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Unintentional accidents in the 0-6 age group: evidence from Turkey

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Objective: This study aims to analyze the data of children in the 0-6 age group who were exposed to unintentional accidents through a data set representing Turkey.
Methods: The variables used in the analysis were obtained from the "TurkStat Health Survey" micro data set for 2016. Although there are fifteen accident types in total, the data for the two accident types were excluded from the analysis because there was no data about them. Each accident element was analyzed by frequency, rate and difference analysis. In addition, the frequency of occurrence of each accident type per hundred thousand was calculated by using the sample.
Findings: The first five accident types with the highest frequency of thirteen accident types, play-related injuries (8.7%), slips and falls (8.1%), insect bites and stings (3.4%), burns (2.9%) and foreign body aspiration (1.6%). The number of people exposed to thirteen accident types is 743 out of 2272 people. 43% of the people exposed to the accident applied for treatment. The frequency of occurrence of all accidents per hundred thousand is 3318.9.
Conclusions: According to the results of the research, the authorities directing the health policy should make an emergency action plan for the types of accidents with the highest frequency and the most sequelae.

Keywords: Unintentional accidents, sequelae, injury, Turkey
Short Title in English: Unintentional Accidents

Introduction

Globally, every year, 973 million people are unintentionally injured each year while 4,8 million people die as a result of the injury. This accounts for 9% of the world's deaths, nearly 1,7 times the number of fatalities that result from HIV/AIDS, tuberculosis and malaria combined. Unintentional injuries including road traffic injuries, falls, burns and drowning account for about three-quarters of injury-related deaths. Injuries have a significant economic burden, as they impose heavy costs on the individual and society. The cost of injuries in India is estimated to be between 2–3% of the gross domestic product (GDP) (1).

In the United States, each year about 13,819 children and adolescents (0–19 years old) die from injuries, incurring a $21.95 billion cost to the social system. And more than three hundred thousand children and adolescents (0–19 years old) need hospitalization due to injuries, generating $32.14 billion cost (2).

Injuries are the leading cause of morbidity and mortality for children (3). Unintentional injury costs are high. According to a study conducted in the USA in 2012, injuries to children (including emergency treatment, hospitalization services and fatal) led to a cost of $ 92 billion costs and increased to $ 502 billion when the quality of life losses was taken into account. Non-fatal injuries account for 83% of these costs (4).

Injuries are divided into two, intentional and unintentional. Death and disability-adjusted life-years occur most often in low- and middle-income countries (more than 90%) (5). The top five causes of unintentional injuries published by the WHO are traffic accidents, drowning, poisoning, burns and falls. Other injuries include fractures, joint and muscle injuries, open wounds, and internal organ injuries. Unintentional injuries in children are affected in different ways by cultural, economic, living conditions and regional and demographic features (6).

Every hour a child in the United States dies from an unintentional injury. About 1 in 5 child deaths is a result of unintentional injury. The sad side is that these deaths and injuries are largely preventable (7). In Table 1 below, in the WISQARSTM (Web-based Injury Statistics Query and Reporting System) U.S.-based and linked to CDC (Centers for Disease Control and) database (one of the most important databases on unintentional injuries) the types of accidents that lead to the most deaths are ranked by age groups.

Table: 1: Leading Causes of Unintentional Injury Deaths, United States 1999 - 2015, All Races, Both Sexes

	Age Groups			
Rank	<1	1-2	3-4	5-6
1	Suffocation 3,968	Drowning 5,191	MV Traffic 3,583	MV Traffic 3,375
2	MV Traffic 1,901	MV Traffic 3,735	Drowning 2,352	Drowning 1,169
3	Drowning 868	Suffocation 1,814	Fire/burn 1,653	Fire/burn 988
4	Fire/burn 500	Fire/burn 1,545	Suffocation 570	Suffocation 285
5	Natural/ Environment 304	Pedestrian, Other 1,271	Pedestrian, Other 469	Other Land Transport 226
6	Unspecified 299	Natural/ Environment 403	Struck by or Against 261	Pedestrian, Other 217
7	Fall 249	Fall 387	Natural/ Environment 229	Struck by or Against 138
8	Poisoning 241	Poisoning 358	Fall 217	Natural/ Environment 129
9	Other Spec., classifiable 141	Struck by or Against 313	Firearm 217	Fall 122
10	Struck by or Against 91	Unspecified 171	Other Land Transport 181	Poisoning 113

Source: https://webappa.cdc.gov/sasweb/ncipc/nfilead.html Accessed in February 2020.

