	<u>30.3%</u>	60.3%	8.8%	0.7%	
4. Do you recommend topical fluoride therapy at home to parents of young children?					
General practitioners	<u>21.1%</u>	69.1%	5.7%	4%	*0.002
Pediatricians	<u>10%</u>	45%	25%	20%	
General dentists	<u>19.6%</u>	57.8%	13.7%	8.8%	
Total	<u>19.9%</u>	63.6%	9.8%	6.7%	
5. Do you recommend a dental visit upon eruption of the first primary tooth and before the age of 1 year?					
General practitioners	<u>33.7%</u>	57.7%	7.4%	1.1%	*0.000
Pediatricians	<u>30%</u>	65%	0%	5%	
General dentists	<u>56.9%</u>	30.4%	11.8%	1%	
Total	<u>41.4%</u>	48.8%	8.4%	1.3%	
6. Do you recommend regular dental visits for children every 6 months?					
General practitioners	<u>29.7%</u>	62.3%	6.3%	1.7%	*0.000
Pediatricians	<u>25%</u>	70%	0%	5%	
General dentists	<u>60.8%</u>	31.4%	6.9%	1%	
Total	<u>40.1%</u>	52.2%	6.1%	1.7%	
7. Do you recommend children to use a fluoridated toothpaste?					
General practitioners	<u>26.3%</u>	69.1%	2.9%	1.7%	*0.000
Pediatricians	<u>20%</u>	55%	5%	20%	
General dentists	<u>42.2%</u>	44.1%	5.9%	7.8%	
Total	<u>31.3%</u>	59.6%	4%	5.1%	
8. Do you recommend vitamin D supplementation for children?					
General practitioners	<u>24%</u>	38.3%	37.1%	0.6%	*0.000
Pediatricians	<u>30%</u>	35%	35%	0%	
General dentists	<u>6.9%</u>	14.7%	52.9%	25.5%	
Total	<u>18.5%</u>	30%	42.4%	9.1%	
9. Do you recommend parents to brush the teeth of their children?					
General practitioners	<u>35.4%</u>	61.1%	2.3%	1.1%	*0.009
Pediatricians	<u>35%</u>	60%	5%	0%	
General dentists	<u>59.8%</u>	37.3%	2%	1%	
Total	<u>43.8%</u>	52.9%	2.4%	1%	
10. Are you interested to acquire more information on oral health?					
General practitioners	75.4%	21.7%	1.1%	1.7%	0.13
Pediatricians	60%	35%	5%	0%	
General dentists	60.8%	32.4%	4.9%	2%	
Total	69.4%	26.3%	2.7%	1.7%	

*Statistically significant.

lacking, possibly due to insufficient knowledge about proper tooth-cleaning methods for children, a high workload, or limited time. The American Academy of Pediatric Dentistry recommends that a child's first dental visit should occur within 6 months after the first primary tooth appears and before the child turns 1 year old. This is intended to prevent early childhood caries by offering oral health advice to parents[29]. In the present study, 30% of pediatricians and 33% of general practitioners always recommended dental visits to parents before their children reach 1 year of age. In most previous studies [30,31], only a small percentage of pediatricians were aware of the need for a dental visit before the age of 1 year and recommended it. In a study by Wagner et al, [32]over 60% of pediatricians believed that the first dental visit should be scheduled after 2 years of age.

The American Dental Association recommends smear fluoridated toothpaste for children under 2 years, and a pea-size for children between 2-6 years [4]. A small percentage of pediatricians and general practitioners in the present study recommended fluoridated toothpaste. In the study by Goyal et al, about 2/3 of the pediatricians were aware of the caries protective role of fluoride, but only a small number of them had correct information about its use. However, over 70% of participants in another study recommended the use of fluoridated toothpaste[19]. Vitamin D deficiency in children can increase the risk of caries[33,34].

Therefore, understanding this subject is crucial. Pediatricians had the highest rate of vitamin D supplementation, while general dentists had the lowest, signaling a need for improving general dentists' knowledge in this area. Additionally, a significant proportion of all three groups expressed a desire for more information, which could be supplied through continuing education programs. In this study, no significant link was identified between knowledge and practice, suggesting that increased knowledge does not automatically translate into appropriate practice. Future studies across multiple centers with a larger sample size are essential to enhance the general applicability of the results.

CONCLUSION

The present results showed high levels of knowledge, attitude, and practice of general practitioners, pediatricians, and general dentists practicing in Ahwaz City regarding pediatric oral health. The study found that general practitioners, pediatricians, and general dentists exhibited high levels of knowledge regarding pediatric oral health. This was reflected in their understanding of essential practices such as the timing of tooth brushing initiation, which over 90% of participants acknowledged should start with the eruption of the first primary tooth. The study revealed that 86% of general practitioners and 50% of pediatricians mistakenly believed that iron drops could cause dental caries. This misconception underscores the need for better education among healthcare providers regarding the effects of iron supplementation on oral health. The participants displayed a generally positive attitude towards oral health, which aligns with findings from previous studies. This positive outlook is crucial for fostering better oral health practices among children. In summary, the study concludes that while there is a high level of knowledge and a positive attitude toward pediatric oral health among Iranian healthcare professionals, there are still significant areas for improvement in practice and education, particularly regarding misconceptions about iron supplementation and the importance of clinical examinations.

