Epidemiological study of hospitalized road traffic injuries in Iran 2011

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Abstract

Background: In Iran, Road Traffic Injuries (RTIs) is the second-leading cause of deaths, and the first leading cause of disability-adjusted life year, and has one of the highest rates of death (32.1 per 100,000 population) all over the world. This study’s aim was to investigate the epidemiological pattern and underlying components of hospitalized RTIs in 31 provinces of Iran in 2011.

Methods: This study conducted on all hospitalized RTIs during one-year period (March 21, 2011 to March 21, 2012). Data extracted from a hospital-based traffic injury registration system. According to a national law passed in 2005, all hospital expenses of traffic injuries should be covered by ministry of health based on governmental tariffs. The medical costs of eligible patients will be paid to the hospitals only if the patient data are sent to the above mentioned database. Statistical analysis was performed using SPSS v.16 (SPSS Inc., Chicago, USA), and spatial maps are provided using GIS 10.2. Descriptive statistics and t-test were used to compare means. World (WHO 2000-2025) standard population used to calculate age-adjusted incidence rate. All statistical tests were performed at the 5% level of statistical significance.

Results: There were 322,064 injured cases recorded in the registration system during the study period. The national age-adjusted incidence rate of RTIs was 405 per 100,000 population. The highest incidence rates were in the age group of 15-29 years (643 per 100,000 population), followed by 30-44 year age groups (401 per 100,000 population). The incidence rate in men was 3.36 times more than women. Motorcyclist were the most frequent type of road users (39.2%) who involved in RTIs, followed by passengers (28.9%) and pedestrians (20.0%). Head injuries were among the most affected part of the body which occurred in 27.2% of the patients. The proportion of urban crashes was 60.7%.

Conclusion: The results of this study indicated that the majority of RTI occurred on motorcyclists and head injuries was the most commonly affected body part. Therefore, in order to reduce motorcycle accidents and avoiding head injury among them, stricter law enforcement is urgently needed for helmet use and promotion of safety behaviors among motorcycle riders.

Keywords: Road traffic injuries, Road user, Head injury

Introduction

Road traffic crashes (RTC) are the leading cause of death, with an increasing number occurring in developing countries. It is estimated that nearly 1.27 million people die each year as a result of road traffic crashes, and 50 million people are injured worldwide, and is shown to have a huge impact on overall health and development (1). Road crashes are the leading cause of death in young people aged 15-29 years, and bleeds away up to 3% of global GDP per year (1). However, it has been anticipated that if the present trend of road traffic injuries (RTIs) continues
without drastic intervention, it will become the fifth-leading cause of mortality around the world by 2030 (2, 3). Many studies have shown an increasing trend of death caused by RTIs in Africa, Eastern Mediterranean and Asia over the recent years (4, 5). The Eastern Mediterranean Region (EMR) has the second-highest traffic-related death rates in the whole world (6) and Iran is shown to have the highest rate of RTIs among EMR countries (7, 8).

In Iran, RTIs is the second-leading cause of deaths, and the first leading cause of lost disability-adjusted life year, and has one of the highest rates of death (32.1 per 100,000 population) all over the world (1, 9). Moreover, it is estimated that RTIs costs can consume up to 6.46% of the gross national product (US$39 billion) per year in developing countries such as Iran (10).

The present study was conducted to investigate the epidemiological pattern and underlying components of hospitalized RTIs in 31 provinces of Iran.

Methods

This study conducted on all hospitalized victims that injured in RTCs during one-year period (March 21, 2011 to March 21, 2012).

From 2005, according to the executive guidelines of Article 92 of the Fourth Economic, Social and Cultural Development Plan in the country, all public, governmental and private hospitals are obliged to admit all inpatients and outpatients who have been injured due to RTCs and provide free-of-charge treatment for injuries. The cost of treatment services is funded by using 10 percent of third-party car insurance that was deposited into a special income account belong to the Ministry of Health and Medical Education (11).

Given the law mentioned above, the required data were collected by a trained group of physicians and nurses. Collected information by hospitals was submitted to deputy of health from all provinces for each year. The database consisted of full name, age, gender, region, type of vehicle (pedestrian, bicycle, motorcycle, and car), place of crashes, date, treatment outcome, and type of injuries were determined based on the International Classification of Diseases (ICD 10), and traffic crashes were classified under V01–V99 codes among people involved in road traffic crashes.

Statistical analysis was performed using SPSS 16 (SPSS Inc., Chicago, USA), and spatial maps are provided using GIS 10.2. Descriptive statistics such as frequency, percentage, mean and standard deviation were used and t-test used to compare means. All statistical tests were performed at the 5% level of statistical significance. Incidence rates were calculated per 100,000 population based on 2010 census. In addition, world (WHO 2000-2025) standard population used to calculate age-adjusted incidence rate (12).

Results

In total, 322064 crashes recorded in the data registration system during the study period, in which 321330 (98.8%) were injured and 3738 (1.2%) death cases. Also, 249175 (77.4%) of accident involved men and the rest 72889 (22.6%) were women. The average age of entire population was 30.6±16.9, and in which the age for men was (29.9±16.34) and women (32.4±18.56) with significant different between them (p<0.001).

The highest crude incident rate of RTIs occurred in the 15-29 year age group, followed by the 30-44 year age group (Table 1).

Descriptive statistics such as frequency, percentage, mean and standard deviation were used and t-test used to compare means. All statistical tests were performed at the 5% level of statistical significance. Incidence rates were calculated per 100,000 population based on 2010 census. In addition, world (WHO 2000-2025) standard population used to calculate age-adjusted incidence rate (12).

