

ORTHODONTIC PACIFIERS

Vijay Kumar Challagulla¹

1. Private Practitioner

ABSTRACT

Physicians are often asked for guidance about pacifier use in children, especially regarding the benefits and risks, and when to appropriately wean a child. The benefits of pacifier use include analgesic effects, shorter hospital stays for preterm infants, and a reduction in the risk of sudden infant death syndrome. Pacifiers have been studied and recommended for pain relief in newborns and infants undergoing common, minor procedures in the emergency department (e.g., heel sticks, immunizations, venipuncture). It is recommended that parents consider offering pacifiers to infants one month and older at the onset of sleep to reduce the risk of sudden infant death syndrome. Potential complications of pacifier use, particularly with prolonged use, include a negative effect on breastfeeding, dental malocclusion, and otitis media. Adverse dental effects can be evident after two years of age, but mainly after four years. It is recommended that mothers be educated about pacifier use in the immediate postpartum period to avoid difficulties with breastfeeding. Weaning children from pacifiers in the second six months of life to prevent otitis media. Pacifier use should not be actively discouraged and may be especially beneficial in the first six months of life.

Keywords: Orthodontic, Pacifiers

INTRODUCTION

Nonnutritive sucking is a natural reflex for a fetus and newborn, usually manifested by sucking the hands and fingers. The pacifier, also referred to as a “dummy,” has been used as a method for fulfilling this innate desire. Historically, pacifiers were viewed as beneficial until the early 1900s, when an anti-pacifier movement spread concerns that their use led to poor

hygiene and indulgent behavior. At present, there are mixed opinions as to whether pacifier use is beneficial, yet roughly 75 to 85 percent of children in Western countries use a pacifier. *Table 1* summarizes the risks, benefits, and recommendations for pacifier use at various ages:

<i>Clinical recommendation</i>	<i>Evidence rating</i>	<i>References</i>	<i>Comments</i>
Pacifiers may be used to help relieve pain from minor procedures.	B	4,12–19	Most studies are small randomized controlled trials.

<i>Clinical recommendation</i>	<i>Evidence rating</i>	<i>References</i>	<i>Comments</i>
Pacifiers may be offered at the onset of sleep to reduce the risk of sudden infant death syndrome.	B	6,22	Reference 22 is a meta-analysis of seven case-controlled studies.
Pacifier use may be associated with early breast weaning or may be a marker of breastfeeding difficulties; therefore, it should be avoided until breastfeeding is well established.	B	5,7,21,23–26	References 21 and 26 are randomized trials.
Although adverse dental effects may occur after 24 months of pacifier use, the effects are more significant after 48 months. Therefore, pacifier use should be discouraged after four years of age.	B	10,11,30–32	Reference 30 is a meta-analysis.
Pacifier use should be stopped or limited in the second six months of life to reduce the risk of otitis media.	B	3,8,9	Reference 3 is a randomized trial.

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series.

TABLE 1

Recommendations for Pacifier Use

<i>Age</i>	<i>Potential benefits</i>	<i>Potential complications</i>	<i>Recommendations</i>
Preterm infants	Analgesia Decreased hospital stay, earlier transition to bottle feeding from enteral feeding, improved bottle feeding performance	—	AAP recommends pacifier use in infants up to six months of age to help prevent pain from minor procedures in the emergency department. ⁴ AAP guideline on breastfeeding does not contradict pacifier use for oral training in preterm infants. ⁵
Up to six months	Analgesia Reduced SIDS risk	Early breast weaning	AAP recommends pacifier use in infants up to six months of age for pain relief from minor procedures in the emergency department. ⁴ AAP suggests offering pacifiers to infants at the onset of sleep to reduce the risk of SIDS. ⁶ AAP recommends avoiding pacifier use until breastfeeding is well established (usually by one month of age). ⁵ AAP recommends educating mothers about the effect of pacifier use on breastfeeding in the immediate postpartum period. ⁷

