



ORIGINAL ARTICLE

## Sudden infant death syndrome: Do the parents follow the recommendations?☆

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### Abstract

**Introduction:** Prone sleeping position is the main known modifiable risk factor for sudden infant death syndrome (SIDS). At the end of the twentieth century, preventive campaigns were initiated, which recommended parents to have their children sleep in the supine position, with a significant reduction of SIDS rates worldwide being observed after this. There are other SIDS recommendations apart from the sleeping position, although with less impact. The objective of this study is to describe the prevalence of prone position during sleep in a sample of Spanish babies and infants, as well as other risk factors associated with SIDS.

**Methods:** Cross-sectional study carried out on 640 families with children from 0 months to 11 months. In addition to the sleep position, the adherence to four other recommendations regarding SIDS was analysed: place where infant sleeps, breastfeeding, use of non-nutritive suction, and maternal smoking.

**Results:** A total of 41.3% of infants under 6 months and 59.7% of infants aged 6–11 months slept in a non-recommended position. Only 6.4% of families analysed followed all five recommendations.

**Discussion:** There is a high, and therefore concerning, prevalence of modifiable risk factors for SIDS among the population studied. Personalised education should be promoted, along with other campaigns to raise awareness and prevent SIDS.

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**PALABRAS CLAVE**

Síndrome de muerte súbita del Lactante;  
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Neonato;  
Recomendaciones

**Síndrome de muerte súbita del lactante: ¿siguen las familias las recomendaciones?****Resumen**

**Introducción:** La postura en decúbito prono al dormir es el principal factor de riesgo modificable conocido para el síndrome de muerte súbita del lactante (SMSL). A finales del siglo XX se iniciaron campañas preventivas que instaban a dormir a los lactantes en decúbito supino, lo que resultó efectivo para disminuir las tasas de SMSL a nivel mundial. Existen otras recomendaciones respecto al SMSL con menor impacto. El objetivo de este estudio es conocer la prevalencia del decúbito prono durante el sueño así como de otros factores de riesgo asociados a SMSL en una muestra de lactantes españoles.

**Material y métodos:** Estudio transversal realizado en 640 familias con niños de 0 meses a 11 meses. Además de la postura, se analizó la adherencia a otras cuatro recomendaciones respecto al SMSL: lugar donde duerme el lactante, lactancia materna, succión no nutritiva y tabaquismo materno.

**Resultados:** El 41,3% de los menores de 6 meses y el 59,7% de los lactantes de 6 a 11 meses dormían en una postura no recomendada. Sólo el 6,4% de las familias seguían las cinco recomendaciones analizadas.

**Discusión:** Existe una elevada prevalencia de factores de riesgo modificables de SMSL en la población estudiada. Parece necesario reimpulsar la educación personalizada y otras campañas de concienciación y prevención del SMSL.

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**Introduction**

Sudden infant death syndrome (SIDS) is defined as the sudden and unexpected death of an infant before age 1 year that remains unexplained after a full investigation of the case, including an investigation of the setting of death, autopsy findings and a detailed review of the medical history.<sup>1</sup> It is a serious problem, and despite all the research conducted in recent years, it continues to be unpredictable.<sup>2</sup>

Sudden infant death syndrome is the leading cause of death between 1 month and 1 year of age in developed countries, accounting for 40–50% of deaths in this age group, with a peak in incidence between ages 2 and 3 months.<sup>3</sup> In the United States of America (USA), the incidence of SIDS is 0.38 per 1000 live births.<sup>4</sup> In countries neighbouring Spain, such as Germany, United Kingdom and Ireland, the incidence ranges between 0.3 and 0.43%. Japan, Sweden and Canada are countries with a low incidence compared to these European countries, as it ranges between 0.1 and 0.24%.<sup>1,3</sup> In Spain, based on data from the Instituto Nacional de Estadística (National Institute of Statistics, INE), in the past few years there have been approximately 50 cases of SIDS per year.<sup>5</sup>

