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Epidemiology of School Children Injuries Due to Violence and Accidents in the City of Sana'a, Yemen: A Service-Oriented Cross-Sectional Study

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Abstract

Background: More than 5 million people die every year as a result of injuries due to accidents or violence. This represents 9% of the world's deaths, nearly 1.7 times the number of deaths from HIV / AIDS, tuberculosis and malaria combined. Regardless of increasing awareness of the scale of the problem, interest in preventing and combating injury and violence among policymakers and those who fund global public health programs remains excessively low. Our study was conducted for the first time in Yemen. Even the Ministry of Health and Population, no WHO has data on the prevalence of injuries among schoolchildren or children and adults in Yemen.

Objectives: The first aim of this study was to provide training of first aid in schools and community, and created of awareness on school children injuries due to violence and accidents in Sana'a city. Determining the prevalence of injuries among representatives of school children in the city of Sana'a. To know the pattern of injuries in the study population. Identify the different factors associated with injuries in order to contribute to developing prevention measures and health promotion in this group.

Methods: The first part of the study including: First aid training and provision of service material, extension of awareness activities to homes of students, child to child education, and Extension awareness to policy makers; include letters recommendation to include prevention of accidents and violence in the curriculum such as special training on crossing the roads, respect of traffic signals etc Were done. Then survey was done in which 3,382 pupils were interviewed in this school-based cross-sectional study conducted in selected schools in Sana'a City from 1 October 2006 to 1 April 2007 using the two-stage cluster sampling method.

Results: 56% of participants suffered from injuries in the past 1 year. Among the injured depending on the mechanism of injuries: the most common type were 35% suffered from traffic injuries, followed by 26% suffered from fall injuries, 17% suffered from fighting and 9% suffered from burn injuries. The most common place where injuries occurred were at street (45%), followed by at home (30%) and school (16%). Total of 977 victims were followed for long term outcome; 50% of them had simple impact, 41% cured, 7% disability and 1% death.

Conclusion: A large proportion of the affected, were temporarily disabled for some time which affected their productivity and also became a social and economic burden on society as a whole. Fostering healthy peer relationships may help reduce injuries in this age group as well as reduce the harmful effects of violence.

Keywords: Epidemiology; Injury; School Children; Population Based Study; Cross-Sectional; Sana'a City, Yemen

Abbreviations: DALYs: Daily Adjusted Life Years; WHO: World Health Organization.

Introduction

Adolescence is a period of transition from childhood to adulthood characterized by great physical, emotional and social relationship changes. It is a period of discovery and achievements in which in they face many changes, and the adolescent is exposed to vulnerable conditions as well as situations of violence, both in the condition of being victims as well as the aggressors [1-3]. Injuries have traditionally been regarded as random, unavoidable "accidents". Within the last few decades, however, a better understanding of the nature of injuries has changed these old attitudes, and today both unintentional and intentional injuries are viewed as largely preventable events [4-7]. As a result of this shift in perception, injuries and their health implications have demanded the attention of decision-makers worldwide and injury policy has been firmly placed in the public health arena. Furthermore, the growing acceptance of injuries as a preventable public health problem over the past decade or so has led to the development of preventative strategies and, consequently, a decrease in the human death toll due to injuries in some countries. Based on the premise that access to accurate, reliable information is the key to sound policy-making, this publication seeks to provide an overview of the nature and extent of injury mortality and morbidity in the form of user friendly tables and charts. It is hoped that the graphical representation of the main patterns of the burden of disease due to injury will raise awareness of the importance of injuries as a public health issue and facilitate the implementation of effective prevention programmers [4].

Unintended injuries such as fractures, concussions, open wounds, and burns are a common cause of morbidity and disability among schoolchildren all over the world [5-7]. Childhood injuries can have social, behavioral and economic consequences for affected children and their families [8]. Morbidity and mortality rates due to unintended injuries are high in the Middle East compared to global averages, and injuries are a common factor in daily adjusted life years (DALYs) in the region [7-9]. This paper describes injury rates, associated exposure, and risk behaviors in Yemen among school children in Sana'a City. There is a need for additional country-level studies to evaluate injury rates, types, and causes among school children, especially in Yemen. In particular, the suggested links between injuries, physical fights and attacks, and various types of bully victimization in a few previous analyses merit further examination [10-12]. The first aim of this study was to provide training of first aid in schools and community, and created of awareness on school children injuries due to violence and accidents in Sana'a city. Determining the prevalence of injuries among representatives of school children in the city of Sana'a. To know the pattern of injuries in the study population. Identify the different factors associated with injuries in order to contribute to developing prevention measures and health promotion in this group.

