

## ORIGINAL ARTICLE

## The Factors Associated with Injury Risk in Toddlers

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## ABSTRACT

**Introduction:** Toddlers are vulnerable to injury. In this phase, toddlers are curious and enjoy exploring the environment, but their understanding and ability to react to danger are limited. Toddlers are active and start to enjoy playing outside. They develop fine motor skills and begin to grasp, open doors, or throw objects around. This study aims to identify factors associated with the risk of injury in toddlers. **Materials and methods:** Descriptive quantitative research type with a cross-sectional approach. The research location was at Posyandu Sukajaya, Rajabasa Jaya Village, Lampung - Indonesia. Respondents were 30 parents of toddlers selected using a Simple random sampling technique. Respondent inclusion criteria: biological parents and owning a private house. Data collection using the interview method using a questionnaire. In this study, univariate data analysis using frequency distribution. Bivariate analysis to determine factors associated with injury risk in toddlers using Chi-square. **Results:** Characteristics of toddlers: Gender: Boys 14 (46.6%), Girls 16 (53.4%). The incidence of injury to children under five was 16 (53.3%), types of injury: Falls 12 (40%), injuries 3 (10%), burns 3 (10%). Child Growth and Development Status: Normal 25 (83.3%) and Growth and Development Disorders (16.7%). Mother's knowledge about injury risk: 70% good and 30% poor. There is a significant relationship between gender ( $p$ -value 0.010) and maternal knowledge (0.001) with the risk of injury to toddlers. There is no significant relationship between a child's growth and development status and the risk of injury to toddlers ( $p$ -value: 0.513). **Conclusion:** Nurses should provide anticipatory guidance and assistance to families to prevent the risk of injury to toddlers.

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**Keywords:** Gender, Mother's knowledge, Risk of injury, Injury prevention, Toddlers

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## INTRODUCTION

Injury is an unexpected and unplanned event which can cause pain and death. Injury is a leading cause of death and disability in children(1). Roughly 950,000 children under the age of eighteen perished from injuries in 2004. The bulk of these child injuries were caused by burns (fire or scalds), falls, poisoning, and auto accidents (2). Accidents to children are a significant health issue, being a major cause of preventable death, serious injury and long-term disability(3). Under-5s are particularly at risk of being injured in home accidents, with falls accounting for the majority of non-fatal accidents and threats to breathing such as suffocation and choking causing the highest number of deaths(4). In Indonesia, the prevalence rate of injuries is slightly high. Based on Basic research results generally reported injuries to children aged 1-4 years in Indonesia, the proportion of injuries was 7.5% in 2007, and it increased to 8.2% in 2013. The percentage of injuries rose by 9.2% in 2018(5)

Toddlers often experience injuries (6). The injuries can

happen at any time inside and outside the house. Injuries hurt a child's growth and development. Apart from that, injuries also have a physical and psychological impact or trauma on toddlers(7). Injured children struggled with changes to their appearance, physical activity restrictions, and late-onset physical symptoms. Toddlers will stop doing things that make them traumatized/scared, which can result in developmental delays (1)

Nurses have a significant role in reducing morbidity and mortality due to injuries in toddlers(8). Nurses can reduce injuries to toddlers by providing appropriate guidance on anticipating injuries (9). Parents must be aware of the risk of injuries in toddlers. Parents provide supervision and attention when toddlers are active, provide safe toys, and create a danger-free environment (10). Most home accidents are preventable through increased awareness, improvements in the home environment and greater product safety(6). This study intends to determine the factors associated with injuries in toddlers.

## MATERIALS AND METHODS

**Study design**

This study is quantitative descriptive research with a cross-sectional approach to determine the child characteristics: age, gender, child growth development

status, and the relationship between independent variables: gender, child growth and development, and mother’s knowledge with dependent variables: risk injury in toddlers. This study collected data at only one point in time (11). The aim is to determine the factors associated with the incidence of injuries in toddlers.

**Study location and population**

This research was carried out in Rajabasa Jaya Village -Lampung, Indonesia. The area is crossed by the Trans Sumatra Road, train line, and bus terminal center. It makes residents and toddlers vulnerable to injury. Population is an overall group of individuals, objects, or entities that have characteristics or attributes that researchers wish to study or measure. Most of the population are immigrants and live in private houses. The population of this study was 42 parents of toddlers aged 0-5 years (12).

