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Falls, cuts and burns in children 0-4 years of age: 2004 Pelotas (Brazil) birth cohort

Acidentes por quedas, cortes e queimaduras em crianças de 0-4 anos: coorte de nascimentos de Pelotas, Rio Grande do Sul, Brasil, 2004

Accidentes por caídas, cortes y quemaduras en niños de 0-4 años: cohorte de nacimientos de Pelotas, Rio Grande do Sul, Brasil, 2004

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Abstract

Knowledge on the incidence of childhood accidents according to the child's stage of development is important for designing preventive programs targeting each age bracket. The aim of this study was to describe the incidence of falls, cuts, and burns in children up to four years of age according to family economic status and maternal age and schooling, in children from the 2004 Pelotas (Brazil) birth cohort. We calculated the incidence rates and incidence rates ratios for the 0-12, 12-24, and 24-48- months of age. Falls were the most frequently reported accidents in all the age brackets, followed by cuts and burns. Boys suffered more falls and cuts than girls in the first two years of life. In the second year of life, the incidence of falls and burns practically tripled, while cuts nearly doubled when compared to the first year, in both sexes. Burns were equally frequent in girls and boys in all three age brackets. The incidence of falls and cuts was higher in boys. In both sexes, having an adolescent mother was associated with falls and cuts in all three age brackets; low maternal schooling was associated with burns and cuts at 48 months; and low family socioeconomic status was associated with falls and cuts at 48 months.

Accidents; Accidental Falls; Burns; Penetrating Wounds; Child

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Introduction

Accidents are a worldwide health problem and the leading cause of death in children and young adults in many countries [1,2,3]. An estimated 875,000 or more children and adolescents die every year in the world from intentional and unintentional injuries [2]. The majority of accidents in childhood include falls, burns, cuts, drowning, and poisoning [4], with consequences ranging from temporary physical incapacity to more serious and permanent sequelae or even death [5].

Childhood accidents care often interpreted as chance incidents or normal events for age [6,7], but studies have shown that low family socioeconomic status, inadequate supervision, family stress, inadequate housing conditions, and the child's own personality characteristics such as hyperactivity, aggressiveness, impulsivity, and inattention are risk factors for accidents [8].

There are no current population-based data on the distribution of childhood accidents according to severity of the injury, since most studies are done in users of health services, mainly emergency departments, with rare population-based studies [9,10]. However, three decades ago a population-based study in Massachusetts showed that the majority of children that suffered accidents did not even reach the health services: for each accident resulting in death there were 45 children with injuries that required hospitalization, 1,300 that required outpatient or emergency room medical treatment, and nearly 2,500 that never came to the knowledge of health services [11].

A report by the World Health Organization (WHO) in 2014 showed that more than 5 million persons die per year due to injuries, including self-inflicted injuries, traffic accidents, burns, drowning, falls, and poisoning, among others [12]. In Brazil, data from the *Surveillance System on Violence and Accidents* (VIVA Survey), obtained from sentinel urgency and emergency services in 24 state capitals and the Federal District in September-October 2011 estimated that approximately 14,225 persons were treated due to falls, of which about one-fourth (24.1%) were children 0-9 years of age [13].

Knowledge on the incidence of accidents according to the child's stage of development is important for designing preventive programs targeting each age bracket. In Brazil, various measures to reduce the morbidity and mortality from accidents and violence have been recommended in the National Policy for the Reduction of Morbidity and Mortality from Accidents and Violence, including: promotion of health behaviors and environments; monitoring the occurrence of accidents; and systematization, expansion, and consolidation of prehospital care for victims of accidents, among others, aimed at better care and the development of new studies in the area [14]. Thus, this study aimed to describe the incidence of falls, cuts, and burns up to four years of age according to family socioeconomic status and maternal age and schooling, among children from the 2004 Pelotas (Brazil) birth cohort.

