



## Epidemiological study of trauma patients referred from Imam Reza trauma center to Shohada orthopedic center in Tabriz, Iran, during 2015

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### Article info

#### Article History:

Received: 23 Jan 2017

Accepted: 04 Feb 2017

ePublished: 20 June 2017

#### Keywords:

Trauma,  
Developing Country,  
Iran, Epidemiology,  
Fracture

### Abstract

**Introduction:** Traumas are one of the most common causes of morbidity and mortality all over the world, especially in developing countries. The economic and social burdens of the disease vastly affect both developed and developing countries in different ways. Although the importance of this issue is obvious, there are few documentations about the characteristics of trauma patients in Iran. This study aimed to evaluate the characteristics of trauma patients referred to orthopedic center in Tabriz, Iran, during 2015.

**Methods:** Eight hundred twenty-one patients with trauma that needed orthopedic interventions were studied in this cross-sectional study during 2015 in Tabriz. Age, sex, trauma type and date were collected and analyzed by SPSS.

**Results:** From 821 patients, 70.9% were male. Most of the patients were referred in summer (33.6%) in June (11.6%). The mean age was  $40.67 \pm 20.4$  with a tendency toward young ages (skewness = 0.28). The most common trauma types were car accidents (54.8%) and falling traumas (33.5%). Falling trauma was higher among females (42.31% vs 31.91%). Car accidents increased in cold seasons of the year. Most falling traumas were in spring and summer. Falling increased with increase in age while bicycle and motorcycle accidents decreased.

**Conclusion:** According to high incidence of traffic injuries, an integrated multidisciplinary intervention to reduce the rate of traumas and their burden is essential.

**Citation:** Pouraghaei M, Sadeghpour A, Moharamzadeh P, Ala A, Bagheri-Asl MM. **Epidemiological study of trauma patients referred from Imam Reza trauma center to Shohada orthopedic center in Tabriz, Iran, during 2015.** J Anal Res Clin Med 2017; 5(2): 33-7. Doi: 10.15171/jarcm.2017.007

### Introduction

Trauma is one of the major causes of morbidity and mortality all over the world.<sup>1-3</sup> It is estimated that  $5 \times 10^6$  people lose their lives as a result of most preventable injury.<sup>4</sup> Based on reports by World Health Organization (WHO), almost 90% of deaths due to injuries occurred in developing countries and will increase up to 65% over 20 years.<sup>5,6</sup>

Musculoskeletal injuries are one of the most common types of trauma especially in developing countries due to high incidence of

road accidents.<sup>7,8</sup> It is known as the second cause of death in Iran following ischemic heart disease.<sup>9,10</sup> Studies from the United States suggest that the lifetime risk of fracture is 50% in males and 33% in females.<sup>11</sup> In one study, 49.2% of traffic accidents lead to limb trauma in Tabriz, Iran.<sup>12</sup> One million two hundred thousand lives are lost and  $50 \times 10^6$  are injured in traffic accidents every year.<sup>13</sup>

In 2013, 973 million people were injured that warranted health care and 4.8 million people died from injuries.<sup>14</sup>

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It has a significant psychosocial and economic impact on involved individuals. The estimated burden of traffic accidents due to post-trauma disability was estimated approximately 1.4 billion USD in 2011 in Iran.<sup>15</sup>

Total economic loss of world during 2014 was 848.205 billion USD. Disability-adjusted life years (DALY) burden of injuries was concentrated (almost 75%) among low- and lower-middle-income countries, but economic burdens of injuries were concentrated (over 80%) among higher-middle- and high-income countries. Iraq had lost almost 20% of its GDP due to injuries and the USA had the highest amount of economic loss for injuries (169.136 billion USD).<sup>16,17</sup>

The epidemiology and demographic characteristics of trauma are highly variable in different countries due to their cultural, educational, economical and geographical characteristics. Also, data documentation and health records are poor in developing countries and as a result, the impact of trauma is unknown on the population.<sup>18</sup>

So, a good understanding of trauma types and patients' characteristics can lead to a better preparation and care, and development of a better preventive strategy. This study was designed to identify the characteristics of the trauma patients who were referred from trauma center of Imam Reza hospital to Shohada hospital (orthopedic center) due to their fractures in Tabriz during 2015.

