



POSITION PAPER

Dummy (pacifier) use and sudden infant death syndrome: Potential advantages and disadvantages

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Abstract: The large decline in deaths due to the sudden infant death syndrome (SIDS) in the last 20 years in many countries is largely due to risk-reduction advice resulting from observational studies that examined the relationship between infant care practices and SIDS. Most of this advice remains largely uncontroversial and educators and researchers in this field are in agreement as to the specific recommendations that should be given to parents and health professionals. However, advice surrounding the apparent protective effect of dummies (also known as pacifiers) has been controversial. Several systematic reviews have demonstrated a strong association between the lack of a pacifier being used by the infant for the final sleep and SIDS, but it is not clear how pacifiers confer protection or if this is a marker for something as yet unmeasured. The Epidemiology and Physiology Working Groups of the International Society for the Study and Prevention of Perinatal and Infant Death (ISPID) are comprised of leading SIDS researchers with an objective to provide evidence-based position statements surrounding the factors associated with SIDS (<http://www.ispid.org/>) and risk-reduction strategies. The evidence, discussion and conclusions from these working groups regarding dummies (pacifiers) are described below to help inform this debate and describe the future evidence required so that we might find a common recommendation about dummies (pacifiers) and SIDS.

Key words: general paediatrics; infant sleep; risk reduction; sudden infant death syndrome.

Background

Non-nutritive sucking is a normal reflex in both the fetus and newborn infant. The dummy (pacifier) has been used to fulfil this innate desire for over 2000 years.¹ Dummies (pacifiers) have been used to soothe or calm infants, and to relieve pain in newborns and infants under 6 months of age undergoing minor procedures in the emergency department.² A recent study has shown that sucking on a dummy (pacifier) reduced crying in young infants undergoing venipuncture.³ It is estimated that about 75% of children in Western countries are offered a dummy (pacifier) at some time.⁴

It was first postulated in 1979 that dummy or pacifier use might decrease the risk for sudden infant death syndrome (SIDS)⁵ at a time when it was thought that SIDS may be due to sleep apnoea. Although this relationship between SIDS and sleep apnoea is no longer thought plausible, there is strong and consistent evidence that fewer SIDS infants use a dummy (pacifier) than age-matched control infants for the final sleep. Some

countries advocate dummy (pacifier) use as a risk-reduction strategy for SIDS while others are more ambivalent requiring further evidence of how this device confers protection. In addition, there has been some concern about potential disadvantages of dummy (pacifier) use, including a possible detrimental effect on breastfeeding.

The Evidence

The New Zealand Cot Death Study⁶ was the first to report an association between dummy (pacifier) use and lower risk for SIDS. In following years several more case-control studies examined the association between SIDS and dummy (pacifier) use.⁷⁻¹³ A meta-analysis of seven case control studies reported a 61% reduction in SIDS among dummy (pacifier) users compared with a control group in the last sleep¹⁴ based on multivariate odds ratios (OR = 0.39, 95% CI: 0.31–0.50), and the authors concluded that dummies (pacifiers) should be recommended as a potential risk-reduction strategy.

Another meta-analysis published the following year using essentially the same studies found a 52% reduction in SIDS among dummy (pacifier) users, based on univariate odds ratios.¹⁵ However, these authors were more ambivalent in their conclusion, suggesting such a recommendation was open to debate and questioning the impact of dummy (pacifier) use on breastfeeding and highlighting the lack of understanding of a

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causal mechanism.¹⁵ Subsequent studies have also found a reduced risk for SIDS among dummy (pacifier) users^{16,17} and one suggested an even greater risk reduction of 90% for infants using dummies (pacifiers).¹⁷

However, some authors have challenged these claims, citing that the assumption of a direct causal relationship between the lack of dummy (pacifier) use and SIDS has not been substantiated.¹⁸ Additional analysis of the German case control study of 333 SIDS infants and 998 matched controls also found that using a dummy (pacifier) for the last sleep was protective for SIDS (aOR = 0.49, 95% CI 0.32–0.76).¹⁹ However, a smaller English case control study (based on 70 cases and 87 controls) published in the same year did not identify a significant protective effect of dummies (pacifiers).²⁰

