

Epidemiology, Incidence and Trend of Injuries in Iran: A National Study

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Research Methods

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Abstract

Background: Injuries are one of the well-known leading causes of disability and mortality in all societies. This study aims to determine the incidence and trend of injuries and their epidemiologic characteristics in Iran.

Methods: In a cross sectional study, injuries fatality data from 2006 to 2016 were obtained from the registry of the Ministry of Health and Medical Education (Iran) and analyzed to determine the epidemiological pattern of injuries. Data were analyzed using descriptive analysis. Excel and statistical package of SPSS version 22 were used for data analysis. The P value of ≤ 0.05 was considered significant.

Results: The highest incidence of injuries was related to traffic injuries with 546.4 per 100000 populations, followed by trauma and falls from heights with 497.7 and 195.2 per 100000 population, respectively. The highest incidence of traffic injuries in Iran had occurred in the year 2011 with 628.1 per 100000 population.

Conclusion: Regarding the high incidence of injuries, especially traffic crashes, traumas and falls the priorities for close monitoring of these injuries during the high-risk periods in order to decrease and control of the rate of the injuries strongly felt.

Introduction

Increasing of various injuries is one of the most important dangers of human life, which annually causes the death of more than 6 million people worldwide (Organization, 2002). Globally, injuries and related injuries are one of the leading causes of death and disability (Garg & Hyder, 2006). Traffic injuries are one of the most important unintentional types of injuries. Motor vehicle crash is the most common cause of death among young people in developed or high-income countries and in developing countries, 65% of deaths and 90% of disabilities are caused by this problem (Wickramanayake, Gunasena, Wickramanayake, & Goonasekera, 2007). According to Forensic Medicine Organization in 2011 and 2012, a total of 20068 and 19089 deaths and 297259 and 318802 injuries were recorded due to traffic injuries in Iran, respectively (Bahadorimonfared et al., 2013; Moradi & Rahmani, 2014). Rapid population growth, increasing vehicles and intercity trips, and changing life style and willingness to use of private cars are considered as the main causes of traffic injuries (Kanchan, Kulkarni, Bakkannavar, Kumar, & Unnikrishnan, 2012; Kopits & Cropper, 2005). Since in Iran, fatality from injuries is the second leading cause of death and on the other hand, useful and purposeful information is necessary to injuries prevention in any society, this study designed to investigate the eight-year trend of different types and epidemiological profiles of injuries in Iran during years 2008-2016.

Methods

This study has been performed based on the collection and analysis of recorded data in the Medical Emergency and injury Management Center affiliated to Ministry of Health and Medical Education (Iran). Injuries Information of all hospitals affiliated to the medical universities in Iran is sent and aggregated in the mentioned registry center. This registration system is designed and developed, aligned with the National Program for Prevention of injuries by the Center for Disease Management of the Ministry of Health in Excel program. This registration system contains main variables such as age, sex, and area of injury, place of injury, type of injury, month and year of injury, outcome and the name of the registrar center. The validity of its data has been verified according to the national program. In the current study injury and fatality statistics of mentioned center from 2008 to 2016 were used for data analysis. Population statistics of the country and provinces were extracted from the detailed results of the population census in 2006, 2011 and 2016. Moreover, population information in the years between the censuses, including years 2007 to 2009 based on the 2006 census with a growth rate of 1.29 percent, in the years 2012 to 2015 based on the census of 2011 and with a growth rate of 1.23 were estimated using exponential method. Data included age groups (0-4, 5 - 19, 20 - 29, 30 - 59 years and old ≥ 60 years) sex, injury area (urban, rural) and injury outcome (recovery, death and disability). After extracting all the information related to injuries and population of the country, the frequency, mortality and incidence in each year were calculated. To analyze the results, the mortality rate of different Injuries were calculated and their trend over different years were plotted, using Microsoft Excel.

Results

In 2008, the highest frequency of injuries was related to the traffic injuries with 395,253, followed by the trauma with 359,300 cases. In the meantime, drowning is ranked 12th in all years. In general, out of 1483425 injuries during 2016, 947 cases were related to drowning (Table 1).

