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Original article

Fatal Drowning in Brazilian Toddlers and Preschoolers in the City of Campina Grande

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SUMMARY

Drowning is one of the accidents with the greatest impact on health. The objective of this paper was to analyze drowning deaths involving children up to four years of age in Campina Grande, Brazil. A cross-sectional study was developed using secondary data, carried out at the Forensic Medicine Unit. All autopsy reports of children 0-4 years of age, victims of drowning in the period from 2008 to 2011 were evaluated. Data referring to the year of occurrence, victims' gender and age, time of day, day of week and place of occurrence were collected. Data analysis involved descriptive statistics (frequency distribution). Ninety-three cases of fatal drowning were identified, of which 20 (21.5%) involved children under four years of age. Most victims were male (80%), aged one year (35%). The accidents occurred predominantly during the day (85%), mostly at home (75%). The drowning victims were mostly boys in the first year of life and most cases of drowning occurred at their homes.

Key words: **drowning, child, mortality**

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INTRODUCTION

Drowning, a distinct type of injury associated with high fatality rate, was a major cause of death among children in all historical periods (1) and it is considered as a significant cause of mortality in Brazil. It is defined as a death due to submersion in a liquid, and the mechanism in acute drowning is hypoxemia and irreversible cerebral anoxia (2).

The World Health Organization (WHO) estimates that over 500,000 deaths per year worldwide are due to drowning (3), thus constituting the leading cause of unintentional injuries that occur at the home environment (4). In the United States (5) and Iran (6), drowning is the leading cause of death in children aged 1 to 4 years, accounting for a mortality rate of 3 per 100,000 habitants (7). In Thailand, the rate is as high as 107 per 100,000 inhabitants (8).

In Brazil, in 2010, 260 children aged less than four years were fatal victims of drowning that mostly occured in their own homes (9). In Campina Grande, Paraiba, during the period from 2003 to 2007, 28 children aged from 0 to 4 years old were fatal victims of drowning (10).

Recent surveys have shown that drowning is a major cause of death in children aged 0-4 years (6, 8, 11, 12). A study carried out in Brazil, revealed that the majority of victims are boys, with predominance of drowning in swimming pools (10). Accidental submersions are multifactorial and not well described by a single cause (13), with variation in relation to age (14), socioeconomic status and geographic location (15). Moreover, they can be related to the behavior of individuals.

Given the importance of the topic and the reduced number of Brazilian studies, this study examined drowning deaths involving children under the age of 4 years, in Campina Grande, Brazil.

SUBJECTS AND METHODS

Study design

A cross-sectional study was performed through indirect observation and analysis of cadaveric reports of fatal victims of drowning at the Department of Forensic Medicine of Campina Grande, Paraiba, Brazil. According to the Brazilian legislation, all deaths from external causes and cases of sudden or suspicious death are autopsied at the Departments of Forensic Medicine.

Sample

The study population included all cadaveric reports of fatal victims of drowning recorded in the period between January 2008 and December 2011. The sample consisted of all cadaveric reports of children aged 0 to 4 years who were fatal victims of drowning.

Data collection

Data referring to the year of occurrence, victim's gender and age, time of day, day of week and place of occurrence (if present) were gathered from the forensic medical reports and transferred to specific registration forms, which were kept in folders classified according to the event. Data collection was conducted in the period from May to July 2012 by two researchers.

Data analysis

Data analysis involved descriptive statistics (frequency distribution). All statistical analyses were performed using the SPSS software, version 18 (SPSS Inc, Chicago, IL, USA).

Ethical aspects

This study followed ethical guidelines recommended by the Brazilian legislation and was approved by the Human Research Ethics Committee of the State University of Paraiba.

RESULTS

Regarding the distribution of the occurrences of drowning according to year, the largest number of cases (n = 8) were reported in 2008, all male, as described in Figure 1.

It was observed that the majority of victims were boys (80%), 1 year of age (35%), as shown in Table 1.

Table 2 shows the distribution of the occurrences of drowning according to the time of the day, revealing that 85 % of the cases occurred during the day, and Thursday was the day of week when most accidents occurred (25 %).

