DOI: 10.1590/1413-81232018232.20732015

Identifying mothers' intention to place infant in supine sleep position: a population-based study

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Abstract *This study aimed to identify mother's opinion on infant sleep position and the factors associated with the intention to place the infant in the supine position in the municipality of Rio Grande, Southern Brazil. A standardized questionnaire was applied to all mothers residing in this municipality who gave birth to a child in the only two local maternity wards from January 1 to December 31, 2010. Chi-square test was used to compare proportions, along with a Poisson regression with robust adjustment in the multivariate analysis. The effect measure used was prevalence ratio (PR). Of the 2,395 mothers interviewed (97.2% of the total), 20.5% (95%CI: 18.4%-21.6%) intended to place the newborn to sleep in the supine position. This prevalence varied from 11% (95%CI: 8.1-13.7) for mothers with three or more children to 35% (CI95%: 31.1-40.2) among those with 12 or more years of schooling. After adjusted analysis, younger mothers with higher education and household income who performed prenatal care in the private system or who have had three or more children had significantly higher PR to place the baby to sleep in the supine position compared to others. Campaigns encouraging this practice should focus primarily on older mothers of lower socioeconomic level and performing prenatal care in PHC facilities.*

Key words *Sudden infant death, Sleeping position, Supine position, Infants*

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Introduction

Sudden Infant Death Syndrome (SIDS) refers to the unexpected occurrence of death among children under one year of age, with no apparent cause and that cannot be explained by the information collected nor by the postmortem examination[1]. Its occurrence is greater from the second to the fourth month of age and its incidence ranges from 0.5 to 3.5/1,000[2]. These data are not available for low-income countries because of the difficulty of confirming the diagnosis[3].

In Brazil, there is no data for the country as a whole, only for some locations. Studies conducted in Pelotas, Ribeirão Preto and Porto Alegre showed a specific SIDS mortality coefficient of approximately 4/1,000 live births. In Passo Fundo, RS, it was 0.6/1,000 live births[3-6]. These studies, however, were affected by the lack of diagnostic precision and a reduced number of cases.

Well-designed and analyzed studies show that the main risk factor for sudden infant death is sleeping belly-down (prone position or ventral decubitus), with an odds ratio ranging from 3.5 to 8.8 in relation to those sleeping in dorsal decubitus (belly up or supine position)[7-8]. Other factors that are also significantly associated with SIDS are maternal age below 20 years, passive smoking, low birth weight, prematurity, low socioeconomic status and sleeping with a covered face, sleeping in the parents' bed or on very soft surfaces[2,3,6-10].

No population-based data on the preferential sleeping position among Brazilian children is available. A single study conducted in 55 hospital institutions with a Medical Residency in Pediatrics revealed that, in 44% of them, the baby slept in the lateral decubitus position (side)[11]. In addition, two-thirds of these services recommended mothers to put the baby to sleep at home in this same position.

This study aimed to know the opinion and identify factors associated with the intention of mothers residing in the city of Rio Grande, RS, to put the baby to sleep belly up.

Methods

Rio Grande is a coastal municipality near the extreme south of Brazil, about 350 km from Porto Alegre. It has a little more than 200 thousand inhabitants. Its economy is based on agribusiness, services, port activity and, more recently, ship platforms building. Its PHC network consists of two general hospitals, three specialty outpatient clinics and 32 PHC facilities. Infant mortality rate in 2014 was 14.34 per 1,000 live births.

All births weighing at least 500 grams or at least 20 weeks of gestational age occurred in the maternities of Santa de Misericórdia and the Hospital of the Federal University of Rio Grande (FURG) between 01/01 and 31/12/2010 were included in this study. In addition, these mothers should reside in the urban or rural area of the municipality of Rio Grande. A cross-sectional design was used and mothers were interviewed in the maternity ward within 24 hours of delivery[12].

The information was collected through a single pre-coded questionnaire with almost all closed questions. This questionnaire sought information on the family's dwelling place, demographic characteristics, occupation, reproductive history and life habits of mothers; the socioeconomic level, father's work characteristics, owning household appliances and housing and sanitation conditions; care received during pregnancy and delivery, access to and use of health preventive and care services and anti-tetanus immunization.

Three social work graduates interviewers were recruited to apply these questionnaires. Their training consisted of reading the questionnaire and the instruction manual. The pilot study was conducted in the first half of December 2009. Throughout the data collection, these interviewers remained on a monthly rotation basis in both maternities. All the mothers signed a consent form for the interview.