Most recently further analysis of the Chicago study that was conducted between 1993 and 1996 suggested dummy (pacifier) use decreased SIDS risk more when mothers were ≥ 20 years of age, married, non-smokers, had adequate prenatal care, and if the infant was ever breastfed.²¹ Dummy (pacifier) use also decreased the risk of SIDS more when the infant was sleeping in the prone/side position, bed-sharing, and when soft bedding was present. The association between adverse environmental factors and SIDS risk was modified favourably by dummy (pacifier) use, but the interactions between dummy (pacifier) use and these factors were not significant. The study concluded that dummy (pacifier) use may provide an additional strategy to reduce the risk of SIDS for infants at high risk or in adverse sleep environments.²¹

An Irish study reported that infants are at increased risk for SIDS if they habitually used a dummy (pacifier) but did not use it for the last sleep, and a British study reported a similar finding, but in multivariate analysis the association did not reach statistical significance.^{7,11} These findings imply one of two or more possibilities, that dummies (pacifiers) have to be used consistently for all sleep periods, or that the absence of a dummy (pacifier) is a marker for an unmeasured disruption in routine.

There are also data regarding dummy (pacifier) use and SIDS rates in various countries. For instance, although prone positioning was advised for Swedish infants in the 1980s, the rate of SIDS in Sweden was low compared with other Nordic countries;^{22,23} the high (70%) prevalence of dummy (pacifier)²⁴ use may have been a contributing factor. In contrast, the UK has seen a halving in the use of dummies (pacifiers) over the last 10 years from 51%⁷ to 21%; during the same period the incidence of SIDS has also declined by 50%.²⁰ This suggests that the decreased SIDS incidence in the past 10 years cannot be attributed to dummy (pacifier) use.

It is recognised that case-control studies are the best available research methodology to study the association between dummy (pacifier) use and SIDS. It is generally accepted that, in order to infer causality, there are several criteria that must be met, including a strong and consistent association, and a biologically plausible mechanism by which this protective effect is exerted. While some would consider the association between dummy (pacifier) use and decreased risk of SIDS to be relatively strong and consistent, demonstrated in multiple studies in varied settings, it is acknowledged that some studies have not shown a protective effect. Furthermore, there is concern that a biologically plausible mechanism does not account for the fact that the

dummy (pacifier) frequently falls out of the infant's mouth soon after falling asleep, nor has a biological gradient (i.e. dummies (pacifiers) have not been found to be used for a longer period during sleep among the controls compared with the SIDS cases²⁵) been established.

Postulated Causal Mechanisms

Currently the mechanisms whereby dummies (pacifiers) provide protection are unclear. A study in one infant with micrognathia (small jaw) has provided evidence that airway size is increased when sucking on a dummy (pacifier).²⁶ One major limiting factor for this mechanism being involved which needs to be addressed is that it has been reported that infants lose their dummy (pacifier) soon after falling asleep.²⁷

Two further mechanisms have been proposed as to why a dummy (pacifier) may be protective against SIDS. Firstly, protection may be related to effects on autonomic control and secondly dummies (pacifiers) may also alter arousability from sleep, potentially increasing arousability. There is only one study investigating the effects of dummies (pacifiers) on cardiovascular control and this study suggested that sucking on a dummy (pacifier) may in some way alter cardiovascular control, with sucking periods being associated with increased sympathetic activation, while during non-sucking periods infants who used a dummy (pacifier) had decreased sympathetic activation and increased parasympathetic activation of heart rate compared to infants who had never used a dummy (pacifier).²⁸ The authors suggested that sucking on a dummy (pacifier) may contribute to the resetting of cardiac autonomic tone, thereby improving behavioural responses to environmental stresses, and thus improving survival.

There is contradictory evidence for the effects of dummies (pacifiers) on infant arousability, with one study reporting that infants were more arousable in active sleep (tests were not carried out in quiet sleep, a sleep state of inherent reduced arousability) when they used a dummy (pacifier),²⁷ however a more recent study which examined both sleep states has shown no effects on arousability of dummy (pacifier) use.²⁹ It is possible that the more arousable babies are given a dummy (pacifier) more frequently, and these babies may be innately protected as they have reduced arousal from sleep thresholds.

