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Unintentional Injuries in Brazilian Preschool Children

Bianca Zimmermann Santos[1], Carla Miranda[2], Keila Cristina Pereira Rausch[2], Vera Lucia Bosco[3], Mabel Mariela Rodríguez Cordeiro[3], Suely Grosseman[3]

[1] Associate Professor, School of Dentistry, Centro Universitário Franciscano, Santa Maria, RS, Brazil.
[2] Professor, School of Dentistry, University of Southern Santa Catarina, Tubarão, SC, Brazil.
[3] Professor, Department of Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil.

ABSTRACT

Objective: To estimate the prevalence of unintentional injuries among children attending public preschools of Florianópolis (Santa Catarina, Brazil) and describe their epidemiological characteristics. **Materials and Methods:** This is a descriptive cross-sectional study conducted with 398 children in 2009 and data were collected through a questionnaire, filled by parents. Statistical analysis was performed, considering a confidence interval of 95%. **Results:** Among the 398 children included, 275 (69.1% - 95%: 66.8 to 71.4%) suffered unintentional injuries, making a total of 573 cases. The sample comprised 55.5% male children between 13 and 36 months (61.6% - 95% CI: 59.3 to 63.9%) that were affected. Child home was the place where 352 (61.4% - 95% CI: 59.0 to 63.8%) injuries occurred, 372 (64.9% - IC95%: from 59.1 to 73.7%), which were caused by falls, and 342 (59.7% - 95%:57.3 to 62.1%) were considered mild. In 223 (38.9% - 95%: 36.5% -41.3%) cases, the mother accompanied the child at the time of injury. **Conclusion:** The prevalence of unintentional injuries was high. In the context of prevention, combined actions among health professionals, government and civil society should be proposed based on local research on the topic. In the era of family health care performed by multidisciplinary teams, it is critical that these injuries receive adequate importance by health professionals and attention in public health policies.

Key-words: Accidents; Accident prevention; Cross-sectional studies; Preschool child.

INTRODUCTION

Despite the evolution of scientific and technological knowledge and medical advances in an attempt to improve the life conditions of people, the occurrence of unintentional injuries in childhood remains a major public health problem [1-7]. In the U.S., approximately 33 children die every day due to unintentional injuries [8].

As the concept of accident is associated with causality and unpredictability, there was need for change in the use of this term, because most accidents can be prevented through education, changes in environment and engineering, creation and enforcement of legislation and specific regulations [9]. Therefore, it is suggested that the term "accident" is replaced by "unintentional injuries" [10].

Children are more vulnerable to unintentional injuries such as falls, injuries caused by sharp objects, poisoning, burns and shocks due to their physical, psychological and behavioral characteristics and because they live in environments designed for adults [11], and the more young and immature the child, the lower his risk perception and motor coordination, which greatly increases his vulnerability and dependence on other people in relation to safety against unintentional injuries [1,2].

Worldwide, unintentional injuries are among the 15 leading causes of death in the age group ranging from 0 to 19 years. In addition to social, economic and emotional impact to family and society, unintentional injuries penalize children and adolescents at their phase of growth and development, in many cases, leaving permanent after-effects [12].

As the source of unintentional injuries is the result of environmental, emotional and especially educational factors, it is understood that in the context of prevention, positive results will be achieved as combined actions are proposed among health professionals, government and civil society [13]. Whereas the mortality rates due to unintentional injuries have increased significantly over the decades [1,2,6,12], the need for policies and strategies to mitigate this public health problem has mobilized societies and organizations [14].

In this context, the conduction of studies to characterize unintentional injuries and their victims in order to better target efforts for their control is of utmost importance. The aim of this study was to estimate the prevalence of unintentional injuries among children attending public preschools of Florianópolis, Santa Catarina, Brazil and describe their epidemiological characteristics.

MATERIALS AND METHODS

Subjects and Study Design

This is a descriptive cross-sectional study conducted with children attending public preschools of Florianópolis / SC / Brazil, in 2009.