Methodology

Located in the far South of Brazil, in the State of Rio Grande do Sul, the city of Pelotas has 330,000 inhabitants (Instituto Brasileiro de Geografia e Estatística. Censo demográfico de 2010. http://cidades.ibge.gov.br/xtras/perfil.php?lang=&codmun=431440&search=rio-grande-do-sul|pelotas, accessed on 20/Mar/2015). All infants of mothers living in the city limits and born in the five maternity hospitals from January 1st to December 31st, 2004, were eligible to participate in the 2004 Pelotas (Brazil) birth cohort, a prospective cohort study. To date, the children have received visits at 3, 12, 24, 48, and 72 months and 11 years of age. Of the 4,231 live born children included in the cohort, the proportions visited at 12, 24, and 48 months were 94.3%, 93.5%, and 92%, respectively. At 48 months, the proportion visited was higher (94%) in children of older mothers (≥ 35 years) and lower (~90%) in families at the highest and lowest income extremes [15]. The questionnaires applied at each follow-up visit contained questions on the mothers' and children's demographic, socioeconomic, behavioral, and biological characteristics. Further details on the cohort have been published elsewhere [15,16,17]. The current study analyzed 3,815 children at 0-12 months of age, 3,783 at 12-24 months, and 3,717 at 24-48 months for which there was information available on outcomes. Twins were excluded from the current analyses (86 children).

An accident was defined as any event reported and interpreted as such by the mother or guardian as long as it resulted in some physical injury, and recorded at the follow-up visits at 12, 24, and 48 months of age. At 12 months, the section of the questionnaire on accidents began with "Now I'm going to ask you some questions about accidents that <CHILD> has had". Next, the following were asked in order: "Has <CHILD> fallen and gotten hurt?", "Has <CHILD> gotten cut?", and "Has <CHILD> gotten burned?", with the following options: "no, yes, or don't know". When the answer was "yes", they were asked: "How many times?" At the 24 and 48-month visits, the questions were similar but referred to the time elapsed between the previous and current visits. For example, at 24 months they were asked: "Since 1 year old, has <CHILD> fallen and gotten hurt?"

A fall was defined as the mother responding in the affirmative that the child had fallen and gotten hurt, bruised, or scraped or scratched. Cuts were investigated as caused by knives, glass, or other sharp objects and burns were defined as resulting from hot liquids or objects, fire, or inflammable substances. The questionnaire recorded the occurrence and number of falls, cuts, and burns between 0-12, 12-24, and 24-48 months of age. As for the number de accidents, when the mother answered "many times" or "several times", the children were classified in the category for the largest absolute number of accidents. In the follow-up visits at 12 and 24 months, the recall period referred to the 12 months prior to the interview (between 0-12 and 12-24 months, respectively). In the visit at 48 months, the recall referred to the two years prior to the interview (from 24 to 48 months of age).

Independent variables were obtained in the perinatal period and included mother's age (complete years at childbirth, subsequently categorized as < 20, 20-30, and > 30 years); maternal schooling, recorded as complete years of school with passing grades, and for analysis, categorized as 0-4, 5-8, and > 8 years; and family economic index, which was constructed on the basis of information on consumer assets and head-of-family's education and subsequently divided into five quintiles, with Q1 as the lowest (poorest families) and Q5 as the highest (wealthiest families).

The analyses were conducted with Stata 12.0 (StataCorp LP, College Station, U.S.A.). Two outcomes were analyzed: the percentage of children that suffered at least one of each of the types of accident per period and the incidence rate for each of the types of accident, per 100 children, per period. The cumulative incidence rates for each type of accident in each period and over the first four years of life were calculated by Poisson regression, presented as incidence rates ratios, with 95% confidence intervals (95%CI). All analyses were stratified by the child's sex, and the incidence rates were presented according to maternal age and schooling and family economic index.

This study was approved by the Institutional Review Board of the School of Medicine, Federal University of Pelotas (COCEPE n. 4.06.01.113; OF.046/06; and OF.012/07). All the mothers signed a free and informed consent form at each visit, agreeing to participate in the study.

Results

Table 1 shows the distribution of the entire cohort and stratified by sex according to maternal age and schooling and family economic index at the time of the child's birth. The largest proportion of mothers belonged to the 20-30-year age bracket, with eight or more years of schooling. Mean maternal age and years of schooling and standard deviations at the time of childbirth were 26.1 ± 6.8 and 8.2 ± 3.5 years, respectively. There were no differences between boys and girls in the distribution of these characteristics (Table 1).

The study included 3,815 children for the analysis at 0-12 months (1,837 girls and 1,978 boys), 3,783 at 12-24 months (1,815 girls and 1,968 boys), and 3,717 at 24-48 months (1,782 girls and 1,935 boys). A total of 3,563 children (1,706 girls and 1,857 boys) had complete information on accidents at all the follow-up visits, from 0 to 48 months of age.

