

Parents, children, and pacifiers in Portugal: use, beliefs, and evidence, a cross-sectional study

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Abstract

Objective: To determine the prevalence of pacifier use in Portugal and its association with otitis media infections, speech sound disorders, dental problems, gastroenteritis, and breastfeeding difficulties and analyze parents' knowledge and beliefs regarding pacifier use. **Methods:** Observational study using an online questionnaire destined to all parents' resident in Portugal, enquiring parents' perceptions regarding pacifier use and child health problems and language development. **Results:** Pacifier use was positively associated with increased risk of middle ear infections and sleep problems but not language development problems, gastroenteritis episodes, dental problems, or breastfeeding difficulties. **Conclusion:** This study outlines the importance of informing parents about the pros and cons of pacifier use supporting individualized and informed decision.

Keywords: Children. Parents. Pacifier. Portugal.

Pais, filhos e chupetas em Portugal: uso, crenças e evidências, um estudo transversal

Resumo

Objetivo: Determinar a prevalência do uso de chupeta em Portugal e a sua associação com otite média aguda, gastroenterite aguda, alterações da fala, problemas dentários e dificuldade na amamentação; avaliar as ideias dos pais em relação à utilização de chupetas nas crianças. **Métodos:** Estudo observacional baseado na aplicação de um questionário online dirigido a pais residentes em Portugal, com questões relativas à perceção dos pais quanto ao uso da chupeta e problemas de saúde e de desenvolvimento da fala das crianças. **Resultados:** O uso de chupetas foi associado positivamente ao aumento do risco de otite média aguda e alterações do sono, mas não com episódios de gastroenterite aguda, alterações do desenvolvimento da fala, problemas dentários ou dificuldade na amamentação. **Conclusão:** Este estudo realça a importância de informar os pais relativamente às vantagens e desvantagens da utilização de chupeta, para que possam tomar uma decisão individualizada e informada.

Palavras-chave: Crianças. Pais. Chupeta. Portugal.

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Keypoints

What is known

- Pacifier's use is very common in western countries.
- The use of pacifiers can be associated with middle-ear infections and dental problems.
- The use pacifiers in older children should be discouraged, as it has no benefits.

What is added

- This study reinforces the need to inform parents about pacifiers, as a significant percentage doesn't seek information about it.
- There was an association between the use of pacifiers and sleep abnormalities.

Introduction

Non-nutritive sucking with pacifiers in various forms has been used by humans for possibly thousands of years¹. Non-nutritive sucking (NNS) is a natural reflex present in fetuses and newborns that helps with nutrition¹, manifested by sucking hands and fingers². The use of pacifiers is very common, about 75-80% of babies in occidental countries², but its benefits and costs remain surrounded with controversy.

On the one hand, parents believe that the pacifier helps soothe the crying or fussy baby, putting the baby to sleep, weaning, avoiding finger sucking; also, evidence suggests that pacifier use helps calming pain and prevents sudden infant death syndrome (SIDS)³.

On the other hand, exclusive breastfeeding, nipple confusion, otitis media infection, breathing, orofacial development, dentition, dental occlusion, mastication, and speech sounds articulation remain as sources of concern for many parents and professionals².

The present paper aims to determine the prevalence of pacifier use in Portugal and characterize it; to determine the existence of otitis media infections, speech sound disorders, dental problems, gastroenteritis, and breastfeeding difficulties and compare it between users and non-users. Moreover, it intends to measure the parents' knowledge about the advantages and disadvantages of pacifier use, comparing it with the most recent evidence about clinical recommendations on this matter.

Methods

We conducted an observational, descriptive, transverse study, based on an online questionnaire given to all parents living in Portugal, in Portuguese. This anonymous questionnaire was made available during one month as a *Google® Form*, promoted in parents' groups, through different digital platforms, like social media networks, instant message, and email providers. It contained 40 open and closed questions, versing child and parents' social and demographic information, parents' ideas and opinions about pacifier use (advantages and disadvantages, prevention of health problems, information sources)

and data concerning child pacifier use (age of onset, type of pacifier used, intensity of use, situations and motives for use, addition of substances, age of pacifier withdrawal and difficulties in the process), food and sleep habits, child health problems (physical growth, middle ear infection, gastroenteritis and dental problems) and language development (language difficulties and/or speech therapy intervention, age at first word, considered a problem after 18 months).

