

UNINTENTIONAL INJURIES AMONG CHILDREN AGED 1-4 YEARS AT HOME

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Abstract. A hospital based case-control study was performed to determine causes of unintentional injuries among children aged 1-4 years at home. Data were obtained by interviewing parents and guardians of 242 children at Lerdsin Hospital in Bangkok, from August to October 1999. The results showed that falls were the most common type of injuries (54.6%). The age of 2 years comprised the major group (28.9%). The study subjects were injured within the home (60.7%). Sunday and Saturday were the most frequent days of injuries (18.2% and 16.5% respectively). The proportion of cases involving playing with others was 71.1%. Most of the injuries occurred in the period 16.00-19.00 hours (32.2%). Head and neck were the main injured area (45.5%). The multivariate model showed that children who had previous injuries were 19.22 times more likely to be injured again than those who had not previously been injured. Children with vigorous physical activities also had a higher risk (OR = 19.73, 95% CI 6.11-63.74). Outdoor working mothers were at higher risk than houseworking mothers (OR = 4.14, 95% CI 1.57-10.93) of having children affects. Children who spent most of the daytime at their relatives' houses had a higher risk than those who stayed at their home (OR = 3.48, 95% CI 1.02-11.81), while, 37.9% of children injured at their relatives' houses and 50.8% of all injured children were without supervision.

INTRODUCTION

Nature of all children have a risk of being injured. Children aged less than 5 years begin to have many vigorous physical activities, namely walking, running, climbing on the furniture or stairs; all of these activities are potentially dangerous (Valman, 1998). Childhood unintentional injuries at home are major important problems in both developed and developing countries (Thomas *et al*, 1993; Matines, 1998). Approximately, 50% of injuries occur at home (Lindblad and Terkelsen, 1991; Suwanna *et al*, 1991). Falls are the major cause of injuries accounting for 40.0-56.0% (Laflamme and Peterson, 1998; Anthony *et al*, 1986; Robertson, 1992). Most of the injured children

fall from furniture and approximately 80% of child injury involves the head, with associated threat of death and disability (Winter *et al*, 1983). Children aged under 5 years constitute the first peak of home injuries (Campbel and McIntosh, 1998).

In Thailand, mortality due to accidents and poisoning are rapidly increasing. The accident-related mortality rate rose from 48.5/100,000 in 1992 to 64.3/100,000 in 1996 and it was the second cause of death each of those years. In 1995, a study in 4 hospitals injuries found that 40.3-48.2% of childhood injuries occurred at home (Santikarn and Wiangpitak, 1996). Other reports also stated that home was the most common place of injuries (Tangsin *et al*, 1997; Huger and Corkum, 1997). Of children with injuries 20.4-32.5% were admitted to hospital (Santikarn and Wiangpitak, 1996). This study was conducted on children aged 1-4 years because they were at high risk of injury (Branko and Thomas, 1996) and mortality was

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highest among this group in some countries (Ellsasser and Berfenstam, 2000). Therefore, this study set out to describe the characteristics of study subjects and ascertain the relationship between factors and unintentional injuries at the home.

MATERIALS AND METHODS

Study design and population

A hospital based, case-control study was performed at Lerdsin Hospital in Bangkok, Thailand, from August to October, 1999, to determine the causes of unintentional injuries at home among children 1-4 years of age. A total of 121 cases and 121 controls were recruited. The cases were newly diagnosed injuries at an emergency room and an outpatient department. The controls were children aged 1-4 years who had other diseases and were treated at the outpatient department. Both cases and controls were excluded in the event of disability, chronic disease, and mental disorder. Cases and controls were matched (1:1) by age and gender. Data collection was obtained by interviewing parents and guardians. The questionnaire comprised socio-demographic status of their parents and guardians namely age, education, religion, marital status, occupation, and family income; child characteristics such as previous injury, rank of birth, behavioral problems and number of children in family; environment within the home and surroundings such as type of house, construction, depth of pond more than 0.5 meter, any materials, toxic substances and pets. Childhood characteristics were displayed by percentage, mean and standard deviation. Chi-square tests were utilized to differentiate proportional exposures between cases and controls for categorical variables. Univariate analysis, [odds ratio (OR), 95% confidence interval and corresponding p-value < 0.05] was employed in order to screen the suitable variables, and multivariate logistic regression was used to identify and adjust for confounding variables in terms of adjusted odds-ratio.

Sample size

The sample size was calculated by the formula (Schlesselman and Stolley, 1982):

$$n = \frac{\{Z_{\alpha/2}\sqrt{2P(1-P)} + Z_{\beta}\sqrt{P_1(1-P_1) + P_0(1-P_0)}\}^2}{(P_1-P_0)^2}$$

Where n = minimum number of children that were included, P₀ = proportion of exposure in control group = 0.151, P₁ = proportion of exposure in case group = 0.388, Z_{α/2} = 1.96 at α = 0.05, Z_β = 1.64 at β = 0.05; OR = 3.56, P = 0.269, the calculated sample size in each group was at least 88.

RESULTS

The general characteristics of cases and controls were shown in Table 1.

Characteristics of childhood injuries, such as type, place, day, time and body area. Falls were the most common type of injuries, accounting for 54.6%. Most of injuries occurred within the home (60.7%) and in the period of 16.00-19.00 hours (32.2%) and followed by 13.00-16.00 hours (21.5%). Sunday and Saturday were the most frequent days of injuries (18.2% and 16.5% respectively). The proportion of cases involving playing with others was

Table 1
Number and percentage of general characteristics.