As to the place of occurrence of drowning, it was found that the majority of cases occurred in the home environment (75 %), followed by public places (rivers and ponds) (15 %), and pools of recreational clubs (10 %).

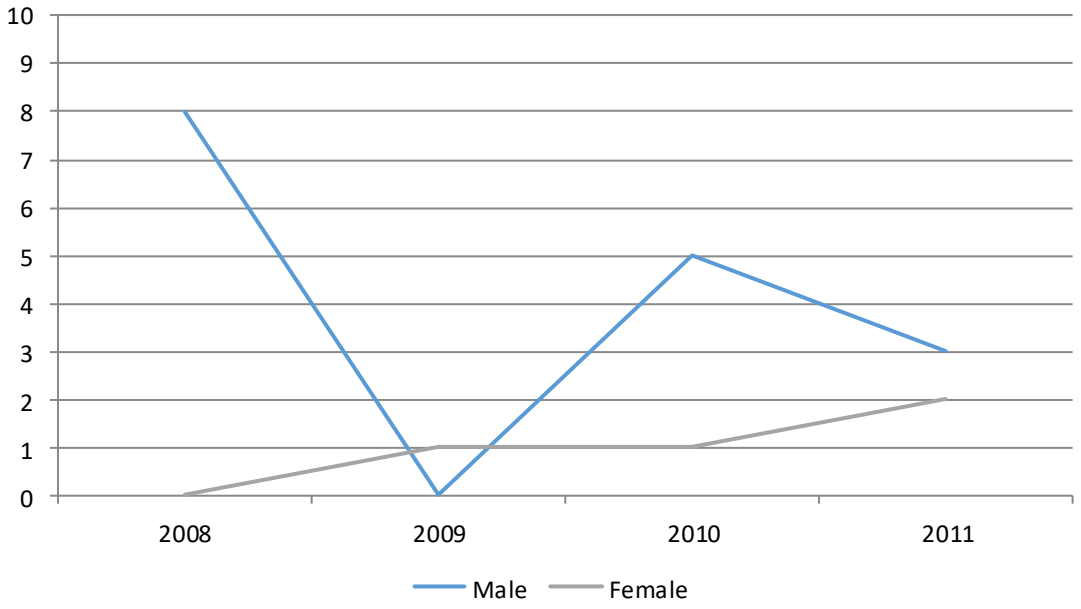

Figure 1. Distribution of children victims of drowning according to gender and year

Table 1. Distribution of children victims of drowning by gender and age

Gender	**Age**										**Total**	
	< 1 yr		1 yr		2 yr		3 yr		4 yr			
	n	%	n	%	n	%	n	%	n	%	n	%
Male	1	6.2	5	31.3	5	31.3	3	18.7	2	12.5	16	80.0
Female	-	-	2	50.0	1	25.0	-	-	1	25.0	4	20.0
Total	1	5.0	7	35.0	6	30.0	3	15.0	3	15.0	20	100.0

Table 2. Distribution of children victims of drowning according to the day of the week and time of the day

Day of week	**Time of occurrence**								**Total**	
	Morning		Afternoon		Evening		Night			
	n	%	n	%	n	%	n	%	n	%
Monday	-	-	-	-	-	-	-	-	-	-
Tuesday	3	75.0	1	25.0	-	-	-	-	4	20.0
Wednesday	1	50.0	1	50.0	-	-	-	-	2	10.0
Thursday	1	20.0	1	20.0	2	40.0	1	20.0	5	25.0
Friday	1	33.3	2	66.7	-	-	-	-	3	15.0
Saturday	2	66.7	1	33.3	-	-	-	-	3	15.0
Sunday	1	33.3	2	66.7	-	-	-	-	3	15.0
Total	9	45.0	8	40.0	2	10.0	1	5.0	20	100.0

DISCUSSION

Drowning is one of the accidents with the greatest impact on health (16) and economy worldwide. According to WHO, 0.7 % of all deaths are caused by unintentional drowning (3). However, the exact number of deaths is unknown because many cases have not been reported.