We asked each family for a single answer – individual as a couple – and, in case of more than one child, answers should report to the youngest.

Data record and statistical analysis was made in *Microsoft Excel®* 2010 and *SPSS®* version 24. We conducted a descriptive analysis with absolute and relative frequencies for categorical variables and with averages and standard deviations for continuous variables. Two groups, those who use and those who do not use pacifiers, were compared. For group analysis we used the *Chi-Square test* for statistical relations between dependent binary variables and independent binary variables, and *t-Student test* for non-categorical variables. *P-values* < 0.05 were considered statistically significant.

Informed consent was provided with the questionnaire and obtained through parents answering the questionnaire. The study protocol was submitted and approved by Administração Regional de Saúde de Lisboa e Vale do Tejo ethical commission.

Results

From the 531 submitted questionnaires, 519 were validated and 12 were eliminated due to inconsistencies. Families from all regions of Portugal submitted the questionnaire, with a major representation of Lisboa (36.4%), Coimbra (14.1%) and Porto (11.8%). Both, parents and children's sociodemographic variables are characterized in [Table 1](#). The sample had mostly only-child families and the most represented children age groups were 0-6 months old (22.4%), 12-24 months old (25%) and 2-3 years old (31.4%) and sex distribution was similar. Most parents were aged between 30-39 years old and had higher education.

Table 1. Sociodemographic characteristics (n = 519)

	Users (n = 403)	Non-users (n = 116)	Total n (%)
Family characterization			
Informant			
Mother	390 (97%)	110 (95%)	500 (96.3%)
Father	13 (3%)	6 (5%)	19 (3.7%)
Health professional	118 (29%)	20 (17%)	138 (26.6%)
Mother			
Age			
20-29 years old	71 (18%)	20 (17%)	91 (17.5%)
30-39 years old	280 (69%)	76 (66%)	356 (68.5%)
40-49 years old	48 (12%)	20 (17%)	68 (13.1%)
50-59 years old	4 (1%)	0 (0%)	4 (0.8%)
Education			
Primary education	2 (1%)	0 (0%)	2 (0.4%)
Basic education - 2 nd and 3 rd cycles	9 (2%)	3 (3%)	12 (2.3%)
Secondary education	93 (23%)	29 (25%)	122 (23.5%)
Higher education	299 (74%)	84 (72%)	383 (73.8%)
Father			
Age			
20-29 years old	42 (10%)	15 (13%)	57 (11.0%)
30-39 years old	271 (67%)	71 (61%)	342 (65.9%)
40-49 years old	85 (21%)	29 (25%)	114 (22.0%)
50-59 years old	3 (1%)	1 (1%)	4 (0.8%)
60-69 years old	2 (1%)	0 (0%)	2 (0.4%)
Education			
Primary education	6 (1%)	1 (1%)	7 (1.3%)
Basic education - 2 nd and 3 rd cycles	50 (12%)	13 (11%)	63 (12.1%)
Secondary education	169 (42%)	47 (41%)	216 (41.6%)
Higher education	178 (44%)	55 (47%)	233 (44.9%)
Residence			
North	75 (19%)	16 (14%)	91 (17.5%)
Centre	156 (39%)	46 (39%)	202 (38.9%)
Área Metropolitana de Lisboa	114 (28%)	36 (31%)	150 (29.0%)
Alentejo	32 (8%)	8 (7%)	40 (7.7%)
Algarve	6 (1%)	6 (5%)	12 (2.3%)
Açores	9 (2%)	2 (2%)	11 (2.1%)
Madeira	11 (3%)	2 (2%)	13 (2.5%)
Only child			
Yes	251 (62%)	75 (65%)	326 (62.8%)
No	152 (38%)	41 (35%)	193 (37.2%)
Children			
Sex			
Male	212 (53%)	52 (45%)	264 (50.9%)
Female	191 (47%)	64 (55%)	255 (49.1%)
Age			
0-6 months	88 (21%)	28 (24%)	116 (22.4%)
7-11 months	15 (4%)	4 (3%)	19 (3.7%)
12-23 months	102 (25%)	28 (24%)	130 (25.0%)
2-3 years old	132 (33%)	31 (27%)	163 (31.4%)
4-6 years old	48 (12%)	23 (20%)	71 (13.7%)
7-10 years old	11 (3%)	1 (1%)	12 (2.3%)
> 10 years old	7 (2%)	1 (1%)	8 (1.5%)
Nursery school attendance			
Yes	225 (56%)	69 (59%)	294 (56.6%)
No	178 (44%)	47 (41%)	225 (43.4%)