Among boys, the medians (interquartile intervals) of falls for 0-12, 12-24, and 24-48 months were 1 (0-2), 2 (1-10), and 2 (0-20) respectively; among girls, corresponding figures were 0 (0-1), 2 (0-10), and 2 (0-20). Medians (interquartile intervals) of cuts for 0-12, 12-24, and 24-48 months in boys were 0 (0-0), 0 (0-1), and 0 (0-1); and in girls, 0 (0-0), 0 (0-0), and 0 (0-1). For burns, the median and interquartile interval for boys and girls in the three age periods was 0 (0-0).

Table 1

Description of sample according to maternal characteristics at admission for childbirth, stratified by newborn's sex.

Maternal characteristics	Girls		Boys		Total	
	n	%	n	%	n	%
Age (years) [n = 3,927]						
< 20	358	18.9	384	18.9	742	18.9
20-30	1,015	53.7	1,100	54.0	2,115	53.8
> 30	518	27.4	552	27.1	1,070	27.3
Schooling (years) [n =3,892]						
0-4	288	15.4	302	14.9	590	15.2
5-8	778	41.6	828	40.9	1.606	41.2
> 8	803	43.0	893	44.2	1.696	43.6
Family income index (quintiles) [n = 3,929]						
1st	367	19.4	390	19.2	757	19.3
2nd	386	20.4	383	18.8	769	19.6
3rd	393	20.8	397	19.5	790	20.1
4th	366	19.3	433	21.3	799	20.3
5th	381	20.1	433	21.3	814	20.7

Accidents in the first year of life

Falls were the most frequent accidents in the first year of life. About half of the cohort (49.5% of girls and 55.6% of boys) (Table 2) had suffered at least one fall during this period, with an incidence rate of 105 (100-109) per 100 girls and 136 (131-141) per 100 boys (Table 3). Cuts were reported in 14.2% of the children (12.1% of girls and 16.2% of boys), with an incidence rate of 14 (13-16) per 100 girls and 21 (19-23) per 100 boys. Burns were the least frequent accidents in the first year of life: 6% of the children (5.2% of girls and 6.5% of boys) had a history of burns, with an incidence rate of 6 (4-7) per 100 girls and 7 (6-8) per 100 boys.

Table 3 shows the incidence rates ratios for falls, cuts, and burns between girls and boys. Among daughters of adolescent mothers, the incidence of falls and cuts was twice as high as among daughters of mothers over 30 years of age, taken as the reference (rates ratio = 2.03; 1.78-2.33 for falls and rates ratio = 2.00; 1.36-2.95 for cuts). The incidence of burns in girls was three times as high when the mother had low schooling (0-4 years) when compared to mothers with more than eight years of formal education.

Among sons of adolescent mothers, the incidence of falls was 50% higher and that of cuts was 80% higher when compared to sons of mothers over 30 years of age (Table 3). Sons of mothers with 5-8 years of schooling showed 8% and 3% higher incidence of falls and cuts, respectively, than sons of mothers with more than eight years of education. Burns in the first year of life were more frequent in boys from the poorest economic strata.

Accidents in the second year of life

More than 70% of children suffered some fall between their first and second birthdays (Table 2), with an incidence of 364 (355-373) falls per 100 girls and 428 (419-437) per 100 boys (Table 4). Cuts and burns were less frequent: 21% of girls and 25% of boys suffered some cut, while burns occurred in 17% of girls and 19% of boys (Table 2). Incidence of cuts was 28 (26-31) per 100 girls and 39 (36-42) per 100 boys; burns was 20 (18-22) per 100 girls and 23 (21-25) per 100 boys (Table 4).

In both sexes, incidence of falls and cuts was higher in children of mothers under 30 years of age (Table 4). When compared to girls and boys whose mothers had more than 8 years of schooling, daughters of mothers with less schooling showed a lower incidence of falls and a higher incidence

Table 2

Proportion of boys and girls that suffered at least one fall, cut, or burn according to age. 2004 Pelotas (Brazil) birth cohort.