Data Source: National Center for Health Statistics (NCHS), National Vital Statistics System; WISQARSTM Produced By: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention

In general, the burden of unintentional injuries among children is considerable all over the world, inflicting great economic losses on society, ranging from the US $516.938 to the US $9.550.704 per year (8). As a risk group, children, especially those under the age of 4, are exposed to higher rates of unintentional injuries. The direct and indirect economic costs of childhood unintentional injuries are mainly calculated by referring to medical treatment, length of stay (LOS) and loss of the healthy year (6).

To analyze the data for children exposed to unintentional accidents of the 0-6 age group through a data set representing Turkey's children is the main purpose of this study. The lack of a study based on data representing Turkey and examining all types of accidents together is the main motivator of this study.

Methods

In this study, “2016 Turkey's Health Research" micro data sets were used. The Health Questionnaire is conducted every 2 years by TURKSTAT and the most recent survey belongs to 2016. Its scope is households located in all settlements within the borders of Turkey. The population defined as institutional (population living in dormitories, hospitals, jails, rest homes, and soldiers) are out of coverage and also the residential places having less than 20 addresses are left out of coverage since it is thought that we would not be able to reach enough sample household number. The dataset was stratified and a two-step cluster sampling methodology was used. 9470 household addresses were selected and researched to gather information about health indicators. The total number of observations in the data set is 23.606. In this study, there is information about 2772 people in the 0-6 age group. There are questions for a total of 15 accident types. Since the question regarding carbon monoxide poisoning was not answered, this accident type could not be analyzed. In addition, since there is a lack of information about other accident types, they were excluded from the study.

Findings

Firstly, six variables (gender, hearing loss, vision loss, presence of mental retardation, speech delay, and attention deficit) included in the data set were subjected to differential analyzes according to accident types. The difference analysis was done with the t-test. Thirteen types of accidents were then tabulated in terms of frequency and rate analysis of exposure, age of exposure, whether they were treated after exposure, and whether there was any malaise or sequelae as a result of the treatment.

Difference analysis; In the analysis of differences, an answer was sought for the question of whether there are differences between the groups in terms of gender, hearing loss, vision loss, the presence of mental retardation, speech delay and attention deficit. No difference was found between all those with and without hearing loss and vision loss in terms of accident types ($p > 0.05$).

"Does the exposure of children with and without delayed speech to all types of accidents differ?" The answer to the question differs only in terms of the following titles: Children with speech delay are exposed to fewer accidents in accident types such as play-related injuries, slips and falls, insect bites and stings, burns and foreign body aspiration ($P < 0.05$). The exposure of children with and without attention-deficit to the accident was examined in terms of all accident types. There are differences only in terms of slips and falls, burns and play-related injuries. Children who have attention deficit are exposed to fewer accidents in accident types such as slips and falls, burns and play-related injuries ($p<0,05$). Those with and without mental retardation were compared in terms of all accident types and no difference could be determined.

The answers to the question of whether the frequency of accident types varies according to the gender variable were examined in terms of thirteen types of accidents. Gender differences are only statistically demonstrable in terms of only two accident types. Girls (N = 1343, M = 1.975 and Sd: 0.15) are exposed to more insect bites and stings (t (2770) = -2.275, p = .023) than boys (N = 1429, M = 1.96 and Sd: 0.195) statistically. Furthermore, girls (N = 1343, M = 1.93 and Sd: 0.253) have more accidents due to more play-related injuries than boys (N; 1429, M = 1.91 and Sd: 0.289) (t (2770) = -2.243, p = .0.025) statistically. The other eleven types of accidents do not differ by the gender variable.