Characteristics	No.	%
Age (year)		
1	58	24.0
2	70	28.9
3	58	24.0
4	56	23.1
Mean ± SD	2.5 ± 1.1	
Gender		
Male	130	53.7
Female	112	46.3

71.1%. Injured areas comprised head and neck (45.5%) wrist, hand, ankle and foot (20.7%), shoulder and arm (19.0%), hip and leg (9.1%), respectively.

There were 12 different factors ($p < 0.05$) included in the model, thus: second rank of birth (OR = 1.77), previous injury (OR = 12.55), number of children ≥ 3 (OR = 2.79); behavioral problems such as behavior 1 (irritable and quick to fly off the handle, OR = 0.22), behavior 2 (sometimes took something which belonged to others, OR = 0.16), behavior 3 (often destroyed his/her belongings and others, OR = 0.22), behavior 4 (could not settle down even in a few minutes, OR = 5.51); mother's education \leq secondary school (OR = 0.42), guardian's education \leq secondary school (OR = 0.30), took care by relative (OR = 5.65), type

of house (town house, OR = 3.06), and place where children spent most of daytime, namely relative house (OR = 4.29), day care center (OR = 5.33), and kindergarten (OR = 2.66). The left variables which were not statistically significant were ruled out.

To evaluate effect of risk factors and adjust for confounding variables, all potential variables were included into the final model. After adjusting for potential confounders, adjusted odds-ratios of 9 factors are shown in Table 2.

Only four independent variables were significantly associated with child injury among children aged 1-4 years. Children who had previous injuries were 19.22 times more at risk to develop injuries compared with those who had none (95% CI 7.57-48.82). Children with outdoor working mothers were 4.14 times more

Table 2
Multiple logistic regression of final model to predict injuries in children .

Variables	OR	95% CI	p-value
Second rank of birth	2.08	0.70 - 6.16	0.188
Previous injury	19.22	7.57 - 48.82	< 0.001 ^a
Behavioral problems			
Behavior 1	0.16	0.05 - 1.42	0.233
Behavior 2	0.11	0.03 - 1.36	0.122
Behavior 3	0.34	0.10 - 1.19	0.092
Behavior 4	19.73	6.11 - 63.74	< 0.001 ^a
Number of children in family			
2	1.36	0.43 - 4.27	0.599
≥ 3	1.92	0.55 - 6.76	0.308
Maternal education	1.60	0.45 - 5.64	0.464
Guardian's education	0.66	0.17 - 2.55	0.549
Maternal occupation	4.14	1.57 - 10.93	0.004 ^a
Place			
Relative house	3.48	1.02 - 11.81	0.045 ^a
Day care center	3.70	0.62 - 22.11	0.151
Kindergarten	1.77	0.21 - 2.83	0.699
Type of house			
Town house	2.16	0.39 - 11.94	0.778

^aStatistically significant at $\alpha = 0.05$.

Behavior 1 = Irritable and quick to fly off the handle.

Behavior 2 = Sometimes took something which belonged to others.

Behavior 3 = Often destroyed his / her belongings and others.

Behavior 4 = Could not settle down even in a few minutes.

Place = Place where children spent most of daytime.

at risk than those of houseworking mothers (95% CI 1.57-10.93). Children who could not settle down even for a few minutes were 19.73 times more at risk than those with none (95% CI 6.11-63.74). Additionally, children who spent most of daytime at relatives' houses had a higher risk than those who stayed at their parental houses (OR = 3.48, 95% CI 1.02-11.81).

DISCUSSION

One of the major risk factors of unintentional injuries was previous injuries (OR = 19.22, 95% CI 7.57-48.82), a finding similar to those of other studies (Sayfan and Berlin, 1999; Kendrick and Marzh, 2001). Children who could not settle down even for a few minutes (behavior 4) showed odds of injuries 19.73 times (95% CI 6.11-63.74) greater than those without this behavioral problem. As in other studies, playing was the most common activity at time of injuries (Hu *et al*, 1993). Maternal occupation, children with outdoor working mothers had a 4.14 times higher risk of injury (95% CI 1.57-10.93), which agreed with Laffoy (1997). In this study, 82.2% of those injured were the children of working mothers, which is the real situation for most mothers in Bangkok.

According to a WHO report in 1999, it was estimated that injuries are the major serious and neglected health problem of developing countries in all regions. Injuries accounted for 16% of the global burden of diseases in 1998 and are growing, so that by 2020 they could be a rival of infectious disease world wide as source of ill health (Forjuoh and Li, 1996; WHO, 1999). According to Queen Sirikit National Institute of Child Health report, the number of childhood injuries has been rising year by year (Thanyanat, 1999). Therefore, preventive and controlling programs were perceived for parents, guardians and other related persons.

Conclusion

Falls remained the leading cause of injury at home (53.3%). Head and neck were the areas of worst injury (45.5%) and wrists/hands or

ankles/ feet comprised 20.7%. Dinnertime (16.00-19.00 hrs) was the peak period of injury because it was busy for parents or guardians concerned with cooking. In multivariate logistic regression it was found that only four independent variables were significantly associated with child injury: behavioral problem 4 (could not settle down even in a few minutes), previous injury, maternal occupation and relative house which children spent most of daytime.

ACKNOWLEDGEMENTS

The authors thank the staff of the Emergency Room and the Outpatient Department, Lerdsin Hospital for their helpfulness. We also thank those who we do not mention for their kindness and encouragement.

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