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Can the fall in Avon's sudden infant death rate be explained by changes in sleeping position?

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Abstract

***Objective*—To examine the impact of changing practice with regard to infant sleeping position on mortality from the sudden infant death syndrome.**

***Design*—A population based study of all infants dying suddenly and unexpectedly during February 1990 to July 1991, and two groups of controls; one comprising every 125th baby born to Avon residents and the other comprising pairs of infants matched to each index case for age, neighbourhood, and date of study. Information about sleeping position was collected at home visits soon after the index baby's death or, for the population based controls, on several occasions in the first six months of life. The design was comparable to that of an earlier study of the same population.**

***Setting*—County of Avon.**

***Subjects*—35 infants who died suddenly and unexpectedly (32 of the sudden infant death syndrome), 70 matched controls, and 152 population based controls.**

***Results*—The prevalence of prone sleeping in the matched controls was much lower than that found in an earlier study in Avon (28% (18/64) 1990-1 *v* 58% (76/131) 1987-9; $p<0.001$) and was comparable with the prevalence in population based controls (29%). This would be expected to lead to a reduction in the incidence of the sudden infant death syndrome to 2·0/1000 live births (95% confidence interval 1·8/1000 to 2·5/1000). The actual mortality fell from 3·5/1000 in 1987–9 to 1·7/1000.**

***Conclusion*—The fall in mortality can be almost entirely accounted for by the reduction in prone sleeping, suggesting a causal relation exists between them. Side and supine positions confer protection but the side position is unstable and the infant may roll prone. We therefore recommend supine as the safest sleeping position for babies.**

Introduction

The prone sleeping position has been associated with a higher risk of sudden infant death than the side or supine position in every published controlled study that has considered it. The calculated relative risks vary between 1·9 and 12·5.[1] If this association were causal a change in practice with regard to sleeping position within a defined population should lead to a parallel change in the sudden infant death rate. Preliminary results from the Netherlands and Australia suggest this may be so.[2,3]

During November 1987 to April 1989, while the prone position was still being actively encouraged, a population based, case-control study in Avon found a relative risk of 8·8 for the prone position.[4] These results aroused considerable interest and debate and prompted many local health care professionals to alter their advice to parents. As part of the continuing study of sudden infant deaths in Avon we examined the impact of changing positioning practice on mortality. To enable valid comparison with the previous Avon study the same basic design was used, but we also recruited an unmatched, population based control group. This was to determine how far conclusions based on the highly selected matched control group could be extrapolated to the whole community.

Subjects and methods

Between February 1990 and July 1991, 35 Avon infants aged under 1 year were found suddenly and unexpectedly dead. All were included prospectively in the study. Within a few hours of the discovery of death we visited their families at home for counselling purposes; during this visit we took a full history. A full paediatric postmortem examination was carried out on all babies, and only the 32 infants whose deaths were attributed to the sudden infant death syndrome are included in the following results.

For each case we recruited two control infants matched for age, neighbourhood, and date of interview as in the previous study.[4] A questionnaire completed at interview included information about the sleeping position of the control baby for the preceding night. In addition 152 babies were recruited into the population based control group by selecting every 125th baby born to Avon residents during the study from the child health computers. The 124th or 126th baby was substituted if the 125th was unavailable. We visited these babies up to three times during their first six months of life and completed a questionnaire on each occasion.

Results

A significant fall was found in the prevalence of the prone sleeping position in the matched control infants from 58% (76/131) in the earlier study to 28% (18/64) in this study ($p<0{\cdot}001$, χ^2 test). The same prevalence (29% (44/152)) of prone sleeping was found in the population based control group.

If a causal relation existed between sleeping in the prone position and the sudden infant death syndrome the number of deaths would depend on the prevalence of each sleeping position in the whole population and should therefore be predictable for any change in positioning practice, all other factors being equal. If the absolute risk for each sleeping position remains constant, the change we observed in sleeping position would be expected to lead to a 43% reduction in deaths to a rate of 2·0/1000 live births (95% confidence interval 1·8/1000 to 2·5/1000) (appendix). The actual reduction in the incidence of the sudden infant death syndrome in Avon between the studies was 51%, from 3·5/1000 to 1·7/1000. A slightly lower proportion of the babies who died were found in the prone position than in the previous study[4] (26/32 (81%) *v* 62/67 (93%) respectively, but this was not significant.

Discussion

A reduction in the prevalence of sleeping in the prone position in Avon was accompanied by a fall in rate of sudden infant death syndrome. The fall was close to that predicted from a previous study in the same population. We have assumed that the positioning practice of the matched control groups is representative of the whole population. This seems to be valid for the current study, in which we also have population based data, but cannot be confirmed in the earlier study. We have also assumed that sleeping position was the only risk factor that varied. The earlier Avon study identified two other risk factors: the amount of bedding and overnight heating.[4] The amount of bedding was constant in the two studies, but the prevalence of overnight heating fell slightly from 25% in 1987-9 to 17% in this study in the matched controls. This would reduce the predicted mortality a little further to 1·8/1000.

The fact that a reduction in the prone sleeping position can almost entirely account for the fall in mortality strengthens the argument for a causal relation between the prone sleeping position and sudden infant deaths, whatever the mechanism. In some way, as yet not fully understood, side and supine sleeping protect against sudden infant deaths.

The predicted percentage of dead babies who had slept prone (77%) lies between the actual figures for those who had been put down to sleep prone (63%) and those who were found dead in the prone position (81%). The higher percentage of infants found prone includes some babies who had been put down on their sides but had rolled on to their fronts. Because the side sleeping position is less stable than the prone or supine positions babies placed on their side may roll prone, and thus they are at a higher risk than those put down to sleep on their back.[5] Traditionally most cultures have nursed young infants supine and there is no evidence that sleeping supine is harmful to other than a tiny minority of babies such as those with Pierre-Robin syndrome or persistent reflux. We therefore recommend the supine position as the safest for babies when sleeping and believe that a nationwide return to this traditional practice would save a significant number of babies' lives.

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Appendix

DETERMINATION OF SUDDEN INFANT DEATH RATES FOR DIFFERENT SLEEPING POSITIONS

Let Y/1000 live births=rate of sudden infant death syndrome for babies not prone, so Y/1000×relative risk=rate of sudden infant death syndrome for prone babies.

In 1987-9 Avon study[4]:

Rate of sudden infant death syndrome (S/1000)=3·5/1000 live births

Relative risk for prone position (R)=8·8 (95% confidence interval 3·3 to 23·4)

Percentage of control population prone (P)=58%

Percentage not prone (1−P)=42%

Total deaths from the syndrome=non-prone deaths+prone deaths

$3{\cdot}5/1000=(Y/1000\times 42\%)+(Y/1000\times 8{\cdot}8\times 58\%)$

$S=(Y(1-P))+(YRP)$

$Y=0{\cdot}63$

Rate for non-prone position=0·63/1000 live births

Proportion of deaths in prone position (YRP/S)=93%

In present study:

Assuming the same rates for non-prone deaths Y/1000 and constant relative risk for prone position (R)

$S_2=(Y(1-P_2))+(YRP_2)$

Percentage of control population prone (P_2)=28%

Percentage not prone ($1-P_2$)=72%

Therefore $S_2=(0{\cdot}63\times 72\%)+(0{\cdot}63\times 8{\cdot}8\times 28\%)$

$S_2=2{\cdot}0$ (95% confidence interval 1·8 to 2·5)

Predicted rate of sudden infant death syndrome=2·0/1000 live births

Predicted proportion of deaths in prone position=(YRP/S_2)=77%

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