Subjects and Methods

The study is a service study and it is one of the first studies for this purpose in Yemen. The study included community service elements in addition to the survey: Students were trained in first aid and first aid service materials were provided. The training has taken place, with the hope of holding training activities for other first aid groups such as police. One of the most important goals of the study is to create awareness in selected places about literature on violence and accidents. Dialogue through local media; School Radio, participation of staff and students. The study aimed to prepare for continuous data collection on a daily basis (providing programs and training) and to establish preventive activities based on daily information about accidents and violence. As well as expanding educational activities for students' homes (from the child to the parents and from the child to the child's education). The awareness was spread by the television and radio media via the Health Education Channel. The medical and social awareness workshop has been expanded to the community. Awareness raising and liaison with policy makers; and sending letters of recommendation to include prevention of accidents and violence in school curricula, such as special training on crossing roads and respecting traffic lights.

The Survey Methods

The survey was done in which 3,382 pupils were interviewed in this school-based cross-sectional study conducted in selected schools in Sana'a City from 1 October 2006 to 1 April 2007 using the two-stage cluster sampling. Data from 3382 students were collected through a closed self-administered questionnaire. The questionnaire was applied in the classrooms by the study researcher, who received assistance from the school's teachers. The instrument was previously tested through pilot testing in classes that were not part of the study. To calculate the sample, a significance level of 2 standard deviations and a maximum error of 2% were considered, with 50% frequency of the event. Thus, the sample consisted of 3382 school children of schools in the public system. Data were processed electronically via Epi Info - version 6. Extensive verification of the data was performed to check for inconsistencies. The results were analyzed using absolute and relative frequencies. A written consent was requested from the Ministry of Health and population and Ministry of Education. Parental consent was provided in advance by the school. The study was approved by Ethics in Research Committee of the Sana'a University.

Results

Characteristic		Frequency	Percent
Gender	Male	1966	58%
	Female	1416	42%
Age groups	6-15Years	2140	63%
	≥16	1242	37%
Living with parents	Father and mother	2974	88%
	Mother only	273	8%
	Father only	67	2%
	Others relatives	68	2%
No family children	> 7	1106	33%
	≤7	2276	67%
Father education	University	1928	57%
	Secondary	682	20%
	Illiterate	772	23%
Mother education	Illiterate	1459	43%
	Essential	1283	38%
	Secondary	274	8%
	University	366	11%
Father Job	Private work	2301	68%
	Employee	899	27%
	Not working	182	5%
Mother Job	House wife	2926	87%
	Teacher	456	13%

Table 1: The demographic and social characteristics of the school children participating in the accident and violence survey in Sana'a city in 2006-2007, Yemen.

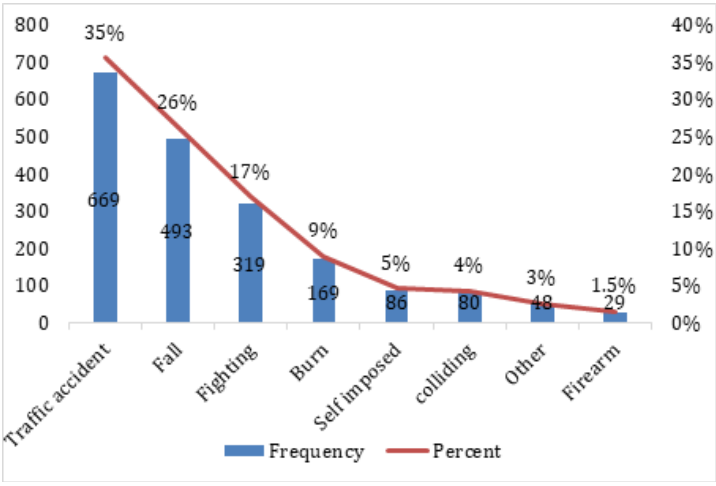

Figure 1: Accidents and violence by type of events among school children participating in the accident and violence survey in Sana'a city in 2006-2007, Yemen.