Table 2. Parents' opinions regarding the use of a pacifier (n = 519)

	Users (n = 403)	Non-users (n = 116)	Total n (%)
Source of information about pacifiers			
Family and friends	20 (5%)	5 (4%)	25 (5%)
Internet	50 (13%)	30 (26%)	80 (15%)
Doctor	69 (17%)	16 (14%)	85 (16%)
Other health professional	78 (19%)	18 (16%)	96 (18%)
Others	16 (4%)	4 (3%)	20 (4%)
No research was made	170 (42%)	43 (37%)	213 (41%)
Pacifier prevents the occurrence of a health event			
Yes	142 (35%)	28 (24%)	170 (33%)
No	261 (65%)	88 (76%)	349 (67%)
Pacifier has advantages			
Yes	310 (77%)	35 (30%)	345 (67%)
No	93 (23%)	81 (70%)	174 (34%)

Table 2 summarizes parents' opinions regarding the use of pacifiers. When it comes to researching information regarding its use, 213 (41%) parents didn't do any research. The ones that did, chose health professionals as the main source of information, followed by the internet.

In this sample, 403 children used a pacifier and 116 didn't. The major reason for not using a pacifier was infant refusal, in 86 children (74%), followed by parents' decision in 29 children (25%). The reasons for having used a pacifier are shown in Table 3. Most of the parents chose "Others," to then describe a combination of other reasons, the main ones being to soothe and to help falling asleep. Six other reasons were mentioned: to avoid finger sucking (twice), social pressure, the child's sucking reflex, to reduce SIDS risk and to stimulate suction in a premature baby.

The characteristics, use and removal of pacifiers are summarized in Table 3. More than half of the parents (275) took a pacifier to the hospital for child delivery. About 52% of the parents said they used it on a regular basis during the first month of the child's life. Among the children that used a pacifier, 136 children had already gone through the experience of removing it, most of them with ages between 1-3 years old. Parents classified it as very easy in most cases (56%). However, there were cases that parents described as difficult (9,6%) and very difficult (2%)- those occurred in children older than 1 year old.

Most children were full-term babies and had adequate growth and language development, with only 5% of them needing speech therapy (Table 4). The mean age of the first word was 10 ± 3.442 months, with a minimum of 4 months and a maximum of 24 months. There wasn't a statistically significant difference between users and non-users regarding speech development

when reported by parents ($p = 0.34$) or determined by the age of the first word ($p = 0.15$).

There was a statistically significant difference between users and non-users regarding finger sucking ($p = 0.009$), with 31% of non-users having had this habit.

As to health-related matters (Table 5), 34% of the children had never been sick and 37% had 1 to 2 disease events. About 36.8% of the children have had at least one event of acute gastroenteritis, with a mean of 0.66 ± 1.092 , and 32% had at least one event of acute otitis media, with a mean of 0.82 ± 1.931 . There is a statistically significant difference ($p = 0.02$) between the group of children that used a pacifier with the one that didn't when it comes to the occurrence of acute otitis media. This difference wasn't observed regarding the occurrence of acute gastroenteritis ($p = 0.55$).

None of the 116 non-users presented sleep abnormalities, determining a statistically significant difference between the groups of children that used and didn't use a pacifier ($p = 0.00$).

Regarding the existence of dental problems, 40 children out of the 389 that had teeth had dental problems (10.3%). When comparing the group of children that used a pacifier with the one that didn't, there wasn't a statistically significant difference ($p = 0.64$).

When it comes to feeding (Table 6), 30% of children were exclusively breastfed until the age of 6 months. The most presented reason for premature weaning was the mother not having enough breast milk. Comparing the group of children that used a pacifier during breastfeeding with the one that didn't, a statistically significant difference wasn't found regarding the difficulty in initiating breastfeeding ($p = 0.77$) nor in breast maladaptation being the reason for stopping breastfeeding before 6 months old ($p = 0.62$).