Since the 1980s, a growing body of evidence has established that there are factors that increase the risk of SIDS, as well as factors that could be considered protective against it. The posture during sleep is the most important modifiable factor, with the supine position being the safest position and the prone position the one associated with the highest risk, while the lateral-sleeping position would increase risk to a lesser degree.<sup>1,3,6,7</sup> Other risk factors can be grouped into maternal factors (pre- and postnatal smoking, cohabitation in the postnatal period, substance

use including alcohol, maternal age less than 20 years, complications during pregnancy or delivery such as anaemia, pre-eclampsia/eclampsia, placental abruption and others), infant-related factors (preterm birth, low birth weight, multiple gestation, male sex) and environmental factors (sleep on a soft surface, presence of objects like stuffed animals or pillows on the sleep surface, excess bedding, hot ambient temperature).<sup>1,7–13</sup> In addition to sleeping in the supine position, other protective factors include breastfeeding (BF), non-nutritive sucking with the use of a pacifier during sleep, sharing a room with the parents and vaccination.<sup>14–16</sup> The risks and protective effects associated with cosleeping remain controversial. While cosleeping could facilitate the maintenance of BF, some studies have found associated risks, at least under specific circumstances.<sup>3,17–19</sup> At present, both the American Academy of Pediatrics and the Working Group on Sudden Infant Death of the Asociación Española de Pediatría (Spanish Association of Paediatrics, AEP) and the Committee on Breastfeeding of the AEP consider that the safest sleeping conditions for an infant are sleeping in the supine position in a crib separate from the parental bed but in the same room as the parents. These groups also recommend against cosleeping with infants aged less than 3 months (4 months in the case of the American Academy of Pediatrics), born preterm or with low birth weights, and also in case parents consume medication with a sedative effect, use drugs like tobacco or alcohol or are very tired. Cosleeping on a couch or chair or bedsharing with relatives other than the parents is also recommended against.<sup>1,6,9</sup>

The establishment in the scientific literature of risk and protective factors prompted the implementation of educational prevention campaigns targeted to parents and health care providers with particular emphasis on promoting the

supine position during sleep, starting around 1994. These campaigns achieved a decrease in the incidence of SIDS in the USA from 1.3 per 1000 live births in 1990 to 0.38 per 1000 live births in 2016, corresponding to the prevention of approximately 1500 deaths due to SIDS in 2016 in this country.<sup>15</sup> Similar decreases have been observed in other countries, with an estimated decrease of 30% in Japan and 82% in the Netherlands and Norway.<sup>7</sup> In the USA, thanks to these campaigns, the percentage of infants sleeping in the prone position decreased from 85.4% to 30.1% (a 55.3% decrease), and the percentage of infants sleeping in the supine position increased from 1.9% to 41.7%, with the proportion of infants dying of SIDS found in the prone position decreasing from 84% to 48.5% in the first decade of the 21<sup>st</sup> century.<sup>20</sup> Thus, establishing that the supine position was the safest position for infants during sleep has been an important milestone in paediatrics, as it has given rise to a simple and efficient recommendation to prevent SIDS. It is unusual for an infant care recommendation to have such an impact on child mortality.

The aim of our study was to identify the adherence of families to current recommendations in a sample of infants. The primary objective was to analyse the position of the infant during sleep, as it is the most important modifiable risk factor for SIDS. The secondary objective was to assess adherence with other recommendations regarding modifiable risk factors.

## Materials and methods

We collected data by surveying families with infants aged less than 12 months residing in Spain. The questionnaires were self-administered and were available online to participating families in a website in Spanish from February 2017 to February 2018 and from June to July 2018.

We recruited participants by disseminating information about the study in the clinics responsible for delivering the well-child programme at the Hospital Universitari General de Catalunya and in childcare centres, as well as social networks. In addition to general information about the study, parents received the link to gain free access to the questionnaire online.

