Dummies and the sudden infant death syndrome

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Abstract

The association between dummy use and sudden infant death syndrome (SIDS) was investigated in 485 deaths due to SIDS in the postneonatal age group and compared with 1800 control infants. Parental interviews were completed in 87% of subjects. The prevalence of dummy use in New Zealand is low and varies within New Zealand. Dummy use in the two week period before death was less in cases of SIDS than in the last two weeks for controls (odds ratio (OR) 0·76, 95% confidence interval (CI) 0·57 to 1·02). Use of a dummy in the last sleep for cases of SIDS or in the nominated sleep for controls was significantly less in cases than controls (OR 0·44, 95% CI 0·26 to 0·73). The OR changed very little after controlling for a wide range of potential confounders.

It is concluded that dummy use may protect against SIDS, but this observation needs to be repeated before dummies can be recommended for this purpose. If dummy sucking is protective then it is one of several factors that may explain the higher mortality from SIDS in New Zealand than in other countries, and may also explain in part the regional variation within New Zealand.

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Dummy (pacifier or comforter) use varies widely within and between countries. Much of the published work on dummies relates to their effect on dentition.[1-4] Cozzi *et al* suggested that the use of a dummy might reduce the risk of sudden infant death syndrome (SIDS or cot death),[5] but we are not aware of any study examining this hypothesis. This paper reports the relation between dummy use and the risk of SIDS in New Zealand.

Subjects and methods

This three year multicentre case control study has been described in detail previously.[6,7] In brief, 78% of all live births in New Zealand occurred in the study regions. The study ran from 1 November 1987 to 31 October 1990. There were 485 deaths from SIDS in the postneonatal age group (68% of all deaths in this age group). The mean (SD) age of these infants was 15·0 (9·1) weeks. Necropsy was performed in 98% of the SIDS cases.

The infants who died from SIDS (cases) were compared with 1800 control infants who were randomly selected from all births in the study regions except home births (less than 1%). The following method was used: (1) a date of interview (nominated date) was randomly selected from all 1096 days in the study period; (2) the control was then randomly allocated an age at which to be interviewed; (3) the date of birth was calculated from age and date of interview; (4) an obstetric hospital was randomly chosen in proportion to the number of births in 1986; and (5) random numbers were used to select a particular infant from those born on the date of birth in the nominated obstetric hospital.

Obstetric records were examined in 465 (96%) of the cases and 1762 (98%) of the controls. Parents (guardians) of subjects were interviewed and a wide range of topics was covered. Parental (guardian) interviews were completed in 393 (81%) of cases and 1592 (88%) of the controls. Eighty one per cent of the interviews with parents of cases were carried out within seven weeks of the infant's death, and 70% of the controls within four days of the nominated date. For questions on infant care practices that related particularly to the period before death in the cases, parents of controls were given a nominated time of day which was randomly allocated to match the estimated distribution of the time of death in cases.

The specific questions related to dummy use covered at the interview were: (1) in the last two weeks did baby use a dummy; and (2) if dummy used did baby use a dummy in the last sleep for cases and in the nominated sleep for controls?

Other variables examined related to the selection process (age of infant, region, season, and nominated time of day/time of death), sociodemographic (ethnic group, parental occupation, marital status, age mother left school, age of mother), pregnancy (age of mother at first pregnancy, number of previous pregnancies, months pregnant when first attended antenatal clinic, attended antenatal classes), and postnatal factors (infant's sex, birth weight, gestation, admission to special care baby unit, breast feeding only at discharge from obstetric hospital, maternal smoking in last two weeks, infant sleep position, and infant sharing a bed with another person). The definition of these variables have been described in detail previously.[6,7] In addition, the respondent was asked if the infant was more than usually restless and irritable in the last two weeks and, if yes, was this in the last two days.