Florianópolis is the capital of the State of Santa Catarina, located in southern Brazil. In 2009, there were 10,000 children enrolled in preschools of the municipal network, distributed among 68 educational units. All children enrolled in these schools aged from two years were eligible to be included in the study.

The sample size calculation was based on the following parameters: confidence level of 95%, prevalence of unintentional injuries among children in the first year of life of 86% [15] and margin of error of 3.5%. This calculation determined a minimum sample size of 385 children. After adding a sample increment of 25% for losses and refusals, questionnaires were given to parents of 481 children. The sample was stratified by city regions, considering all five regions: North - 17 schools, Central - 22 schools, East - 3 schools, South - 16 schools and Mainland - 10 schools. The number of selected schools for the study was proportional: North - 3 schools, Central - 4 schools, East -1 school, South - 3 schools and Mainland - 2 schools.

Prior to data collection, the examiner was submitted to a process of training and calibration with the aim of studying the diagnostic criteria and measuring the diagnostic reproducibility. A pilot study was conducted with 10% of the total sample, involving children not participating in the sampling plan to assess the feasibility of the methodological proposal. It was found that such a proposal was feasible, without requiring adjustments. Data were collected during the third quarter of 2009 through a questionnaire with open and closed questions. Questionnaires were given to the teachers of children that composed the sample, which were completed at home by parents of guardians and later returned to the school.

Study Variables

The questionnaire presented the following variables:

1. Variables of identification of parents or guardians: age, parental relationship with the child; marital status; number of children; educational level and work situation;

2. Variables characterizing the child's age; sex; who cares for the child and number of unintentional injuries already suffered in life;

3. Variables of socioeconomic characteristics of the household: presence of specific goods: television, refrigerator, stove, microwave oven, air conditioner, landline, DVD player, computer, car, motorcycle, toilet inside the house (this item considered the quantity), maid; type of dwelling (house or flat) and number of people living in the household;

4. Variables characterizing suffered unintentional injuries: age of the child at the time of the occurrence; location; circumstances; who was with the child at the time of injury; type; severity (severe: hospitalization, moderate: treated in hospital without hospitalization - emergency department; mild: home care) and if the child hit the mouth and / or teeth;

5. Variables related to the prevention of unintentional injuries by parents or guardians: guidance for injury prevention and means of information (TV, health professionals, family members), as well as their behavior regarding prevention over the child's life.

Statistical Analysis of Data

Data were recorded in EpiData software version 3.1, with performance of double entry and further validation to correct inconsistencies. Descriptive statistical analysis was performed for all variables by verifying the frequency distribution of categorical variables and measures of central tendency and dispersion of numerical variables. One-off measures and confidence intervals of 95% were calculated. Data were electronically processed through the public domain Epi Info – software version 3.5.1.

Ethical Aspects

This study was submitted to the Ethics Research Committee of the Federal University of Santa Catarina and approved under number 256/07.

RESULTS

Of the 481 children whose parents or guardians received the survey instrument, 416 returned the questionnaire filled. Of these, 13 were excluded for being less than two years old and five due to problems in completing the questionnaire. Therefore, this study considered the questionnaires of 398 children, which resulted in a loss and refusal ratio of 17%.

The majority of parents or guardians (76.1%) aged 20 - 34 years. Variables of characterization of children, responsible and households are shown in Table 1.

Parents or guardians aged 20-34 years were prevalent (76.1%), and the most frequent parental relationship was maternal (86.4%). Most parents live in a stable marriage with the spouse (52%) and have 1 or 2 children (77.9%). Overall, 317 (79.6%) of the 398 parents or guardians work, contributing to the family income, and have educational level up to uncompleted high school (45.7%).

