



## ORIGINAL ARTICLE

# Knowledge of Andalusian paediatricians and parents about early-onset tooth decay<sup>☆</sup>



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E. González\*, S. Pérez-Hinojosa, J.A. Alarcón, M.A. Peñalver

Departamento de Estomatología, Área de Odontopediatría, Facultad de Odontología, Universidad de Granada, Granada, Spain

Received 23 September 2013; accepted 16 January 2014

Available online 22 November 2014

### KEYWORDS

Early-onset decay;  
Children;  
Paediatricians;  
Parents;  
Paediatric dentist;  
Questionnaire

### Abstract

**Objectives:** To determine the level of knowledge of paediatricians and parents from Andalucía (southern Spain) about early-onset tooth decay, and to assess if paediatricians provide information to parents about paediatric oral care and visits to the paediatric dentist.

**Materials and methods:** A random sample of 113 paediatricians and 112 parents with children under 3 years of age received an anonymous questionnaire comprising 14 items for paediatricians and 16 items for parents, grouped into five blocks: visits to the dentist, oral hygiene, caries, nutritional habits, and treatment of caries. The chi-squared test was used to assess differences between groups.

**Results:** Paediatricians showed deficiencies in their knowledge about visits to the dentist and treatment of caries, however their level of knowledge on oral hygiene, tooth decay and nutritional habits were adequate. Parents showed a low level of knowledge in all aspects of the study, mainly about the treatment of tooth decay. There were no significant differences between paediatricians and parents in the knowledge about visits to the dentist, however paediatricians had more knowledge than the parents about hygiene, tooth decay, nutritional habits and treatment ( $P < .001$ ). Most of the parents indicated that paediatricians did not provide them detailed information on oral care, and about the possibility of visiting a paediatric dentist.

**Conclusions:** Andalusian paediatricians should improve their knowledge about early-onset tooth decay, and provide more information to parents about the oral care and the possibility of visiting a paediatric dentist. Parents have a very low level of knowledge about early-onset tooth decay, and particularly about treatment.

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\* Please cite this article as: González E, Pérez-Hinojosa S, Alarcón JA, Peñalver MA. Conocimiento de pediatras y padres andaluces sobre caries de aparición temprana. An Pediatr (Barc). 2015;82:19–26.

Corresponding author.

E-mail address: [egonzale@ugr.es](mailto:egonzale@ugr.es) (E. González).

## PALABRAS CLAVE

Caries de aparición temprana;  
Niños;  
Pediatras;  
Padres;  
Odontopediatras;  
Cuestionario

## Conocimiento de pediatras y padres andaluces sobre caries de aparición temprana

### Resumen

**Objetivos:** Investigar el conocimiento de pediatras y padres andaluces sobre las caries de aparición temprana y valorar si los pediatras proporcionan información a los padres sobre salud oral infantil y visitas al odontopediatra.

**Material y método** Una muestra aleatoria de 113 pediatras y 112 padres con niños menores de 3 años recibieron un cuestionario anónimo compuesto por 14 ítems para pediatras y 16 ítems para padres. Las preguntas se agruparon en 5 bloques: visitas al dentista, higiene oral, caries, hábitos nutricionales y tratamiento de caries. Las diferencias entre los 2 grupos se establecieron mediante la prueba chi-cuadrado.

**Resultados:** Los pediatras mostraron escasos conocimientos con respecto a las visitas al dentista y al tratamiento de las caries; sin embargo, su nivel de conocimientos sobre higiene oral, caries y hábitos nutricionales era adecuado. Los padres tenían bajos conocimientos en todos los aspectos del estudio, especialmente sobre el tratamiento de las caries. No hubo diferencias significativas en el conocimiento sobre visitas al dentista entre pediatras y padres, sin embargo, los pediatras tenían un mayor conocimiento sobre higiene, caries, hábitos nutricionales y tratamiento ( $p < 0,001$ ). La mayoría de los padres indicaron que los pediatras no les informaban detalladamente sobre cuidados orales ni sobre la posibilidad de visitar al odontopediatra.

**Conclusiones:** Los pediatras andaluces deberían mejorar sus conocimientos sobre las caries de aparición temprana e informar más a los padres sobre cuidados orales y sobre la posibilidad de visitar al odontopediatra. Los padres tienen unos conocimientos muy escasos sobre caries de aparición temprana, especialmente sobre tratamiento.