Relative risks were estimated by calculation of odds ratios (OR). The univariate ORs have confidence intervals (CIs) calculated by the method of Cornfield. The multivariate ORs are obtained from unconditional logistic regression modelling as are their CIs. The χ^2 values are from $2 \times n$ contingency tables comparing dummy users with non-users.

Ethical approval for the study was obtained from each of the local ethics committees.

Results

Table 1 shows the percentages and ORs of the two questions relating to the use of dummies. In

Table 1 Number (percentage), univariate, and multivariate odds ratios of variables related to the use of dummies (pacifiers)

Variable	Cases	Controls	Odds ratio (95% confidence interval) Univariate	Multivariate*
Dummy use in the two weeks before death/nominated time				
Yes	74 (18·9)	372 (23·4)	0·76 (0·57 to 1·02)	0·71 (0·50 to 1·01)
No	318 (81·1)	1219 (76·6)	1·00	1·00
Dummy use at death/nominated time				
Yes	19 (4·9)	165 (10·4)	0·44 (0·26 to 0·73)	0·43 (0·24 to 0·78)
No	372 (95·1)	1421 (89·3)	1·00	1·00

*Controlling for the following variables: infant's age, region, season, time of day, ethnic group, occupation, marital status of mother, age mother left school, age of mother, age of mother at first pregnancy, number of previous pregnancies, months pregnant when first attended antenatal clinic, attended antenatal classes, infant's sex, birth weight, gestation, admission to special care baby unit, breast feeding at discharge from obstetric hospital, maternal smoking in last two weeks, sleep position, and infant sharing bed with another person.

the two weeks before the death or nominated time for controls dummy use was less common in cases than in controls, but the difference was not significant at the 5% level (OR 0·76, 95% CI 0·57 to 1·02). Dummy use in the last sleep for cases or in the nominated sleep for controls was significantly less in cases than in controls (OR 0·44, 95% CI 0·26 to 0·73).

After controlling for region, season, marital status, ethnic group, occupation, age of mother at birth of infant, number of pregnancies, infant sex, birth weight, breast feeding, age of infant, sleep position, and infant sharing a bed with another person, use of dummy in the two week period before death/nominated time was significant at the 6% level (OR 0·71, 95% CI 0·50 to 1·01) and use of dummy at the time of death/nominated time was significantly associated with a decreased risk of SIDS (OR 0·43, 95% CI 0·24 to 0·78).

As irritability or restlessness may promote the use of dummies we also controlled for this variable and found that again the OR changed very little.

To find out which infants were more likely to be dummy users we compared dummy users and non-users in the control group only (tables 2–4). Table 2 shows the sociodemographic variables. Infants of younger mothers and younger school leaving age were more likely to use dummies. Table 3 shows the variables related to pregnancy. Infants of mothers who attended antenatal clinics early were more likely to use a dummy. Table 4 shows the variables related to postnatal factors. Infants who were breast fed or slept prone were less likely to use a dummy.

Discussion

Dummy use varies considerably between countries. In Milwaukee, dummy use at three months is high at 88%,[8] although prevalence figures between 35 and 45% have more often been reported.[2,3] One previous report from New Zealand found that the prevalence of dummy use in the first 12 months of life was 9%.[9] As dummy sucking is initiated by the infants' parents such wide variation in the prevalence of dummy use would be expected to reflect the cultural and dental attitudes of the community rather than differences in infants. Interestingly, in New Zealand, dummy use has been strongly discouraged in the past and this probably accounts for its now relatively rare use.[10]

Published work on dummy use predominantly relates to its effects on dental malocclusion,[1-3] and suggests that any effects are small and disappear with time when the habit stops. As malocclusion may be worse with finger sucking, it has been suggested that parents should encourage dummy sucking in children who show signs of being potential finger suckers to prevent this habit from arising.[11] The other area of concern with dummies for the dental profession relates to dental caries, which seems to be a problem only if the dummy is sweetened.[4]

Information on infant deaths and dummies is sparse. Dummies as the cause of occasional asphyxial deaths from impaction in the airway have been reported in older children.[12] Some deaths have also occurred by strangulation by

