Original Article

Years of life lost due to unintentional injuries in children

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ABSTRACT

Results: In this seven year period, 1040 children in Yazd province died due to unintentional injuries. The most commonly affected age group was 15-19 years. YLL due to childhood unintentional injury in our study was 77127 years [male/female ratio: 2.52] accounting for near 15% of all cause YLL. The leading causes of YLL were road traffic injuries [68.63%], burns [7.73%] and drowning [6.72%] causing the loss of 52933, 5961 and 5182 years respectively. Injury mortality rate per 100000 was 45.5 in 2004 and 43.1 in 2010. Injury YLL in 2004 and 2010 was 12062 and 11153 years respectively. Conclusion: Considering little change of health burden of injuries in children despite health promoting actions, these findings can serve as an alarm for health care professionals and policymakers to implement more robust preventive measures. Considering different gender and seasonal patterns in developing prevention strategies can increase the real effectiveness of these measures.

Keywords: Injuries, children, mortality rate, years of potential life lost.

Introduction

Unintentional injury is one of the most common and preventable causes of childhood deaths. More than 95% of total number of deaths due to unintentional injuries occurs in middle income and low income countries. Also, 40% of childhood deaths in developed countries are caused by injuries[1, 2]. Studies in 50 countries with low and middle income reveal that injury mortality in younger children has decreased considerably, but in adolescents and older children, this change is not prominent [3]. Considerable reduction in rate of childhood injury mortality in developed countries, confirms the preventability of these deaths [4-6].

Injury deaths just show a small proportion of the real burden. It is estimated that with every death due to unintentional injury,12 and 100 children will require hospitalization and outpatient treatment respectively [7, 8]. These estimations will draw the attention to the need for more detailed researches in this field. Each urban and rural zone may need specific measures due to the leading cause and its associated factors in that area [9]. Yazd province in center of Iran, has gone through major developments in economic and environmental situations in last decades which may have changed the most common public health problem of this region[10]. In the local area, previous studies show the high burden of road traffic accidents among all types of unintentional injuries which needs to be addressed carefully considering the ever growing use of personal vehicles in this province [11, 12]. Appropriate interventions for reducing mortality in different age groups of children, also vary considerably. Child population in the region of our study in 2006 and 2011 census was 363927 and 355315 respectively [11]. YLL can show the impact of disease mortality on society better compared to the mortality rate. Since childhood injury death deprives the society of many productive years, calculating YLL can show a more comprehensive image of public health burden compared to the mortality rate. YLL has been used in similar studies in this area to investigate the trend of mortality due to other causes such as cancer [13, 14]. An understanding of the specific patterns, trends, and burden of each type of injury can help develop effective measures for prevention [15]. In this study, we want to describe the current situation and trend of YLL due to unintentional injuries in Yazdi children.

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Materials and Methods:

Our study group consisted of all deceased children [0-19 years] in Yazd province between March 2004 and March 2010. We collected data of all cause deaths and deaths due to unintentional injuries according to ICD10 codes from death registration system of Yazd province health center. This registry used data from various sources including forensic medicine department, local health centers, and hospitals. The estimated population of children of Yazd was based upon national census in 1995, 2005, and 2010 [16]. We used vital horoscope data and population growth rate in rural and urban areas to estimate population in years before and after. YLL due to unintentional injury was calculated based on the age at death and remaining life expectancy according to the method of the global burden of disease study 2010. Cases were classified according to age, sex, and type of injury. Excel 2007 and SPSS 16 was used for calculation and analyzing data. Secondary data were used anonymously, and confidentiality of information was highly respected. All steps were in according to ethical codes.

Results:

In this seven year period, 1040 children aged 0-19 years lost their lives due to unintentional injuries which accounts for 23.76% of all deaths in this population. Mean age of victims was 12.3 and 8.12 years old in male and female population respectively. 77127 years were lost due to injuries with a male/female ratio of 2.52. This number accounts for 14.58% of YLL due to all causes. Injury YLL decreased from 12062 in 2004 to 11153 in 2010 in the total population. The trend of YLL in these years showed a reduction in male population (from 9018 in 2004 to 7743 in 2010) and a mild increase in female population (from 3045 in 2004 to 3410 in 2010).(Figure 1) The ratio of YLL due to injury to all cause was highest among the oldest age group.(42.80%)

Average injury mortality rates in boys and girls were 61.8 and 23.4 per 100000 people respectively. Mortality rate due to unintentional injuries per 100000 people in this seven year period fluctuated between 52.6 and 71.6 in male population and from 19.3 to 26.5 in female population.(Table 1) 46.3% of victims were between 15-19 years old. The highest mortality rate of 62.9 and male to female ratio of 5.4 was reported in this age group. (Table 1)