The outcome of this analysis was the intention of the mother to put the baby to sleep in the dorsal position (supine or belly up). The independent variables included demographic (age in full years, skin color observed, living with companion), socioeconomic (mothers' schooling in full years, household income and mothers paid work), pregnancy and delivery care (number of prenatal consultations, month of prenatal consultations' onset, prenatal care with the same physician and in the public or private sector and type of delivery) and reproductive life (parity - number of children who were still alive and stillbirths) characteristics.

Questionnaires were coded by interviewers at the end of each working day and delivered to the project headquarters where they were reviewed, typed and analyzed in blocks of a maximum of 100 questionnaires regarding the existence of unexpected values. In this case, the physical questionnaire was searched and any misstatements corrected. When doubt persisted, the new moth-

ers were contacted by telephone or home visit. Next, labels were placed, variables categorized and derivative variables created. This data entry was made using program Epidata 3.1[13], while data analysis was performed in the program Stata 11.2[14].

Data analysis was based on a previously defined hierarchical model with three levels of causal determination[15]. In the first one, the following variables were included: age, skin color observed, marital status, mothers' schooling, household income and paid work. In the second, we had the number of prenatal consultations performed, the prenatal care quarter of onset, prenatal care location, whether all prenatal care was performed with the same doctor and delivery type. The last level included parity and previous occurrence of stillbirths. The level of statistical significance was 95% for two-tailed tests[16].

Prevalence was obtained by frequency listing and Pearson's chi-square test (X^2) was used to compare proportions. The effect measure, in this case the prevalence ratio, was obtained by Poisson regression with adjustment for robust variance[17].

Quality control consisted of a repetition of 5% of interviews, most of which were done by telephone or through home visit. The research protocol was submitted to and approved by the Research Ethics Committee in Health (CEPAS) of the Federal University of Rio Grande. Mothers were assured confidentiality regarding data collected, voluntary participation and possibility of dropping out of the study whenever they pleased and without any justification.

Results

In 2010, there were 2,464 births whose mothers resided in the municipality of Rio Grande. Of these, 2,395 (97.2%) mothers were interviewed.

Table 1 shows that about 20% of them were adolescents (< 20 years); 70% were white-skinned, 83% lived with a companion, 55% had nine or more schooling years, 49% had a household income greater than 2 monthly minimum wages (MMW) and 57% had paid work during this pregnancy. About 80% performed six or more prenatal consultations, started these consultations in the first quarter of pregnancy and always consulted with the same physician; 55% had prenatal care in the public service, 57% had C-section delivery, 44% were primiparous women, 3% had at least one stillbirth and 20.5% (CI 95%: 18.4%-21.6%) said they intended to put the newborn child to sleep belly up (supine position).

Table 2 shows that the prevalence of intention to put the baby to sleep belly up ranged from 11% for mothers with three or more children to 35% among those with 12 years of schooling or household income ≥ 5 MMW. In the adjusted analysis, the intention to put the baby to sleep in this position showed that the younger the age, the greater the likelihood of the mother putting the baby to sleep in this position. PR for mothers aged 30 years and over was 0.68 (95% CI: 0.52-0.88) in relation to adolescent mothers (< 20 years), who represented the baseline category. PR were 1.99 (95% CI: 1.30-3.07) for mothers with 12 and more years of schooling and 2.06 (95% CI: 1.49-2.84) for mothers with a household income ≥ 5 MMW in relation to those with schooling between 0 and 4 years and household income < 1 MMW, respectively. Mothers who underwent prenatal care with a private doctor showed PR = 1.44 (95% CI: 1.13-1.85) in relation to mothers who underwent prenatal care at PHC facilities to put the baby to sleep belly up, while PR for mothers with three or more children was 0.56 (95% CI: 0.40-0.79) compared to primiparous women (basal category).

Discussion

One-fifth of the mothers showed intention to put the child to sleep belly up, the correct position. The adjusted analysis showed that factors associated with this decision were age and mothers' schooling, household income, location of prenatal consultations and number of children (parity).

Twenty percent of the mothers interviewed expressed their intention to put the newborn to sleep belly up. Not a single population-based study evaluating mothers' intention to put the newborn to sleep in this position was found anywhere else. This may have occurred because, in developed countries, sleeping in this position is a common practice and Sudden Infant Death Syndrome (SIDS) in other countries is not a major cause of death. In the case of Brazil, where infant mortality has been falling dramatically in recent decades, it is possible to assume that SIDS will soon be a major cause of death. Evidence of this is that, recently, at the initiative of the "Pastoral da Criança" (*NGO connected to the Catholic Church*) and with the support of several other in-

Table 1. Distribution of mothers according to some characteristics and opinion on the baby's sleep position. Rio Grande, RS, 2010. (n = 2,395).