Table 2 The use of dummies by variables related to sociodemographic factors for the control infants

	Dummy use in two weeks before nominated time			Dummy use at nominated time		
	Yes (%)	No (%)	χ^2 (p value)	Yes (%)	No (%)	χ^2 (p value)
Socioeconomic status						
I, II	120 (22·1)	423 (77·9)		50 (9·3)	490 (90·7)	
III, IV	193 (25·6)	560 (74·4)	4·24 (0·109)	93 (12·4)	657 (87·6)	6·65 (0·036)
V, VI, and others	59 (20·1)	235 (79·9)		22 (7·5)	272 (92·5)	
Region						
Auckland	172 (32·3)	361 (67·7)		78 (14·7)	452 (85·3)	
Central North Island	116 (24·3)	362 (75·7)		56 (11·8)	420 (88·2)	
Southern North Island	49 (20·5)	190 (79·5)	66·42 (0·000)	16 (6·7)	222 (93·3)	41·53 (0·000)
Christchurch	29 (16·6)	146 (83·4)		14 (8·0)	161 (92·0)	
Southern South Island	6 (3·6)	160 (96·4)		1 (0·6)	165 (99·4)	
Ethnic group						
Maori	60 (20·0)	240 (80·0)		23 (7·7)	276 (92·3)	
Pacific Islander	28 (20·4)	109 (79·6)	3·55 (0·170)	7 (5·1)	130 (94·9)	8·70 (0·013)
Other	284 (24·6)	870 (75·4)		135 (11·7)	1014 (88·3)	
Age mother left school (years)						
<16	99 (27·9)	256 (72·1)		45 (12·7)	309 (87·3)	
16	126 (24·9)	379 (75·1)	9·09 (0·011)	64 (12·7)	439 (87·3)	10·66 (0·005)
17+	147 (20·1)	584 (79·9)		56 (7·7)	672 (92·3)	
Married						
Yes	266 (22·6)	913 (77·4)	1·70 (0·191)	116 (9·9)	1059 (90·1)	1·41 (0·235)
No	106 (25·7)	306 (74·3)		49 (12·0)	361 (88·0)	
Age of mother at infant birth (years)						
<20	34 (28·6)	85 (71·4)		13 (11·0)	105 (89·0)	
20–24	97 (27·2)	259 (72·8)	7·58 (0·055)	46 (13·0)	309 (87·0)	9·07 (0·028)
25–29	124 (22·0)	439 (78·0)		64 (11·4)	497 (88·6)	
30+	112 (20·7)	430 (79·3)		39 (7·2)	501 (92·8)	

Table 3 The use of dummies by variables related to pregnancy for the control infants