Table 3. Pacifiers' use characterization (n = 403)

	Total n (%)
Pacifier to the hospital	
Yes	275 (68%)
No	128 (32%)
Type of pacifier	
Conventional	91 (23%)
Orthodontic	262 (65%)
Doesn't know	50 (12%)
Pacifier with a ring	
Yes	337 (84%)
No	66 (16%)
Pacifier with a ribbon	
Yes	223 (55%)
No	180 (45%)
Reason to use a pacifier	
Soothe	67 (16.6%)
Sleep	69 (17.1%)
Ease pain	4 (1%)
Amuse	2 (0.5%)
All the above	47 (11.7%)
Others	214 (53.1%)
First use of a pacifier	
1 st week	207 (51%)
1 st month	119 (30%)
< 6 months	60 (15%)
> 6 months	17 (4%)
Reposition of pacifier when the child cries	
Always	28 (7%)
Almost every time	196 (49%)
Occasionally	109 (27%)
Rarely	58 (14%)
Never	12 (3%)
Addition of substance to the pacifier	
Always	1 (0.2%)
Almost every time	6 (1.5%)
Occasionally	33 (8.2%)
Rarely	49 (12.2%)
Never	314 (78%)
Reposition of pacifier during sleep	
Always	8 (2%)
Almost every time	35 (9%)
Occasionally	49 (12%)
Rarely	113 (28%)
Never	198 (49%)
Sleeping position	
Side	206 (51.1%)
Supine	168 (41.7%)
Prone	29 (7.2%)
Age of pacifier's removal	
1 month	6 (2%)
< 6 months	19 (5%)
6-11 months	10 (2.5%)
12-23 months	41 (10%)
2-3 years old	50 (12%)
> 3 years old	10 (2.5%)
Still uses a pacifier	267 (66%)

(Continues)

Table 3. Pacifiers' use characterization (n = 403)
(continued)

	Total n (%)
Pacifier's removal	
Very difficult	3 (1%)
Difficult	13 (3%)
Easy	44 (11%)
Very easy	76 (19%)
Still uses a pacifier	267 (66%)

Discussion

Our study covered all Portuguese regions, resulting in a sample that can give us reliable information, about parent's ideas and beliefs regarding the use and safety of pacifiers. We found no previous studies, in our country, regarding this parenting point of view.

The estimated prevalence of pacifier use in this study was 77.6%. In western countries, 75-85% of parents admitted to using a pacifier²; This massive use can be explained by the calming effect on the baby's cry, the help it provides in sleeping, reducing stress and pain, as identified by the parents in this study. All these problems can cause great anxiety, especially in first-time parents, or those of newborns, therefore leading to an early pacifier use⁴. Accordingly, in our study, 53% of parents took a pacifier to the maternity ward for child delivery and half of them made use of it in the 1st week after birth. However, other reasons for using a pacifier were also listed, such as a way of avoiding finger sucking, social pressure, because of the child's non-nutritive sucking reflex, to prevent SIDS and to stimulate suction in a premature baby, all these commonly described in other studies³. A 2017 Cochrane Review⁵ stated that there was no randomized control trial evidence on which to support or refute the use of pacifiers for the prevention of SIDS. On the other hand, breastfeeding for at least two months, especially when breastfeeding is exclusive, is protective against SIDS⁶.

The reasons parents identified for avoiding pacifiers were infant refusal, parents' decision, and maxillofacial malformation. Other reasons described in the literature were also fear of attachment to the pacifier, nipple confusion, hygiene, and dental and growth problems⁷.

Although the use of pacifiers is something they worry about, most parents (41%) didn't seek any information about it. Those who had information about the use of pacifiers, obtained it either from health professionals (34%) or via internet (15%), with the latter having a greater expression on those parents whose child didn't use a pacifier.

Table 4. Child's development (n = 519)

	Users (n = 403)	Non-users (n = 116)	Total n (%)	p value
Development				
Pregnancy duration				
< 37 weeks	25 (6%)	8 (7%)	33 (6.4%)	
≥ 37 weeks	378 (94%)	108 (93%)	486 (93.6%)	
Adequate growth				
Yes	368 (91%)	112 (97%)	480 (92.5%)	
No	35 (9%)	4 (3%)	39 (7.5%)	
Speech development problems				0.34
Yes	24 (6%)	4 (3%)	28 (5%)	
No	226 (56%)	64 (55%)	290 (56%)	
Doesn't speak	153 (38%)	48 (42%)	201 (39%)	
Finger sucking				
Yes	82 (20%)	36 (69%)	118 (23%)	
No	321 (80%)	80 (31%)	401 (77%)	