<i>Age</i>	<i>Potential benefits</i>	<i>Potential complications</i>	<i>Recommendations</i>
Six months to two years	—	Otitis media	AAFP/AAP joint guidelines recommend reducing or stopping pacifier use in the second six months of life to reduce the risk of otitis media. ⁸ ICSI recommends avoiding pacifier use after 10 months of age. ⁹
Two years and older	—	Dental malocclusion (misalignment of the teeth, such as open bite, crossbite, or overjet)	ADA and AAPD recommend actively discouraging pacifier use after four years of age. ^{10,11}

NOTE: *Pacifier colonization with microorganisms may occur with pacifier use at any age; however, a direct association between these organisms and infection has not been proven. AAFP = American Academy of Family Physicians; AAP = American Academy of Pediatrics; AAPD = American Academy of Pediatric Dentistry; ADA = American Dental Association; ICSI = Institute for Clinical Systems Improvement; SIDS = sudden infant death syndrome.*

Orthodontic pacifiers:

Pacifiers are "peacemaker" devices used to satisfy a baby's need for sucking. Other names for pacifiers include soothers and "Binkies". Pacifiers in one form or another have been used for centuries. Today's pacifiers come in different shapes and sizes. Some are almost a square orthodontic-shaped, and some are shaped like the nipple on a baby bottle. Consumer standards in most countries legislate that infant pacifiers are made from non-toxic materials.

TYPES:

Orthodontic Pacifiers vs. Rounded Pacifiers

Orthodontic pacifier nipples have a rounded top and a flat bottom, and were designed to prevent tooth troubles later in

baby's life.. Both types of pacifier nipples have been found to increase bite problems, like overbite, later in life, but limiting the amount of time baby spends with the pacifier and taking the pacifier away after baby's first year can minimize dentition damage.

Silicone or Latex Pacifiers?

Both silicone and latex pacifier nipples have advantages, and the choice usually comes down to baby's preference. Silicone is sturdy, doesn't retain odors, cleans up easily and is harder for baby to bite through. Silicone is not as soft on baby's mouth, though. Latex is soft in baby's mouth and baby may like the way it retains scents, but latex doesn't hold up as well to repeated cleanings and little teeth can quickly chew through it.

Must-Have Pacifier Features

A safe pacifier should be at least 1.5 inches across to prevent choking. Many babies develop rashes from the constant moisture under the pacifier shield, so look for pacifiers that have vent holes in the shield to let air get to baby's skin. Color

and style are up to you, but brightly colored pacifiers are easier to spot under vehicle seats and in diaper bags. Glow-in-the-dark pacifiers might be easier to find at bedtime. Be sure the pacifier can be boiled or put in the dishwasher for cleaning.



BENEFITS:

ANALGESIA

Pacifiers provide a calming effect and have been used for pain and anxiety prevention. A subgroup of the American Academy of Pediatrics (AAP) lists pacifiers as one of the key methods for pain relief in newborns and infants younger than six months undergoing minor procedures in the emergency department. A small amount of sucrose solution (2 mL) can be given within two minutes of a procedure, alone or in combination with a nipple or pacifier; the combination appears to be more effective. Several studies of full-term and preterm newborns showed that pacifiers were superior to various sweet solutions, whereas a study of very preterm newborns showed that pacifiers in combination with sweet solutions were no better than sweet solutions alone. A more recent study confirmed that pacifier use reduces crying time in infants undergoing venipuncture in the emergency department, especially in those younger than three months. Pacifiers have been studied or recommended by the AAP for use with the following procedures: catheterization, circumcision, heel sticks, immunizations, insertion of an intravenous line, lumbar puncture, screening for retinopathy of prematurity, and venipuncture.

PRETERM INFANTS

A Cochrane review found that nonnutritive sucking is associated with shorter hospital stays, earlier transition to bottle feeding from enteral feeding, and improved bottle feeding. Although the review did not show that pacifiers have a significant impact on weight gain, behavior, energy intake, heart rate, oxygen saturation, intestinal transit time, or age at full oral feeds, none of the studies reported harmful effects from pacifier use. Overall, pacifier use appears to be a reasonable and inexpensive option for preterm infants.