Accidents	0-12 months			12-24 months			24-18 months		
	Girls % (95%CI)	Boys % (95%CI)	p-value	Girls % (95%CI)	Boys % (95%CI)	p-value	Girls % (95%CI)	Boys % (95%CI)	p-value
Falls	49.5 (47.2-51.8)	55.6 (42.3-46.6)	< 0.001	70.4 (68.3-72.5)	77.7 (75.8-79.5)	< 0.001	67.7 (65.5-69.9)	71.6 (69.5-73.6)	< 0.001
Cuts	12.1 (10.6-13.6)	16.2 (14.6-17.8)	< 0.001	20.9 (19.1-22.8)	25.4 (23.4-27.3)	0.001	28.9 (26.8-31.0)	31.6 (29.6-33.7)	0.07
Burns	5.2 (4.2-6.2)	6.5 (5.4-7.6)	0.10	16.9 (15.1-18.6)	19.1 (17.4-20.8)	0.08	15.8 (14.1-17.5)	17.5 (15.8-19.2)	0.17

95%CI: 95% confidence interval

Table 3

Incidence rates per 100 children and incidence rates ratios for falls, cuts, and burns at 12 months (95% confidence interval – 95%CI) according to maternal age and schooling and family economic index, stratified by child's sex and age. 2004 Pelotas (Brazil) birth cohort (n = 3,815).

Characteristics	Accidents					
	Falls		Cuts		Burns	
	Girls % (IC95%)	Boys % (IC95%)	Girls % (IC95%)	Boys % (IC95%)	Girls % (IC95%)	Boys % (IC95%)
Maternal age (years)	p < 0.001	p < 0.001	p = 0.0002	p = 0.0003	p = 0.08	p = 0.46
< 20	2.03 (1.78-2.33)	1.50 (1.34-1.69)	2.00 (1.36-2,95)	1.79 (1.33-2.42)	1.76 (1.04-3,0)	1.33 (0.81-2.20)
20-30	1.54 (1.37-1.74)	1.27 (1.15-1.40)	1.87 (1.34-2.61)	1.52 (1.18-1.96)	1.10 (0.69-1.77)	1.25 (0.83-1.88)
> 30	1.00	1.00	1.00	1.00	1.00	1.00
Schooling (years)	p = 0.63	p = 0.01	p = 0.90	p = 0.04	p < 0.001	p = 0.29
0-4	0.98 (0.86-1.13)	0.92 (0.82-1.03)	0.93 (0.64-1.34)	0.69 (0.49-0.96)	3.11 (1.91-5.06)	1.10 (0.66-1.83)
5-8	1.04 (0.94-1.15)	1.08 (1.0-1.18)	0.95 (0.73-1.24)	1.03 (0.84-1,27)	1.46 (0.92-2.32)	1.33 (0.93-1.90)
> 8	1.00	1.00	1.00	1.00	1.00	1.00
Family economic income (quintiles)	p = 0.003	p = 0.064	p = 0.62	p = 0.45	p = 0.046	p = 0.049
1st	1.18 (1.02-1.37)	1.09 (0.97-1.23)	1.01 (0.68-1.52)	1.13 (0.83-1.55)	2.05 (1.12-3.74)	1.84 (1.07-3.16)
2nd	1.29 (1.12-1.48)	1.03 (0.91-1.16)	1.15 (0.79-1.70)	1.06 (0.77-1.47)	1.73 (0.94-3.20)	1.73 (1.00-3.00)
3rd	1.06 (0.91-1.22)	1.0 (0.89-1.12)	1.30 (0.89-1.90)	1.15 (0.84-1.57)	1.05 (0.53-2.09)	0.98 (0.53-1.82)
4th	1.08 (0.94-1,26)	0.91 (0.81-1,03)	1.06 (0.71-1.58)	1.32 (0.98-1.77)	1.11 (0.56-2.19)	1.57 (0.90-2.69)
5th	1.00	1.00	1.00	1.00	1.00	1.00
Incidence/100 children	105 (100-109)	136 (131-141)	14 (13-16)	21 (19-23)	6 (4-7)	7 (6-8)

of cuts, while sons showed a lower incidence of both falls and cuts. Among the poorest children, the incidence of falls was lower and that of cuts was higher than among the wealthiest. Burns were more frequent in sons of adolescent mothers and mothers with less schooling (Table 4).