The study was approved by the Ethics Committee of the Hospital Universitari General de Catalunya and the Research Ethics Committee of the Universitat Internacional de Catalunya (UIC-Barcelona).

We collected data on the following variables for analysis: age and sex of the infant, maternal age, maternal educational attainment, maternal smoking, usual position of infant during sleep, BF at the time of the survey and use of non-nutritive sucking with a pacifier.

## Study population and participants

We recruited infant-relative dyads by open and consecutive sampling. The inclusion criteria were age 0–11 months, residing in Spain and obtaining the signed informed consent of parents in the online platform of the study. The exclusion criteria were age 12 months or greater, not residing in Spain, presence of a language barrier in communicating with the family and refusal of the family to participate.

## Statistical analysis

We performed the statistical analysis with the software Microsoft Excel version 15.12.3 for Mac and the R Statistical Software version 3.5.1 for Mac. We carried out a descriptive analysis using the chi square test for dichotomous data.

## Ethical considerations

Parents received written information about the study and signed a digital informed consent form. The study adhered to the basic principles of the Declaration of Helsinki, the Council of Europe Convention of Human Rights and Biomedicine, the Universal Declaration on the Human Rights of the UNESCO and Spanish law applicable to biomedical research.

## Results

We obtained data for a total of 640 infant-relative dyads, of which 79.3% resided in Catalonia and 20.7% in other autonomous communities of Spain. Of all respondents, 95% were mothers, with a mean age of 34.5 years. Only 1 infant was born to a mother younger than 20 years. The distribution by maternal educational attainment was 9.21% primary education, 22.7% secondary education and 68.09% university degree.

When it came to the infants, 51.6% were male and 48.4% female. As for age, 288 (45.0%) were aged 0–5 months and 352 (55.0%) 6–11 months, and the mean age was 6 months.

Tables 1 to 4 summarise the findings regarding the sleeping position and setting of the infant, breastfeeding and maternal smoking.

We found that 139 (48.3%) of infants aged less than 6 months were exclusively breastfed, 52 (18.0%) received other foods in addition to BF and 97 (33.7%) were no longer breastfed at all, so that 66.3% of infants in this age group received some form of BF (exclusive or mixed). In the group aged 6–11 months, 185 infants (52.6%) were breastfed.

We found that only 10.4% of families of infants aged 0–5 months and 3.1% of families of infants aged 6–11 months

**Table 1** Sleeping position. Absolute frequencies and percentages by age group.

	0–5 months (n = 288)	6–11 months (n = 352)	Total (0–11 months) (n = 640)
Supine	169 (58.7%)	142 (40.3%)	311 (48.6%)
Side-lying	94 (32.6%)	131 (37.2%)	225 (35.2%)
Prone	25 (8.7%)	79 (22.5%)	104 (16.2%)

**Table 2** Setting of sleep. Absolute frequencies and percentages by age group.

	0–5 months	6–11 months	Total (0–11 months)
Crib in parental bedroom	169 (58.7%)	138 (39.2%)	307 (48.0%)
Crib in separate bedroom	31 (10.8%)	111 (31.5%)	142 (22.2%)
Same surface as parents (cosleeping)	88 (30.5%)	103 (29.3%)	191 (29.8%)

**Table 3** Adherence to the different recommendations for preventing SIDS by age group.

	[0.2–3]0–5 months		[0.4–5]6–11 months		[0.6–7]Total (0–11 months)	
	Yes	No	Yes	No	Yes	No
Supine position	58.7%	41.3%	40.3%	59.7%	48.6%	51.4%
Recommended setting	58.7%	41.3%	39.2%	60.8%	48.0%	52.0%
Breastfeeding	66.3%	33.7%	52.6%	47.4%	58.7%	41.3%
Non-nutritive sucking	46.2%	53.8%	59.4%	40.6%	53.4%	46.6%
Nonsmoking mother	87.2%	12.8%	86.5%	13.5%	86.7%	13.3%

followed all the recommendations regarding the modifiable risk factors for SIDS included in the analysis.