Table 5. Child's health aspects (n = 519)

	Users (n = 403)	Non-users (n = 116)	Total n (%)	p value
Health				
Disease events in a year				
None	135 (34%)	41 (35%)	176 (34%)	
1-2 times	142 (35%)	50 (43%)	192 (37%)	
3-4 times	78 (19%)	17 (15%)	95 (18.3%)	
> 4 times	48 (12%)	8 (7%)	56 (11%)	
Acute otitis media				0.02
Yes	139 (65%)	27 (77%)	166 (32%)	
No	264 (35%)	89 (23%)	353 (68%)	
Acute gastroenteritis				0.55
Yes	151 (63%)	40 (65%)	191 (36.8%)	
No	252 (37%)	76 (35%)	328 (63.2%)	
Speech therapy				
Yes	19 (5%)	8 (7%)	27 (5%)	
No	231 (57%)	60 (52%)	291 (56%)	
Still doesn't speak	153 (38%)	48 (41%)	201 (39%)	
Dental problems				0.64
Misalignment	4 (1%)	3 (2.5%)	7 (1.3%)	
Cavities	6 (2%)	4 (3%)	10 (1.9%)	
Malocclusion	15 (4%)	3 (2.5%)	18 (3.5%)	
Others	5 (1%)	0 (0%)	5 (1%)	
No problems	273 (67%)	76 (66%)	349 (67.2%)	
Still no teeth	100 (25%)	30 (26%)	130 (25%)	
Preferential breathing through				
Mouth	28 (7%)	7 (6%)	35 (6.7%)	
Nose	295 (73%)	85 (73%)	380 (73.3%)	
Doesn't know	80 (20%)	24 (21%)	104 (20.0%)	
Sleep abnormalities				0.00
Sleeping with mouth open	92 (23%)	0 (0%)	92 (17.7%)	
Snoring	26 (6%)	0 (0%)	26 (5%)	
Drooling	23 (6%)	0 (0%)	23 (4%)	
Waking up thirsty	22 (5%)	0 (0%)	22 (4%)	
None of the above	240 (60%)	116 (100%)	356 (68.6%)	

Table 6. Child's feeding habits (n = 519)

	Users (n = 403)	Non-users (n = 116)	Total n (%)	p value
Feeding				
Feeding until 6 months old				
Breastfeeding	223 (55%)	97 (84%)	320 (62%)	
Formula feeding	29 (7%)	3 (2%)	32 (6%)	
Breast + formula feeding	151 (38%)	16 (14%)	167 (32%)	
Exclusive breastfeeding				
Until leaving the maternity	13 (3%)	2 (2%)	15 (2.9%)	
Until the 1 st week	31 (8%)	5 (4%)	36 (6.9%)	
Until the 1 st month	28 (7%)	4 (3%)	32 (6.2%)	
Until the 2 nd month	28 (7%)	2 (2%)	30 (5.8%)	
Until the 4 th month	93 (23%)	16 (14%)	109 (21%)	
Until the 6 th month	107 (26%)	53 (46%)	160 (30.8%)	
> 6 months	59 (15%)	31 (26%)	90 (17.3%)	
Never	44 (11%)	3 (3%)	47 (9.1%)	
Difficulty in initiating breastfeeding				0.77
Yes	164 (41%)	35 (30%)	199 (38%)	
No	239 (59%)	81 (70%)	320 (62%)	
Reason for stopping breastfeeding before 6 months old				0.62
Little weight gain	9 (2%)	1 (1%)	10 (2%)	
Insufficient breast milk	68 (17%)	6 (5%)	74 (13%)	
Mum had to go back to work	27 (7%)	7 (6%)	34 (6%)	
Breast maladaptation	30 (7%)	1 (1%)	31 (5%)	
Mum's option	17 (4%)	4 (3%)	21 (4%)	
Others	16 (4%)	1 (1%)	17 (3%)	
Still breastfeeds	236 (59%)	96 (83%)	332 (57%)	
Pacifier use during breastfeeding				
Yes	356 (88%)	0 (0%)	356 (69%)	
No	47 (12%)	116 (100%)	163 (31%)	

Choosing a pacifier may be difficult for parents because the offer is so vast, and doctors are often confronted with questions regarding pacifiers' characteristics. One study⁸ concluded that orthodontic pacifiers have less impact on open bite when compared to conventional pacifiers, although other studies⁹ haven't found any differences. It is recommended that the pacifier has a ring, so it can be pulled in case of choking, and a ribbon that should be attached to the child's clothes, no bigger than 22cm to avoid suffocation¹⁰. As it was observed, Portuguese parents followed these recommendations, using orthodontic (65%) pacifiers, with a ring (84%) and a ribbon (55%).