Table 2: Injuries in terms of gender, referral to treatment and sequelae

	GENDER (N 2772)				OTHER HIGHLIGHTS (N 2772)								
ACCIDENTAL ELEMENTS	Male	Male %	Female	Female %	I HaC +	II NC -	I/II	Per one hundred thousand	NAT	TAR	RS	SRR	SRR per hundred thousand
Play-related injuries	131	30.75	92	29	223	2549	0.087	8044.73	53	0.24	24	0.009	865.8
Slips and falls	118	27.7	90	28.4	208	2564	0.081	7503.61	101	0.49	25	0.009	901.88
Insect bites and stings	57	13.38	33	10.4	90	2682	0.034	3246.75	30	0.33	2	0.001	72.15
Burns	43	10.09	35	11	78	2694	0.029	2813.85	62	0.79	30	0.011	1082.25
Foreign body aspiration	23	5.4	20	6.3	43	2729	0.016	1551.23	16	0.37	2	0.001	72.15
Cutting tool injuries	12	2.82	12	3.8	24	2748	0.009	865.8	11	0.46	5	0.002	180.38
Drowning	11	2.58	12	3.8	23	2749	0.008	829.73	9	0.39	0	0	0
Poisoning	9	2.11	10	3.2	19	2753	0.007	685.43	18	0.95	0	0	0
Traffic accident	8	1.88	4	1.3	12	2760	0.004	432.9	7	0.58	2	0.001	72.15
Nursery school injury	8	1.88	5	1.6	13	2759	0.005	468.98	8	0.62	1	0	36.08
Electric shock	4	0.94	1	0.3	5	2767	0.002	180.38	1	0.2	1	0	36.08
Sports injury	2	0.47	1	0.3	3	2769	0.001	108.23	3	1	0	0	0
Corrosive Esophageal Burns	0	0	2	0.6	2	2770	0.001	72.15	1	0.5	0	0	0
THE OVERALL TOTAL	**426**	**100**	**317**	**100**	**743**		**0.022**	**2061.828**	**320**	**0.43**	**92**	**0.033**	**3318.9**

HaC: Had an accident +; NC -: No accident; NAT: Number of Applicants to Treatment; TAR: Treatment Applicant Rate; RS: Remaining sequelae ve SRR: Sequelae remaining rate

The top five accident types with the highest frequency of thirteen accident types are play-related injuries (8,7%), slips and falls (8,1%), insect bites and stings (3,4%), burns (2,9%) and foreign body aspiration (1,6%). The number of people exposed to thirteen accident types is 743. Of these, 426 are boys and 317 are girls. 43% of the people exposed to the accident applied for treatment. The most common types of accidents that apply to treatment are slips and falls, burns, play-related injuries and insect bites and stings respectively. Those exposed to burning are the group that has to live mostly with sequelae. This group is followed by those who are exposed to slips and falls and play-related injuries. The rate of sequelae after the treatment is 3,3%. In order to provide an international comparison, the frequency of occurrence of all accidents per hundred thousand has been calculated and determined as 3318,9. (Table 2)

The frequency of occurrence of thirteen accident types in the 0-6 age range is shown in Table 2. When the table is viewed in general, the age at which the play-related injuries are most common is the age of 5 and above. In the slip and fall group, the group above 2 years of age and below 3 years of age fell the most. In terms of insect bites and stings, those over 3 years under 4 years take the lead. In terms of burns and corrosive esophageal burns, those over 2 years under 3 years take the lead. Information on other types of accidents is detailed in Table 3.