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## Introduction

Early childhood caries is a chronic and transmissible disease with a complex multifactorial aetiology.<sup>1</sup> Its worldwide prevalence varies, ranging from 3.6% to 15.3% in developed countries, while in developing countries it rises up to 67.7%.<sup>2,3</sup> The prevalence in Spain is 22.06%.<sup>4</sup>

Some aetiological factors are: frequent bottle feeding with sweetened fluids; prolonged recurrent formula feeding or breastfeeding while sleeping; the use of the pacifier sweetened with honey, sugar, or fruit juice; excessive carbohydrate intake; poor oral hygiene; and reduced salivary flow.<sup>5,6</sup> Other factors associated with caries are genetic predisposition, dietary habits, and the education level and socioeconomic status of parents.<sup>1</sup> *Streptococcus mutans* (*S. mutans*) has been identified as the major bacterial aetiological agent in early childhood caries.<sup>7</sup> The vertical, mother-to-child transmission of this bacterium has been observed, and it is found in children by 6 months of age. A child whose mother has high salivary *S. mutans* levels is at risk of being colonised by the microorganism earlier than a child whose mother has lower levels.<sup>8</sup>

The prevention of early childhood caries in children focuses on the control of aetiological factors, that is, on increasing host resistance, reducing the number of oral microorganisms, controlling the diet, reducing the duration of the presence of cariogenic foods in the mouth, and establishing good hygiene habits. Once caries has developed, the lesions must be treated by a dentist. The possibility of mitigating or eliminating many of the factors involved in tooth decay depends directly on the motivation and willingness of

parents to cooperate. The role of paediatricians is crucial in this regard, as they are the first line of contact with children and their parents. Paediatricians are the professionals that can best and at the earliest motivate parents and seek their collaboration.<sup>7</sup> They could also diagnose carious lesions at the earliest possible stage in order to refer children to the paediatric dentist for their management.<sup>9</sup> Thus, the attitude and level of knowledge of paediatricians are essential factors that affect the prevention and treatment of early childhood caries.

The purpose of this study was to determine the knowledge of early childhood caries of paediatricians and parents in Andalusia. Specifically, we sought to assess the knowledge of paediatricians and parents in regard to when the child has to have the first dental visit, oral hygiene, dietary habits, and the prevention and treatment of caries. Last of all, we wanted to assess the information provided to parents by paediatricians pertaining to oral care and dental visits.

## Materials and methods

### Participants

We conducted a cross-sectional randomised study of regional scope (Andalusia) on a sample of 113 paediatricians and 112 parents. The inclusion criteria were for paediatricians to be currently practising, for parents to have children 3 years old or younger, and for both paediatricians and parents to be willing to be interviewed.

The paediatricians were selected at random from the Andalusian paediatricians who participated in the X Reunión de Pediatría de Atención Primaria (X Reunion of Primary Care Paediatrics) held in May 2010 in Benalmádena, Málaga. The parents were selected at random from child care centres in Málaga, Granada, Almería and Seville during the same period of time. Enrolment in the study was voluntary for all respondents, who signed an informed consent form for their participation, and respondents were reassured that their answers would be kept confidential.

## Questionnaire

The data of the study were collected through a questionnaire designed by a working group of experts in paediatrics and paediatric dentistry of the Universidad de Granada. It was a fully anonymous self-administered questionnaire that was given to participants along with a letter of endorsement describing the study.

The questionnaire consisted of 14 items for the paediatricians and parents, with three response options each ([Table 1](#)). The same items were included for both groups of participants, and two more items (number 15 and 16) with categorical answers (Yes, No) were added for the parents. The questions common to both groups were organised in five blocks to assess the knowledge on:

- Dental visits (block 1; items 1 and 2).
- Oral hygiene (block 2; items 3 and 4).
- Dental caries (block 3; items 5, 6 and 7).
- Dietary habits (block 4; items 8, 9, 10 and 11).
- Treatment of dental caries (block 5; items 12, 13 and 14).
- Information provided to parents by paediatrician (only for parents; items 15 and 16).

Three levels of knowledge were established for each block: adequate, medium, or inadequate, depending on the answers given to the items that composed it ([Table 2](#)).

## Assessment of the questionnaire's validity

Once the questionnaire had been developed, a pilot study was conducted to ensure that the instrument was valid and easy to understand, administering the questionnaire to 10 paediatricians and 10 parents selected at random. The necessary changes were implemented to obtain the final version of the questionnaire, which only included the items whose meaning, pertinence, and clarity had been unanimously agreed on.