The mean age of the children included in the study was 4 years and 1 month, with standard deviation of 1.19 years. Regarding gender, the study included 221 boys (55.5%) and 177 girls (44.5%). The following were considered "caregivers" of children: mother (366/398), father (282/398), grandparents (185/398), uncles (112/398%), older brothers (86/398), and babysitter

(18/398). Regarding economic indicators (item count), it was observed that 4 (1%) parents or guardians reported owning 0-3 items, 172 (43.2%) 4-7 items, 205 (51.5%) 8-11items, 10 (2.5%) 12 or more items, and 7 (1.8%) did not respond. Overall, 339 families live in houses (85.2%) and 50 in flats (12.6%) and 9 (2.3%) did not respond. About 256 children (64.3%) live in households with 3 or 4 individuals. Variables characterizing the children and households are shown in Table 2.

Table 1. Variables characterizing parents or guardians in the sample of children attending preschools in the city of Florianópolis, SC, Brazil, 2009 (n = 398).

Variables	n	%
Age		
<20 years	9	2.3
20-24	109	27.4
25-29	56	14.1
30-34	138	34.7
>35 years	72	18.1
Not informed	14	3.5
Parental relationship with the child		
Mother	344	86.4
Father	40	10.1
Grandmother	2	0.5
Grandfather	3	0.8
Aunt	0	0.0
Uncle	1	0.3
Brother (Sister)	1	0.3
Others	0	0.0
Not informed	7	1.8
Marital status		
Single	77	19.3
Married	207	52.0
Living together unmarried	93	23.4
Divorced	8	2.0
Widowed	4	1.0
Not informed	9	2.3
Number of children		
1	180	45.2
2	130	32.7
3	45	11.3
4	17	4.3
5	9	2.3
6	6	1.5
7-+	0	0.0
Not informed	11	2.8
Educational level		
Incomplete elementary school	72	18.1
Full elementary school	35	8.8
Incomplete high school	75	18.8
Full high school	136	34.2
Incomplete higher education	34	8.5
Full higher education	26	6.5
Post-graduation	6	1.5
Not informed	14	3.5
Work situation		
No	73	18.3
Yes	317	79.6
Not informed	8	2.0

In the sample, 275 children were affected by unintentional injuries. Each child could have a history of recurrence of unintentional injuries. Overall, 547 unintentional injuries occurred, with average age of affected children, in months, of 27.93 (CI 95%: 0 - 55.97) (Table 3).

Table 2. Variables characterizing children and households in the sample of children attending preschools in the city of Florianópolis, SC, Brazil, 2009 (n = 398).

Variables	n	%
Children's Characterization		
Age		
24-35	87	21.9
36-47	95	23.9
48-59	109	27.4
60-71	75	18.8
72- +	32	8.0
Gender		
Female	221	55.5
Male	177	44.5
Who cares for the child		
Mother	366	34.7
Father	282	26.7
Brother/Sister	86	8.1
Aunt/Uncle	112	10.6
Grandmother/Grandfather	185	17.5
Babysitter	18	1.7
Did not respond	7	0.7
Injuries already suffered in life		
1	115	41.5
2	84	30.3
3	38	13.7
4	17	6.1
5	19	6.9
6-+	2	0.7
Did not respond	2	0.7
Household Characterization		
Presence of specific goods		
0-3	4	1
4-7	172	43.2
8-11	205	51.5
12-+	10	2.5
Did not respond	7	1.8
Type of dwelling		
House	339	85.2
Flat	50	12.6
Did not respond	9	2.3
People living in the household		
1	3	0.8
2	25	6.3
3	133	33.4
4	123	30.9
5	58	14.6
6	47	11.8
7-+	1	0.3
Did not respond	8	2.0

Table 4 shows the epidemiological characteristics regarding their circumstances and consequences. Child's home was the place where 352 (61%) injuries occurred, and 372 (65%) of them were caused by falls. In 223 (39%) cases the mother accompanied the child at the time the injury occurred,

and in 132 (23%) cases, mother and father were present. Regarding severity, 342 (60%) of the injuries were mild, requiring home care and 214 (37%) had moderate severity requiring hospital care without hospitalization. In 123 (22%) accidents, the child hit the mouth and / or teeth.