	Dummy use in two weeks before nominated time			*Dummy use at nominated time*		
	Yes (%)	*No (%)*	χ^2 *(p value)*	*Yes (%)*	*No (%)*	χ^2 *(p value)*
Age of mother at first pregnancy (years)						
<20	76 (27·1)	205 (72·9)		31 (11·1)	249 (88·9)	
20–24	146 (25·3)	431 (74·7)	7·70 (0·021)	67 (11·6)	509 (88·4)	2·78 (0·249)
25+	145 (20·1)	577 (79·9)		64 (8·9)	654 (91·1)	
Previous pregnancies						
0	123 (25·6)	358 (74·4)		54 (11·3)	424 (88·7)	
1	105 (22·7)	357 (77·3)	2·80 (0·123)	44 (9·6)	415 (90·4)	0·94 (0·817)
2	72 (23·1)	240 (76·9)		30 (9·6)	282 (90·4)	
3+	67 (20·6)	258 (79·4)		34 (10·5)	291 (89·5)	
Months pregnant when first attended antenatal clinic						
0–3	320 (24·3)	997 (74·7)	3·74 (0·053)	146 (11·1)	1167 (88·9)	3·61 (0·057)
4+	50 (18·8)	216 (81·2)		19 (7·2)	245 (92·8)	
Attended antenatal classes						
Yes	185 (25·1)	551 (74·9)	2·50 (0·113)	78 (10·7)	653 (89·3)	0·07 (0·784)
No	185 (21·8)	665 (78·2)		87 (10·3)	762 (89·7)	
Infant's sex						
Male	206 (25·8)	592 (74·2)	6·05 (0·014)	82 (10·3)	712 (89·7)	0·00 (0·963)
Female	161 (20·6)	621 (79·4)		80 (10·3)	700 (89·7)	
Birth weight (g)						
<2500	21 (28·4)	53 (71·6)		9 (12·3)	64 (89·3)	
2500–2999	47 (22·1)	166 (77·9)	1·29 (0·732)	21 (10·0)	190 (90·0)	0·44 (0·931)
3000–3499	125 (22·9)	420 (77·1)		54 (9·9)	489 (90·1)	
3500+	174 (23·3)	574 (76·7)		78 (10·4)	669 (89·6)	
Gestation (weeks)						
28–33	8 (36·4)	14 (63·6)		4 (18·2)	18 (81·8)	
34–37	23 (20·9)	87 (79·1)	2·46 (0·292)	11 (10·1)	98 (89·9)	1·51 (0·471)
38+	336 (23·2)	1112 (76·8)		147 (10·2)	1296 (89·8)	

cords, which may be used to tie the dummy around the neck of the infant.[13]

Cozzi *et al* suggested that in SIDS a vacuum might occur in the pharynx, pulling the tongue back and blocking the airway.[5] They suggested that a dummy might prevent the tongue sealing off the airway. To our knowledge, however, this hypothesis has not been tested.

In this study dummy use in cases in the two weeks before death was less common than for controls, but did not reach significance at the 5% level. Dummy use in the sleep at the time of death, or at the nominated sleep for controls, however, was significantly less for the cases than for the controls. Moreover, after controlling for a wide range of possible confounders, including maternal age, education, breast feeding, infant's sleeping position, and irritability, dummy use continued to be protective.

This study confirms the low rate of use of dummies in New Zealand.[9] Not only is dummy use rare in New Zealand, but dummy use is also intermittent. A total of 23% of control infants used a dummy in the previous two weeks, but only 10% of infants used a dummy during the nominated sleep. If dummy use is protective then it is one of several factors that might explain the higher rate of mortality from SIDS in New Zealand.

We found marked regional variations in the use of dummies, with less than 5% of controls in southern New Zealand using dummies compared with 32% using dummies in the Auckland region (northern New Zealand). This difference may reflect the strength of advice on child care practices in each area. This is one of several factors which may explain the north-south variation in SIDS mortality in New Zealand. Dummy use was more common in infants with young mothers and mothers who left school at an early

Table 4 The use of dummies by variables related to postnatal factors for the control infants