**Samples**

Samples are defined as parts from the population which is the actual source of data in a Study (13). The number of samples was calculated using the Slovin formula with a significance level of 10%, the number of samples in this survey research is 30 (14). Respondents were parents of toddlers with the inclusion criteria of biological parents, who were selected using Simple random sampling technique.

**Data collection**

Data collection was obtained by interview method using a questionnaire compiled by researchers. This questionnaire consists of 25 items and has been tested for item validity with a correlation coefficient of >0.375 (15). The questionnaire consists of three parts: Part 1 about characteristics of toddlers: gender, age, and child growth and development. Part 2 History of injury to the child, and Part 3 Maternal knowledge about preventing injuries to toddlers.

**Data analysis**

In this study, data was analyzed using SPSS program versi 17. Descriptive data by univariate analysis used frequency distributions to determine the percentages of variables. Bivariate analysis used The Chi-Square Test to test the relationship between factors and the risk of injury to toddlers (12).

**Ethical clearance**

Before the study began, researchers submitted an ethical review in the form of ethical review protocol and checklist to the Health Ethics Commission via SIM-EPK (Health Research Ethics Management Information System). This research applies ethical principles, such as providing informed consent and informed choice where potential respondents are free to participate or not or stop being respondents. In addition, all data is confidential and guaranteed by researchers. Data processing uses a computerized system that can only be opened by researchers and authorized parties if

necessary. All respondents received the injury prevention module for toddlers as compensation for being research respondents. This research has received approval from the Tanjungkarang Health Polytechnic Research Ethics Committee No. 463/KEPK-TJK/VIII/2023.

**RESULTS**

**Characteristic of Children**

In this study, The characteristics of toddlers at Posyandu Sukajaya: Child gender are male 14 (46.7%) and female 16 (53.3%). Most of the children age who suffered injuries were toddlers 15 (50%). Most children had norm growth and development status 25 (83.3%).

**Table I: Characteristics of Toddlers**

Variable	Amount	Percent (%)
Gender		
Male	14	46.7
Female	16	53.3
Child age		
Infant	5	16.7
Toddler	15	50
Pre school	10	33.3
Growth and Development status		
Normal	25	83.3
Growth and Development Disordder	5	16.7

**Injury incident**

The majority of toddlers at Posyandu Sukajaya had experienced injuries 16 (53.3%). The Children haven’t injuries 14 (46,7%). The type of injury experienced by toddlers at Posyandu Sukajaya was falls (40%), burns (10%), and wounds or animal scratches (10%).

**Table II: History of Injuries among Toddlers**

Variable	Amount	Percent (%)
No	14	46.7
Yes	16	53.3
Falls	12	40
Burns	3	10
Wounds/Animal Scratches	3	10

**Mother’s knowledge about injury prevention**

The results of the study showed that the majority of mothers’ knowledge about preventing injuries to toddlers was good 21 (70%). There were still mothers’ knowledge that was not good 9 (30%). It shows that mothers in Rajabasa Jaya Village have good basic skills to prevent injuries to their children.

**Table III: The Mothers’ Knowledge about Injury Prevention**

Mother’s Knowledge about Injury Prevention	Amount	Percent (%)
Good	21	70
Not Good	9	30
Amount	30	100

### The Relationship between Gender and Risk of Injury to Toddlers

From Table VI, the risk of injury occurs most frequently in boys 11 (36.7%) compared to girls 5 (16.7%). There was a significant relationship between gender and the risk of injury in toddlers (p-value 0.010). The Prevalence Ratio (PR) calculation shows that boys are three times more likely to experience injuries if compared to girls, with a PR 95% CI (1.11-9.22).

**Table IV: The Relationship between Gender and Risk of Injury to Toddlers**

Gender	Risk of Injury				Total		PR 95%CI	p-value
	No	%	Yes	%	N	%		
Male	3	10	11	36.7	14	46.7	3.02 (1.11-9.22)	0.010
Female	11	36.7	5	16.7	16	53.3		

### The Relationship between Status Growth and Development and Risk of Injury to Toddler

From this study, the risk of injury most often occurs in children with a normal child of 14 children (46.7%) if compared to children with growth and development problems two children (6.7%). There was no significant relationship between the child's growth and development status and the risk of injury to the child (p-value 0.513). This table shows that a normal child can prevent 0.7 times the incidence of injury in toddlers. PR 95% CI (0.32-1.7).