Most parents (49%) reposition the pacifier almost every time when the child cries, and 7% do it every time. This may be because the baby's cry can cause great anxiety. On the contrary, most parents (49%) never reposition the pacifier during sleep, which is in accordance with recommendations¹¹. Also, on the positive side, we found that almost 93% of children sleep

in a supine or side position, which is in line with current guidelines regarding sleep safety⁵.

Most parents never or rarely add a substance to the pacifier, but some added sugary substances to the pacifier, probably to diminish the possibility of refusal. This practice is not recommended because of its effects on future eating patterns and risk of botulism in certain parts of the world¹¹.

Non-nutritive sucking can also be manifested by finger sucking. There was a difference between groups regarding finger sucking ($p = 0.009$), with non-users more frequently developing this habit. Exclusive breastfeeding also reduces non-nutritive sucking habits¹².

Removing pacifiers may cause anticipatory anxiety to parents, that try to plan for it. In our study parents considered the removal an easy process. Children were between the ages of 1 and 3 in 67% of cases. The American Academy of Pediatrics and the American Academy of Family Physicians recommend that pacifiers should be avoided after the age of 6 months because

of the risk of otitis media and discourage its use after 4 years old because of dental malocclusions. The delay of the removal age may have an impact on the development of stomatognathic structures and functions, essential for language development¹.

A major source of concern for parents and health professionals is the effect of the use of pacifiers on the child's development and health. No differences were found regarding premature weaning from breastfeeding between users and non-users. There is divergent evidence in this area, with a study demonstrating no differences in premature weaning from breastfeeding until 3 months old between full-term, exclusively breastfed babies that used and didn't use a pacifier¹³ and another demonstrating a premature weaning from breastfeeding and formula feeding⁴. The use of pacifier may also be associated with several unfavorable behaviors during breastfeeding regarding positioning, attachment, suction adequacy, and baby's responses⁴. In addition, pacifier use has been associated with acute otitis media and there is also some evidence reporting association with dental infection and respiratory and gastrointestinal symptoms². In our study, a difference was observed between users and non-users regarding acute otitis media ($p = 0.02$), but not acute gastroenteritis ($p = 0.55$). A topic that still lacks solid evidence are the effects of pacifier use on speech. A recent study analyzed the duration and frequency of pacifier use in children, finding no clear association with speech abnormalities¹⁴. Our study also presented no difference between users and non-users when analyzing the existence of speech problems, including speech delay. Nonetheless, some of these difficulties may yet not be seen by parents and become apparent in the future, for this questionnaire was also answered by parents of very young children.

We found no difference in dental problems between users and non-users but there seems to be some evidence supporting the association between the use of pacifier and anterior open bite and posterior crossbite⁸. There is also a correlation between the use of pacifiers and smaller intercanine distance of the upper arch, mean overjet, half-open or open lip posture and unexpected contraction during mastication, affecting the harmonious development of the orofacial structures¹⁵. It was also reported a higher frequency of Angle's class II in females and class III in males in association to the use of pacifiers¹⁶. Although dental effects were noted in children older than 2 years, the most significant changes were seen in children older than 4 years, therefore the use of pacifier should be discouraged after 4 years of age². Another alteration that is reported in association with the use of pacifiers is mouth breathing, and for

each year that pacifier removal is delayed, mouth breathing diagnosis is increased by 25%¹⁵. No difference between users and non-users was found in our study in this regard. However, when comparing the two groups for sleep abnormalities (mouth breathing, snoring, drooling and thirsty when waking), there was a significant difference ($p = 0.00$). These changes can be influenced by other factors that weren't evaluated, such as the presence of nasal obstruction, resulting in the need for future studies.

We found several limitations in our study that prevents us from making a population inference.