## Discussion

The prevalence of modifiable risk factors for SIDS in the sample under study was unacceptably large, especially when it came to sleeping positions other than the supine position.

More than half of the infants did not sleep in the supine position, which is the position that offers the most protection against SIDS, even though informational campaigns have been promoting this position since the 1990s. Approximately 40% of infants aged 0–5 months did not sleep in the supine position, and nearly 9% slept in the prone position. These findings are relevant, as this is the age group with the highest incidence of SIDS, and the position infants sleep at this age is mostly dependent on their parents. In Spain, there are few published data on the adherence to these recommendations. An epidemiological study conducted in Navarre found that following an educational campaign that recommended not to use the prone position, the proportion of infants aged less than 6 months that slept in this position decreased from 86.5% to 38.3%, the proportion that slept lying on their sides increased from 3.5% to 9%, and the proportion that slept in the supine position increased from 5.6% to 46%, figures that were not as favourable as the figures we have found in our study.<sup>21</sup> Another study conducted in Murcia found that only 2.3% of infants slept in the prone position and 39.8% on their sides in 2007.<sup>22</sup>

Multiple factors may explain our findings, among them the ignorance of parents of these recommendations because the clinician in charge of the infant has not conveyed this information. In fact, a study conducted in Catalonia in the 2012–2013 period concluded that while 94% of paediatricians considered themselves sufficiently knowledgeable to give advice regarding SIDS, only 58% was aware that the supine position was safest for sleeping and recommended only this position to parents.<sup>23</sup> To this we must add the potential confusion generated by the advice of relatives or

acquaintances, as traditionally it was recommended to place infants to sleep in the prone position.

A substantial percentage of infants (35.16%) slept on their sides, which also increases the risk of SIDS. In addition to the other contributing factors that we have hypothesised about above, hospital staff involved in postpartum care may play a role in this regard, as they may recommend placing the newborn to sleep on his or her side in the belief that this position decreases the risk of aspiration in case of vomiting or regurgitation, despite the absence of epidemiological, clinical or forensic evidence in support of this claim,<sup>24–26</sup> even when it comes to gastro-oesophageal reflux.<sup>1,27</sup>

The role of cosleeping as a risk factor is less clear compared to the other 4 recommendations considered in our study. Although some studies have found a potential benefit of cosleeping in association with the practice of BF,<sup>17,18</sup> it appears that its risks outweigh these presumed benefits, not only under specific circumstances, such as infants aged less than 3 or 4 months, parental smoking or alcohol or substance use, or sleeping on a surface other than a bed.<sup>18,19</sup> There is evidence that cosleeping may pose a risk even outside of all those circumstances.<sup>6,28</sup> In our study, we considered it a risk factor, in agreement with the recommendations of the Task Force of the American Academy of Pediatrics,<sup>1</sup> the Public Health Agency of Canada,<sup>29</sup> The White Book on Sudden Infant Death of the AEP<sup>30</sup> and the Committee on Breastfeeding of the AEP.<sup>31</sup> In our study, we found that 48.0% of infants slept in a crib in the parental bedroom, which is considered the most protective setup for the prevention of SIDS.

In the sample under study, the percentage of infants aged less than 6 months that were exclusively breastfed (as recommended by the World Health Organization [WHO]) did not reach 50%, and one third of infants aged less than 6 months and half of infants aged 6–11 months were not breastfed at all.<sup>32</sup> Based on data from the most recent National Health Survey, conducted in 2017, the rate of BF (including exclusive and mixed BF) is 73.9% at age 6 weeks, 63.9% at age 3 months and 39% at age 6 months.<sup>33</sup> In our sample, 68.7% of infants were breastfed at 6 months. Despite the multiple

**Table 4** Number of recommendations families adhered to (out of the 5 included in the analysis). Absolute frequencies and percentages by age group.