Table 3. Distribution of occurrences of unintentional injuries according to mean age in months at the time the injury occurred among affected children, Florianópolis, SC, Brazil, 2009 (N = 547).

Number of unintentional injuries	N	%	Mean age (months) at the time the injury occurred	CI 95%
Only one	275	50.27	49.78	(21.68 -77.88)
2 injuries	157	28.70	30.08	(2.86 - 57.30)
3 injuries	72	13.16	31.43	(2.46 - 60.40)
4 injuries	38	6.94	35.42	(4.95 - 65.87)
Not informed	5	1.00	---	------

When asked about receiving guidance on preventing unintentional injuries, 354 (88.9%) of the 398 parents or guardians reported having been informed about through means of information shown in Table 5.

DISCUSSION

The present study, conducted with a sample of children (n = 398) attending preschools in Florianópolis, indicated a prevalence of unintentional injuries of 69.1%.

Most of the reported injuries occurred in the child's home and in the presence of the mother. The most frequent type of accident was fall and the injury reported with higher frequency was hematoma, ecchymosis or local edema. Most injuries reported were mild and in about one-fifth of cases, the child hit the mouth and / or teeth.

In Brazil, there are few studies on this topic [13,14,16]. Of these, almost all were based on data collected in emergency care services and / or hospitals [14,16]; however, it is known that many minor unintentional injuries require no medical care, so this type of injury end up by not being considered.

Studies with primary data collection are important tools to know the epidemiological characteristics of lesions, especially those of lower severity, which are the most common, since there are no broad information systems to record this type of injury. Only more serious injuries are recorded in the Mortality Information System (SIM) and Hospital Information System of the Unified Health System (SIH-SUS), Ministry of Health.

Moreover, this study may be subject to survival or prevalence bias, since children who suffered more serious injuries that caused death or need for withdrawal from school may not have been included in the sample. This type of bias may have underestimated the prevalence recorded in the same way as the recall bias.

Table 4. Characteristics of circumstances and consequences of unintentional injuries among children (n = 275) who attended preschools in Florianópolis, SC, Brazil, 2009.

Variables	n	%
Location		
Home	352	61
Home of friends / family	84	15
School / daycare	80	14
Street	38	6.6
Car	9	1.6
Park / Recreation club	6	1
Health center	1	0.2
Not informed	3	0.5
Circumstances		
Fall	372	65
Physical impact against barrier	80	14
Gripping member in hinge /articular surface	52	9.1
Burn (soaking or scalding)	23	4
Introduction of foreign bodies into body orifice (mouth, nose and ear)	16	2.8
Ingestion of toxic material / medication	8	1.4
Cut with sharp object	6	1
Electric shock by introducing finger or object into socket	6	1
Traffic accidents (pedestrian or passenger)	5	0.9
Animal bite	3	0.5
Foreign body aspiration	2	0.3
Not informed	2	0.3
Who was with the child		
Mother	223	39
Mother and Father	132	23
Teacher / school assistant	59	10
Another child	48	8.4
Grandfather / grandmother	32	5.6
Father	31	5.4
Uncle / Aunt	16	2.8
Alone	15	2.6
Other	12	2.1
Not informed	5	0.9
Type		
Hematoma / bruising / local swelling	401	70
Crush	52	9.1
Cut	41	7.2
Burn	24	4.2
Fracture / Twist / Sprain / Dislocation	19	3.3
Asphyxia	18	3.1
Intoxication	6	1
Electric shock	5	0.9
Bite	2	0.3
Not informed	5	0.9
Severity		
Taken care at home	342	60
Moderate - without hospital admission	214	37
Severe - hospitalization	13	2.3
Not informed	4	0.7
Hit the mouth and / or teeth		
No	447	78
Yes	123	22
Not informed	3	0.5

Table 5. Means of information on the prevention of unintentional injuries and their quality.