SUDDEN INFANT DEATH SYNDROME

AAP guidelines suggest offering pacifiers to infants at the onset of sleep to reduce the risk of sudden infant death syndrome (SIDS). The guidelines recommend not introducing pacifiers to breastfeeding infants until one month of age because later onset of pacifier use appears to have fewer negative effects on breastfeeding. Pacifiers should not be forced on the infant or reinserted during sleep if the infant spits it out. The exact mechanism of benefit for reducing rates of SIDS is not fully understood, but pacifier use may decrease the likelihood of rolling into the prone position, increase arousal, maintain airway patency, decrease gastroesophageal reflux and resultant sleep apnea, or increase respiratory drive with carbon dioxide retention. A meta-analysis

of seven case-control studies demonstrated a strong association between pacifier use and a reduction in the risk of SIDS, estimating a number needed to treat of 2,733.

1. Pacifiers can be need for non-nutritive sucking

Sucking is a normal infant reflex. For many infants the urge to suck seems to be more than what's needed for nourishment. Many infants want to suck when they are tired, bored or in need of comfort. If an infant wants to suck beyond what nursing or bottle feeding provides, a pacifier may satisfy that need.

2. Pacifiers may help infant sleep

Many infants enjoy sucking as they drift off to sleep. Sucking is a self-comforting behavior. The pleasurable stimulation of sucking on a pacifier, fingers or hand helps infants to cope better with the many distractions of a big and confusing world.

3. A pacifier may reduce the risk of overfeeding for bottle fed infants

The urge to suck for comfort is often mistaken as a sign of hunger for both bottle fed and breastfed infants. This misunderstanding is not of concern for a breastfed infants as they can control the flow of milk while breastfeeding. However, young infants cannot control the flow of milk from a bottle in the same way, so the risk of overfeeding is greater

when an infant is fed from a bottle. Reducing the risk of overfeeding in a bottle fed infant is where a pacifier can fill an important need.

4. Its easier to stop using a pacifier than it is to stop thumb sucking

Many parents worry about thumb sucking becoming a habit that may be difficult to break in the future, and may opt for a pacifier in preference. One advantage a pacifier has over thumb sucking is a parent can control the use of a pacifier.

5. Pacifiers may reduce the risk of Sudden Infant Death Syndrome (SIDS)

There are a number of studies which have identified a substantially lower incidence of SIDS in infants who use pacifiers compared to those who do not.

6. Pacifiers can provide comfort during medical procedures

The comfort from sucking on a pacifier provide security and comfort can reduce the amount of stress a baby experiences. Studies have shown clear benefits are seen with pacifier use during painful medical procedures. The use of a pacifier is a simple, noninvasive and effective addition in pain management.

Problems associated with pacifier use

Complications

BREASTFEEDING

Observational studies and a randomized controlled trial (RCT) showing that pacifier use is associated with early breast

weaning have led to concerns. However, an RCT that studied the effect of pacifier use on breast-feeding in 281 mother-infant pairs for three months postpartum had a different conclusion. Although an observational association was noted between pacifier use and early weaning, when the data were analyzed further, the intervention (advice to avoid pacifier use) did not significantly reduce weaning at three months. The authors concluded that pacifier use may be a marker of breast-feeding difficulties, but does not appear to be the cause of early weaning. The intervention group used pacifiers less often, but had no significant difference in crying or fussing, suggesting that other soothing methods are as effective as pacifier use. A more recent RCT on preterm infants did not demonstrate a significant effect of pacifier use on early weaning.

Because there is conflicting evidence about whether early use of a pacifier disrupts breastfeeding or merely indicates other breastfeeding difficulties, guidelines are cautionary. Educating mothers about the risks of pacifier use in the immediate postpartum period. The AAP recommends postponing pacifier use until breastfeeding habits are well established; this recommendation does not contradict use in preterm infants for oral training.