Number of recommendations followed	0–5 months ( <i>n</i> = 288)	6–11 months ( <i>n</i> = 352)	Total: 0–11 months ( <i>n</i> = 640)
None of the 5	0	1 (0.3%)	1 (0.2%)
Only 1 out of 5	13 (4.5%)	23 (6.5%)	36 (5.6%)
Only 2 out of 5	56 (19.5%)	116 (33.0%)	172 (26.9%)
3 out of 5	103 (35.9%)	139 (39.5%)	242 (37.9%)
4 out of 5	86 (29.9%)	62 (17.6%)	148 (23.1%)
Adherence to all 5	30 (10.4%)	11 (3.1%)	41 (6.4%)

and important benefits of BF, these percentages are still far from the objectives established by the WHO.

The prevalence of smoking has tended to decline in recent years as a result of campaigns against tobacco. The National Health Survey of 2017 reported that 18.8% of women and 25.6% of men smoke.<sup>33</sup> The prevalence of smoking in mothers in our sample was 13.3%. Although this prevalence could be considered low, efforts must be made to achieve the ideal prevalence of 0%. We were unable to determine the prevalence of smoking during pregnancy in our sample.

Some of the potential limitations of our study include the retrospective assessment of risk factors, which carries a risk of recall bias. However, the use of questionnaires to establish lifestyle habits at the population level is very useful on account of its feasibility. Since the published literature shows that surveying parents is an effective method to detect behavioural problems and sleep disturbances, we consider information from families particularly important.<sup>34</sup> On the other hand, our sample may not be representative of the entire population of Spain because most participants resided in Catalonia and two thirds had a university education, with overrepresentation of the latter group relative to the proportion in the general population. If we consider that infants with university-educated parents are more likely to be placed to sleep in the supine position compared to parents with a primary or secondary education diploma, and that this difference is statistically significant ( $P = .018$ ), it would be fair to conclude that the percentage of infants sleeping in a position other than recommended is probably higher than the one found in our study. The patterns in young mothers are probably underrepresented, as there were few of them in the sample, and only 1 mother aged less than 20 years.

Our findings evince that there prevalence of modifiable risk factors for SIDS in Spain is still high, and thus that there is ample opportunity for improvement in this regard. The enormous impact of SIDS on affected families and the high number of cases occurring each year worldwide make SIDS a very important problem in paediatrics.<sup>35,36</sup>

Based on the number of births and the number of SIDS cases reported by the INE, the estimated annual incidence of SIDS in Spain in recent years is 0.12‰, which is among the lowest compared to other countries for which data are available.<sup>5,37</sup> This figure probably underestimates the magnitude of this problem in Spain. Clinical and epidemiological research, the standardization of protocols for autopsies and the forensic investigation of the circumstances surrounding the death and the classification of causes of death are crucial for the purpose of establishing the actual incidence of SIDS, increase our knowledge of the problem and improve its prevention.

## Conclusions

It seems that massive campaigns need to be launched again to raise awareness of SIDS and promote its prevention, disseminating current knowledge on risk and protective factors among health care providers and conveying this information to families so they can take it into account in the decisions they make about their childrearing practices. This informa-

tion should be provided to families during pregnancy, after birth and in the paediatric visits that follow, with delivery of a unanimous message by the entire health care community, including physicians and nursing staff. The reduction of the incidence of SIDS after the implementation of evidence-based interventions is an example of the potential of the field of epidemiology to contribute to the understanding and prevention of an important public health problem.

A single preventable fatal outcome is already one too many. The findings of our study are a wake-up call and a reminder of our duty. As health care providers, we need to make a collective effort to help families be aware of and practice the most important safety recommendations when it comes to caring for their children, especially when it comes to measures that do not involve any added expense.

## Conflicts of interest

The authors have no conflicts of interest to declare.

## Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.anpedi.2019.06.011>.

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