Variables	n	%
Receiving guidance		
No	36	9
Yes	354	88.9
Not informed	8	2
Means of information		
Television	287	30.1
Newspaper and magazines	227	23.8
Family members	186	19.5
Health Professionals	136	14.3
School	69	7.2
Course	41	4.3
Not informed	7	0.7
Quality of information		
Satisfactory	225	62.2
Reasonably satisfactory	107	29.6
Unsatisfactory	16	4.4
Not informed	14	3.9
Action of parents / guardians in relation to prevention		
No	31	7.8
Yes	356	89.4
Not informed	11	2.8
Action of parents / guardians in relation to prevention		
"I am always near the child"	157	44.1
"Retreat objects that might hurt him of his reach"	125	35.11
"Explain to children about the danger of getting hurt in some circumstances"	113	31.74
"I store cleaning supplies in high cupboards to prevent the child from reaching them"	72	20.22
"I do not let him go near the stove"	58	16.29
"I never leave the child without adult supervision"	41	11.52
"Retreat medications from his reach"	33	9.27

Importantly, the data were collected retrospectively, and thus depended on the memory of guardians, which may not have been as accurate when providing the information requested. Furthermore, injuries that occurred in the presence of another person, other than the person who filled the questionnaire may not have been informed.

In addition, the sample was composed of children attending public preschools, predominantly from families with low socio-economic level, which limits the generalization of results.

Despite the statistics of mortality / morbidity resulting from unintentional injuries in children [12,17,18] by 2005, only half of the countries in South America had national prevention strategies or advisory groups on the topic[20]. Thus, research in this area can provide information on the reality of these events in the population, so that programs for the prevention of unintentional injuries can be implemented in an attempt to control this important public health problem.

With regard to risk factors for unintentional injuries, studies have shown a correlation with the presence of two or more siblings in the family, since the presence of the siblings could encourage dangerous activities between them and hinder the caregiver's work. In the present study, it was observed that there was a prevalence of smaller families, with no or only 1 sibling [20].

Advanced in age or very young parents [21,22] have also been reported as a factor influencing the higher incidence of injuries; however, the predominant age of parents was 20-34 years.

In this study, most children sampled were from families with low socioeconomic level. It is important to consider that the associations of literature between the occurrence of injuries and family income or maternal or paternal educational level have shown that most accidents occurred in children with lower socioeconomic level and parents with lower educational level [1,20,21].

It was observed that most of the children studied live at houses, so they can be more exposed to greater environmental risks, since they often stay longer time playing outside, with greater exposure to the occurrence of unintentional injuries [2,23].

Some studies have shown that the mother being the child's caregiver is a risk factor for unintentional injuries [24,25]. As in this and in previous studies, it was observed that the mother was the predominant caregiver, which may reflect this association as injuries probably occur, because the mother spends more time with her child in comparison to other family members [25].

In the present study, the prevalence of unintentional injuries was 69.1%. In a recent study, researchers found a prevalence of 12.6% among children aged 0-5 years living in Malatya in Turkey [3]. However, it is important to consider that in the current literature, most studies on this topic are carried out in hospitals and emergency health services [2,3,6,12,18,21], so data comparability is impaired.

Regarding the predominance of males among victims of accidents, the higher frequency of males has been discussed and justified by the difference in activity between genders, in addition to the greater supervision over female children [5,14,16].

The highest incidence of injuries in the age group from one to three years is possibly associated with the characteristics of their neuropsychomotor development (physical and mental immaturity, inexperience, inability to anticipate and avoid dangerous situations, curiosity, tendency to imitate adult behaviors, lack of notion of body and space, poor motor coordination) and characteristics of some children (hyperactivity, aggression, impulsivity and distraction) [1,2]. In this context, the child is often helpless and vulnerable [14].