The majority of the autopsy findings are related to asphyxia and have no specific link to drowning. The signs of drowning depend on the delay in recovering the body and on the development of the putrefaction phenomenon, which alter the positive signs of drowning (2).

In the present study, it was found that boys were the victims most affected by drowning, corroborating data from other Brazilian (6, 15, 17) and international studies (18, 19). The sex ratio is up to four times higher for males (5).

With respect to age, children aged 1 year were the most affected. This fact can be associated with incidents occurring in baby bathtubs that are responsible for the majority of home drowning cases (20). The literature demonstrates that children under one year of age are often involved in accidents in bathtubs and buckets, which is directly related with the negligence of parents and guardians (21). According to WHO, the mortality rates due to drowning in children aged 0-4 years are the highest in the entire world (3). The deaths in the younger age group may be due to negligence or absence of preventive measures such as grids or screens around pools (15, 16).

Regarding the time of occurrence of accidents, there was a predominance of morning and afternoon, a result similar to that described in Bangladesh (12), Spain (22) and Saudi Arabia (23). Possibly during this period, parents or guardians are busy with household tasks or other activities such as talking on the phone, neglecting the supervision of children and potentially contributing to the occurrence of these events (8).

As to the place of occurrence of these events, the majority occurred in the victim's home, which is in keeping with the findings of other authors (18, 22, 24). Home has been identified as the place of frequent occurrence of events (23). It is considered that the greatest risk for drowning is found in a backyard pool, when the child is not under the supervision of an adult (4), so that for children aged 1-3 years, residential swimming pools represent a great risk of drowning (4). Another important risk factor is the use of portable pools at home, which in recent years has become very popular (18).

Thus, simple strategies should be adopted by parents, especially in the home environment, because as previously mentioned, home has shown to be a potential place for the occurrence of drowning (1). Such measures include: supervision, protection and isolation of swimming pools and other environments, use of safety equipment (floating devices or life jackets) and educational measures, from swimming instruction and guidance on the practice of safe behaviors in water (1, 16). Regarding supervision, the constant presence of a responsible adult when the child is in the water or near is essential, and no child should swim without adult supervision (4).

Epidemiological surveys operate as pioneer and initial tools in logistic cost-effectiveness management processes, as well as in the decision making of managers of health policies (25-28). Therefore, measures to prevent these events should be intensively applied based on changes in environments and stimuli to healthy lifestyle behaviors, especially for children in an attempt to reduce mortality by drowning.

CONCLUSION

Victims of drowning were mostly boys in the first year of life, with most cases occurring in the child's home.

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Davljenje sa smrtnim ishodom mlađe i predškolske dece u gradu Kampina Grande

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SAŽETAK

Davljenje je jedan od nesrećnih slučajeva sa najvećim uticajem po zdravlje čoveka. Cilj ovog rada bio je da se analiziraju smrtni slučajevi uzrokovani davljenjem dece do četvrte godine starosti u gradu Kampina Grande. Urađena je studija preseka na Odeljenju za sudsku medicinu korišćenjem sekundarnih izvora. Analizirani su izveštaji svih autopsija dece do četvrte godine starosti koja su bila žrtve davljenja u periodu od 2008. do 2011. godine. Sakupljeni su podaci o godini nesreće, polu i starosti žrtve, periodu u toku dana kada se nesrećni slučaj dogodio, danu u nedelji i mestu nesreće. Podaci su analizirani primenom deskriptivne statistike. Identifikovana su devedeset i tri slučaja davljenja sa smrtnim ishodom, od čega je dvadesetoro dece (21,5%) bilo mlađe od četiri godine. Većina žrtava su bila muškog pola (80%), do prve godine života (35%). Nesreće su se dešavale uglavnom u toku dana (85%), najčešće kod kuće (75%). Žrtve davljenja su uglavnom bila muška deca do prve godine života, i najveći broj nesreća se dogodio kod kuće.

Ključne reči: **davljenje, dete, smrtnost**