Shows the demographic and social characteristics of school children participating in the Incident and Violence Survey in Sana'a City in 2006-2007, Yemen. The study included 1966 (58%) males and 1,416 (42%) females. Most of the tested children live with their parents (88%), 8% live with only a mother and 2% live with only the father. Illiteracy at the father is 23% while the mother is 43% (Figure 1).

Shows accidents and violence by type of events among school children participating in the accident and violence survey in Sana'a city in 2006-2007, Yemen. Among the injured depending on the mechanism of injuries: the most common type were 35% suffered from traffic injuries, followed by 26% suffered from fall injuries, 17% suffered from fighting and 9% suffered from burn injuries. The most common place where injuries occurred were at street (45%), followed by at home (30%) and school (16%) (Figure 2).

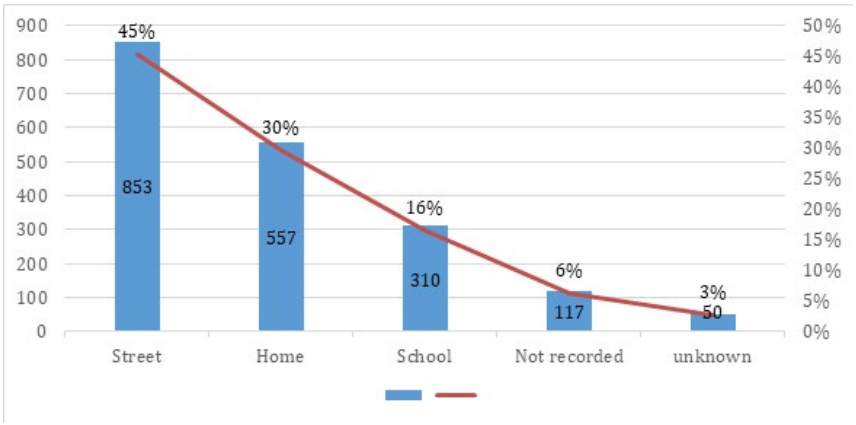

Figure 2: Accident and violence events among by place among school children participating in the accident and violence survey in Sana'a city in 2006-2007, Yemen.

Outcome	Number	Percent
Immediate		
Wound	564	36%
Fracture	354	23%
Deep wound	313	20%
Bleeding	151	10%
Coma	82	5%
No harm	37	2%
Psychological	24	2%
Swelling	13	1%
Death	8	1%
Total	1546	100%

Table 2: Accident and violence outcome among school children participating in the accident and violence survey in Sana'a city in 2006-2007, Yemen.

Shows the accident and violence outcome and type of injuries among school children participating in the accident and violence survey in Sana'a city in 2006-2007, Yemen. Most of injuries were unintentional (85%) and 15% violence injuries. Wound was the most common injury in which surface wound counts 36% and deep wounds counts 20%, also fracture counts 23%, bleeding 10%. Total of 977 victims were followed for long term outcome; 50% of them had simple impact, 41% cured, 7% disability and 1% death (Table 3).

Long-term outcome	Number	Percent
Cure	396	41%
simple impact	492	50%
Disability	71	7%
Death	12	1%
Deformation	6	1%
Total	977	100%

Table 3: Long term outcome for Accident and violence among school children participating in the accident and violence survey in Sana'a city in 2006-2007, Yemen.

Table 4 shows personal factors related to accident or violence incidents among school children participating in the Accident and Violence Survey. Males had a risk factor for injury with the incidence rate being 69% with an associated odds ratio = 3.7 times (P <0.001) higher than 37% of females. Another risk factor was the 6-15 year age group associated with OR equal to 1.3 times (P <0.001). Another risk factor

was that the child had a vision problem with an associated odds ratio of 1.6 times (P <0.001), and there was also a risk of developing a good study level (OR equal to 2.1 times p <0.001). Table 5 illustrates the family and social factors associated with the accident or violence among school children participating in the accident and violence survey in Sana'a city. The large number of children in the household was a risk factor for infection as the incidence rate was 67% with an associated odds ratio = 1.9 times (P <0.001) in > 7 children in the household. Another risk factor was not lived with both parents with OR equal to 1.6 times (P <0.001). Another risk factor was the mother working outdoors with or equal to 1.5 times (P <0.001).