As in most studies on the topic [3,14,16,18], in this research, the child's home was the place where most injuries occurred. Probably, most accidents occur at home because the home presents a large number of

objects and situations of risk for the occurrence of these events. Moreover, in many cases, there may be inadequate supervision of the child due to the simple fact that the adult caregiver develops other activities at the same time [14].

Falls have been reported as the most common cause of unintentional injuries [3,18]. In a recent study conducted in Mozambique, researchers evaluated a sample of 315 children aged 0-14 years treated at 3 hospitals in Maputo and found that 40.6% of injuries were due to falls [12]. Other researchers described the profile of accidents involving children (<10 years old) treated in public emergency health services in Brazil between 2006 and 2007 and found that falls on the same level were the most common injuries in all age groups, followed by falls from other levels in children > 1 year; in infants, the second place was represented by falls from bed / cradle or sofa [16].

In this study, as in another recent study, most children who suffered unintentional injuries were being supervised by mothers [3]. Researchers have found that mothers who have a higher level of awareness about the vulnerability of their children regarding this type of accident perform a more rigorous and efficient supervision, preventing undesired situations [24]. Therefore, prevention through family counseling, especially from mothers (who are the primary "caregivers" of children), physical changes of the home space and development and or enforcement of specific laws (e.g. packaging of drugs, alcohol bottles and others) [17,18,26,27], seems to be the best solution.

Regarding the type of injury, hematoma / bruising / local swelling were predominant, which reveals the low relative severity of injuries. This assumption is supported on results reported by other studies [16,26]. However, despite the low severity, these events are responsible for a significant portion of government or private hospital expenditure and cause stress to the child and his family [6].

In the present study, in 21.5% of unintentional injuries, the child hit mouth and / or teeth. Indeed, one of the body regions most affected seem to be the head [16], which may be due to the fact that children are not yet able to protect the cephalic region in case of falls and impacts.

The dissemination of information on the prevention of unintentional injuries is important to avoid the increase of these problems, since it establishes effective measures that prevent the child from getting hurt. In this study, it was observed that the majority of caregivers reported having been informed about the prevention of unintentional injuries, and this information was given in a manner deemed satisfactory, largely through the media (newspapers, television and magazines).

Regarding the strategies adopted for the prevention of injuries, almost all respondents reported to take some precautions to prevent unintentional injury in children under their care. Thus, it was observed that prevention measures are carried out even by those who did not receive information, demonstrating the concern of the public about this topic.

Parents should be aware of these dangers, adopting safety systems and mechanisms at home [28] such as protective screens, gates at the ends of stairs, socket covers, angle brackets, safety locks on toilets, smoke detectors, storage of medicines and cleaning materials in high and lockable places, among others, to minimize such occurrences [16].

It is suggested that the governments implement policies addressing the prevention of unintentional injuries, such as child care centers to promote training and assistance to prevent injuries [29]. There is evidence that home safety interventions are also associated with reduction in the incidence of injuries, especially because this environment is where they mostly occur [10]. Thus, as governments, health professionals, educators and parents are aware that childhood injuries are preventable and that prevention measures are effective, it will be possible to decrease the statistics of these events that affect so many children [30].

CONCLUSION

The prevalence of unintentional injuries found was high. These are the result of a number of environmental, emotional and especially educational factors. Thus, it is understood that in the context of prevention, positive results will be achieved as combined actions among health professionals, government and civil society are adopted, based on local research on the topic.

In the era of family health care performed by multidisciplinary teams, it is critical that these injuries receive adequate importance by health professionals and attention in public health policies.

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Correspondence:
Bianca Zimmermann Santos
Rua Guilherme Cassel Sobrinho, 275/902, Nossa Senhora de Lourdes.
CEP: 97050-270
Santa Maria, Rio Grande do Sul, Brasil
Phone: (55) 9695-1225
Email: biancazsantos@hotmail.com