DENTAL HEALTH

A systematic review found inconsistent results regarding the effect of pacifier use on early childhood caries, suggesting that there is no proven correlation. A meta-analysis concluded that pacifier use after three years of age is associated with a higher incidence of malocclusion. In one study, the prevalence of malocclusion was roughly 71 percent in children who used a pacifier or sucked a digit for more than 48 months, compared with 32 percent in those who ceased sucking between 36 and 48 months, and 14 percent in those who ceased sucking before 24 months. The most significant malocclusions occurred in children who continued sucking habits beyond 48 months, but there were notable changes in children who continued beyond 24 months. A more recent study confirms these negative dental effects with pacifier use after two years of age.

INFECTION

Several studies have shown that pacifiers are often colonized with *Candida* and bacterial organisms (typically nonpathogenic). One study found 21 of 40 pacifiers to have a positive culture finding, with none containing the common pathogens of otitis media. Latex pacifiers are more significantly colonized with *Candida* and *Staphylococcus* than silicone pacifiers.

The 36 percent of infants who used a pacifier had a higher incidence of earache

and colic compared with the 40 percent of infants who did not suck and the 21 percent of infants who sucked fingers. The 2.7 percent of infants who sucked both a pacifier and fingers had more wheezing and earaches and poorer health in the month before the study. One explanation for the association between pacifier use and illness may be that pacifiers were used to calm sick infants. A direct link between illness and type of sucking habit could not be determined from this study; more research is needed before recommendations can be made.

A systematic review of epidemiologic studies found three studies that showed an association between pacifier use and infection, such as otitis media, dental infection, and respiratory and gastrointestinal symptoms. These studies are also too limited to draw conclusions. Although some evidence exists for pacifier colonization with microorganisms, the direct association between these organisms and infection has not been proven.

OTITIS MEDIA

There are two proposed mechanisms for how pacifier use could cause otitis media: reflux of nasopharyngeal secretions into the middle ear from sucking, and eustachian tube dysfunction from altered dental structure. A meta-analysis, including 22 studies from various countries, showed that pacifier use

increased the risk of developing otitis media, with a risk ratio (RR) of 1.24. Infants in day care outside the home had an RR of 2.45, those in family day care had an RR of 1.59, and those with a parent who smoked had an RR of 1.66. Breastfeeding reduced the risk of otitis media, with an RR of 0.87.

One widely cited, open, controlled cohort study of more than 400 patients evaluated the incidence of otitis media in infants whose parents were counseled to restrict pacifier use to when the infant was falling asleep. This counseling reduced continuous pacifier use by 21 percent and led to 29 percent fewer episodes of otitis media in the intervention group. A more recent prospective cohort study from the Netherlands found that 35 percent of 216 children using pacifiers and 32 percent of 260 children in the control group developed at least one episode of otitis media. However, rates of recurrent otitis media were higher in the pacifier group (16 versus 11 percent), leading the authors to conclude that pacifier use may increase the risk of recurrent otitis media.

1. For some infants pacifiers may interfere with growth

Sucking requires energy. Small, ill or jaundiced infants can tire easily. Overuse of a pacifier may result in poor feeding and poor weight gains in frail babies.

Babies of easy going temperaments may also not gain as effectively if feeding is frequently delayed by the use of a pacifier.

2. Pacifiers increase the risk of ear infections

Pacifier use appears to be a risk factor in the development of middle ear infection (otitis media). Authors speculate that the continuous sucking on a pacifier might alter the pressure within the middle ear chamber where ear infections can form. The results suggest that between the ages of 6 and 10 months, restricting pacifier use to the moments of falling asleep would reduce the risk of middle ear infections.

3. Overuse of pacifiers may lead to delayed speech

Frequent use of pacifiers can create little "addicts" who are rarely seen without a pacifier in their mouth. The use of pacifiers after 12 months of has been show to interfere with normal babbling and speech development because it's hard to talk with a pacifier in your mouth!

4. A pacifier can become a sleep association

Some babies regularly use a pacifier to fall asleep. This can then become a **sleep association**, meaning it is what a baby associates with falling asleep. In the deep part of sleep the pacifier will fall out of the mouth. As waking between **sleep cycles** a natural occurrence, the infant will want the pacifier returned so that it can go back to

sleep. Infant will either find it for herself/himself if she/he's old enough (somewhere around the age of 12 to 18 months).This is one area where thumb sucking has an advantage over pacifiers. Thumbs are easy for babies to find!