Table 3: Number of Accidents by Age Groups

ACCIDENTAL ELEMENTS	Age Ranges							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**Total**
Play-related injuries	9	24	33	33	43	33	48	223
Slips and falls	18	28	33	40	32	24	33	208
Insect bites and stings	8	8	12	17	19	9	17	90
Burns	1	16	29	21	4	6	1	78
Foreign body aspiration	2	11	10	12	0	6	2	43
Cutting tool injuries	1	1	3	6	6	4	3	24
Drowning	7	5	4	5	0	0	2	23
Poisoning	1	1	5	3	4	3	2	19
Traffic accidents	1	0	0	1	3	3	4	12
Nursery school injuries	0	1	2	0	3	5	2	13
Electric shocks	0	0	1	3	1	0	0	5
Sports injuries	1	0	0	0	1	1	0	3
Corrosive Esophageal Burns	1	0	1	0	0	0	0	2
Total age groups	**50**	**95**	**133**	**141**	**116**	**94**	**114**	**743**

1: 0-6 months; 2: less than 6 months-12 months; 3: over 1 year under 2 years; 4: over 2 years under 3 years; 5: over 3 years under 4 years; 6: over 4 years under 5 years and 7: 5 years and over

Discussion

Accidents are still an important public health problem due to their frequent occurrence, leading to death and disability. Unsafe environmental conditions and unsafe behavior play an important role in accident formation (9). Children who are curious, active, very interested in their environment, but whose mobility skills are not fully developed, their cognitive and behavioral developments are not completed, and therefore lack of perception of possible risks is frequently exposed to accidents (10).

In a study conducted in Turkey, 12,6% of children were identified in the accident story (11). Since there were thirteen types of accidents in this study, the highest distribution is 8,7% with the play-related injury. The type of accident that has the lowest rate is a sport-related injuries with oesophagus and burns with a ratio of one per thousand. In many studies conducted in our country and in the world, the frequency of accidents in children is at most 1-4 years of age. It is an expected result that the frequency of the accident has increased due to the fact that the self-monitoring behavior in children under three years of age has not developed, the visual fields are not fully developed and the inability to accurately determine the direction in which the sounds come from in children under the age of five (10).

In addition to road injuries, falls and burns are the leading causes of injuries among the population under the age of seven. Burns and falls are typically commoners and more severe among children (12). In this study, the most common accident types were play-related injuries (8,7%), slips and falls (8,1%), insect bites and stings (3,4%), burns (2,9%) and foreign body aspiration (1,6%).

According to the systematic review study conducted by Barcelos et al in 2017, it was determined that there were significant improvements in the results of many studies thanks to the programs to prevent burns (13). Burn injuries are a major public health problem for children (14). Burns is an important cause of injury for young children and it is the third most common cause of injury after accidents resulting in death in motor vehicle accidents and drownings. Burn injuries lead to prolonged hospital stays and increase care-related costs. Most burn injuries in children are most commonly seen in children between the ages of 0-4, and these injuries are mostly burn injuries caused by hot liquids (15). In this study, burn injuries were more common in children aged 2-4 compared to other age groups. The highest age group is 3 years old. Approximately 3 people out of 100 were exposed to burns. In 2010, a study conducted by Atak

et al. on children under the age of 5 confirmed that burns were the second most common type of accident causing injuries. In this study, burn was ranked fourth (11).

In our study, the rate of application to the health institution after the accident was found to be 43% as the average of all accident types. There are accident types with 100 percent application (sports injuries; the number of people 3) and very low accident types (such as play-related injuries and electric shocks; one per thousand). Everyone exposed to sports injuries applied to health institutions. Ninety-five out of every hundred poisoned people, eight out of every ten people exposed to a burning accident, six out of every ten people exposed to a nursery injury, almost six out of ten exposed to a traffic accident, one out of two exposed to an esophagus burn, one in two people exposed to esophageal burns and one in two exposed to falls (49%) applied to a health facility. The lowest application numbers are applications related to game injuries and electric shock and one in five people applied. Sümer et al. determined this rate as 55% in their study in 2019 (9). In the study of Kurt and Aytekin, this rate was reported as 51,0%. In Kurt and Aytekin's study, falls accounted for 45.9% of household accidents (16).