AKNOLEDGMENT

The authors would like to express their sincere gratitude to the Vice-Chancellor for Research of Ahwaz Jundishapur University of Medical Sciences for supporting this study. We also extend our special thanks to all the general practitioners, pediatricians, and dentists in Ahwaz who kindly participated in completing the questionnaires.

Conflict of Interest. The authors declare that they have no conflict of interest regarding the publication of this paper.

REFERENCES

1. Fei W., 2024. Child Oral Health Management: Prevention, Early Diagnosis, and Intervention Strategies. *Journal of Innovations in Medical Research*, 3(2), 47–57.
2. Vafayi A., Zarandi A., 2015. Comparison of knowledge, attitude and practice of general physicians, pediatricians & dentists regarding the children's oral health in Tabriz. *Iranian Journal of Pediatric Dentistry*, 11(1), 23–36.
3. Sabbagh H., El-Kateb M., Al Nowaiser A., Hanno A., Alamoudi, N., 2011. Assessment of pediatricians' dental knowledge, attitude, and behavior in Jeddah, Saudi Arabia. *Journal of Clinical Pediatric Dentistry*, 35(4), 371–376.
4. Wright J. T., Crall J. J., Fontana M., Gillette E. J., Nový B. B., Dhar V., Donly K., Hewlett E. R., Quinonez R. B., Chaffin J., 2016. Evidence-based clinical practice guideline for the use of pit-and-fissure sealants: a report of the American Dental Association and the American Academy of Pediatric Dentistry. *The Journal of the American Dental Association*, 147(8), 672–682.
5. Eslamipour F., Birang R., Rahimi N., Bakrani M. R., 2010. Knowledge, Attitude, and Practice of Physicians and Pediatricians Regarding the Prevention of Oral Disease in Isfahan. *Journal of Dentistry* (17283426), 11(3).
6. Nammalwar R. B., Rangeeth P., 2012. Knowledge and attitude of pediatricians and Family Physicians in Chennai on Pediatric Dentistry: A survey. *Dental Research Journal*, 9(5), 561.
7. Subramaniam P., Girish Babu K., Babu P. S., Naidu P., 2008. Oral health care of children: Gynecologists and pediatricians' perspective. *Journal of Clinical Pediatric Dentistry*, 32(3), 253–258.
8. Balaban R., Aguiar C. M., da Silva Araujo A. C., Dias Filho E. B. R., 2012. Knowledge of paediatricians regarding child oral health. *International Journal of Paediatric Dentistry*, 22(4), 286–291.
9. Gezgin O., Korkut E., Özer H., Şener Y., 2018. Comparison of knowledge, attitude and practice toward oral health between pediatricians and family doctors. *International Dental Research*, 8(1), 7–14.
10. Katana E., Šaćić S. L., Marković N., Bajrić E., Zukanović A., Arslanagić M. A., 2023. Attitude, knowledge and practice of pediatricians in the prevention of early childhood caries. *Balkan Journal of Dental Medicine*, 27(1), 43–50.
11. Poornima P., Bajaj M., Nagaveni N. B., Roopa K. B., Neena I. E., Bharath K. P., 2015. Evaluation of the knowledge, attitude and awareness in prevention of dental caries amongst paediatricians. *Int J Community Med Public Health*, 2(1), 64–70.
12. Imtiaz S., Raza Y., Rajper S. P., Talpur N., Ali S., Banglani M. A., Shams S., 2022. Knowledge of Pediatricians about Oral Health Care of Children.
13. Haghighikhan M., Khaleghian M., Saberi A., Nasiri, M., 2021. A Survey of Knowledge Level about Pediatric oral/dental Health among Pediatricians. *Indian Journal of Forensic Medicine & Toxicology*, 15(1).
14. Bozorgmehr E., MALEK M. T., Hajizamani A., Vahidi A., Khajoe F., 2012. Knowledge, attitude, and practices of pediatricians about children's oral health.
15. Gambhir R. S., Batth J. S., Arora G., Anand S., Bhardwaj A., Kaur H., 2019. Family physicians' knowledge and awareness regarding oral health: A survey. *Journal of Education and Health Promotion*, 8(1), 45.
16. Oliveros-Villarico M., Flores K. K. R., de Guzman J. C. Z., Manrique A. L. V., Millo G. A., & Estrera K. R. P., 2023. Pediatrician knowledge, attitude and practices on children's oral health in a tertiary public hospital in the Philippines: A descriptive study. *Acta Medica Philippina*, 57(7), 56.
17. Alshathri B., Aljasser, N., Kofi M., 2020. Knowledge of oral health among family medicine physicians in Riyadh, Saudi Arabia 2020. *Journal of Family Medicine and Primary Care*, 9(9), 4761–4768.
18. Indira M. D., Dhull K. S., Nandlal B., 2015. Knowledge, Attitude and Practice toward Infant Oral Healthcare among the Pediatricians of Mysore: A Questionnaire Survey. *International Journal of Clinical Pediatric Dentistry*, 8(3), 211–214.