Accidents between 2 and 4 years of age

Falls continued to be the most frequent type of accidents: two-thirds of girls and 71% of boys suffered some fall during the period (Table 2), with an incidence of 318 (313-324) per 100 girls and 362 (356-368) per 100 boys per year (Table 5). Some 30% das children (28.9% of girls and 31.6% of boys) suffered at least one cut, with an annual incidence of 25 (23-26) per 100 girls and 31 (29-32) per 100 boys. Although the proportion of children that suffered some burn was similar to that seen in the second year of life (15.8% of girls and 17.5% of boys), the incidence of burns decreased to 9 (8-10) per 100 girls and 10 (9-11) per 100 boys per year.

As in younger age brackets, falls and cuts were more frequent in children of mothers under 30 years and belonging to the poorest quintiles (Table 5). Incidence of cuts and burns was higher in children of mothers with less than 8 years of schooling (Table 5).

Discussion

The observed increase in the accident rate from the first to the second year of life in both sexes is consistent with the literature [18,19,20]. The higher incidence in boys has also been reported by other authors [9,10,11,18,19,20,21,22,23,24,25,26]. The reasons for the difference between sexes are not clear. Some suggest that boys' greater vulnerability may be due to personality traits making them more involved than girls in risky situations [2]. Meanwhile, parental supervision of girls may be greater, and their games may differ from those of boys [1].

The incidence rate for the three types of accidents taken together over the course of the four years in the current study was 337 per 100 children, with falls reported most frequently (286 per 100 children 0-4 years of age) (data not shown). Data from the VIVA Survey (2009-2011) show that of all treatments for accidents in children, falls accounted for the highest proportion [13]. The incidence rate for cuts in the 0-4-year period in the current study was 27 per 100 children, while that of burns was 12 per 100 children (data not shown). The incidence rate observed by Fonseca et al. [21] in one month in a subsample of the 1993 Pelotas (Brazil) birth cohort was 26 per 100 children, consistent with our findings, since that study was done between November 1997 and May 1998, when the children were 4 to 5 years of age. The surveillance system in hospitals and emergency rooms in Massachusetts in 1980-81 also recorded falls as the most frequent accidents [11]. In Chicago (1994-1998), of treatments in emergency departments, falls showed the highest incidence of accidents in children 0-4 years [26]. According to Mohammadi et al. [10], using data from emergency departments in the Islamic Republic of Iran, the most frequent accidents were burns, cuts, and falls, in that order.

It was not possible to compare the associations between types of accidents in each childhood age bracket and maternal and family income variables with the findings from other studies. We only found one study in the literature that investigated the incidence of accidents according to family and maternal variables, in which no association was found between family income, parents' schooling, and children's accidents [21]. The above-mentioned report by the WHO [12] shows that accidents are more frequent among lower-income individuals, both in middle and low-income countries and in wealthier countries, which is consistent with our findings. A case-control study nested in a cohort that investigated risks of burns in under-5 children found that children of mothers over 40 years were less likely to suffer burns when compared to children of adolescent mothers, contrary to the current study [27]. But in the same study, the relationship between accidents and family income agreed with our findings, since children of families with fewer consumer goods showed higher odds of burns, when compared to wealthier families [27].

Preventive measures should be considered in order to reduce the childhood accident rates. According to the WHO, planning, implementing, and monitoring effective preventive strategies should follow these steps: monitoring the extent and nature of accidents, identifying risk factors,

Table 4

Incidence rates per 100 children and incidence rates ratios for falls, cuts, and burns at 24 months (95% confidence interval – 95%CI) according to maternal age and schooling and family economic index, stratified by child's sex and ag. 2004 Pelotas (Brazil) birth cohort (n = 3,783).