Potential Disadvantages

There are a number of concerns regarding other health issues with the use of dummies (pacifiers) that need to be considered. The primary concern is that dummies (pacifiers) may be associated with a decreased frequency and duration of breastfeeding. However, the studies that have investigated this have produced conflicting findings. Some studies have showed reduced exclusive and overall breastfeeding rates.^{30,31} In contrast, a recent Cochrane review of two randomised and quasi-randomised controlled trials comparing dummy (pacifier) use versus no dummy (pacifier) use in 1302 healthy full-term newborns who had initiated breastfeeding found no significant effects of dummy (pacifier) use.³² The study found no differences in the proportion of infants exclusively breastfed at 3 months (risk ratio (RR) 1.00; 95% confidence interval (CI) 0.95 to 1.06) and at 4 months of age (RR 0.99; 95% CI 0.92 to 1.06).

Also, there was no effect on the proportion of infants partially breastfed at 3 months (RR 1.00; 95% CI 0.97 to 1.02) and at 4 months of age (RR 1.01; 95% CI 0.98 to 1.03). However, this review was limited to healthy infants where breastfeeding was already established and concludes that 'evidence to assess the short-term breastfeeding difficulties faced by mothers and long-term effect of pacifiers on infants' health is lacking'.

A systematic review examining the association between dummies (pacifiers) and breastfeeding included 29 studies: 4 randomised controlled trials (RCTs), 20 cohort studies and 5 cross-sectional studies.³³ None of the RCTs found a significant difference in breastfeeding outcomes with the dummy/pacifier-related intervention. Seventeen of the observational studies reported an odds ratio, hazard ratio or relative risk of shortened duration or exclusivity of breastfeeding with dummy (pacifier) use, while some of the eight remaining studies found trends (statistically not significant) in the same direction. RCTs are generally considered as providing stronger evidence than observational studies, as the latter cannot prove the direction of causality, i.e. does dummy (pacifier) use lead to decreased breastfeeding or does decrease in breastfeeding, such as during weaning, lead to increased use of dummies (pacifiers)? However, there is some concern that randomisation in RCTs of mothers to dummy (pacifier) use or non-use may not be truly representative of the behaviours and motivations typically seen in mothers who would make this decision on their own.

In summary, while there are methodological challenges to the current published evidence about the impact of dummy (pacifier) use on breastfeeding duration and frequency, the current evidence reinforces the importance of introducing the dummy (pacifier) to breastfed infants only after breastfeeding has been well-established, which generally takes 3–4 weeks. Further studies will be important to confirm this and to determine if earlier dummy (pacifier) introduction is detrimental to breastfeeding efforts.

Another concern with dummy (pacifier) use is that of increased infection rates, particularly otitis media (ear infections). A meta-analysis of 18 studies found an increased relative risk of 1.24, (95% CI 1.06–1.46, $P = 0.008$) for acute otitis media in infants who used a dummy (pacifier).³⁴ However, in this study the greatest risk was associated with attending childcare. An intervention to limit use of dummies (pacifiers) to bedtime was effective in reducing the incidence of acute otitis media by 33% in non-continuous users compared with continuous users.⁴ However, the study was performed in infants under 18 months of age, with most infants being 7–18 months old with a mean age of 8.1 months. This age is older than the age when SIDS risk is greatest i.e. 2–4 months. A more recent study of children aged 0 to 4 years of age, with 43% of the children being 1–2 years of age found similar rates of one or more episodes of acute otitis media between infants who used and did not use a dummy (pacifier), however dummy (pacifier) users had more bouts of recurrent otitis media (16% vs. 11%) compared with non-users.³⁵ Again the majority of infants in this study were older than infants at risk of SIDS. Although the evidence to date is consistent in suggesting an association between acute otitis media with use of dummies (pacifiers)³⁶ these observations have largely been made in later infancy rather than early infancy when most SIDS deaths occur.

