

Original Article

Non-nutritive sucking habits among preschool children in southern Saudi Arabia: A cross-sectional study

Abdulaziz Al-Shahrani, Syed Mohammed Yaseen*, Rafi Ahmed Togoo, Alaa Al-Qarni, Haifa Al-Faifi, Sara Al-Asmari, Jamilah Mashiki

Department of Pediatric Dentistry and Orthodontic Sciences, College of Dentistry, King Khalid University, P.O. Box: 3263, Abha-61471, Kingdom of Saudi Arabia.

* Corresponding author: drsmyom@gmail.com

Submitted: 24/02/2017. Accepted: 27/09/2017. Published online: 27/09/2017.

Abstract Prolonged non-nutritive sucking habits have negative effects on child's orofacial structures, physical, social and psychological wellbeing. The objectives of the present study were (1) to determine the prevalence of non-nutritive sucking habit in Saudi preschool children, (2) to assess the factors influencing the habit, (3) to determine mothers' view on causes of non-nutritive sucking and their reasons to stop the habit and (4) to report methods used by the mothers in eliminating the habit. This cross-sectional observational study was conducted in the kindergartens in Abha and Khamis Mushayt cities. The sample included parents of 328 male and female preschool children. A pre-piloted self-administered questionnaire was used for data collection and the response rate was 85.4%. The prevalence of non-nutritive sucking habit was 46.6%; of these, pacifier sucking was 30.2% and digit sucking was 16.4%. There were significant differences with pacifier habit between mother's educational status and sex ($p=0.008$ and $p=0.002$ respectively). The odds of pacifier habit were higher in females [OR=2.14, 95% CI (1.32, 2.52)] and mothers with higher university education [OR=1.67, 95% CI (1.03, 2.72)]. There were significant differences with digit sucking habit and mothers' educational status ($p=0.022$). The odds of digit sucking habit was higher in mothers with intermediate and secondary education [OR=2.25, 95% CI (1.24, 4.07)]. Some mothers (37.90%) used non-nutritive sucking as solution to calm the crying child, while others (47.05%) wanted to stop the habit as it might affect the child's dentition. Some mothers (37%) interrupted the habit physically, while only 10% had preferred to consult the dentist.

Keywords: Non-nutritive sucking, digit sucking, finger sucking, pacifier sucking, preschool children.

Introduction

The sucking habits are nutritive when they satisfy nutritional needs and become non-nutritive when they only fulfill psychological needs (Larsson, 1985; Warren *et al.*, 2000). Nutritive sucking includes breastfeeding and bottle-feeding, while the non-nutritive sucking includes pacifier and digit sucking (Chen *et al.*, 2015). The prevalence of non-nutritive sucking habits among the Brazilian preschool-aged children has been reported to be from 40% to 76.1% (Fernandes *et al.*, 2015). Comparatively, the rate of pacifier sucking was 26.6% and finger sucking was 10.6% in the Iranian children (Jahanbin *et al.*, 2010) and the prevalence of both digit and dummy sucking habits has been reported to be 48.36% in Riyadh, Saudi Arabia (Farsi and Salama, 1997).

Non-nutritive sucking habit persisted for 36 months and beyond is considered prolonged non-nutritive sucking and can cause occlusal, physiological and esthetic changes (Maia-Nader *et al.*, 2014). There is convincing evidence of alterations in transverse dimensions, midline deviations occurring in deciduous dentition as result of prolonged non-nutritive sucking (Peres *et al.*, 2015; Nihi *et al.*, 2015; Lopes Freire *et al.*, 2016). Moreover, non-nutritive sucking particularly pacifier sucking is reported to increase the risk of gastrointestinal infections due to the colonization of pacifier surface by infectious microbes (da Silveira *et al.*, 2009).

Non-nutritive sucking habit has been reported to be influenced by various factors such as educational level of parents, child birth rank, cultural, and socio-economic factors (Vogel *et al.*, 2001;

Mauch *et al.*, 2012; Jahanbin *et al.*, 2010). Older maternal age, higher maternal education level and having no older siblings are reported to play a significant role in developing prolonged non-nutritive sucking in children (Warren *et al.*, 2000). Several studies reported a high prevalence of non-nutritive sucking in children of educated parents (Farsi and Salama, 1997; Adair 2003; Santos *et al.*, 2009).