Characteristics	Accidents					
	Falls		Cuts		Burns	
	Girls % (95%CI)	Boys % (95%CI)	Girls % (95%CI)	Boys % (95%CI)	Girls % (95%CI)	Boys % (95%CI)
Maternal age (years)	p < 0.001	p < 0.001	p < 0.001	p < 0.001	p = 0.18	p = 0.002
< 20	1.22 (1.13-1.31)	1.18 (1.10-1.26)	1.80 (1.39-2.33)	1.62 (1.30-2.02)	1.33 (0.98-1.81)	1.58 (1.19-2.11)
20-30	1.21 (1.15-1.29)	1.11 (1.06-1.17)	1.39 (1.11-1.74)	1.53 (1.27-1.84)	1.16 (0.90-1,50)	1.44 (1.13-1.83)
> 30	1.00	1.00	1.00	1.00	1.00	1.00
Schooling (years)	p < 0.001	p < 0.001	p = 0.0001	p = 0.001	p = 0.16	p = 0.04
0-4	0.85 (0.79-0.92)	0.70 (0.66-0.75)	0.91 (0.69-1.22)	1.29 (1.05-1.59)	1.27 (0.94-1.71)	1.08 (0.81-1.44)
5-8	1.02 (0.97-1.08)	0.89 (0.85-0.93)	1.42 (1.18-1.71)	1.32 (1.13-1.54)	1.21 (0.96-1.52)	1.29 (1.05-1.58)
> 8	1.00	1.00	1.00	1.00	1.00	1.00
Family economic income (quintiles)	p = 0.027	p < 0.001	p = 0.12	p < 0.001	p = 0.12	p = 0.80
1st	0.94 (0.87-1.01)	0.86 (0.80-0.92)	1.46 (1.10-1.93)	1.68 (1.34-2.10)	1.55 (1.11-2.19)	1.35 (1.02-1.80)
2nd	0.89 (0.82-0.96)	0.98 (0.92-1.05)	1.30 (0.98-1.72)	1.59 (1.27-2.00)	1.30 (0.92-1.84)	0.97 (0.71-1.33)
3rd	0.97 (0.90-1.04)	0.92 (0.86-0.98)	1.27 (0.96-1.69)	1.06 (0.83-1.36)	1.26 (0.89-1.79)	0.99 (0.73-1.34)
4th	0.93 (0.86-1.00)	1.09 (1.02-1.16)	1.22 (0.91-1.64)	1.12 (0.89-1.43)	1.43 (1.00-2.02)	1.23 (0.92-1.63)
5th	1,00	1.00	1.00	1.00	1.00	1.00
Incidence/100 children	364 (355-373)	428 (419-437)	28 (26-31)	39 (36-42)	20 (18-22)	23 (21-25)

developing strategies to address causes, assessing the effects of these measures, and finally implementing effective programs for prevention [12]. In Brazil, national policies to reduce morbidity and mortality due to accidents and violence, and comprehensive child health care, should prioritize, among others, monitoring the extent and nature of accidents that reach urgency and emergency services, and accident prevention, respectively [14,28].

The current study has both strengths and limitations. The strengths feature the population base, cohort design, relatively long observation period, and low proportion of losses at each follow-up visit. The difference of 514 children (12%) from the beginning of the cohort to the 48-month analyses was due to the following: 94 deaths, 338 losses and refusals (change of city; change of address and at least three unsuccessful attempts to locate the family, on different days and at different times), and 82 children with no information on accidents at four years of age. Comparing the losses to the total cohort, the only difference was in maternal age (the number of mothers lost at the 48-month follow-up visit was higher in the 20-30-year age bracket). The great majority of previously published studies have been done in data from hospitals, specialized trauma centers, and case series in emergency rooms. These data sources present limitations, either because they represent the most serious accidents, which require medical care, or because they analyze specific types of accidents such as falls from bunk beds, falls while ice skating, etc.

Table 5

Incidence rates per 100 children and incidence rates ratios for falls, cuts, and burns at 48 months (95% confidence interval – 95%CI) according to maternal age and schooling and family economic index, stratified by child's sex and age. 2004 Pelotas (Brazil) birth cohort (n = 3,717).