## Data analysis

We analysed the data using the SPSS 19.0 software (SPSS, Chicago, United States). We performed a descriptive analysis, calculating the absolute frequencies and percentages for each questionnaire item. We used the chi-squared test to assess the differences between paediatricians and parents in the level of knowledge for each block. The level of statistical significance was set at  $P < .05$ .

**Table 1** Questionnaire distributed to paediatricians and parents.

1. *At what age do you think children should have their first dentist appointment?*
  - (a) At 1 year
  - (b) At 2 years
  - (c) I don't know/no answer
2. *Starting at 2 years of age, children should have a dental check-up:*
  - (a) Every 6–12 months
  - (b) Every 24 months
  - (c) I don't know/no answer
3. *From what age should the child's teeth get brushed?*
  - (a) From the time the child has teeth in his/her mouth
  - (b) From the time the child can brush his/her own teeth by him/herself
  - (c) I don't know/no answer
4. *Saliva is not produced at night, and therefore the teeth are less protected against decay, so brushing teeth at night is a must*
  - (a) True
  - (b) False
  - (c) I don't know/no answer
5. *What is the earliest age that you think a child can develop caries?*
  - (a) Starting at 2 years
  - (b) Starting at 4 years
  - (c) I don't know/no answer
6. *Premature loss of deciduous teeth has a negative effect on permanent teeth*
  - (a) True
  - (b) False
  - (c) I don't know/no answer
7. *At what age do you think a child can lose most teeth due to dental caries associated to poor dietary or hygiene habits?*
  - (a) Starting at 3 years
  - (b) Starting at 5 years
  - (c) I don't know/no answer
8. *Prolonged, on-demand (whenever the child wishes to feed) breastfeeding for over a year may facilitate the development of caries*
  - (a) True
  - (b) False
  - (c) I don't know/no answer
9. *Frequent bottle feeding with sweetened milk may lead to early childhood caries*
  - (a) True
  - (b) False
  - (c) I don't know/no answer
10. *Frequent and prolonged bottle feeding with sweetened instant or natural chamomile tea or sweetened packaged or fresh juices is harmful to the teeth*
  - (a) True
  - (b) False
  - (c) I don't know/no answer

**Table 1 (Continued)**

11. Frequent use of a pacifier sweetened with sugar, honey, or juices, especially at night, is harmful to the teeth  
 (a) True  
 (b) False  
 (c) I don't know/no answer
12. Tooth decay in deciduous teeth must be treated by a dentist  
 (a) True  
 (b) False  
 (c) I don't know/no answer
13. Dental treatment of pits and fissures with a sealant prevents caries in permanent teeth  
 (a) True  
 (b) False  
 (c) I don't know/no answer
14. Do you think that dental prostheses can be placed in children 4 years of age who have lost part or all of their deciduous teeth due to decay?  
 (a) True  
 (b) False  
 (c) I don't know/no answer
- The following two items are additional questions for parents:**
15. Has your paediatrician provided you with detailed information about oral care from early on in your child's visits?  
 (a) Yes  
 (b) No
16. Has your paediatrician discussed with you the possibility of your child seeing a paediatric dentist?  
 (a) Yes  
 (b) No

## Results

**Table 3** shows the absolute frequencies and percentages for each questionnaire item for both paediatricians and parents. The results showed that paediatricians had poor knowledge in some aspects, such as the timing of the first visit to the dentist. Thus, only 28.3% of paediatricians knew that the

**Table 2** Level of knowledge with the items grouped in blocks.

Block	Knowledge level	Required answers
1 and 2	Adequate	2 correct answers
	Medium	1 correct answer
3 and 5	Inadequate	0 correct answers
4	Adequate	3 correct answers
	Medium	2 correct answers
	Inadequate	1 or 0 correct answers
4	Adequate	3 or 4 correct answers
	Medium	2 correct answers
	Inadequate	1 or 0 correct answers

child should have his or her first dental appointment in the first year of life.

The parents' knowledge was poor. Parents had a much lower percentage of correct answers than paediatricians. Knowledge was particularly lacking in some areas; for example, only 11.6% knew that dental prostheses can be fitted in children who have lost teeth due to caries.

In the items addressed only to parents, 59.8% of them reported that their paediatrician had not provided information about oral care for their child, and 66.1% that their paediatrician had never brought up the possibility of having their child visit the paediatric dentist.