We do not have information regarding how many of the children have elbow, femur and humerus fractures at the end of each accident when applying to the health facility. In addition, the survey participants were not asked if they were hospitalized as a result of the accident and about the care costs. Despite this, some statements have been added to the text by making use of the literature about the possible consequences of falling accidents by using the resources below. The most common cause of injury in children is falling. The sideways trend may lead to upper extremity fractures in order to protect himself/herself while falling. Most distal radius and elbows are affected by this injury. The frequency of elbow injuries is most common in preschool children. Supracondylar humerus fractures account for 60% of elbow fractures (17). Femur fractures due to falls are among the conditions that children of this age are exposed to. Femur fractures occur as a result of high falls or motor or bicycle accidents. This affects hospital stay time and costs (18). The most frequently injured area differs greatly by age. In another study, it was observed that elbow injuries were common in groups of 0-2 (mummy's boy), 3-6 (game boy) (19).

When the literature was analyzed, it was reported that boys were more often exposed to accidents than girls (9,20,21). In Laffoy's (1997) study, 59.2 % of the children who had a home accident were identified as boys. In the study of Yalaki et al., this rate was found to be 52 % for the boys. It was stated that boys are more frequently exposed to accidents than girls since they are more active and active (22). In this study, in terms of frequency and ratio, boys were

injured more than girls in game-related injuries. However, on the T-test based on group averages, the average of boys was 1.9083 and the average of girls was 1.9315. Since $p < 0.05$, the difference between group averages is significant. Girls with a high average are more likely to have game-related injury levels than boys. This finding reverses the general literature. This subject can be clarified with wider participation and multinational studies taking into account the geographical and cultural dimensions.

Limitations

Questions such as whether there were deaths as a result of the types of accidents were not asked in The Turkish Health Survey Data. Therefore, there was no general assessment of the fate of the people who suffered the accident. We only have information whether sequelae remain as a result of the treatments of the accident victims. There is also no information on the time of the accident and the factors that led to the accident. The Turkish Health Survey data does not include the result statements for sequela and injury related to accidents. For example, loss of hearing or vision due to an accident. As the participants were asked about conditions such as hearing loss, vision loss, mental retardation, speech delay and attention deficit, the statements regarding this condition were not associated with accidents and were not evaluated in the discussion section.

In addition, when the answers to the questions asked by 0-6 age group patients are examined, the answers to the questions related to the family, socio-economic status and household characteristics of each child are not included in the Turkish Health Survey data. Parents were asked separate questions. Questions about hearing loss, vision loss, mental retardation, speech delay and attention deficit were answered in binary groups as yes or no. In this respect, only the difference analysis could be made with the available data. The causes and consequences of accidents were not asked with detailed questions, and impact and relationship analyzes could not be carried out as there is no data available.

Riberio et al. examined accidents under two headings as proximal determinants and distal determinants in their compilation study in 2019. The proximal determinants identified were: age and sex of children, and ethnicity. Mediating variables were variables such as parental behavior and surveillance. Parental employment and socioeconomic status were identified as distal determinants. In health research data, there are no variables that question ethnicity, mediators and the socio-economic level of parents.

Result

Injury is an important child health problem that requires adequate attention and funding. Improved data collection infrastructure and evidence-based resource allocation for surgical services can aid in addressing pediatric injury, which is a major public health problem (12).

The frequency and preventability of unintentional injury underscore the importance of child and teen injury as a public health problem. We know what works, but there are a variety of challenges to overcome. Because injuries are common, they may be thought of as inevitable and "just part of growing up." There are many causes of injury, and each poses different risks and has different prevention strategies that change as children grow and develop. We cannot and should not aim to prevent every bump and bruise. However, we can identify the behaviors and environments most likely to contribute to severe, devastating, or fatal injuries and teach children, teens, and parents how to avoid them (7).

Based on WHO's wound prevention strategies, policymakers need to develop an action plan to prevent unintentional injuries. The first precaution should be to determine the deaths due to accidents. The action plan should give priority to accident elements with the highest frequency and develop a financial burden calculation methodology for each accident type. Furthermore, strategies for intervention and prevention of unintentional injuries must be developed rapidly. For example, road safety improvements, the use of bicycle helmets, child seats and smoke alarms can significantly reduce the number of accidental injuries.

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