The leading causes of YLL in our study were transport accidents (69.4%), burns(7.6%) and drowning(6.25%).(Table 2) Mean age of victims in these injuries were 11.9, 11.7 and 7.1 years respectively. Transport accidents caused loss of years more than all the other causes of deaths combined together. (Figure 2) 83.5% of the study population resided in urban areas. In the investigation of time of injury, most and least injuries happened in summer and winter, respectively. (31.6% vs. 19.2%) Regarding month of injury, last month of summer had the highest percentage of injuries. (12.4%) while the least injuries occurred in last month of winter.(5.9%) Some types of injury had specific time distribution in years. (Figure 3)

Table 1: Number of deaths, mortality rate per 10000 and years of life lost due to unintentional injuries in children by age group and sex in Yazd province

	Number of Deaths			Mortality rate per 100000			Years of Life Lost		
Age group	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-4	150	117	267	51.64	42.19	46.99	9892	10000	19892
5-9	92	44	136	35.13	17.89	26.76	7475	3575	11050
10-14	113	42	155	37.81	15.56	27.04	8619	3203	11822
15-19	410	72	482	102.73	19.23	62.10	29229	5133	34362
Total	765	275	1040	61.60	23.43	43.06	55215	21911	77126

Table 2: Leading causes of YLL due to unintentional injuries among children in Yazd province, from 2004 to 2010

Cause of unintentional injury	Male	Female	Total	M/F ratio
Transport accidents	39552	13381	52933	2.96
Burn	3295	2666	5961	1.24
Drowning	3288	1894	5182	1.74
Falls	1907	510	2417	3.74
Electric current	2286	0	2286	NA
Accidental threats to breathing	652	844	1496	0.78
Poisoning	1592	1327	2919	1.20

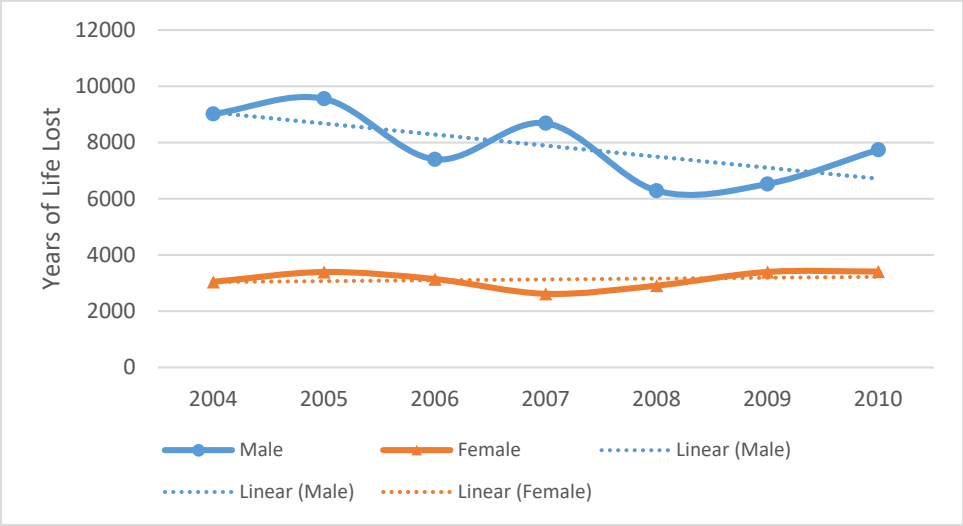

Figure 1: Years of life lost due to unintentional injuries in Yazd from 2004 to 2010 in men and women