**Table V: The Relationship between Child Growth and Development Status with Risk of Injury to Toddlers**

Maternal Knowledge	Risk of Injury				Total		PR 95%CI	p-value
	No	%	Yes	%	N	%		
Normal	11	36.7	14	46.7	25	83.3	0.7 (0.32-1.7)	0.513
Growth and development disorders	3	10.0	2	6.7	5	16.7		

### The relationship Mother's knowledge and Risk of Injury to Toddlers

The results of the study showed the risk of injury occurs most frequently in mothers with poor knowledge (30%) compared to mothers with good knowledge (23.3%). There was a significant relationship between maternal knowledge and the risk of injury to children (p-value 0.001). This table show that good maternal knowledge can prevent 0.3 times the incidence of injury in toddlers PR 95% CI (0.18-0.61)

**Table VI: The Relationship between Material Knowledge and Risk of Injury to Toddlers**

Maternal Knowledge	Risk of Injury				Total		PR 95%CI	p-value
	No	%	Yes	%	N	%		
Good	14	46.7	7	23.3	21	70	0.3 (0.18-0.61)	0.001
Not Good	0	0	9	30	9	30		

## DISCUSSION

Toddlers are a crucial phase in a child's growth and development. In this phase, toddlers experience rapid motoric, sensory and cognitive growth (2). In cognitive development, toddlers have a high level of curiosity and exploration of the environment, but this is not balanced with the ability to understand things or react to danger. Toddlers naturally have a desire to explore their surrounding environment. This often causes them to touch, climb and interact with objects that could pose a risk, such as sharp objects, hot surfaces or small objects that could be swallowed.

In the Toddler phase, gross motor skills and coordination are being developed. Toddlers begin to actively move, run, go up and down stairs, climb, jump, or play bicycles, and enjoy playing outside the house. However, they are prone to falling because they have not mastered how to walk, run or balance themselves(16). Toddlers are also developing their fine motor skills. They begin to develop skills in grasping, opening, closing, or throwing objects around. This condition causes toddlers to be a group that is vulnerable to injury (10). Toddlers are not yet able to predict the consequences and anticipate the dangers of their actions. Toddlers often have no fear and may engage in risky behavior without understanding the potential danger. For example, they may climb on furniture or run into the street (2). This makes toddlers more susceptible to accidents(17).

The type of injury that often occurred in toddlers was falls (40%). These results are from a joint community survey in East and Southeast Asia, which showed that fatal injuries that cause death in children under five years old are falls and drowning. The research showed that falls were the leading cause of injury in children under three years old. The causes of toddlers falling were objects such as unwell-organized furniture, falling from stairs, and play tools (2).

Toddlers often experience falls due to various factors related to their development and environment. They are learning to walk but are not fully skilled at developing balance and motor coordination. Toddlers often stumble, wobble, and fall. The proportion heads are larger than their bodies. Their legs being short makes them more likely to lose balance and fail to avoid obstacles. Limited spatial awareness causes toddlers not to recognize the dangers around them. Toddlers also have high curiosity and like to explore their surroundings, which often puts them in situations where they are at risk of falling. Apart from that, an unsafe environment: uneven surfaces, slippery floors, and rooms that can cause toddlers to slip and fall.

The variable related to the incidence of injuries in toddlers was gender (p-value< 0.010). Boys tended to experience injuries more often because they were

typically more active and aggressive than girls. Prior studies revealed that the yearly mean of child injuries seen in emergency rooms was 107 per 1000 (95% CI 91–123), with males suffering from greater injury rates than girls (122 vs. 91 per 1000;  $p < 0.05$ ) (16).

External causes of injuries changed substantially by the developmental stage. Boys experienced injuries more often due to differences in behaviour, and gross motor and kinaesthetic development were dominant, so boys got greater risk exposure. In addition, girls had finer motor skills than boys(18). Injuries such as burns, scratches, bruises, lacerations, sprains, contusions, fractures, and traffic accidents were more common in boys (10). Boys tended to experience injuries more often and more seriously than girls. In children under 15 years of age, there were, on average, 24% more deaths from injuries in boys than in girls. Boys tended to experience injuries more often because boys were usually more active and aggressive than girls (2).

Injuries are the most important cause of paediatric morbidity and mortality. Child injuries are a growing global public health problem and constitute a significant area of concern from the age of one year until the age of a child. They progressively contribute more to the overall rates of child mortalities. Hundreds of children perish from injuries, and millions of others suffer the consequences of non-fatal injuries (9).