Characteristics	Total
Mother age (full years)	
Below 20	18.6%
20 to 24	26.8%
25 to 29	25.8%
30 and over	28.8%
Mean (standard deviation)	25.9 (6.4)
Skin color (observed)	
White	69.5%
Brown	20.6%
Black	9.9%
Living with companion	83.2%
Schooling (full years)	
0 to 4	8.0%
5 to 8	37.2%
9 to 11	44.5%
12 and over	10.3%
Mean (standard deviation)	9.0 (3.2)
Household income (in monthly minimum wages)	
Below 1	17.6%
1 to 1.9	33.5%
2 to 3.9	31.3%
4 and over	17.6%
Mean (standard deviation) in minimum wages	3.26 (8.5)
Paid work during pregnancy	57.2%
Number of prenatal consultations performed	
0 to 5	20.0%
6 and over	80.0%
Started prenatal care in the first three months	78.3%
Performed all the prenatal care with the same doctor	78.9%
Location for prenatal consultations	
Basic health facility	33.5%
Public outpatient clinic	24.3%
Covenant/private doctor	42.1%
Delivery type	
Vaginal	43.4%
C-section	56.6%
Number of children had	
None	43.9%
1 or 2	36.9%
3 or more	19.2%
Previous stillbirths	3.5%
Mothers who intend to put the baby to sleep belly up (supine position)	20.5%
Total	100.0% (n = 2395)

stitutions, the "Sleeping Belly Up" campaign was launched nationally, recommending mothers to put babies to sleep in this position.

The finding that one in five mothers showed intention to put the baby to sleep belly up suggests the potential growth of this campaign. Thus, it is worth noting that sleeping in this position reduces the occurrence of death among infants, especially between the second and fourth month of age. The implementation of the "Back to Sleep" campaign from 1991 halved the rate of sudden infant death in the United States, Austra-

Table 2. Gross and adjusted analyses for the mother's intention to put the baby to sleep belly up. Rio Grande, RS, 2010.

Level	Variable	Intention to put the baby to sleep belly up	Analysis (Prevalence ratio and CI95%)	
			Crude	Adjusted
I	Mother age (full years)		P = 0.985	P = 0.022
	Below 20	20.7%	1.00	1.00
	20 to 24	19.8%	0.96 (0.75-1.21)	0.78 (0.61-1.00)
	25 to 29	19.9%	0.96 (0.75-1.22)	0.71 (0.55-0.91)
	30 and over	20.0%	0.97 (0.76-1.23)	0.68 (0.52-0.88)
	Skin color (observed)		P = 0.019	P = 0.172
	White	21.4%	1.00	1.00
	Brown	18.4%	0.86 (0.70-1.06)	0.95 (0.78-1.17)
	Black	13.9%	0.65 (0.46-0.90)	0.73 (0.53-1.01)
	Living with companion		P = 0.810	P = 0.605
	Yes	20.1%	1.00	1.00
	No	19.6%	1.03 (0.83-1.27)	0.94 (0.76-1.17)
	Schooling (full years)		P = 0.000	P = 0.000
	0 to 4	12.6%	1.00	1.00
	5 to 8	14.7%	1.17 (0.78-1.76)	1.08 (0.72-1.62)
	9 to 11	22.4%	1.78 (1.21-2.64)	1.55 (1.05-2.30)
	12 and over	34.7%	2.76 (1.83-4.16)	1.99 (1.30-3.07)
	Household income (minimum wages)		P = 0.000	P = 0.000
	Below 1	13.8%	1.00	1.00
	1 to 1.9	16.5%	1.24 (0.93-1.66)	1.23 (0.92-1.65)
	2 to 3.9	20.1%	1.51 (1.12-2.05)	1.38 (1.01-1.88)
	3 to 4,9	23.2%	1.75 (1.30-2.36)	1.50 (1.10-2.05)
	5 and over	34.8%	2.61 (1.96-3.49)	2.06 (1.49-2.84)
	Paid work during pregnancy		P = 0.000	P = 0.367
	Yes	17.65%	1.00	1.00
	No	23.24%	1.32 (1.12-1.54)	1.08 (0.91-1.29)
II	Number of prenatal consultations performed		P = 0.003	P = 0.591
	0 to 5	21.6%	1.00	1.00
	6 and over	15.0%	1.43 (1.13-1.82)	1.09 (0.80-1.47)
	Started prenatal care in the first quarter		P = 0.001	P = 0.220
	Yes	21.9%	1.51 (1.19-1.90)	1.19 (0.90-1.56)
	No	14.5%	1.00	1.00
	Location for most prenatal consultations		P = 0.000	P = 0.000
	Basic health facility	14.1%	1.00	1.00
	Public outpatient clinic	18.7%	1.33 (1.03-1.70)	1.30 (1.01-1.68)
	Covenant/private doctor	26.1%	1.86 (1.51-2.28)	1.44 (1.13-1.85)
	Performed all prenatal care with the same doctor		P = 0.110	P = 0.735
	Yes	21.0%	0.84 (0.68-1.04)	0.96 (0.78-1.19)
	No	17.6%	1.00	1.00
	Delivery type		P = 0.118	P = 0.247
	Vaginal	18.6%	1.00	1.00
	C-section	21.2%	1.14 (0.98-1.34)	0.90 (0.75-1.08)
III	Number of children had		P = 0.000	P = 0.000
	None	25.6%	1.00	1.00
	1 or 2	18.0%	0.70 (0.59-0.84)	0.76 (0.63-0.93)
	3 or more	11.3%	0.44 (0.33-0.58)	0.56 (0.40-0.79)
	Previous stillbirths		P = 0.134	P = 0.718
	Yes	13.2%	0.65 (0.37-1.14)	0.90 (0.53-1.55)
	No	20.3%	1.00	1.00