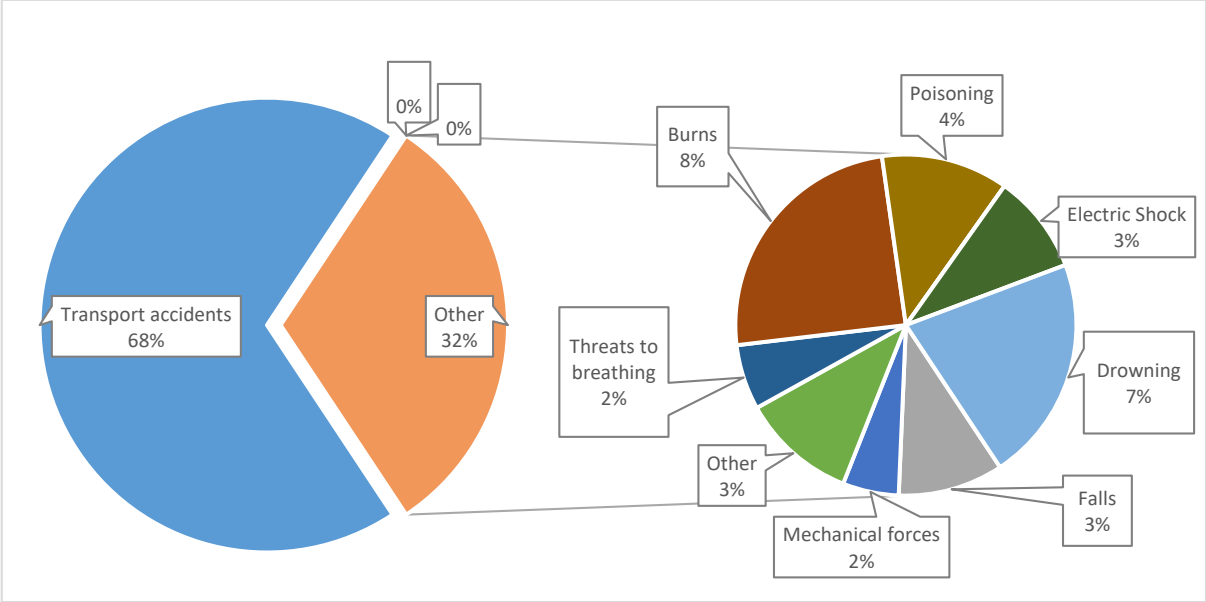

Figure 2: Different causes of years of life lost due to unintentional injuries in children in Yazd

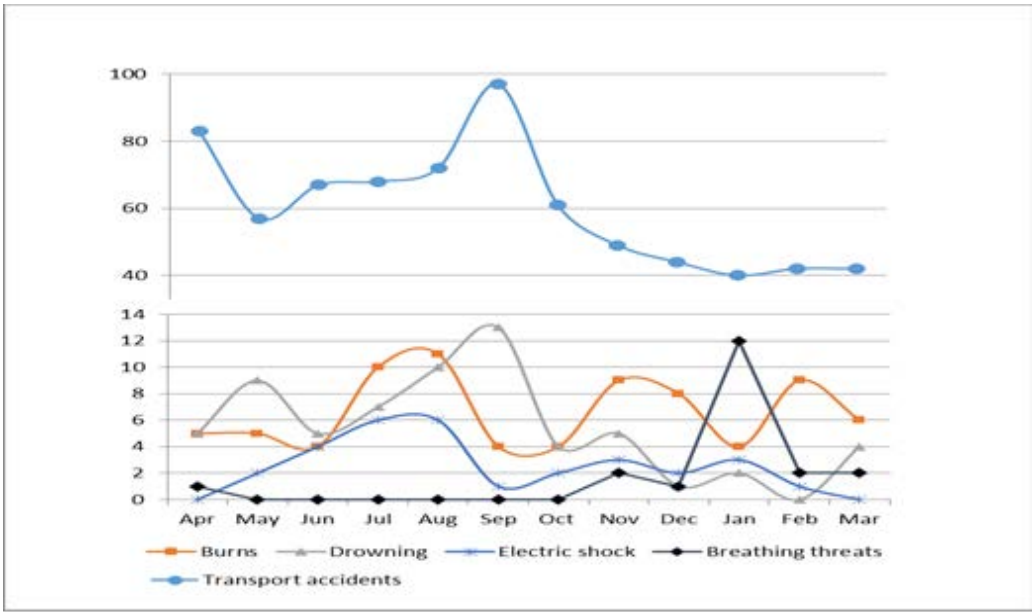

Figure 3: Distribution of prevalence of different types of injury deaths between months in Yazd province

Discussion:

Near 15% of all cause YLL in children is due to unintentional injuries. Considering this substantial proportion and preventability of these injuries, investigations in this field are of paramount importance. Annual YLL from injury was decreased by a small number from 12062 in 2004 to 11153 in 2010. Despite reduction among men, annual injury YLL increased from 3045 in 2004 to 3410 in 2010. Injuries mortality rate per 100000 with a similar pattern, was decreased from 45.5 in 2004 to 43.1 in 2010. Mortality rate in our study was higher compared to some similar studies which have reported a reduction in number of injury deaths in recent years [17-19]. Similar to our finding in this study, in US, unintentional injuries were the leading cause of death in this age group. (37% of all deaths) and mortality rate of childhood unintentional injuries decreased by 29% from 2000 to 2009. In US, regardless of age, gender, ethnicity and socioeconomic status, unintentional injuries are always considered a major cause of death [18, 20, 21] In other national studies, injuries are the second cause of lost life years in the age group of 0-4 years and the first in the age group of 5-14 years [7, 22] .