**Table 4** shows the level of knowledge of parents and paediatricians with the items grouped in blocks. Inadequate knowledge about dental visits was observed in 33.6% of paediatricians and 31.3% of parents, with no significant differences between them. However, paediatricians had better knowledge of dental hygiene, caries, dietary habits, and dental treatment than parents ( $P < .001$ ). When it came to oral hygiene, 69.9% of paediatricians had adequate knowledge on the subject, compared to only 22.3% of parents. Knowledge of caries was adequate in most paediatricians (71.7%), but not in parents, of whom only 22.3% responded correctly. Knowledge of dietary habits was adequate in 84.9% of paediatricians versus 28.6% of parents. As for dental treatment in early childhood, 53.1% of paediatricians showed adequate knowledge of it, and only 1.8% of parents were aware of the treatment options.

## Discussion

We conducted a cross-sectional, randomised, regional study in Andalusia by means of a questionnaire specifically developed to determine the knowledge of paediatricians and parents of early childhood caries. The results show that paediatricians have limited knowledge of the adequate timing of dental visits and the treatment of caries, although their knowledge of oral hygiene, caries, and dietary habits could be considered adequate. The level of knowledge of parents was poor for every aspect under study, and particularly lacking in the area of dental treatment. The results show that paediatricians generally fail to provide parents with adequate information about oral care and the possibility of having children visit a paediatric dentist.

Several studies are consistent in showing that paediatricians lack knowledge on basic concepts of dentistry, and particularly paediatric dentistry, probably due to the scarce information they received on these subjects during their university training and their paediatrics residency.<sup>10–13</sup> According to Krol,<sup>13</sup> the level of oral health training for paediatricians at the undergraduate, graduate, and continuing medical education levels in the United States is inadequate to provide paediatricians with the necessary knowledge on this subject. Nonetheless, paediatricians are aware that they have an important responsibility in preventing oral diseases in children.<sup>11,12</sup> No studies on this subject have been done in Spain.

In our study, only 28.3% of paediatricians answered correctly the age at which children should first be seen by a dentist (1 year). The results were even worse in a study by Lewis et al.,<sup>14</sup> in which only 14.6% of respondents knew

**Table 3** Absolute frequencies/percentages of the questionnaire completed by paediatricians and parents.

Items	Responses	Paediatricians (n = 113) Frequency (%)	Parents (n = 112) Frequency (%)
1. At what age do you think children should have their first dentist appointment?	At 1 year At 2 years I don't know/no answer	32 (28.3) 63 (55.8) 18 (15.9)	53 (47.3) 35 (31.2) 24 (21.4)
2. Starting at 2 years of age, children should have a dental check-up	Every 6–12 months Every 24 months I don't know/no answer	74 (65.5) 30 (26.5) 9 (8.0)	69 (61.6) 22 (19.6) 21 (18.8)
3. From what age should the child's teeth get brushed?	From the time the child has teeth in his/her mouth From the time the child can brush his/her own teeth by him/herself I don't know/no answer	103 (91.2) 4 (3.5) 6 (5.3)	70 (62.5) 14 (12.5) 28 (25.0)
4. Saliva is not produced at night, and therefore the teeth are less protected against decay, so brushing teeth at night is a must	True False I don't know/no answer	88 (77.9) 19 (16.8) 6 (5.3)	29 (42.0) 47 (32.1) 36 (25.9)
5. What is the earliest age that you think a child can develop caries?	Starting at 2 years Starting at 4 years I don't know/no answer	112 (99.1) 1 (0.9) 0 (0)	41 (36.6) 37 (33.0) 34 (30.4)
6. Premature loss of deciduous teeth has a negative effect on permanent teeth	True False I don't know/no answer	81 (71.7) 21 (18.6) 11 (9.7)	53 (47.3) 36 (32.1) 23 (20.5)
7. At what age do you think a child can lose most teeth due to dental caries associated to poor dietary or hygiene habits?	Starting at 3 years Starting at 5 years I don't know/no answer	103 (91.2) 7 (6.2) 3 (2.7)	58 (51.8) 39 (34.8) 15 (13.4)
8. Prolonged, on-demand (whenever the child wishes to feed) breastfeeding for over a year may facilitate the development of caries	True False I don't know/no answer	25 (22.1) 69 (61.1) 19 (16.8)	12 (10.7) 65 (58.0) 35 (31.2)
9. Frequent bottle feeding with sweetened milk may lead to early childhood caries	True False I don't know/no answer	108 (95.6) 3 (2.7) 2 (1.8)	68 (60.7) 13 (11.6) 31 (27.7)
10. Frequent and prolonged bottle feeding with sweetened instant or natural chamomile tea or sweetened packaged or fresh juices is harmful to the teeth	True False I don't know/no answer	105 (92.9) 6 (5.3) 2 (1.8)	74 (66.1) 13 (11.6) 25 (22.3)
11. Frequent use of a pacifier sweetened with sugar, honey, or juices, especially at night, is harmful to the teeth	True False I don't know/no answer	111 (92.8) 2 (1.8) 0 (0)	89 (79.5) 3 (2.7) 20 (17.9)
12. Tooth decay in deciduous teeth must be treated by a dentist	True False I don't know/no answer	98 (86.7) 8 (7.1) 7 (6.2)	75 (67) 6 (5.4) 31 (27.7)
13. Dental treatment of pits and fissures with a sealant prevents caries in permanent teeth	True False I don't know/no answer	99 (87.6) 9 (8.0) 5 (4.4)	47 (42) 18 (16.1) 47 (42.0)