5. Prolonged or inappropriate use of a pacifier may lead to dental problems

Use of pacifiers or thumb sucking beyond the age of 5 years can affect the shape of infant 's oral cavity and dentition , leading to protruding teeth. Pacifiers which are frequently dipped in sweet substances such as sugar, corn syrup, glucose or honey can lead to an increase in caries

Do's and Don'ts of pacifier use

Do

- Do sterilize the pacifier by boiling it in water for 5 minutes before the first use.
- Do have identical back up pacifiers available. Pacifiers have a way of getting lost or falling on the floor or street when you need them most.
- Do clean infant's pacifier frequently by washing with hot soapy water, rinsing in clear water and allowing it to air dry
- Do rinse your infant's pacifier after it drops on the floor, to decrease the exposure to germs.
- Do discontinue pacifier use well before the age of 5 years, as it may

cause problems for her teeth after that time.

Don't

- Don't let the infant crawl or walk around with a pacifier all day long; this may interfere with speech developments and increase the risk of middle ear infections.
- Don't dip infant's pacifier into sweet substances as this may lead to caries.

Safety tips when using pacifiers

- Pacifiers come in a number of different sizes for different age groups.
- A one-piece model that has a soft nipple (some models can break into two pieces) would be better..
- The shield should be at least 1 1/4 inches across, so that the infant cannot put the entire pacifier into the mouth. Also the shield should be made of firm plastic with air holes.
- Do not tie the infant's pacifier with ribbon or string longer than 6 inches as it may become entangled around infant's neck and can cause strangulation and death.
- Check the pacifier regularly for signs of damage. Small pieces can break off causing a choking risk. Replace the infant's pacifier every

few months rather than wait for it to breakdown.

Approach to the Patient

- In addition to reviewing the risks and benefits of pacifiers, physicians should also counsel parents about the safe use of pacifiers. Parents or caregivers should not put sweet substances on pacifiers to entice the infant. Pacifiers should be cleaned and replaced regularly to maintain good hygiene and avoid mechanical hazards. Pacifier use should no longer be actively discouraged and may be especially beneficial in the first six months of life. However, the risks begin to outweigh the benefits around six to 10 months of age and appear to increase after two years of age. Because research suggests that limiting pacifier use does not significantly affect crying or fussing, physicians should be prepared to counsel parents about soothing alternatives and pacifier weaning. Physicians should be mindful that after six months of age, pacifiers transform from a means of nonnutritive sucking to objects of affection that give the child a sense of security. Removing the pacifier can be a great source of anxiety for children and parents.

Key alternatives to pacifier use in younger infants include swaddling, rocking, soft music, singing, and infant massage. Older infants or toddlers may be distracted from pacifiers with activities, toys, or other objects of affection. Some

weaning methods that have been studied include physician or parent encouragement, putting unpalatable substances on the pacifier, and stopping the habit abruptly.

REFERENCES:

1. Levin S. Dummies. *S Afr Med J*. 1971;45(9):237–240.
2. Gale CR, Martyn CN. Dummies and the health of Hertfordshire infants, 1911–1930. *Soc Hist Med*. 1995;8(2):231–255.
3. Niemelä M, Pihakari O, Pokka T, Uhari M. Pacifier as a risk factor for acute otitis media: a randomized, controlled trial of parental counseling. *Pediatrics*. 2000;106(3):483–488.
4. Zempsky WT, Cravero JP, for the American Academy of Pediatrics. Relief of pain and anxiety in pediatric patients in emergency medical systems. *Pediatrics*. 2004;114(5):1348–1356.
5. Gartner LM, Morton J, Lawrence RA, et al., for the American Academy of Pediatrics Section on Breastfeeding. Breastfeeding and the use of human milk. *Pediatrics*. 2005;115(2):496–506.
6. American Academy of Pediatrics. The changing concept of sudden infant death syndrome. *Pediatrics*. 2005;116(5):1245–1255.
7. American Academy of Family Physicians. Breastfeeding (position paper).<http://www.aafp.org/online/en/home/policy/policies/b/breastfeedingpositionpaper.html>. Accessed March 14, 2008.
8. American Academy of Pediatrics. Diagnosis and management of acute otitis media. *Pediatrics*. 2004;113(5):1451–1465.
9. ICSI. Diagnosis and treatment of otitis media in children.http://www.icsi.org/otitis_media/diagnosis_and_treatment_of_otitis_media_in_children_2304.html. Accessed November 6, 2008.
10. For the dental patient. Thumb sucking and pacifier use. *J Am Dent Assoc*. 2007;138(8):1176.
11. American Academy of Pediatric Dentistry. AAPD fast facts. 2007<http://www.aapd.org/media/FastFacts07.pdf>. Accessed October 20, 2008.
12. Greenberg CS. A sugar-coated pacifier reduces procedural pain in newborns. *Pediatr Nurs*. 2002;28(3):271–277.
13. Kaufman GE, Cimo S, Miller LW, Blass EM. An evaluation of the effects of sucrose on neonatal pain with 2 commonly used circumcision methods. *Am J Obstet Gynecol*. 2002;186(3):564–568.
14. Carbajal R, Chauvet X, Couderc S, Olivier-Martin M. Randomised trial of analgesic effects of sucrose, glucose, and pacifiers in term

- neonates. *BMJ*. 1999;319(7222):1393–1397.
15. Boyle EM, Freer Y, Khan-Orakzai Z, et al. Sucrose and non-nutritive sucking for the relief of pain in screening for retinopathy of prematurity. *Arch Dis Child Fetal Neonatal Ed*. 2006;91(3):F166–F168.
 16. Mathai S, Natrajan N, Rajalakshmi NR. A comparative study of non-pharmacological methods to reduce pain in neonates. *Indian Pediatr*. 2006;43(12):1070–1075.
 17. Carbajal R, Lenclen R, Gajdos V, Jugie M, Paupe A. Crossover trial of analgesic efficacy of glucose and pacifier in very preterm neonates during subcutaneous injections. *Pediatrics*. 2002;110(2 pt 1):389–393.
 18. Curtis SJ, Jou H, Ali S, Vandermeer B, Klassen T. A randomized controlled trial of sucrose and/or pacifier as analgesia for infants receiving venipuncture in a pediatric emergency department. *BMC Pediatr*. 2007;7:27.
 19. Reis EC, Roth EK, Syphan JL, Tarvell SE, Holubkov R. Effective pain reduction for multiple immunization injections in young infants. *Arch Pediatr Adolesc Med*. 2003;157(11):1115–20.
 20. Pinelli J, Symington A. Non-nutritive sucking for promoting physiologic stability and nutrition in preterm infants. *Cochrane Database Syst Rev*. 2005;(4):CD001071.
 21. Howard CR, Howard FM, Lanphear B, et al. Randomized clinical trial of pacifier use and bottle-feeding or cupfeeding and their effect on breastfeeding. *Pediatrics*. 2003;111(3):511–518.
 22. Hauck FR, Omojokun OO, Siadaty MS. Do pacifiers reduce the risk of sudden infant death syndrome? *Pediatrics*. 2005;116(5):e716–e723.
 23. Vogel AM, Hutchison BL, Mitchell EA. The impact of pacifier use on breastfeeding: a prospective cohort study. *J Paediatr Child Health*. 2001;37(1):58–63.
 24. Aarts C, Hörnell A, Kylberg E, Hofvander Y, Gebre-Medhin M. Breast-feeding patterns in relation to thumb sucking and pacifier use. *Pediatrics*. 1999;104(4):e50.
 25. Howard CR, Howard FM, Lanphear B, deBlieck EA, Eberly S, Lawrence RA. The effects of early pacifier use on breastfeeding duration. *Pediatrics*. 1999;103(3):E33.
 26. Kramer MS, Barr RG, Dagenais S, et al. Pacifier use, early weaning, and cry/fuss behavior: a randomized controlled trial. *JAMA*. 2001;286(3):322–326.
 27. Collins CT, Ryan P, Crowther CA, McPhee AJ, Paterson S, Hiller JE. Effect of bottles, cups, and dummies on breast feeding in preterm infants: a randomised controlled trial. *BMJ*. 2004;329(7459):193–198.
 28. Ponti M, Leduc D. Canadian Paediatric Society statement. Recommendations for the use of pacifiers. *Paediatrics & Child Health*. 2003;8(8):515–519.
 29. Peressini S. Pacifier use and early childhood caries: an evidence-based study of the literature. *J Can Dent Assoc*. 2003;69(1):16–19.
 30. Poyak J. Effects of pacifiers on early oral development. *Int J Orthod Milwaukee*. 2006;17(4):13–16.