Parents, especially mothers play vital roles in recognizing the deleterious effects of the habits. Though most of the parents observe the adverse effects, they often lack the knowledge and motivation to deal with the causes of this condition and fail to request assistance from the dentist (Al-Jobair and Al-Emran, 2004). It has been reported that treatment of the digit-sucking habit is often neglected because of the belief that elimination of digit sucking could lead to substitution of other habits (VanNorman, 1985).

Most of the studies had focused on etiology, adverse effects, and management of non-nutritive sucking habits, while not much attention has been paid to mothers' view on non-nutritive sucking habit, and their effort in breaking the habit. Mother is the person who spends most of her time in rearing child and her role is vital in eliminating an unhealthy habit. In a study in Riyadh, it was reported that no mother accepted the digit sucking habit beyond 4 years of age and often used noninvasive methods such as providing gifts as positive reinforcement, physically interrupting, restricting the use of pacifier to specific times in day and methods such as applying bitter substances on digit, wrapping the digit with adhesive tapes to stop the habit (Al-Jobair and Al-Emran, 2004; Al-Hussyeen, 2010).

Since there is no data for the present study population, the objectives of the study were to assess the prevalence of non-nutritive sucking habit in Saudi preschool children, factors influencing the non-nutritive sucking habit, mother's view on causes of non-nutritive sucking, reason to stop the habit and methods used by them to eliminate the habit in their children.

Materials and methods

Study design and population

This cross-sectional observational study was conducted to determine prevalence and factors influencing non-nutritive sucking habits among Saudi children aged 3 to 5 years old. The study was approved by the Research Committee at King Khalid University College of Dentistry (Ref No: 2016-17/84). A multi-stage cluster random sampling was used in selecting the sample. In the first stage, children within specified age range were selected through cluster random sampling from six kindergartens in Abha and Khamis Mushayt, two cities located in southwest Saudi Arabia. A list of kindergartens in both cities was obtained from the Saudi Ministry of Education. To achieve the calculated sample size, the six kindergartens were randomly selected. All children in the selected kindergartens were included in the study. In the second stage, the respective mothers of children were contacted to collect information on non-nutritive sucking habits related to causes, a reason to stop the habit and methods used to control the habit.

Pilot study and sample size determination

A pilot study was done on 35 children aged 3 to 6 years old who were not included in the main study. Results of this study were used to determine sample size to assess the prevalence of non-nutritive sucking habit among Saudi preschool children. Establishing at the prevalence rate of 50% and an absolute precision of 5% and confidence interval of 95%, the sample size for the present study was calculated to be 384. Thus, the estimated study subjects were 384 children and their respective mothers. Cluster random sampling technique was used in selecting the sample. The questionnaire was tested for validity and reliability during this pilot study and necessary corrections were made.

Data collection

Data collection of the present study was done by means of a pre-tested questionnaire which was handed out to

parents when they dropped the children in the kindergarten and return it on the next day. The self-administered Arabic questionnaire included details regarding child's age, sex, parents' education, child's prolonged sucking habits (digit/pacifier), the mother's view on how the habit could have been developed, the mother's reason to stop the habit and their effort in breaking the habit. Non-nutritive sucking habits were defined as prolonged when they persisted beyond 3 years of age or more. Question regarding child's prolonged sucking habit was age related and hence the mother was asked to answer only if the child had non-nutritive sucking habit beyond 3 years of age. All the questions were closed ended with only one choice to be selected. Each questionnaire had a covering letter requesting that the forms to be completed by the mother only. The returned questionnaire along with the signed consent form was collected and subjected to data analysis using statistical software package SPSS, version 19 for Windows (SPSS Inc., Chicago, IL). Chi-square test was used and a *p*-value of less than 0.05 was considered as statistically significant. Odds ratio (OR) was calculated manually.