that the first dental visit had to happen at 12 months of age (in accordance with the recommendations of the American Academy of Pediatric Dentistry<sup>15</sup>). Another publication reported that only 5% of paediatricians in the state of Virginia (United States) refer children to the dentist for their first appointment at 1 year of age.<sup>16</sup>

We found significant differences between paediatricians and parents in the level of knowledge of oral hygiene, which was adequate in 69.9% of paediatricians and only in 22.3% of parents. Most paediatricians (91.2%) knew that children should start brushing teeth once the first tooth erupts, and a smaller percentage (77.9%) was aware of the importance

**Table 4** Comparison of the knowledge level of paediatricians and parents by block of items.

Block	Level of knowledge	Paediatricians, n (%)	Parents, n (%)	P
Dental visits	Inadequate	38 (33.6)	35 (31.3)	.101
	Medium	44 (38.9)	32 (28.6)	
	Adequate	31 (27.4)	45 (40.2)	
Oral hygiene	Inadequate	1 (0.9)	38 (33.9)	<.001
	Medium	33 (29.2)	49 (43.8)	
	Adequate	79 (69.9)	25 (22.3)	
Caries	Inadequate	1 (0.9)	43 (38.4)	<.001
	Medium	31 (27.4)	44 (39.3)	
	Adequate	81 (71.7)	25 (22.3)	
Dietary habits	Inadequate	2 (1.8)	15 (13.4)	<.001
	Medium	15 (13.3)	65 (58.0)	
	Adequate	96 (84.9)	32 (28.6)	
Treatment of caries	Inadequate	14 (12.4)	66 (58.9)	<.001
	Medium	39 (34.5)	44 (39.3)	
	Adequate	60 (53.1)	2 (1.8%)	

of brushing teeth at night before sleeping. In contrast, only 42% of parents knew that brushing teeth before bedtime is essential because teeth are more vulnerable to caries during the night.

When it came to knowledge of caries, 71.7% of paediatricians had adequate knowledge. Almost all (99.1%) knew that dental caries can develop in 2-year-old children. Meanwhile, only 22.3% of parents had adequate knowledge of caries. In a national survey of paediatricians carried out in the United States, 47% of respondents reported that they saw early childhood caries at least once a month.<sup>14</sup> As some authors<sup>17</sup> suggest, paediatricians could easily incorporate dental screenings in their periodic check-ups of children, and provide oral health counselling to parents to prevent dental disease. This approach could contribute to improve the oral health of children, facilitating early referrals to the dentist. According to this study,<sup>17</sup> paediatricians achieved an adequate level of knowledge to identify caries in early childhood after only 2 h of training on caries detection.