Characteristics	Accidents					
	Falls		Cuts		Burns	
	Girls % (95%CI)	Boys % (95%CI)	Girls % (95%CI)	Boys % (95%CI)	Girls % (95%CI)	Boys % (95%CI)
Maternal age (years)	p < 0.001	p < 0.001	p = 0.01	p = 0.0001	p = 0.25	p = 0.51
< 20	1.43 (1.35-1.51)	1.49 (1.42-1.57)	1.33 (1.10-1.61)	1.31 (1.10-1.56)	1.31 (0.95-1.81)	1.05 (0.78-1.42)
20-30	1.22 (1.17-1.28)	1.28 (1.23-1.33)	1.10 (0.94-1.29)	1.35 (1.17-1.55)	1.17 (0.90-1.52)	1.14 (0.90-1.44)
> 30	1.00	1.00	1.00	1.00	1.00	1.00
Schooling (years)	p < 0.001	p < 0.001	p < 0.001	p < 0.001	p = 0.04	p = 0.03
0-4	0.84 (0.79-0.89)	1.00 (0.96-1.06)	1.58 (1.31-1.91)	2.06 (1.75-2.42)	1.22 (0.87-1.70)	1.11 (0.82-1.51)
5-8	0.99 (0.95-1.03)	1.18 (1.14-1.22)	1.41 (1.21-1.64)	1.75 (1.54-2.00)	1.37 (1.07-1.74)	1.33 (1.07-1.64)
> 8	1.00	1.00	1.00	1.00	1.00	1.00
Family economic income (quintiles)	p < 0.001	p < 0.001	p < 0.001	p < 0.001	p = 0.15	p = 0.48
1st	1.22 (1.15-1.30)	1.09 (1.04-1.15)	1.70 (1.37-2.10)	2.90 (2.39-3.53)	1.11 0.77-1,62)	1.29 (0.95-1.76)
2nd	1.14 (1.08-1.21)	0.98 (0.93-1,03)	1.34 (1.07-1.67)	2.18 (1.77-2.68)	1.23 (0.86-1.77)	1.21 (0.88-1.66)
3rd	1.18 (1.11-1.25)	1.02 (0.96-1.07)	1.31 (1.06-1.64)	1.62 (1.31-2.01)	1.16 (0.81-1.66)	1.04 (0.75-1.44)
4th	1.07 (1.01-1.14)	0.97 (0.92-1.02)	1.02 (0.81-1.30)	1.44 (1.16-1.78)	1.54 (1.09-2.17)	1.16 (0.85-1.58)
5th	1.00	1.00	1.00	1.00	1.00	1.00
Incidence/100 children	637 (625-649)	724 (712-736)	49 (46-53)	61 (58-65)	18 (16-20)	21 (19-23)

Among the limitations, the study did not look into the circumstances leading to the accident (place of occurrence, the person that was with the child at the time, etc.), the injury's specific severity, or whether medical treatment was required, all important aspects when designing preventive measures. According to unpublished data from the 2004 cohort, 14 children 0-4 years of age were hospitalized due to falls, cuts, or burns (incidence rate of 1 per 1,000 children), half of which due to the latter. Another limitation is that the study did not evaluate swallowing and/or inhaling foreign bodies, poisoning from medicines and household cleaning products, insect bites, or bites by pets or venomous animals. In addition, since the information depends on the parent or guardian's perception of falls, cuts, or burns, there may have been an information bias, given that interpretation of the questions may vary according to prior experience. We found no articles on studies designed to measure the validity of maternal information on childhood accidents. However, the high incidence rates suggest some hypotheses: are the environments habitually frequented by children in Pelotas too unsafe, or do the high incidence rates result essentially from the inclusion of accidents that involved trivial injuries? Studies in hospitals and emergency rooms show much lower incidence rates. For example, the fall rate in the 0-5-year age bracket in the Massachusetts study was 18 per 100 children/year, [11] and in Chicago, in the 0-4-year bracket it was 12 per 100 children/year [26]. Future studies may shed light on this issue. However, the relatively long recall period at each follow-up visit favored the reporting of accidents that resulted in more serious injuries. Thus, safety conditions for children in Pelotas need

to be investigated in studies designed specifically for this purpose. In addition, the scope of this study did not include the investigation of cultural and regional characteristics pertaining to family care, the values culturally transmitted as care, or the paternal role in accident prevention.

Despite the limitations, this study expands the knowledge base by presenting incidence rates based on data collected from birth to four years of age. Measures to prevent falls, cuts, and burns are already well defined [29,30] and include the protection of cribs, beds, stairways, and windows to avoid falls; keeping ornaments, kitchen utensils, scissors, and sharp objects out of children's reach to avoid cuts; and watching bathwater temperature, keeping hot pans out of reach on the stove, and hindering access to easily combustible objects, thereby preventing burns. Adolescent mothers and poorer families with less schooling should be targeted by health actions in order to implement preventive measures in risky environments.