Results

A total of 384 children were initially recruited as per the sample size calculations after which their respective mothers were contacted. One of the difficulties encountered in this research was due to non-response by the mothers. Despite several attempts in reminding the mothers about returning the questionnaire, non-response rate was found to be 14.6%. Since a response rate of 80% and more is standard for evaluation, the data was analyzed with 328 responses (Fincham, 2008). Completed questionnaires were returned by 328 participants (148 boys, 180 girls) with a response rate of 85.4%. Characteristics of the study group are presented in Table 1. From the total, 153 (46.6%) were reported as having prolonged sucking habit, with a prevalence rate of 26.8%, 38.6%, and 34.6% respectively for the age group 3, 4 and 5. With regards to sex, sucking habits were

more prevalent in girls (54.9%), but there was no statistically significant difference between boys and girls ($p>0.05$).

Among the non-nutritive sucking habit, pacifier sucking was found to be more prevalent (64.66%) than digit sucking (35.28%). The presence of pacifier habit among different age groups and father's educational status were found to have no statistically significant differences ($p>0.05$). However, there were significant differences with pacifier habit between mother's educational status and sex ($p=0.008$ and $p=0.002$ respectively). The odds of pacifier habit were higher in females than males [OR=2.14, 95% CI (1.32, 2.52)] and mothers with higher university education than lower education levels [OR=1.67, 95% CI (1.03, 2.72)] (Table 2).

The presence of digit sucking habit among different age groups, sex and father's educational status were found to have no statistically significant differences ($p>0.05$). However, there were significant differences with digit sucking habit between mother's educational status ($p=0.022$). The odds of digit sucking habit was higher in mothers with intermediate and secondary education than other education levels [OR=2.25, 95% CI (1.24, 4.07)] (Table 2).

Responses from mothers who have children with prolonged non-nutritive sucking habit were included to analyze their opinions on how the habit had developed, their reasons and methods adopted by them to stop the habit. Table 3 presents the mothers' opinions about reasons for having the non-nutritive sucking habits. Nearly 37.9% of the mothers reported using sucking habit as a solution to calm the crying child. While 26.79% of the mothers believed that leaving the children alone and they missing the parents could be the cause for developing non-nutritive sucking habit. Table 4 presents the mothers' reasons to stop the habit. Each mother was asked to give the most important reason why the habit must be stopped. Most of the mothers (47.05%) believed that non-nutritive sucking habits will affect the child's developing dentition, while 33.33% believed that the habit might continue as

the child grows older which could later be difficult to stop.

The different methods tried by mothers to stop the habit are summarized in Table 5. Of these, the most common were interrupting the habit physically (37.25%), followed by placing unpleasant flavored substances over the

digits (27.45%). Interestingly, 14% of the mothers reported that they spoke to the child in discouraging the habit and 11% reported positive reinforcement in means of reward to stop the habit. Only 10% of the mothers reported consulting the dentist and 3% consult the pediatrician to stop the habit.

Table 1 Distribution of children with non-nutritive sucking habits according to age, sex, parents' education level

Variables	Non-nutritive sucking habit		χ^2 statistics	p-value	Odds ratio (OR)	95%CI
	Yes	No				
Age in years						
3	41 (12.50%)	34 (10.36%)			1.52	0.90-2.55
4	59 (17.98%)	70 (21.35%)	2.74	0.254	0.94	0.60-1.47
5	53 (16.16%)	71 (21.65%)			0.77	0.49-1.22
Sex						
Male	62 (40.5%)	86 (49.1%)			0.71	0.45-1.09
Female	91 (59.5%)	89 (50.9%)	2.45	0.118	1.42	0.92-2.19
Mother's Education Level						
Elementary education	11 (7.2%)	38 (21.7%)			0.28	0.14-0.57
Intermediate & Secondary education	58 (37.9%)	48 (27.4%)	14.6	0.001	1.62	1.01-2.57
University graduate/postgraduate	84 (54.9%)	89 (50.9%)			1.17	0.76-1.82
Father's Education level						
Elementary education	29 (19.0%)	40 (22.9%)			0.78	0.46-1.35
Intermediate & Secondary education	54 (35.3%)	60 (34.3%)	0.770	0.681	1.04	0.66-1.65
University graduate/postgraduate	70 (45.8%)	75 (42.9%)			1.12	0.73-1.74