Characteristics		Total N=3382	Accident or violence Events				
		Yes N=1887 (56%)				P	
		No.	Percent	OR	95% CI		
Gender	Male	1966	1358	69%	3.7	3.2-4.3	<0.001
	Female	1416	529	37%	0.26	0.2-0.3	<0.001
Age groups	6-15Years	2140	1256	59%	1.3	1.1-1.6	<0.001
	>=16 Years	1242	631	51%	0.7	0.6-0.8	<0.001
Malnutrition	Yes	2159	1268	59%	1.4	1.2-1.6	<0.001
	No	1223	619	51%	0.7	0.6-0.8	<0.001
Chronic Disease	Yes	1066	612	57%	1.1	0.97	0.19
	No	2316	1275	55%	0.9	0.7-1.1	0.19
Vision problem	Yes	1030	652	63%	1.6	1.3-1.8	<0.001
	No	2352	1235	53%	0.6	0.5-0.77	<0.001
Hearing problem	Yes	166	91	55%	0.95	0.7-1.3	0.79
	No	3216	1796	56%	1.04	0.76-1.4	0.79
Behavior	Abnormal	513	270	53%	0.8	0.7-1.03	0.11
	Normal	2869	1617	56%	1.2	0.9-1.4	0.11
Study Level	Weak	190	72	38%	0.4	0.3-0.6	<0.001
	Good	3192	1815	57%	2.1	1.6-2.9	<0.001

Table 4: Personal factors associated with accident or violence events among school children participating in the accident and violence survey.

Discussion

Injuries are the ninth most common cause of death in the world and will be the most common cause of death by 2030. The prevalence of injuries in this study was 56% which is higher than the community study conducted in India (19.8%) [13,14] as well as in Sierra Leone with prevalence Only 12.4% [15]. Age was strongly related to injuries in this study in particular in the 6-15 age group (59%, with associated OR = 1.3, p <0.001) (Table 4). Moore, et al. 2014 in the United States of America [16] also mentioned that age is a strong factor affecting injuries especially in people between the ages of 10 and 19 years. Males in the current study reported about 4 times more injuries (69%) than females; associated OR = 3.7, p <0.001 (Table 4). Similar results were also reported from the USA with a strong tendency for males to be three times more likely to be injured than females [16]. Males may have higher rates of injury than females because they were often more vulnerable. Likewise, Pant, et al. [17] has also been mentioned that adolescent boys are the most common age group at risk of injury in Nepal. Bartolomeo, et al. [18] was also mentioned that males are the most commonly affected sexes in Italy. One more study by Moshiro, et al. [19] also reported that males are more common than females in Tanzania. Baset, et al. [20] also reported that males are more commonly affected than females in Bangladesh. Socio-economic status plays a major role in determining the size, pattern and severity of injuries and diseases in different countries [21]. Some studies have shown that lower socioeconomic status is associated with risk of injuries, but results are not linear and contradictory [22]. The poor and the wealthy tend to be exposed to various risks to their injuries. In Yemen, poor families usually have slippery or rough floors, poor-quality kitchens, and a general low quality of housing, which puts people at greater risk of injury, from falls, burns and fires. The relationship between low socioeconomic status or poverty and high risk of

injury is well documented [23]. Low paternal and maternal education level (OR = 1.1, 1.02) is related to injuries of their children in our study. In addition, the results also show no significant associations between parental education and injuries when taken in repetition groups, and this may be due to a lack of statistical power due to the small numbers analyzed in the study group. Thus, the absence of significant correlations does not mean that the effect of education on injuries small. Nearly similar results were reported for injuries in 15 European cities [24]. Likewise, Laflamme, et al. [25] also reported a low socioeconomic background strongly associated with injuries among school children.