Type of injury

Road traffic mortality rate per 100000 people was decreased from 35.5 in 2004 to 24.4 in 2010. However, it's still higher than average of the Eastern Mediterranean region (18.3) and the world (10.7). This reduction pattern is seen in all ages across the country.[23] Road traffic injuries account for more than 70% of unintentional injuries in children which is more than two times of the world data [2, 24]. The use of two-wheeled vehicles, and risk taking behaviors in driving are the major causes of higher road traffic fatality rate in Yazd compared to the world. Preference of Yazdi people for owning vehicles and low cost of motorcycle has resulted in the ownership of motorcycle by 57% of Yazdi families which is 2.5 times greater than mean of other provinces [11]. Targeting road traffic accidents for reducing unintentional injury burden on societies should be considered in all populations [25]. In a report in US, by UC Irvine healthcare for countywide service area residents, motor vehicle accident as an occupant was the leading type of unintentional injury death for those 13-20 years. Overall, in that report accidental poisoning, motor vehicle accidents, and unintentional falls were among the leading types of injuries needing hospitalization within Orange County [26].

Burning was the second most common cause of death in our study. Specific mortality rate was 3.3 per 100000 people which was lower than the world [3.9]. Burns are the third most common type of injury globally and the cause of the longest hospitalizations in childhood [2, 27] . A substantial part of hazard in this category is in the child's home environment. Providing hazard assessment tool and checking for possible risk factors may help reduce child injury [28].

The third most common cause was drowning which resulted in the death of 2.7 per 100000 people in our study. This number is much lower than the world average (7.2 per 1000000).(2) This may be a reflection of lower possibility of swimming-related recreations due to geographical reasons. The existence of unprotected water areas in or around home environment is an important environmental risk factor [29]. This risk factor is found much less in the field of our study due to the dry climate.

Unintentional drowning or submersion was the most common type of fatal unintentional injuries in children younger than 12 according to a report in US [26].

Sexual difference

Male mortality rate per 100000 decreased from 68.7 in 2004 to 58.8 in 2010, but this rate in female population increased from 21.0 to 26.5. The YLL followed a similar pattern. This different trend was mainly because of 60% reduction in road traffic deaths which commonly occurred in boys.

In our study deaths due to unintentional injuries in the male population were much higher (67% vs. 33%). This sexual difference intensified with increasing age as male to female ratio increased from 1.2 in the first age group(0-4years) to 5.4 in the last age group.(15-19 years). This ratio was also different according to the type of injury. Falling and road traffic had the most sexual difference with ratios of 3.9 and 3.1 respectively, but this difference was less in poisoning and burns with ratios of 1.16 and 1.2. Higher mortality of males due to injuries was reported in other studies [2, 30, 31], and can be attributed to more exposure to risk taking behaviors in male population especially road injuries. In a study in China, which road accidents were not the leading cause, the gender difference was not statistically significant [32].

Time of injury

Investigation of time trend of different injuries regarding months revealed that some predictable risky behaviors could explain the differences. The highest mortality in the last month of summer with 12.4% could be explained by the peak of road traffic deaths (the most common injury) in this month which was probably due to more summer road travels. Also, more summer trips to beaches could explain the higher drowning mortality in summers. Since the province of our study is located in a hot and dry part, high rate of electrical shock deaths in summer (43% of electrical shock deaths) could be explained by the use of electric air conditioners without safety percussions in summer. 80% of deaths due to accidental threats to breathing occurred in winter which is probably because of suffocation due to the misuse of heat producing devices.

Place of residence

However the difference between urban and rural injuries mortality rate per 100000 was not statistically significant, the annual trend in rural areas showed a more noticeable reduction from 52.68 in 2004 to 27 in 2010. In the same period, the urban mortality rate increased from 43.3 to 46.1. This different trend can be explained by the more significant decrease of road traffic deaths in rural areas compared to urban areas. On the other hand, generally higher degree of efforts are needed to

overcome healthcare utilization barriers implement preventive measures in underserved areas. Rate of road traffic deaths and drowning was significantly higher in rural areas compared to urban areas in a study in China [33]. In another study in Ireland, higher rural mortality was attributed to higher fatality rate in road traffic accidents and more exposure to possibly dangerous farm tools, firearms and unprotected areas of water [34]. Regarding the long period of our study, some temporary fluctuations in trend of mortality may be due to inconsistencies in data collection which was seen in other similar studies in this area [35].

Conclusion:

Unintentional injury contributes significantly to YLL among children. Road traffic death was the most common cause of childhood injury deaths in our study. Mandatory use of baby seats and safety helmets, reevaluation of motorcycle riding laws and more serious penalties is recommended. On the other hand, defining safety certifications and hazard checklists and obligation for meeting those criteria is essential for decreasing unintentional injuries in houses. Various types of injury, have a different gender and seasonal pattern in urban and rural areas. These differences should be addressed in developing preventive measures for an evidently improved outcome.

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