Table 2 Influence of age, sex and parents' education level on non-nutritive sucking habit

Variables	Pacifier habit						Digit sucking					
	Yes (n=99)	No (n=229)	χ^2 statistics	p-value	OR	95%CI	Yes (n=54)	No (n=274)	χ^2 statistics	p-value	OR	95%CI
Age in years												
3	24 (24.2%)	51 (22.3%)			1.16	0.64-1.95	17 (31.5%)	58 (21.2%)			1.71	0.89-3.26
4	39 (39.4%)	90 (39.3%)	0.196	0.907	1.01	0.62-1.63	20 (37.0%)	109 (39.8%)	2.87	0.238	0.89	0.48-1.63
5	36 (36.4%)	88 (38.4%)			0.91	0.56-1.49	17 (31.5%)	107 (39.1%)			0.71	0.38-1.34
Sex												
Male	32 (32.3%)	116 (50.7%)			0.46	0.28-0.76	21 (38.9%)	127 (46.4%)			0.74	0.41-1.34
Female	67 (67.7%)	113 (49.3%)	9.38	0.002	2.14	1.32-3.52	33 (61.1%)	147 (53.6%)	1.01	0.314	1.36	0.75-2.47
Mother's Education Level												
Elementary education	6 (6.1%)	43 (18.8%)			0.28	0.11-0.68	5 (9.3%)	44 (16.1%)			0.53	0.20-1.41
Intermediate & secondary education	32 (32.3%)	74 (32.3%)	53.7	0.008	1.01	0.60-1.66	26 (48.1%)	80 (29.2%)	7.67	0.022	2.25	1.24-4.07
University graduate/postgraduate	61 (61.6%)	112 (48.9%)			1.67	1.03-2.72	23 (42.6%)	150 (54.7%)			0.62	0.34-1.11
Father's Education level												
Elementary education	15 (15.2%)	54 (23.6%)			0.58	0.31-1.08	14 (25.9%)	55 (20.1%)			1.39	0.71-2.74
Intermediate & secondary education	38 (38.4%)	76 (33.2%)	3.03	0.219	1.25	0.77-2.04	16 (29.6%)	98 (35.8%)	1.22	0.542	0.76	0.40-1.43
University graduate/postgraduate	46 (46.5%)	99 (43.2%)			1.14	0.71-1.83	24 (44.4%)	121 (44.2%)			1.01	0.56-1.82

Table 3 Mothers' opinions about reasons for having the non-nutritive sucking habits

Reasons	Number	Percentage (%)
non-nutritive sucking as solution to calm the crying child	58	37.90%
Missing the parent when left alone	41	26.79%
Felt hungry	37	24.20%
Pacifier given all the time	17	11.11%

Table 4 Mothers' reasons in stopping the non-nutritive sucking habits

Reasons	Number	Percentage (%)
Will affect the child's dentition	72	47.05
Prevent the habit to continue when the child is older	51	33.33
Socially unacceptable	16	10.46
Could affect speech	9	5.89
Could affect the child's appetite	5	3.27

Table 5 Methods used by mothers to stop the non-nutritive sucking habits*

Methods	Number	Percentage (%)
Interrupt the habit physically	57	37.25
Put unpleasant flavored substances over the digits	42	27.45
Wrap the hand with tape/bandage	38	24.83
Talk to the child to discourage the habit	22	14.37
Positive reinforcement	17	11.11
Consult dentist	16	10.45
Consult pediatrician	4	2.61

*Few mothers selected more than one option

Discussion

The purpose of this cross-sectional study was to assess the prevalence, factors influencing non-nutritive sucking habits and mother's view on causes, a reason to stop the habit as well as methods attempted in stopping the habit. It has been reported that the effect of prolonged non-nutritive sucking habit is a common oral health problem and could affect the quality of life (Bönecker *et al.*, 2012; Dimberg *et al.*, 2015). In the present study, the prevalence is 46.6%, which is in agreement with other previous studies (Farsi and Salama, 1997; Al-Hussyeen and Baidas, 2009).