In our study, knowledge about dietary habits was adequate in 84.9% of paediatricians, which is consistent with other studies.<sup>18,19</sup> Most paediatricians knew that providing certain foods on demand, such as milk, juices, carbonated drinks, and even sweetened chamomile tea, especially at night, increased the risk of developing caries in early childhood. Similarly, the habit of sweetening the pacifier with sugar, honey, or juice has been proven to be harmful to teeth. In contrast, only 28.6% of parents demonstrated adequate knowledge about dietary habits, a worrisome finding that is aggravated by the fact that some parents engage in risk practises such as sweetening the child's pacifier with sugar, honey, or juice.<sup>12,20</sup>

The relationship between prolonged on-demand breastfeeding and dental caries is complex and subject to controversy, as it involves numerous factors. At present, scientific evidence does not support the association between

prolonged on-demand breastfeeding and early childhood caries.<sup>21–23</sup> Thus, there is no reason to believe that prolonged on-demand breastfeeding is harmful or increases the risk of developing caries in early childhood. After conducting a systematic review, White concluded that given the proven health benefits of breastfeeding and the lack of scientific evidence linking breastfeeding to the development of early childhood caries, dental professionals should support current recommendations for breastfeeding. White also suggests that emphasis should be placed on promoting good oral hygiene practise from the time of eruption of the first tooth and on reducing the frequency and consumption of sugar-containing foods and drinks.<sup>21</sup>

When it came to the treatment of caries, 53.1% of paediatricians had adequate knowledge. The items in this block showed that most paediatricians knew that caries in deciduous teeth require dental treatment, and that sealing dental pits and fissures prevents the development of caries in permanent teeth. Furthermore, 65.5% knew that implants can be fitted in 4-year-old children that have lost deciduous teeth due to caries. In contrast, only 1.8% of parents demonstrated adequate knowledge of caries treatment, the lowest result they achieved among all the blocks. This result illustrates the important role paediatricians could play in counselling parents about early childhood caries.

Most of the surveyed parents reported that their paediatrician did not provide them with detailed information about oral care for their children (59.8%) or the option of having their child seen by a paediatric (66.1%). Based on the parents' answers, only a low percentage of Andalusian paediatricians (33.9%) advise parents to take their children to the paediatric dentist. Similar results were obtained in a survey of paediatricians done in Italy, according to which only 40.6% of the Italian paediatricians advise parents to take their children to the dentist once a year; 88.4%

counsel parents on dietary habits; and 76.1% counsel parents on how to prevent oral diseases.<sup>12</sup> Another study conducted on Chinese children younger than 4 years showed that paediatricians only recommended a dental visit when they saw clinical signs of early caries or there was a high risk of dental problems.<sup>24</sup>

When parents receive adequate information, the dental health of their children improves considerably. Weinstein et al.<sup>25</sup> found that children of parents who participated in health promotion programmes had 63% fewer new carious lesions. Kressin et al.<sup>26</sup> found that parents that partook in an oral health education programme had received more information about the aetiology, treatment, and prevention of caries than parents who had not partaken in such a programme.

As the Sociedad Española de Odontopediatría (Spanish Society of Paediatric Dentistry; [www.odontologiapediatrica.com](http://www.odontologiapediatrica.com)) has proposed, the implementation of preventive measures would ideally start in the last trimester of gestation. Future parents would be informed of the benefits of correct breastfeeding or the appropriate use of pacifiers. They would also be informed that dental caries is an infection, that any tooth in the mouth is susceptible to developing caries, and that consequently the oral and dental care of the child should be initiated as soon as the first deciduous teeth started erupting in the mouth.

Thus, information is one of the cornerstones in preventing oral and dental disease. The more information is made available to parents, educators, health care providers, and children, too, once they are old enough to understand it, the more the message will reach them and the more effective it will be. Paediatricians play a key role in informing and motivating parents, as they are the first medical professionals to examine children, and have more frequent contact with children and parents than any other type of health care provider.

The limitations of this study should be taken into account when interpreting its results. First of all, the questionnaires were distributed among Andalusian paediatricians who attended the X Reunión de Pediatría de Atención Primaria held in May 2010 in Benalmádena, Málaga, and among parents of children attending child care centres in Málaga, Granada, Almería and Seville. This method may have led to samples that are not sufficiently representative in both population groups, and thus, could limit the generalisation of the results to the populations under study. Secondly, due to the scarcity of previous studies on this subject, we may not have included all of the variables that are relevant to understanding the knowledge of early childhood caries.

Based on the results of this study, we advise that Andalusian paediatricians improve their general knowledge of early childhood caries, with particular emphasis on some aspects of childhood oral health, such as the treatment of caries and visits to the paediatric dentist. Andalusian parents of young children have a low level of knowledge of dental hygiene, caries prevention, dietary habits, and especially the treatment of caries. This lack of information fosters the development of early-onset caries in deciduous teeth. Paediatricians ought to provide parents with detailed information on this topic.

## Conflicts of interest

The authors have no conflicts of interest to declare.

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