Table 1
Frequency of the accidents in the Iran based on the type of accident during 2008-2016

year	2008	2009	2010	2011	2012	2013	2014	2015	2016
Assult	13892	13370	13133	14911	20489	20288	21760	22550	26882
Scorpion bite	23393	22705	26135	25390	27181	24687	26139	22784	23670
Burn	63056	56547	58660	64465	61592	63726	64503	63872	68757
Drowning	747	885	923	1073	1083	1022	1008	1220	947
Electrocution	4351	3890	4681	5240	4847	4710	4694	4706	4746
Fall	141210	116802	143581	165449	154609	162411	148225	165603	203523
Trauma	359300	344243	411441	418198	452718	435117	428711	457548	478532
Poisoning	57148	53958	65567	70952	82043	71121	76611	72317	70661
Violence	67689	62302	83907	84890	87187	82572	82551	78746	92045
Suicide	53162	54937	60083	55275	53805	46800	42178	40049	37595
Traffic	395253	367008	460506	471979	468202	443742	432340	441407	456000
Others	107600	95501	113914	117223	141944	221216	185448	196131	496366
Total	1286801	1192148	1442531	1495545	1555700	1480387	1514168	1566933	1483425

In the 8-year study period, the highest incidence rate of injuries was related to traffic crashes with 546.4 per 100000 populations, followed by trauma and falls from heights with 496.7 and 195.2 per 100000 populations, respectively. During the study period, 2011 had the highest incidence rate of traffic injuries with 628.1 per 100000 populations. While drowning had the lowest incidence during the years 2008-2016, electrocutions and animal attacks had the second and third lowest incidence rate during these years (Table 2).

Table 2
Incidence of accidents in Iran per 100,000 populations, based on the type of accident during 2008-2016

year	2008	2009	2010	2011	2012	2013	2014	2015	2016
Assult	19.2	18.3	17.7	19.8	26.9	26.3	27.9	28.6	33.6
Scorpion bite	32.3	31.0	35.2	33.8	35.7	32.1	33.5	28.9	29.6
Burn	87.2	77.2	79.0	85.8	80.9	82.7	82.7	80.9	86.0
Drowning	1.03	1.21	1.24	1.43	1.4	1.3	1.3	1.6	1.2
Electrocution	6.01	5.31	6.31	6.97	6.37	6.12	6.02	5.96	5.94
Fall	195.2	159.4	193.43	220.16	203.22	210.87	190.09	209.78	254.64
Trauma	496.6	469.7	554.29	556.49	595.06	564.93	549.81	579.62	598.72
Poisoning	79	73.64	88.33	94.41	107.84	92.34	98.25	91.61	88.41
Violence	93.57	85.02	113.04	112.96	114.6	107.21	105.87	99.75	115.16
Suicide	73.49	74.97	80.94	73.55	70.72	60.76	54.09	50.73	47.04
Traffic	546.4	500.8	620.39	628.05	615.41	576.13	554.46	559.17	570.53
Others	148.7	130.3	153.46	155.99	186.57	287.21	237.83	248.46	621.03
Total	1778	1626	1943	1990	2044	1922	1941	1984	1855

In 2008, the highest mortality ratio was related to drowning, with 1726.9 deaths per 10000, followed by electrocution with 441.2 deaths per 10000 injuries. Nevertheless, only 71.8 and 7.37 deaths per 10000 were related to traffic injuries and trauma, respectively. In the years 2009-2016, the highest mortality ratio was related to drowning, followed by electrocutions and suicides, and the lowest mortality ratio was related to trauma, scorpion bites and animal attacks, respectively (Table 3).

Table 3
Mortality ratio per 10,000 accidents in Iran during the 2008-2016

year	2008	2009	2010	2011	2012	2013	2014	2015	2016
Assult	6.47	5.23	6.85	8.71	6.34	7.36	7.35	7.81	8.04
Scorpion bite	17.52	7.92	8.41	9.45	5.88	8.1	10.71	6.49	5.68
Burn	77.86	74.45	49.09	40.64	69.97	39.34	26.2	24.75	17.45
Drowning	1726.9	2259.8	2556.8	2096.9	1837.4	1708.3	1309.5	1488.7	1378.9
Electrocution	441.2	275.1	309.7	293.8	274.3	250.4	244.9	202.3	178.2
Fall	19.33	20.63	21.59	21.15	21.86	22.1	22.12	22.9	23.3
Trauma	7.37	6.47	7.31	4.71	5.56	4.94	4.66	4.01	3.55
Poisoning	42.17	33.35	37.06	35.79	31.08	33.4	34.85	31.41	30.41
Violence	30.28	33.22	30.39	24.14	21.9	20.98	19.13	16.24	13.87
Suicide	83.7	83.91	74.39	91.54	95.9	102.8	113.32	113.4	118.6
Traffic	71.8	76.78	66.66	57.58	54.27	54.78	54.97	47.14	43.32
Others	50.74	98.21	92.96	74.2	74.3	66.4	50.1	60.4	57.3
Total	44.1	48.82	44.26	38.63	38.18	36.36	34.32	32.1	29.89

Figures 1-3 show the trend of changes in the mortality ratio during the 2008 to 2016 based on the type of injuries. Trauma, animal attacks and scorpion bites have had a steady trend over the years, while falling, traffic injuries, poisoning, burns and electrocutions have had a declining trend, and suicide and violence have been increased. Animal attacks, scorpion bites, traumas, falling and violence had a fatality ratio in the range of 4 to 35 deaths per 10000 cases as well (Figure 1a). Fatality ratio of burns, poisoning, suicide, traffic crashes and other injuries, ranged from 18 to 120 deaths per 10,000 (figure 1b). While the drowning mortality ratio during the 2008–2016 was in the range of 1309 to 2556 (Figure 1c).