19. Goyal J., Menon I., Singh R. P., Sharma A., Passi D., Bhagia P., 2019. Association between maternal dental anxiety and its effect on the oral health status of their child: An institutional cross sectional study. *Journal of Family Medicine and Primary Care*, 8(2), 535–538.
20. Lewis C. W., Grossman D. C., Domoto P. K., Deyo R. A., 2000. The role of the pediatrician in the oral health of children: A national survey. *Pediatrics*, 106(6), E84. <https://doi.org/10.1542/peds.106.6.e84>
21. Hajiah S., Faridoun A., Alterkait A., 2022. Oral Health Knowledge and Experience of Pediatricians and Pediatric Residents in Kuwait: A Nationwide Cross-Sectional Survey Study. *International Journal of Dentistry*, 2022.
22. Campos P. H., Gimenez T., Rocha R. S., Caneppele T. M. F., Guaré R. O., Lussi A., Bresciani E., Diniz, M. B., 2022. Prevalence of White Spot Caries Lesions in Primary Teeth in Preschool Children: Systematic Review and Meta-analysis. *Current Pediatric Reviews*, 18(1), 33–46.
23. Hadjipanayis A., Grossman Z., Del Torso S., Michailidou K., Van Esso D., Cauwels R., 2018. Oral health training, knowledge, attitudes and practices of primary care paediatricians: a European survey. *European Journal of Pediatrics*, 177(5), 675–681.
24. Garrocho-Rangel A., López-Torre M. E., Santos-Díaz M. Á., Torre-Delgadillo G., Flores-Arriaga J. C., Saadia M., Pozos-Guillén A., 2022. Assessment of Pediatricians' Knowledge, Practices, and Attitudes on Oral Health/Care in Children in the Last Decade: A Systematic Scoping Review and Critical Reflection. *The Journal of Clinical Pediatric Dentistry*, 46(4), 262–272.
25. Nazari M., Mohammadnejad E., Dalvand S., Ghanei Gheshlagh R., 2019. Prevalence of iron deficiency anemia in Iranian children under 6 years of age: a systematic review and meta-analysis. *Journal of Blood Medicine*, 10, 111–117.
26. Esmaeilzadeh M., Mojarad F., Donyavi Z., Yousefi Mashouf R., Sarijeh N., 2015. Using Iron Supplements for Prevention of Dental Caries; An Experimental Study. *Avicenna Journal of Clinical Microbiology and Infection*, 2.
27. Alshunaiber R., Alzaid H., Meaigel S., Aldeeri A., Adlan A., 2019. Early childhood caries and infant's oral health; pediatricians' and family physicians' practice, knowledge and attitude in Riyadh city, Saudi Arabia. *The Saudi Dental Journal*, 31(Suppl), S96–S105.
28. Sezer R. G., Paketci C., Bozaykut A., 2013. Paediatricians' awareness of children's oral health: Knowledge, training, attitudes and practices among Turkish paediatricians. *Paediatrics & Child Health*, 18(4), e15-9.
29. Prakash P., Lawrence H. P., Harvey B. J., McIsaac W. J., Limeback H., Leake, J. L., 2006. Early childhood caries and infant oral health: Paediatricians' and family physicians' knowledge, practices and training. *Paediatrics & Child Health*, 11(3), 151–157.
30. Ramroop V., Kowlessar A., Ramcharitar-Maharaj V., Morris L., Naidu R., 2019. Knowledge, attitudes and behaviour towards preventive oral care in early childhood among paediatricians in Trinidad and Tobago: findings of a national survey. *International Dental Journal*, 69(1), 67–76.
31. Dickson-Swift V., Kenny A., Gussy M., McCarthy C., Bracksley-O'Grady S., 2020. The knowledge and practice of pediatricians in children's oral health: a scoping review. *BMC Oral Health*, 20(1), 211.
32. Wagner Y., Heinrich-Weltzien R., 2014. Pediatricians' oral health recommendations for 0- to 3-year-old children: results of a survey in Thuringia, Germany. *BMC Oral Health*, 14, 44.
33. Almoudi M. M., Hussein A. S., Abu Hassan M. I., Schroth R. J., 2019. Dental caries and vitamin D status in children in Asia. *Pediatrics International : Official Journal of the Japan Pediatric Society*, 61(4), 327–338.
34. Williams T. L., Boyle J., Mittermuller B.-A., Carrico C., Schroth R. J., 2021. Association between Vitamin D and Dental Caries in a Sample of Canadian and American Preschool-Aged Children. *Nutrients*, 13(12).