## Methods

This retrospective cross-sectional study comprised of patients who were admitted to Imam Reza hospital and were referred to Shohada orthopedic center after initial treatments and procedures for complementary treatments and surgeries due to fractures in Tabriz, during March 2014 to March 2015. Patients with minor injuries and laceration that did not have any determinant fractures and patients with major head, chest and abdominal injuries and the ones whose lives were in danger and needed collateral

wards attention before orthopedic treatments were excluded from the study. Also, patients with unsatisfactory data were excluded from the study. All the data were collected from Imam Reza hospital electronic archive, including age, sex, trauma type, admission month and season.

All data were analyzed by SPSS software (version 21, SPSS Inc., Chicago, IL, USA) and was described using frequency, percentage, mean  $\pm$  standard deviation (SD), median, mode, range, Kolmogorov-Smirnov for age distribution, and Kruskal-Wallis. P-value  $<$  0.05 was considered significant.

## Results

From 821 referred patients, 582 (70.9%) were male and 239 (29.1%) were female (M:F ratio = 1:2.43).

Most of the patients were referred in summer (33.6%), spring (24.6%), winter (23%) and autumn (18.8%).

Most of the patients were referred in June (11.6%), July (11.2%), August (10.8%) and months with less referral were November (6.1%), October (6.2%) and March (6.2%).

The mean age of the subjects was  $40.67 \pm 20.4$  (median = 39, mode = 21) with a 90 years range (min = 1, max = 91). The distribution of patients was skewed toward the left and was not normal according to Kolmogorov-Smirnov test ( $P < 0.01$ , skewness = 0.28) that represents the young age of trauma patients.

The most common trauma types were car accidents (54.8%) and falling (33.5%). Other types of trauma were motorcycle accidents (4.1%), pedestrian accidents (3.8%), assault (2.6%), others (1%) and bicycle accidents (0.2%).

The most common trauma types were car accidents and falling in both sex groups. Also falling (42.31% vs 31.91%) and bicycle accidents (0.55% vs 0.21%) were higher among females.

The most falling traumas (36.3%), car accidents (32.4%) and motorcycle accidents (32.2%) were in summer, while pedestrian accidents were common in winter (32.2%), and assaults were more common in spring (42.8%) Car accidents were high in all seasons and

increased in cold seasons of the year. Most falling traumas were in spring and summer.

The trauma types were statistically related to the age of the patients according to Kruskal-Wallis test ( $P < 0.01$ ); falling increased with the patients' age and bicycle and motorcycle accidents had inverse association with the patients' age (Table 1).

**Table 1.** Patients age in different trauma types

Trauma type	Mean $\pm$ SD	Min	Max
Falling trauma	47.41 $\pm$ 18.61	4	91
Car accident	38.76 $\pm$ 20.38	1	91
Motorcycle accident	21.91 $\pm$ 3.53	14	36
Pedestrian accident	39.52 $\pm$ 20.65	8	78
Assault	27.10 $\pm$ 7.97	16	45
Bicycle accident	16.50 $\pm$ 3.53	14	19
Other	42.50 $\pm$ 15.14	21	61

SD: Standard deviation

## Discussion

Trauma is one of the most common causes of patient admissions in the emergency wards. Precise epidemiological study of traumas and their characteristics is difficult as there are no fracture and trauma surveillance systems in developing countries (including Iran). Our study is based on data from hospital coding systems. It is evident that there is a serious need for trauma national registry to provide records that can help to develop health service policies, and strategies.

Our study intended to record and analyze characteristics of trauma patients with fractures that needed an orthopedic intervention.

The sex ratio was statistically different; males were involved two to three times higher than females and our result is in line with previous reports from Iran and other countries.<sup>19-22</sup>

The male sex was 3.5 fold higher in the study by Hemmati et al. in Guilan, Iran.<sup>19</sup> Jones et al. study from Texas<sup>21</sup> and Byun et al.<sup>22</sup> from Seoul had similar results. These results represent that males are more susceptible to trauma that can be due to tougher workplace environment and daily activities and a higher rate of vehicles, driven by men.