Table 1. The age and sex-specific incidence rate of hospitalized RTIs in Iran-2011

| Variables | Number of injuries | Percent | Incidence rate (per 100,000 population) |
|-----------|--------------------|---------|---------------------------------------|
| Sex       |                    |         |                                       |
| female    | 72889              | 22.6    | 195.8                                 |
| male      | 249175             | 77.4    | 657.9                                 |
| Age -group|                    |         |                                       |
| 0-4       | 12914              | 4       | 207.2                                 |
| 5-14      | 24368              | 7.6     | 215.1                                 |
| 15-29     | 152322             | 47.4    | 642.9                                 |
| 30-44     | 70030              | 21.8    | 401.3                                 |
| 45-59     | 37866              | 11.8    | 369.9                                 |
| 60+       | 23830              | 7.4     | 386.9                                 |

Table 2. Injured body regions of patients hospitalized due to RTIs in Iran-2011

| Injuries to body regions | Number of hospitalization based on Injuries to body regions | Percent of hospitalization based on Injuries to body regions |
|-------------------------|----------------------------------------------------------|-----------------------------------------------------------|
| Injuries to the head(S00-S09) | 87492                                                 | 27.2                                                     |
| Injuries to the neck(S10-S19) | 6403                                                  | 2.0                                                      |
| Injuries to the thorax(S20-S29) | 9571                                                  | 3.0                                                      |
| Injuries to the abdomen, lower back, lumbar spine and pelvis(S30-S39) | 20049                                                | 6.2                                                      |
| Injuries to the shoulder and upper arm(S40-S49) | 13682                                               | 4.2                                                      |
| Injuries to the elbow and forearm(S50-S59) | 14508                                               | 4.5                                                      |
| Injuries to the wrist and hand(S60-S69) | 15013                                               | 4.7                                                      |
| Injuries to the hip and thigh(S70-S79) | 14647                                               | 4.5                                                      |
| Injuries to the knee and lower leg(S80-S89) | 45104                                           | 14.0                                                     |
| Injuries to the ankle and foot(S90-S99) | 21511                                           | 6.7                                                      |
| Injuries involving multiple body regions(T00-T07) | 52687                                           | 16.4                                                     |
| Others | 12264                      | 3.8                                           |
| Unspecified | 9133                        | 2.8                                           |

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for all population was 404.7 per 100000 population. This rate for males and females was 613.4 and 193.5 per 100000 populations respectively.

The motorcycle crashes 126360(39.2%) reserved the highest rank in terms of the type of crashes (Road user) and their frequency, Car passengers 92947 (28.9%), pedestrian crashes 64282(20.0%) and other 38475(11.9%) were allocated in the subsequent rank (Fig. 1).

The maximum number of RTIs was observed in September (34673; 10.8%) and the lowest number occurred in the February (20736; 6.4%) (Fig. 2).

Analysis of hospitalized RTIs showed that head injuries (S00-S09) 87492(27.2%), multiple body regions injuries (T00-T07) 52687(16.4%), and knee and lower leg injuries (S80-S89) 45104(14%), were the most affected part of the body (Table 2).

In general, urban crashes occur more frequently than rural crashes and other places (Fig. 3).

According to Fig. 4, road traffic accidents had high incidence rate in the central and eastern provinces of Iran, especially in Semnan (1352 cases in 100,000), and Qom provinces (1438 cases in 100,000).

Discussion

In the present study about three-fourths of RTIs were male patients. This finding is similar to the previous studies in Iran (13), and Colombia (14). Also, the male: fe-
Hospitalized road traffic injuries

| Countries     | Riders (%) | Passengers (%) |
|---------------|------------|----------------|
| Indonesia     | 85         | 52             |
| Malaysia      | 97         | 89             |
| Thailand      | 52         | 20             |
| Vietnam       | 96         | 83             |
| France        | 98         | 92             |
| Norway        | 99         | 99             |
| Spain         | 99         | 99             |
| Germany       | 99         | 99             |
| USA           | 63         | 46             |
| Canada        | 95         | 95             |

Table 3. Percentage of using helmets according to Global Status Report on Road Safety 2015 (1)

The distribution of crashes by month have shown to be varied, with the highest rate in September and July, and lowest rate in June. While in USA, similar to our study, most accidents occurs in the summer months and October (21), the majority of traffic crashes in Colombia occurs in the fall and winter months (22). Although many factors are associated with road traffic injuries, but the main attributed factor is probably different travel patterns over a year. The main related factors for increased crash rates during summer are length of day, good weather condition, long drives, and increasing speed peak (23, 24). Moreover, in Iran, more people tend to take their vacations in summer times which increases RTCs rate.

This study revealed significant findings regarding location of RTIs. The majority of persons injured in road vehicle traffic crashes consisted of urban crashes which is in line with other study in Iran(13). Semnan and Qom had the higher incidence rate within all provinces, because these provinces located in central Iran, and their roads and highways are heavily used by road users.

Limitation of this study was fact that data only involved hospitalized patients and did not include information about victims who died on scene and were not hospitalized. According to this limitation, underestimation in our study should be considered.

Conclusion

The results of this study indicated that the majority of RTCs were involved the motorcyclists compared to others. Head injury was the most commonly affected body region by RTCs. In general, urban crashes occur much more frequently than rural and other place. In order to reduce motorcycle crashes and head injury it is recommended to enforce stricter laws enforcement, require proper motorcycle drivers’ license and helmet use, promote safe behaviors among motorcycle riders and their passengers.

Conflict of Interests

The authors declare that they have no competing interests.

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