In the present study, 65% of the children had pacifier sucking habit and digit sucking was at 35%. Such findings were similarly reported by other studies (Farsi and Salama, 1997; Degan and Puppini-Rontani, 2004; Al-Hussyeen, 2010) but were contrarily reported by Köhler and Holst (1973) of which, the digit sucking was found to be more prevalent than the pacifier. The high prevalence of pacifier sucking could be attributable to cultural variations, maternal employment, early weaning practices, maternal age and level of education (Castilho and Rocha, 2009; Maia-Nader *et al.*, 2014).

In the present study, the prevalence of non-nutritive sucking among girls was 59.5% and 40.5% in boys. This difference in prevalence between boys and girls has been similar to previous studies (Farsi and Salama, 1997; Santos *et al.*, 2009). The probable reason for non-nutritive sucking to be more common in girls could be due to the fact that girls have more emotional problems (Leite-Cavalcanti *et al.*, 2007; Santos *et al.*, 2009).

Recognizing factors associated with persistent sucking habit could help the clinicians to intervene the habit. One such important factor is the parents' education. In the present study, chi-square test revealed there were differences with sucking habits and parents' education level ($p=0.008$ for pacifier sucking, $p=0.022$ for digit sucking habit) (Table 2). It was found that children of higher educated parents were often pacifier suckers. These results were in accordance with those reported by

previous studies (Farsi and Salama, 1997; Santos *et al.*, 2009). It is unclear why less educated parents were less likely than others to have children with a pacifier-sucking habit. However, it could be due to the greater time the educated mothers spent working outside the home (Jahanbin *et al.*, 2010).

Psychological and environmental factors such as emotional deprivation need for attention, early weaning, maternal employment, education and cultural variations have been found to be responsible for developing non-nutritive sucking habit. In a previous report, 78% of mothers had used pacifiers when the child was just 5 months old, in which 69% had introduced the pacifiers during the first week of life (Pansy *et al.*, 2008). In the present study, most mothers considered calming the crying child and leaving the child unaccompanied as the major reasons for children acquiring the non-nutritive sucking habits. These findings are in accordance with other previous studies that reported parents often preferred pacifiers to calm their children (Al-Hussyeen, 2010; Mauch *et al.*, 2012).

Prolonged non-nutritive sucking habits beyond the age of three could lead to increased overjet, reduced overbite, posterior cross bite, Class II malocclusion and development of tongue thrusting habit (Warren *et al.*, 2005). In the present study, the mothers' main reason (47%) in stopping the habit was due to its deleterious effect on developing dentition, as similarly reported by others (Al-Jobair and Al-Emran, 2004; Al-Hussyeen, 2010). The probable reason could be that the mothers might have noticed the harmful effects of sucking habit on the occlusion. It has been reported that pacifier sucking beyond 3 years of age increased the risk of midline deviation, open bite, posterior cross bite and myofunctional alterations in deciduous dentition (Peres *et al.*, 2015; Nihi *et al.*, 2015; Lopes Freire *et al.*, 2016). Digit sucking beyond 3 years of age increased the risk of malocclusion by 4.25 times resulting in anterior open bite and posterior crossbite in deciduous dentition (Lopes Freire *et al.*, 2016).

In the present study, 37% of mothers had interrupted the habit physically either by not providing the pacifier or by removing the digit/pacifier physically. These findings were similar to another previous study although the percentage was lesser (Al-Hussyeen, 2010). On the other hand, the use of the bitter substance on digit was also preferred (Al-Jobair and Al-Emran, 2004). The abrupt interruption of habits is not encouraged as they could lead to the development of other bad habits such as teeth scraping and compulsion for food (Santos and Valente, 2003). In the present study, only 11% of the mothers chose positive reinforcement as an essential method in eliminating the habit. It was shown that children could be helped to eliminate the sucking habit without coercion and with positive reinforcement (Degan *et al.*, 2001; Muzulan and Gonçalves, 2011). Thus, awareness strategy and positive reinforcement could become the initial steps to intervene the habit and needs to be addressed to the study population.