One is the small number of participants in a convenience sample. Another is the identification of health-related variables and diagnosis being self-reported which can potentially lead to over or underestimation (ex: otitis media, gastroenteritis, late language development, dental problems) and recall bias. Additionally, 26% of parents in our sample are health professionals, and 73.8% of mothers and 44% of fathers had higher education, which is a much higher proportion than in the general population.

We consider very important that parents are given information about the pros and cons of pacifier use so they can make an individualized and informed decision and be prepared to minimize possible problems related to pacifier use.

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Conflicts of interest

None.

Ethical disclosures

Protection of human and animal subjects. The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

Use of artificial intelligence for generating text. The authors declare that they have not used any type of generative artificial intelligence for the writing of this manuscript, nor for the creation of images, graphics, tables, or their corresponding captions.

References

1. Shotts LL, McDaniel DM, Neeley RA. The impact of prolonged pacifier use on speech articulation: a preliminary investigation. *Contemporary Issues in Communication Science and Disorders*. 2008;35:72-5.
2. Sexton S, Natale R. Risks and benefits of pacifiers. *Am Fam Physician*. 2009;79:681-5.
3. Callaghan A, Kendall G, Lock C, Mahony A, Payne J, Verrier L. Association between pacifier use and breast-feeding, sudden infant death syndrome, infection and dental malocclusion. *Int J Evid Based Healthc*. 2005;3:147-67.
4. Batista CL, Ribeiro VS, Nascimento MD, Rodrigues VP. Association between pacifier use and bottle-feeding and unfavorable behaviors during breastfeeding. *J Pediatr (Rio J)*. 2018;94:596-601.
5. Psaila K, Foster JP, Pulbrook N, Jeffery HE. Infant pacifiers for reduction in risk of sudden infant death syndrome. *Cochrane Database of Syst Rev*. 2017;4:CD011147.
6. Hauck FR, Thompson JM, Tanabe KO, Moon RY, Vennemann MM. Breastfeeding and reduced risk of sudden infant death syndrome: a meta-analysis. *Pediatrics*. 2011;128:103-10.
7. Joyner BL, Oden RP, Moon RY. Reasons for pacifier use and non-use in african-americans: does knowledge of reduced SIDS risk change parents' minds? *J Immigr Minor Health*. 2016;18:402-10.
8. Schmid KM, Kugler R, Nalabothu P, Bosch C, Verna C. The effect of pacifier sucking on orofacial structures: a systematic literature review. *Prog Orthod*. 2018;19:8.
9. Corrêa CC, Bueno MR, Lauris JR, Barretin-Felix G. Interference of conventional and orthodontic nipples in stomatognathic system: systematic review. *CoDAS*. 2016;28:182-9.
10. Dirección Nacional de Maternidad e Infancia, Ministerio de Salud. Recomendaciones sobre el uso del chupete para equipos de salud, padres y cuidadores. 2015.
11. Pacifiers (soothers): A user's guide for parents. *Paediatr Child Health*. 2003 Oct;8(8):520-30.
12. Lopes-Freire GM, Cárdenas AB, Suarez de Deza JE, Ustrell-Torrent JM, Oliveira LB, Boj Quesada JR Jr. Exploring the association between feeding habits, non-nutritive sucking habits, and malocclusions in the deciduous dentition. *Prog orthod*. 2015;16:43.
13. Jaafar SH, Ho JJ, Jahanfar S, Angolkar M. Effect of restricted pacifier use in breastfeeding term infants for increasing duration of breastfeeding. *Cochrane Database Syst Rev*. 2016(8):CD007202.
14. Strutt C, Khattab G, Willoughby J. Does the duration and frequency of dummy (pacifier) use affect the development of speech? *Int J Lang Commun Disord*. 2021;56(3):512-27.
15. Milanesi JM, Berwig LC, Markezan M, Schuch LH, Moraes AB, Silva AM, Corrêa EC. Variables associated with mouth breathing diagnosis in children based on a multidisciplinary assessment. *CoDAS*. 2018;30:e20170071.
16. Machado S, Céspedes M, Moreira J, Pacheco J, Rompante P, Torrent J. A sample of non-nutritive sucking habits (pacifier and digit) in Portuguese children and its relation with the molar classes of angle. *J Clin Exp Dent*. 2018;10:e1161-6.