Most of our patients were referred in summer (33.6%) and spring (24.6%). The result

of Abbasi and colleagues' study in Shiraz, Iran, reported an increase in patients with trauma admission in warm and sunny seasons.<sup>20</sup>

Kieffer et al. reported an increase in trauma cases during summer and weekends.<sup>23</sup>

Falling traumas increased significantly in summer and spring due to harvesting crops and trees. Car accidents were the most common cause of referral in all seasons and increased in cold seasons as a result of roads and weather condition.

The mean age was  $40.67 \pm 20.4$  with a tendency toward young ages (skewness = 0.28).

The average age of other studies such as Hemmati et al.<sup>19</sup> in Iran and Byun et al.<sup>22</sup> in Seoul were a bit lower (31.6 and 35.22 years respectively).

The higher average age of patients in our study can be explained by the high incidence of falling trauma among older patients. Another reason for this was inclusion of patients without fractures, which we had previously excluded in present study.

The most common types of trauma in our study were car accidents (54.8%) followed by falling (33.5%) and the results are consistent with other studies that took place in developing countries,<sup>19,20</sup> but were merely similar to developed countries.<sup>22,24</sup>

The first cause of trauma in Seoul was falling as Byun et al. mentioned in their study.<sup>22</sup> Data from the Center for Disease Control and Prevention (CDC) also suggested the same results. Falling (26.3%) was the most common type of trauma during 2011 in the USA and motor-vehicle traffic accidents only comprised 8.9% of all injuries.<sup>25</sup>

Falling traumas (42.31% vs 31.91%) were higher among females and increased with the patients' age. This can be due to osteoporosis that involved women more than men and at younger ages, especially in developing countries.<sup>26-28</sup>

## Conclusion

Road traffic accidents are still the major cause of trauma and associated morbidity and mortality in Iran. This indicates a need for

multidisciplinary interventions and programs to reduce trauma incidence.

The need for qualified trauma care services, public knowledge improvement to take safety and protective measurements and strict law observation besides producing safe vehicles and roads are obvious and essential to reduce the impact and burden of traumas.

#### Acknowledgments

Special thanks to Dr. Samad Shams Vahdati for his comments and helps.

#### Authors' Contribution

Mahboub Pouraghaei designed the study and analyzed the data, Mohammad Mehdi Bagheri-Asl gathered the data and prepared

the first draft, Alireza Ala and Alireza Sadeghpour consulted and supervised the work, and critically revised the draft, and Payman Moharamzadeh has done the management and proofing.

#### Funding

There is no funding support.

#### Conflict of Interest

Authors have no conflict of interest.

#### Ethical Approval

This study was approved by ethics committee of Tabriz University of Medical Sciences (5/D/81071).