Discussion

The finding of the current study suggested that the incidence of injuries, in Iran had a growing trend from 2008 -2016. This growing trend may be due to an increase in at risk population, an improvement in injury registration systems, or a real increase in injuries, (Neghab, Habibi, Rajaeefard, & Choobineh, 2008). According to our results, the highest incidence rate of injuries, in 2008 was related to traffic crashes with 546.4 per 100000 and the highest incidence rate of traffic injuries, was related to 2011 with 628.1 per 100000 population. In general, the local probability of the occurrence of injuries, and especially traffic injuries, may be due to multiple factors such as geographical factors, low cost of fuel, poor public transport system, dangerous driving behaviors, growing in the automotive industry and low quality cars and motorcycles as well as unsafe road network (Naghavi et al., 2009). According to the results of the current study, in 2008, the highest mortality ratio for accidental death was related to drowning with 1726.9 deaths per 10000 followed by electrocution with 441.2 deaths per 10000 injuries,. Interestingly, traffic crashes included only 71.8 deaths per 10000 injuries, and 7.37 deaths per 10000 were seen in the trauma incidents. In 2009-2016, the highest mortality to injury ratio was related to drowning. The results indicate that although the incidence of drowning is lower than the other injuries, but the mortality ratio in drowning is higher than other injuries. According to the Iranian Forensic Medicine Organization, from 2013 to 2017, 3716 deaths occurred due to drowning in Iran (Derakhshan et al., 2020), of which, about one third (1010 deaths) had happened in rivers. Unfortunately, most rivers do not have warning signs, many people do not realize how dangerous swimming can be, and due to financial problems, they cannot enjoy the benefits of swimming in private pools (Derakhshan et al., 2020). According to the results of the current study, the mortality rate from falling, traffic injuries, poisoning, burns and electrocution has been declining in recent years. These results corroborate the findings of the Global Burden of Disease (GBD) Study 2016 (GBoDC, 2017). The results of Mahdian et al. and Rahmani et al.'s study showed that in 2006 to 2012, mortality rate due to traffic injuries has decreased(Mahdian et al., 2018; Rahmani, HashemiNazari, & Ghadirzadeh, 2016). However, in proportion to this declining trend, there has been no significant reduction in the number of pre-hospital deaths (deaths at the scene of an injury or during transfer). Moreover, in some years (2009 and 2010) the number of deaths at the scene of the injury or during the transfer has been higher (Rahmani et al., 2016). Although in recent years, much attention has been paid to pre-hospital care with the establishment of mobile emergency centers (115 emergency), but due to the impact of many factors such as the type of vehicles used, road conditions and traffic culture on the severity of injuries and mortality (Nantulya & Reich, 2003; Yung, Haagsma, & Polinder, 2014), it is difficult to judge about increasing in fatality in those years. However, according to the results of Rahmani's study (Rahmani et al., 2016), prehospital deaths at the scene of the injury as well as during transferring of the victims and the factors affecting them need to be analyzed as important factors to present to policy makers and officials. The present study also showed that mortality from poisoning declined in Iran over the study period and this finding is in agreement with the results of Z. Ghodsi et al study (Ghodsi et al., 2019). Reduction of poisoning mortality in Iran is in line with changes in global poisoning mortality (Haagsma et al., 2016). A similar reduction in mortality has occurred in other countries (Chaparro-Narváez & Castañeda-Orjuela, 2015; Wigen Skjerdal, Andrew, & Gjertsen, 2016). This also accords with a Chinese study, which showed a reduction of plant pesticide poisoning between 2006 and 2016 (Page et al., 2017). The incidence of burns in our study period showed a decreasing trend, which is also in line with other parts of the world. This declining trend has been due to legal changes, prevention programs and increased occupational safety (Duke et al., 2012; Peck, 2011; Sarma, 2011). Finding risk factors and their interaction on each other, and their relationship with injuries can contribute to the creation of new hypotheses, especially causal factors. Moreover, they eventually may lead to the development of new interventions to prevent injuries and related injuries. Implementing training programs through mass media, strengthening traffic law legislation as well as monitoring systems is necessary to reduce injuries in the society. Building a safe society and success in implementing of injury prevention programs will not be possible without the cooperation and participation of all responsible parties.