Normal toddlers and those with growth and development problems are both at risk of injury. In normal children, injuries occur because their activity is high because they are in the exploration phase. Toddlers are very curious and love to explore their surroundings. They also don't have enough fear of danger, so they tend to be bolder. This often puts them at risk of injury. Meanwhile, children with growth and development problems are also at risk of injury due to motor and sensory delays. Sensory limitations reduce a child's ability to perceive stimuli, and process and understand information, making it more difficult for toddlers to recognize dangerous situations and take appropriate precautions. Limited motor skills require toddlers to use assistive devices, such as wheelchairs or walkers. This causes the child to face additional challenges in navigation and may be more easily injured if the device is not used properly.

Children with developmental delays, including those with related neurobehavioral disorders such as autism, ADHD, and hyperactivity, often also have language, social, emotional, or behavioral delays. This delay can have an impact on the child's ability to learn, communicate and interact with other people. Children with developmental delays usually struggle with social and emotional skills. They have difficulty understanding social cues, initiating communication with others, or having two-way conversations. They may also have difficulty dealing with frustration or dealing with

change. The child may experience prolonged tantrums. This behavior can cause the child to be at risk of injury. need more support by modifying their environment or learning skills to cope with social and emotional challenges.

Another variable in this study related to the incidence of injuries in toddlers was the mother's knowledge about injury prevention ( $p$ -value 0.001). Knowledge itself results from "knowing" that occurs after a person senses a particular object. A person's knowledge of an object will underlie the formation of behaviour. Parents who have correct knowledge about injuries and efforts to prevent injuries to toddlers will enable the formation of behaviour in preventing their toddlers from injuries(18)

Several studies showed a significant relationship between the mothers' knowledge about injury risks and actions to prevent toddlers from injuries. Mothers' good understanding of the risk of injury positively impacts preventing toddler injuries. Therefore, people had better have health workers (nurses) provide anticipatory guidance regarding the risk of specific injuries that can occur in toddlers in line with the characteristics of the toddler's growth and development. As a result, four preventative priorities are determined, including: 1) optimizing supervision; 2) restricting access to hazards; 3) providing protection from heights; and 4) anticipating risks(19)(20).

Parents also need to consider various risk factors that influence the effectiveness of an injury prevention intervention for toddlers to get positive results (21). The main problems of injuries in toddlers are not a well-organized home environment, inadequate play space, and exposure to rubbish and chemicals(22). Reducing the risk of injury can involve effective planning and education, such as planning a safe home environment and play area. Parents need injury prevention guidance on the importance of safety and injury prevention in toddlers. This can help educate and motivate parents in ensuring the safety of their children(23). So that they can carry out environmental modifications and safety measures to reduce the level of injury, morbidity, and death in toddlers (24) (25).

Nurses have a role in preventing injuries to children through various aspects of promotive and preventive efforts. Nurses can act as health promotion workers who educate parents and children about potential dangers at home, school, environment and teach safety practices such as wearing helmets when cycling, using seat belts, and using personal protective equipment. Nurses can also accompany parents to assess the child's living environment and identify risks of injury, such as unsafe stairs, sharp objects, and electrical equipment. Nurses can also advise parents on preventative measures that can be taken, such as installing guards on stairs, keeping sharp objects away, and ensuring electrical equipment

is safe to use.

Nurses can motivate parents to supervise and pay attention to their children's safety when doing activities, playing, and studying. Especially for children with special needs to reduce the risk of injury. Nurses can also carry out Safety promotion, and participate in safety campaigns to increase public awareness about preventing injuries to children. Nurses can collaborate with schools, communities, and health organizations to improve child safety. Nurses can also provide First Aid and Injury Care if an injury occurs and ensure the child gets proper medical care. Nurses can also teach parents and caregivers how to provide first aid. By fulfilling this role, nurses can effectively help prevent injuries to children and ensure they grow up in a safe and healthy environment.

## CONCLUSION

Toddlers often experience injuries related to their growth and development phase: exploration, Limited motoric coordination, taking risks, minimal protection, and environmental hazards. Nurses can provide anticipatory guidance to parents in the form of education about the stages of growth and development of toddlers, the risk of injury that can occur, and efforts to prevent injuries to toddlers, namely: Providing a safe environment, supervising toddlers when playing or doing activities, avoiding potential dangerous, and teaches toddlers basic safety rules.

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