lia and England. This led the post-neonatal mortality rate in these countries to fall from 2/1,000 to 1/1,000 live births, although its mechanism is still not well known[2,11].

The prevalence ratio for mothers aged 30 years and over for the intention of putting the baby to sleep belly up in relation to adolescent mothers was 0.68 (95% CI: 0.52-0.88). This means that these mothers are 32% less likely to put their child to sleep in this position than younger mothers. It is possible that this little inclination or even resistance of older mothers to this recommendation is due to previous favorable experience, since the SIDS is a very infrequent event, almost rare and that, moreover, shows great diagnostic difficulty[2,3].

It is also interesting to note that, when studying sudden death as an outcome, the greater age of mothers, even after controlling for several confounding factors, appears as a protective factor, while younger age appears as a risk factor[6,7,11]. This suggests that this young mother does not have so much autonomy and that, in daily life, she may be suffering from her mother's influence, that is, from the child's grandmother. This, however, deserves further investigation.

Prevalence ratio for the intention to put the baby to sleep in the supine position was significantly higher among mothers of higher household income and schooling than those with worse socioeconomic status. The risk of dying from SIDS is substantially higher among poorer families[3,6,7,10,11]. Higher levels of mothers schooling and household income provides mothers with greater knowledge, safety and independence, and this can be reflected in the intention to place the baby to sleep in the supine position. Among the poorest, the use of this position depends on constant encouragement from health professionals, which is not a routine practice[18]. Mothers who performed most consultations with private or covenanted doctors were much more likely to put their child to sleep in the dorsal position than those seen at PHC facilities (UBS). In the case of mothers with the lowest socioeconomic status, in general, in the UBS, there is greater resistance to adhere to the dorsal decubitus position as the safest position for their child to sleep[18,19]. It is quite possible that this greater inclination to put the baby to sleep belly up comes from the best level of schooling of the mothers attended in private practices. Thus, it should be emphasized that new knowledge and technologies first reach those with the lowest risk and only then reach the poorest[20]. However, this needs to be further investigated.

The higher the parity, the lower the PR for the intention of the mother to put the baby to sleep in the supine position. Nothing was found in literature that addressed this subject, either to justify or dismiss this finding. It is true that the higher the age, the greater the parity, and, therefore, the greater the experience. This often successful experiment, because SIDS is rare, may, in principle, be responsible for the resistance in putting the newborn to sleep belly up.

There is sufficient evidence that sleep in dorsal decubitus reduces the occurrence of sudden infant death[2,11]. Thus, it is recommended that health professionals relay, insist and encourage mothers to put the newborn to sleep in this position. This is because it is a simple, low-cost and easy-to-apply measure with proven effective results.

Finally, we believe that further studies are required on this topic in Brazil. These studies should include from knowledge of health professionals and mothers to the evaluation of the impact of this intervention on infant mortality, also considering the interference of grandparents on this practice and the resistance of doctors in recommending the adoption of this position as the safest for the baby to sleep. Sudden infant death syndrome should soon account for about 20% of all infant deaths in the country. It is important to further address and analyze this issue as soon as possible.

Collaborations

JA Cesar designed the study, coordinated data collection and was responsible for data analysis and final writing of the paper. JD Acevedo contributed to the analysis and final writing of the paper. CR Kaczan, JCP Venzo, LR Costa and LCM Silva prepared the database, performed the preliminary analysis and participated in the analysis and final writing of the paper. NA Neumann participated in the study design, data analysis and final writing of the paper. All authors approved the final version submitted to the CSC.

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Article submitted 06/10/2015
Approved 14/01/2016
Final version submitted 16/01/2016