31. Warren JJ, Bishara SE, Steinbock KL, Yonezu T, Nowak AJ. Effects of oral habits' duration on dental characteristics in the primary dentition. *J Am Dent Assoc.* 2001;132(12):1685–1693.
32. Góis EG, Ribeiro-Júnior HC, Vale MP, et al. Influence of nonnutritive sucking habits, breathing pattern and adenoid size on the development of malocclusion. *Angle Orthod.* 2008;78(4):647–654.
33. Adair SM, Milano M, Dushku JC. Evaluation of the effects of orthodontic pacifiers on the primary dentitions of 24- to 59-month-old children: preliminary study. *Pediatr Dent.* 1992;14(1):13–18.
34. Zardetto CG, Rodrigues CR, Stefani FM. Effects of different pacifiers on the primary dentition and oral myofunctional structures of preschool children. *Pediatr Dent.* 2002;24(6):552–560.
35. Ollila P, Niemelä M, Uhari M, Larmas M. Risk factors for colonization of salivary Lactobacilli and Candida in children. *Acta Odontol Scand.* 1997;55(1):9–13.
36. Sio JO, Minwalla FK, George RH, Booth IW. Oral Candida: is dummy carriage the culprit? *Arch Dis Child.* 1987;62(4):406–408.
37. Mattos-Graner RO, de Moraes AB, Rontani RM, Birman EG. Relation of oral yeast infection in Brazilian infants and use of a pacifier *ASDC J Dent Child.* 2001;68(1):33–3610.
38. Brook I, Gober AE. Bacterial colonization of pacifiers of infants with acute otitis media. *J Laryngol Otol.* 1997;111(7):614–615.
39. Comina E, Marion K, Renaud FN, Dore J, Bergeron E, Freney J. Pacifiers: a microbial reservoir. *Nurs Health Sci.* 2006;8(4):216–223.
40. North Stone K, Fleming P, Golding J. Socio-demographic associations with digit and pacifier sucking at 15 months of age and possible associations with infant infection. *Early Hum Dev.* 2000;60(2):137–148.
41. Joanna Briggs Institute. Early childhood pacifier use in relation to breastfeeding, SIDS, infection and dental malocclusion. *Nurs Stand.* 2006;20(38):52–55.
42. Rovers MM, Numans ME, Langenbach E, Grobbee DE, Verheij TJ, Schilder AG. Is pacifier use a risk factor for acute otitis media? A dynamic cohort study. *Fam Pract.* 2008;25(4):233–236.
43. Uhari M, Mäntysaari K, Niemelä M. A meta-analytic review of the risk factors for acute otitis media. *Clin Infect Dis.* 1996;22(6):1079–1083.
44. Schwartz RH, Guthrie KL. Infant pacifiers: an overview. *Clin Pediatr (Phila).* 2008;47(4):327–331.
45. Neville HL, Huaco J, Vigoda M, Sola JE. Pacifier-induced bowel obstruction—not so soothing. *J Pediatr Surg.* 2008;43(2):e13–e15.
46. Pacifiers and breastfeeding. *JAMA.* 2001;286(3):374.
47. Degan VV, Puppini-Rontani RM. Prevalence of pacifier-sucking habits and successful methods to eliminate them. *J Dent Child (Chic).* 2004;71(2):148–151.