Only 10% of the mothers had consulted the dentist and most of these were mothers of 5 years old children. These results indicate that as the child's age increased, the mother's concern in getting doctor's consultation also increased. The probable reason could be that the mothers might have tried various methods enlisted in this study to stop the habit or might have noticed signs of malocclusion in the child. When such methods failed to produce any effective results, only then they consulted the dentist. This also indicates that though the majority of parents in our study were university graduates, they still lacked the awareness on non-nutritive sucking habit as well as early dental visit. Thus, it is the responsibility of all child health care providers to include non-nutritive sucking habit as mandatory part of their routine examination protocol and educate mothers on its causes, ill effects of such prolonged habit and methods to eliminate it. It is also important to counsel the expecting mothers on non-nutritive sucking habits.

In inferring the present study results, it is essential to concede the possible limitations of the study. As it was a cross-sectional study, there is a possibility of

respondent's bias. Moreover, the sample size was small and it could not be generalized to the entire population. Despite those limitations, our study results might have important implications in educating the mothers on non-nutritive sucking habit and the study could serve as an impetus for further research on this subject.

Conclusion

Within the limitations of the study, it could be concluded that pacifier sucking was more prevalent than digit sucking among Saudi preschool children, with pacifier sucking being more predominant among children of educated parents. Most mothers used non-nutritive sucking as a prime resort to calm the child while crying. However, when the habit persisted majority of mother's vital concern to stop the habit was its impact on developing dentition. Most mothers tried to interrupt the habit physically, while consulting the dentist was not practiced much in the study population.

Acknowledgement

Authors express their sincere gratitude to King Khalid University for their guidance and support to the research.

References

- Adair SM (2003). Pacifier use in children: a review of recent literature. *Pediatr Dent*, **25**(5): 449-458.
- Al-Hussyeen AJ (2010). Attitudes of Saudi mothers towards prolonged non-nutritive sucking habits in children. *Saudi Dent J*, **22**(2): 77-82.
- Al-Hussyeen AJ, Baidas L (2009). Prevalence of non-nutritive sucking habits among Saudi children and its effects on primary dentition. *Pakistan Oral Dent J*, **29**(1): 69-78.
- Al-Jobair A, Al-Emran SES (2004). Attitudes of Saudi Arabian mothers towards the digit-sucking habit in children. *Int J Paediatr Dent*, **14**(5): 347-354.
- Bönecker M, Abanto J, Tello G, Oliveira LB. (2012). Impact of dental caries on preschool children's quality of life: an update. *Braz Oral Res*, **26**(Suppl 1): 103-107.
- Castilho SD, Rocha MA (2009). Pacifier habit: history and multidisciplinary view. *J Pediatr (Rio J)*, **85**(6): 480-489.