	Dummy use in two weeks before nominated time			*Dummy use at nominated time*		
	Yes (%)	*No (%)*	χ^2 *(p value)*	*Yes (%)*	*No (%)*	χ^2 *(p value)*
Infant admitted to special care baby unit						
Yes	53 (29·0)	130 (71·0)	3·82 (0·051)	25 (13·9)	155 (86·1)	2·85 (0·092)
No	314 (22·5)	1083 (77·5)		137 (9·8)	1257 (90·2)	
Breast feeding only at discharge from obstetric hospital						
Yes	289 (21·5)	1055 (78·5)	15·01 (0·000)	117 (8·7)	1222 (91·3)	23·47 (0·000)
No	78 (33·0)	158 (67·0)		45 (19·2)	190 (80·9)	
Maternal smoking in last two weeks (No of cigarettes each day)						
0	238 (22·0)	843 (78·0)		106 (9·8)	971 (90·2)	
1–9	49 (25·8)	141 (74·2)	3·68 (0·299)	17 (9·0)	173 (91·0)	4·78 (0·189)
10–19	51 (25·9)	146 (74·1)		23 (11·7)	174 (88·3)	
20+	34 (27·6)	89 (72·4)		19 (15·7)	102 (84·3)	
Season of nominated day						
Jan/Feb	56 (22·2)	196 (77·8)		24 (9·6)	227 (90·4)	
Dec/Mar	66 (23·2)	219 (76·8)		27 (9·5)	258 (90·5)	
Nov/Apr	70 (28·2)	178 (71·8)	5·54 (0·353)	34 (13·8)	213 (86·2)	4·23 (0·517)
Oct/May	59 (20·4)	230 (79·6)		32 (11·1)	256 (88·9)	
Sept/Jun	62 (25·0)	186 (75·0)		23 (9·4)	223 (90·6)	
Aug/Jul	59 (21·9)	210 (78·1)		25 (9·3)	243 (90·7)	
Position infant placed to sleep at nominated time						
Prone	95 (18·2)	426 (81·8)		45 (8·6)	475 (91·4)	
Side	213 (26·1)	602 (73·9)	11·70 (0·003)	86 (10·6)	724 (89·4)	4·63 (0·099)
Back	63 (25·4)	185 (74·6)		34 (13·7)	214 (86·3)	
Sharing parental bed						
Yes	33 (19·9)	133 (80·1)	1·21 (0·271)	12 (7·3)	153 (92·7)	1·93 (0·165)
No	336 (23·7)	1082 (76·3)		152 (10·8)	1261 (89·2)	

age. Dummy use was also more common in infants of mothers who attended antenatal clinics early.

Breast fed infants were less likely to use a dummy than bottle fed infants. There are several plausible explanations for this: (*a*) it seems likely that an unsettled breast fed infant would be offered the breast rather than the dummy as a method of comforting; or (*b*) offering a dummy may be counter productive in successfully establishing breast feeding. When breast feeding was taken into account in the logistic regression, however, the apparent beneficial effect of dummy usage in lessening SIDS risk remained unchanged.

Infants placed to sleep prone were less likely to use a dummy than infants placed in the non-prone position. The reason for this may be purely mechanical in that sucking on a dummy with the face down is impracticable. Also there is evidence that prone sleeping is associated with more rapid settling of the infant[14 15] and hence may circumvent the need to resort to a dummy.

The nature of the infant must also be taken into account. The act of offering a dummy to a child will be to some extent determined by the temperament of the infant. The more passive and quiet infant (perhaps even neurologically damaged) is not such a disturbance to the parents and therefore is unlikely to be given a dummy, whereas the more active and demanding infant may be strongly encouraged to suck on a dummy. When an indicator of irritability or restlessness was introduced into the model, however, again no decrease in the dummy's apparent protective effect was seen.

The sucking of fingers instead of (or in addition to) a dummy should also be taken into account. Unfortunately, we do not have any information on this, though data are currently being collected in another project.

How might dummy use be protective? The mechanism proposed by Cozzi *et al* may be one method.[5] Alternatively, dummy use may result in a reduction in gastro-oesophageal reflux,[16] which has been related to apnoeas, though the relation between gastro-oesophageal reflux and apnoeas is controversial.[17] Perhaps of more importance is upper airway muscle tone, which is dependent on sensory input. Active protrusion of the tongue, which occurs with normal dummy sucking, will keep the tongue forward and thus help to maintain upper airway patency.

Dummy use is relatively uncommon in New Zealand and if it was to be confirmed to have a protective effect its promotion could reduce the number of deaths from SIDS by about 50%. We do advise caution and we emphasise that we have not advised the promotion of dummy use in the National Cot Death Prevention Campaign currently being run in New Zealand.[18] This new association of dummy use and a lower risk of SIDS is provisional and this observation urgently needs to be repeated in another community and the possible mechanisms examined. Whether thumb or finger sucking is equally protective is not known as information on this variable was not collected in this study, but future studies should explore this.

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