Among the mechanisms of injury, road traffic accidents were the most common in the current study with a prevalence of 35% (Figure 1) followed by falls having a prevalence of 26%. Road traffic accidents and falls share roughly the same portion of injuries in this study. Similar results were reported by the World Health Organization, 2013 regarding injury-related risk factors [26]. Road traffic accidents have also been reported as the most common injury mechanism by Bartolomeo, et al. [18]. They reported that road accidents were the main mechanism (81%) of injuries. A different study by Bansal, et al. [27] road traffic accidents were also reported as the most common mechanism of injury (24%). Likewise, Azubuike, et al. [28] similar results were also reported since road traffic accidents are the most common mechanism of injury. Close enough falls was the second common injury mechanism in the current study (26%) that was also reported by Stewart, et al. [15]. Likewise, Duan, et al. [29] also reported that falls was the most common mechanism of injury, followed by traffic accidents at number two. Another study by Tripathy, et al. [30] was also mentioned that falling was the most common mechanism of injury. Another study by Nodrberg, et al. [31] also reported that falling was the most common mechanism of injury. Olawale, et al. [32] falls and road traffic injuries are also mentioned as common injury mechanisms. In the current study, the location of the injury was on the street (45%); this finding is different from that reported by Sharma, et al. [33] where the majority of injuries occurred at home (32.3%).

Characteristics		Total N=3382	Accident or violence Events				
		Yes N=1887(56%)				P	
		No.	Percent	OR	95% CI		
No. Family children	> 7	1106	741	67%	1.9	1.6-2.2	<0.001
	≤7	2276	1146	50%	0.49	0.4-0.5	<0.001
Not live with parents	Yes	408	266	65%	1.6	1.3-1.9	<0.001
	No	2974	1621	55%	0.63	0.5-0.7	<0.001
Father working	No	182	105	58%	1.1	0.8-1.4	0.59
	Yes	3200	1782	56%	0.9	0.68-1.2	0.59
Mother working	Housewife	2926	1671	57%	1.5	1.2-1.8	<0.001
	Employee	456	216	47%	0.67	0.55-0.8	<0.001
Father Education	Low	772	434	56%	1.02	0.8-1.2	0.78
	High	2610	1453	56%	0.97	0.8-1.1	0.78
Mother Education	Low	2742	1544	56%	1.1	0.9-1.3	0.21
	High	640	343	54%	0.89	0.7-1.0	0.21

Table 5: Family and social factors associated with Accident or violence among school children participating in the accident and violence survey in Sana'a city.

Another study from India reported similar results [27]; the home is the most common place where injuries occurred, especially among children and the elderly. Likewise, Ghimre, et al. [34] from Nepal they also reported that home was the most common location of injury. This study reported unintentional injuries (85%) (Table 2) to be the most common on the basis of human intent which is coherent with Gosavi, et al. [14] who reported 94.0% of injuries as unintentional based on human intent. The current study reported wound injuries (36%) along with fracture (23%) as the most common types of involved in injuries which has been reported also by Stewart, et al. [35] in Sierra Leone as wounds in extremities were the most commonly type of injury outcome. Wani, et al. [13] reported cut, bite or other open wounds (37.2%) as the most common among nature of injuries followed by Bruise or Superficial injury (17.8%) which is almost similar as reported by Bansal et al. [27] in India as cutting and crushing injuries to be the most common

among nature of injuries. Similarly, Hedstrom, et al. [36] also reported open wounds, abrasions and contusions to be the most common among nature of injuries in Sweden. Close enough Verma et al. [37] also mentioned superficial injuries as the most common type in Delhi, India. This study's findings about basic risk factors (age, sex, and family size) (Tables 4 & 5).

Are consistent with other studies elsewhere in which <15 years children, male children and large family size were risk factors for injuries [13,34-37]. The death rate in the current survey was 1% (8 cases), and deaths depend on the nature of injuries in the population. Among injury-related deaths, 50% were internal organ and / or head injury which although occurring in hospital, delay in the pre-hospital stage could also be responsible. Another important factor that may affect a high hospital mortality rate is bringing the patient to the hospital to confirm death.

Conclusion

The study showed that injuries are an important health problem of school children in the city of Sana'a, Yemen. The prevalence rate of 56% clearly reflects nearly half of schoolchildren who are injured each year. Its prevalence is higher among males (69%) and younger children (59%) in particular. Road accident injuries topped the list of observed injuries followed by falls which resulted in 1% death and 98% morbidity, and thus led to disability with a harmful psychological and health burden. By Incidentally, Home injury was found to be the second most frequent occurrence in this area, often due to the lack of proper housing and hazardous home surroundings.

Conflict of Interest

"No conflict of interest associated with this work".

Author's Contribution

The first author presented the data and the first and second authors analyzed the data and wrote, revised and edited the paper.

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