- Chen X, Xia B, Ge L (2015). Effects of breast-feeding duration, bottle-feeding duration and non-nutritive sucking habits on the occlusal characteristics of primary dentition. *BMC Pediatr*, **15**:46.
- da Silveira LC, Charone S, Maia LC, Soares RM, Portela MB (2009). Biofilm formation by *Candida* species on silicone surfaces and latex pacifier nipples: an in vitro study. *J Clin Pediatr Dent*, **33**(3): 235-240.
- Degan VV, Boni RC, Almeida RC (2001). Idade adequada para remoção de chupeta e/ou mamadeira, na faixa etária de 4 a 6 anos. *J Orthop Orthod Pediatr Dent*, **3**: 5-16.
- Degan VV, Puppim-Rontani RM (2004). Prevalence of pacifier-sucking habits and successful methods to eliminate them: a preliminary study. *J Dent Child* (Chic), **71**(2): 148-151.
- Dimberg L, Arnrup K, Bondemark L (2015). The impact of malocclusion on the quality of life among children and adolescents: a systematic review of quantitative studies. *Eur J Orthod*, **37**(3): 238-247.
- Farsi NM, Salama FS (1997). Sucking habits in Saudi children: prevalence, contributing factors, and effects on the primary dentition. *Pediatr Dent*, **19**(1): 28-33.
- Fernandes IB, Pereira TS, de Carvalho MFF, Ramos-Jorge J, Marques LS, Ramos-Jorge ML (2015). Non-nutritive sucking habits after three years of age: a case-control study. *J Indian Soc Pedod Prev Dent*, **33**(1): 19-24.
- Fincham JE (2008). Response rates and responsiveness for surveys, standards and the *Journal*. *Am J Pharm Educ*, **72**(2): 43.
- Jahanbin A, Mokhber N, Jabbarimani A (2010). Association between sociodemographic factors and nutritive and non-nutritive sucking habits among Iranian girls. *East Mediterr Health J*, **16**(11): 1143-1147.
- Köhler L, Holst K (1973). Malocclusion and sucking habits of four-year-old children. *Acta Paediatr Scand*, **62**(4): 373-379.
- Larsson E (1985). The prevalence and aetiology of prolonged dummy and finger-sucking habits. *Eur J Orthod*, **7**(3): 172-176.
- Leite-Cavalcanti A, Medeiros-Bezerra PK, Moura C (2007). Breast-feeding, bottle feeding, sucking habits and malocclusion in Brazilian preschool children. *Rev Salud Pública*, **9**(2): 194-204.
- Lopes Freire GM, Espasa Suarez de Deza JE, Rodrigues da Silva IC, Butini Oliveira L, Ustrell Torrent JM, Boj Quesada JR (2016). Non-nutritive sucking habits and their effects on the occlusion in the deciduous dentition in children. *Eur J Paediatr Dent*, **17**(4): 301-306.
- Maia-Nader M, Silva de Araujo Figueiredo C, Pinheiro de Figueiredo F, Moura da Silva AA, Thomaz EB, Saraiva MC *et al.* (2014). Factors associated with prolonged non-nutritive sucking habits in two cohorts of Brazilian children. *BMC Public Health*, **14**:743.
- Mauch CE, Scott JA, Magarey AM, Daniels LA (2012). Predictors of and reasons for pacifier use in first-time mothers: an observational study. *BMC Pediatr*, **12**:7.
- Muzulan CF, Gonçalves MI (2011). Recreational strategies for the elimination of pacifier and finger sucking habits. *J Soc Bras Fonoaudiol*, **23**(1): 66-70.
- Nihi VSC, Maciel SM, Jarrus ME, Nihi FM, de Salles CLF, Pascotto RC *et al.* (2015). Pacifier-sucking duration and frequency on occlusion and myofunctional alterations in preschool children. *Braz Oral Res*, **29**(1): 1-7.
- Pansy J, Zotter H, Sauseng W, Schneuber S, Lang U, Kerbl R (2008). Pacifier use: what makes mothers change their mind? *Acta Paediatr*, **97**(7): 968-971.
- Peres KG, Peres MA, Thomson WM, Broadbent J, Hallal PC, Menezes AB (2015). Deciduous-dentition malocclusion predicts orthodontic treatment needs later: findings from a population-based birth cohort study. *Am J Orthod Dentofacial Orthop*, **147**(4): 492-498.
- Santos AC, Valente SV (2003). Prevalência de hábitos orais deletérios e má oclusão em um grupo de adolescentes. *Rev CEFAC*, **5**(3): 213-219.
- Santos SA, Holanda AL, Sena MF, Gondim LA, Ferreira MA (2009). Nonnutritive sucking habits among preschool-aged children. *J Pediatr* (Rio J), **85**(5): 408-414.
- VanNorman R (1985). Digit sucking: It is time for an attitude adjustment or a rationale for the early elimination of digit-sucking habits through positive behavior modification. *Int J Orofacial Myology*, **11**(2): 14-21.
- Vogel AM, Hutchison BL, Mitchell EA (2001). The impact of pacifier use on breastfeeding: a prospective cohort study. *J Paediatr Child Health*, **37**(1): 58-63.
- Warren JJ, Levy SM, Nowak AJ, Tang S (2000). Non-nutritive sucking behaviors in preschool children: a longitudinal study. *Pediatr Dent*, **22**(3): 187-191.
- Warren JJ, Slayton RL, Bishara SE, Levy SM, Yonezu T, Kanellis MJ (2005). Effects of nonnutritive sucking habits on occlusal characteristics in the mixed dentition. *Pediatr Dent*, **27**(6): 445-450.