Declarations

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Competing interests: No

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Figures

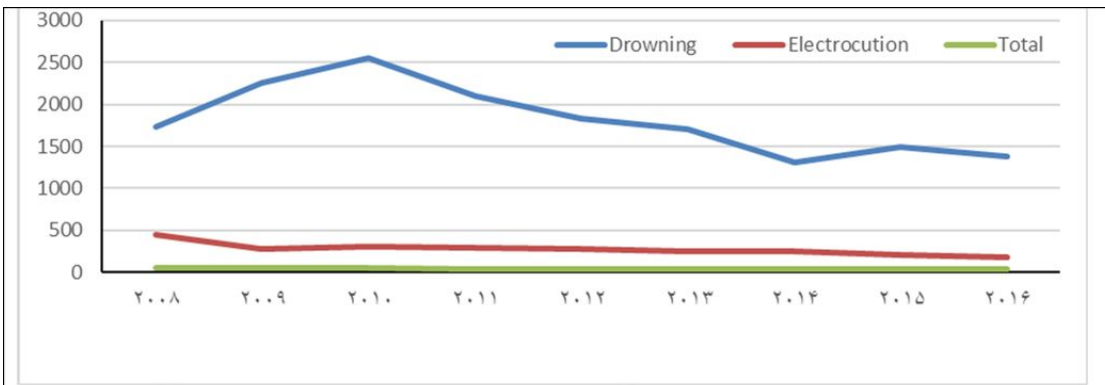


Figure 1-a) Mortality ratio per 10,000 accidents in Iran during the 2008-2016

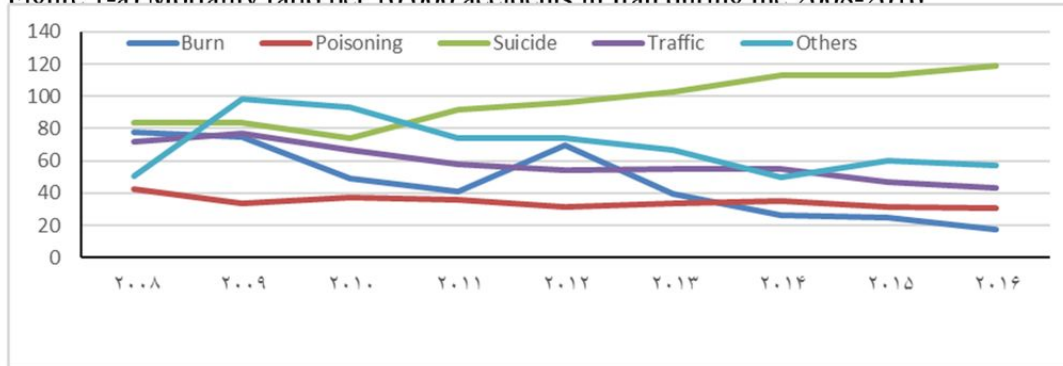


Figure 2-a) Mortality ratio per 10,000 accidents in Iran during the 2008-2016

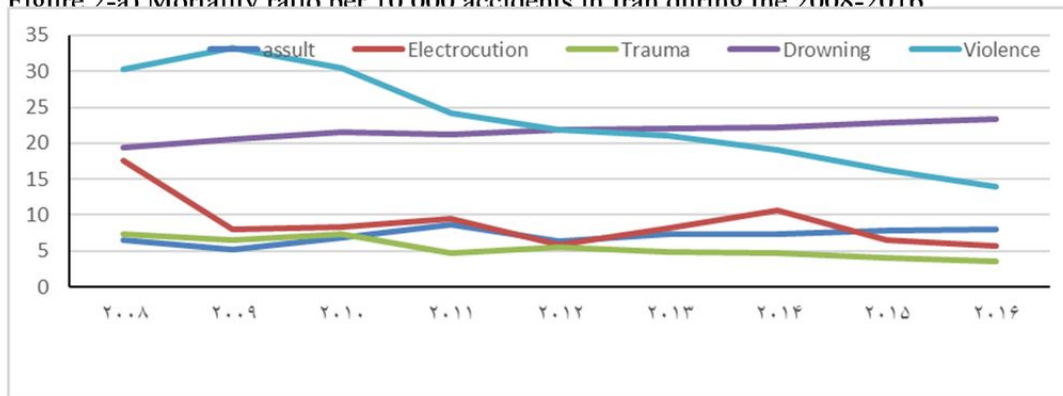


Figure 3-a) Mortality ratio per 10,000 accidents in Iran during the 2008-2016

Figure 1

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