Another study found that there were more mother-reported episodes of cough, wheezing, earache and diarrhoea/gastroenteritis among infants using dummies (pacifiers) through 6 months of age.³⁶ Increased oral colonisation with *Candida* (a type of yeast) has also been reported in dummy (pacifier) users.³⁷

Finally, concern has been expressed about the possible detrimental effects of dummies (pacifiers) on dentition in infants and young children.¹⁴ Some dental malocclusions, notably posterior crossbite, have been found more commonly among dummy (pacifier) users than among nonusers, but these differences generally disappear after discontinuing their use.³⁸ It has been shown that infants not offered dummies (pacifiers) were more likely to suck their fingers, a habit that is more difficult to break³⁹ and more likely to cause malocclusion.³⁸ The American Academy of Pediatric Dentistry's policy on oral habits states: 'non-nutritive sucking behaviours (i.e. finger or pacifier sucking) are considered normal in infants and young children and usually are associated with their need to satisfy their urge for contact and security.'⁴⁰ The policy notes that dummies (pacifiers) are unlikely to cause long-term problems if stopped by the age of 3 years. Others have recommended decreasing dummy (pacifier) use at the age of 2 years and discontinuation by the age of 4 to minimise the development of malocclusion.⁴¹

Other Potential Advantages

Other advantages of dummy (pacifier) use have been reported. Dummy (pacifier) use has been shown to help reduce pain during painful procedures, as measured by reduction of crying.^{42,43} A review of 19 studies of preterm infants found that dummy (pacifier) users had a reduced length of hospital stay without any adverse outcomes compared with nonusers.⁴⁴

Current Recommendations in Different Countries

The current safe sleeping recommendations of some countries include the recommendation that a dummy (pacifier) be offered for sleep, however it is stressed that this should not be offered in breastfed babies until breastfeeding is established. The introduction of a dummy (pacifier) at 3–4 weeks of age may provide an additional protection when infants are at the peak age of SIDS risk (2–4 months of age). Breastfed babies who use dummies (pacifiers) at this age may have added protection, however further studies to confirm this are needed.

Typically, recommendations that advocate use of dummies (pacifiers) for SIDS risk reduction include the following:⁴⁵

- 1 Dummies (pacifiers) have been shown to be associated with reduced risk of SIDS, i.e. fewer babies who used a dummy (pacifier) for the last sleep died than those who did not use a dummy (pacifier).
- 2 Dummies (pacifiers) can be offered at nap time and bedtime in breastfed infants after 3–4 weeks of age, when breastfeeding is well established.
- 3 Dummies (pacifiers) can be offered to bottle-fed infants from birth. If being used, they should be offered for all sleep periods.

4 Parents should be aware of the potential adverse effects of dummy (pacifier) use.

In other countries dummies (pacifiers) are not discouraged but neither are they encouraged.⁴⁶ Parents and health professionals are made aware of the different arguments and the need to resolve issues regarding breastfeeding and causality.

Implications for Future Research

In summary, there is very strong evidence that dummies (pacifiers) are associated with reduced risk for SIDS when used consistently, however, the mechanisms which underpin this protection are currently unknown and it is not known whether this association is a marker for something else. Future work should include monitoring the rates of dummy (pacifier) use and SIDS as well as searching for a plausible causal protective mechanism, which may be physiological or behavioural (e.g. the dummy (pacifier) may discourage the infant from rolling to the prone position). Future observational studies should investigate whether dummy (pacifier) use during sleep periods only is protective (compared with use at other times), and examine the circumstances under which infant care routines change and how this impacts dummy (pacifier) use.

ISPID Recommendation

At this time, the ISPID Board is unable to provide a definitive recommendation regarding the use of dummies (pacifiers) for SIDS risk reduction. As noted above, there are differences in recommendations made by different countries, agencies, and researchers, and thus the purpose of this document has been to present the evidence, interpretations, and guidelines across different viewpoints. We agree, however, that parents of newborns should be educated about the evidence and potential benefits and risks to using dummies (pacifiers), so that they are able to make informed choices regarding use for their own infants.

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