Conclusions

In summary, this study showed that falls were the most frequent accidents in both boys and girls up to four years of age. Boys suffered more falls and cuts than girls in the first two years of life, after which there was no difference between the sexes. In the second year of life, the incidence of falls and burns practically tripled and that of cuts doubled in comparison to the first year, in both sexes. Burns occurred at equal rates between girls and boys in all three age periods. The incidence rates for falls and cuts stabilized after 2 years of age, while the incidence of burns dropped to close to the rates in the first year of year of life.

In addition, children (both boys and girls) of adolescent mothers were more likely to suffer falls and cuts in all three periods, and boys were more likely to suffer burns in the second year of life. Low maternal schooling was associated with more cuts and burns reported at 48 months in both sexes; with cuts in boys at 24 months; and with burns in girls at 12 months. Low family income was associated with falls and cuts reported at 48 months and with burns reported at 12 months in both sexes; and with falls in girls at 12 months and cuts in boys at 24 months.

Contributors

R. S. Barcelos and I. S. Santos participated in the conception, project, data analysis and interpretation, writing of the article and relevant critical revision of the content, and approval of the final version for publication. A. Matijasevich, A. J. D. Barros, F. C. Barros, G. V. A. França and V. L. S. Silva contributed in the relevant critical revision of the content and approval of the final version for publication.

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Resumo

O conhecimento da incidência de acidentes na infância, de acordo com o estágio de desenvolvimento da criança, é importante para a formulação de programas de prevenção dirigidos para cada faixa etária. O objetivo deste estudo foi descrever a incidência de quedas, cortes e queimaduras, até os quatro anos de idade, conforme nível econômico da família e idade e escolaridade maternas, entre as crianças da coorte de nascimentos de Pelotas, Rio Grande do Sul, Brasil, 2004. Foram calculadas as taxas de incidências e razões de taxas de incidências entre 0-12, 12-24 e 24-48 meses. As quedas foram os acidentes mais relatados em todos os períodos, seguidas dos cortes e queimaduras. Os meninos sofreram mais quedas e cortes do que as meninas nos dois primeiros anos de vida. No segundo ano de vida, a incidência de quedas e queimaduras praticamente triplicou e a de cortes dobrou, em comparação ao primeiro ano, dentre ambos os sexos. As queimaduras ocorreram com igual frequência entre meninas e meninos nos três períodos de idade analisados. Em suma, a incidência de quedas e cortes foi maior entre os meninos. Em ambos os sexos, ter mãe adolescente foi associado a quedas e cortes nos três períodos analisados; ter mãe com baixa escolaridade esteve associado a queimaduras e cortes aos 48 meses; e ser de família de baixo nível socioeconômico, a quedas e cortes aos 48 meses.

Acidentes; Acidentes por Quedas; Queimaduras; Ferimentos Penetrantes; Criança

Resumen

El conocimiento de la incidencia de accidentes en la infancia, de acuerdo con el grado de desarrollo del niño, es importante para la formulación de programas de prevención dirigidos para cada franja de edad. El objetivo de este estudio fue describir la incidencia de caídas, cortes y quemaduras, hasta los cuatro años de edad, conforme el nivel económico de la familia y edad y escolaridad maternas, entre los niños de la cohorte de nacimientos de Pelotas, Rio Grande do Sul, Brasil, 2004. Se calcularon las tasas de incidencias y razones de tasas de incidencias entre 0-12, 12-24 y 24-48 meses. Las caídas fueron los accidentes más relatados en todos los períodos, seguidos de los cortes y quemaduras. Los niños sufrieron más caídas y cortes que las niñas durante los dos primeros años de vida. En el segundo año de vida, la incidencia de caídas y quemaduras prácticamente se triplicó y la de cortes se duplicó, en comparación con el primer año, entre ambos sexos. Las quemaduras se produjeron con igual frecuencia entre niñas y niños durante los tres períodos de edad analizados. En resumen, la incidencia de caídas y cortes fue mayor entre los niños. En ambos sexos, tener madre adolescente se asoció a caídas y cortes en los tres períodos analizados; tener madre con baja escolaridad estuvo asociado a quemaduras y cortes a los 48 meses; y ser de familia de bajo nivel socioeconómico, a caídas y cortes a los 48 meses.

Accidentes; Accidentes por Caídas; Quemaduras; Heridas Penetrantes; Niño

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