#### References

1. Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJ. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. *Lancet* 2006; 367(9524): 1747-57. DOI: 10.1016/S0140-6736(06)68770-9
2. Krug EG, Sharma GK, Lozano R. The global burden of injuries. *Am J Public Health* 2000; 90(4): 523-6
3. Mock C, Cherian MN. The global burden of musculoskeletal injuries: challenges and solutions. *Clin Orthop Relat Res* 2008; 466(10): 2306-16. DOI: 10.1007/s11999-008-0416-z
4. Baker SP, O'Neill B, Ginsburg MJ, Li G. The injury fact book. 2<sup>nd</sup> ed. New York, NY: Oxford University Press; 1991.
5. World Health Organization. Global status report on alcohol and health 2014. Geneva, Switzerland: WHO; 2014.
6. Murray CJL, Lopez AD. The global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020: summary. Geneva, Switzerland: World Health Organization; 1996.
7. Montazeri A. Road-traffic-related mortality in Iran: a descriptive study. *Public Health* 2004; 118(2): 110-3. DOI:10.1016/S0033-3506(03)00173-2
8. Peden M, Scurfield R, Sleet D, Mohan D, Hyder AA, Jarawan E, et al. World report on road traffic injury prevention. Geneva, Switzerland: World Health Organization; 2004. p. 255-6.
9. UNICEF. Road traffic injuries in Iran and their prevention, a worrying picture [Online]. [cited 2014]; Available from: URL: [https://www.unicef.org/iran/media\\_4783.html](https://www.unicef.org/iran/media_4783.html)
10. Institute for Health Metrics and Evaluation (IHME). Country Profiles: Iran [Online]. [cited 2016]; Available from: URL: <http://www.healthdata.org/iran>
11. Brinker MR, O'Connor DP. The incidence of fractures and dislocations referred for orthopaedic services in a capitated population. *J Bone Joint Surg Am* 2004; 86-A(2): 290-7
12. Shams VS, GhafarZad A, Rahmani F, Panahi F, Omrani RA. Patterns of road traffic accidents in North West of Iran during 2013 new year holidays: complications and casualties. *Bull Emerg Trauma* 2014; 2(2): 82-5
13. Mothers C, Fat DM. The global burden of disease: 2004 update. Geneva, Switzerland: World Health Organization; 2008. DOI: 10.1016/B978-012373960-5.00335-X
14. Haagsma JA, Graetz N, Bolliger I, Naghavi M, Higashi H, Mullany EC, et al. The global burden of injury: incidence, mortality, disability-adjusted life years and time trends from the Global Burden of Disease study 2013. *Inj Prev* 2016; 22(1): 3-18. DOI: 10.1136/injuryprev-2015-041616
15. Behnood HR, Haddadi M, Sirous S. Lost output by road traffic injuries in Iran, an estimate based on disability-adjusted life years index. *International Journal of Transportation Engineering* 2016; 3(4): 253-66. DOI: 10.5812/traumamon.35997
16. Dalal K, Svanstrom L. Economic burden of disability adjusted life years (DALYs) of injuries. *Health* 2015; 7(4): 487-94. [In Persian]. DOI: 10.4236/health.2015.74058
17. Hofman K, Primack A, Keusch G, Hrynokow S. Addressing the growing burden of trauma and injury in low- and middle-income countries. *Am J Public Health* 2005; 95(1): 13-7. DOI: 10.2105/AJPH.2004.039354
18. Oluabunwa EC, Sun J, Jean Jubanyik K, Wallis LA. Electronic medical records in low to middle income countries: the case of Khayelitsha hospital, South

- Africa. *Afr J Emerg Med* 2016; 6(1): 38-43. DOI: 10.1016/j.afjem.2015.06.003
19. Hemmati H, Yousefzadeh Chabok S, Dehnadimoghdam A, Mohammadi Melksari H, Ahmadi Dafchahi M, Shabani S. Trauma in Guilan (north of Iran): An epidemiologic study. *Acta Medica Iranica* 2009; 47(5): 403-8. DOI: 10.2143/IA.29.0.630123
  20. Abbasi HR, Mousavi SM, Taheri AA, Niakan MH, Bolandparvaz S, Paydar S. Pattern of traumatic injuries and injury severity score in a major trauma center in Shiraz, southern Iran. *Bull Emerg Trauma* 2013; 1(2): 81-5
  21. Jones L, Johnson K, Hellsten J, Mathabela B. Overview of injury in Texas and the role of the EMS/trauma registry. Austin, TX: Texas Department of State Health Services, Environmental Epidemiology and Injury Surveillance Group; 2004.
  22. Byun CS, Park IH, Oh JH, Bae KS, Lee KH, Lee E. Epidemiology of trauma patients and analysis of 268 mortality cases: trends of a single center in Korea. *Yonsei Med J* 2015; 56(1): 220-6. DOI: 10.3349/ymj.2015.56.1.220
  23. Kieffer W, Michalik D, Gallagher K, McFadyen I, Bernard J, Rogers B, et al. Temporal variation in major trauma admissions: Is there a trauma season? *Int J Surg* 2015; 23(suppl 1): S24. DOI: 10.1016/j.ijssu.2015.07.065
  24. Pitts SR, Niska RW, Xu J, Burt CW. National Hospital Ambulatory Medical Care Survey: 2006 emergency department summary. *Natl Health Stat Report* 2008; (7): 1-38
  25. Sasser SM, Hunt RC, Faul M, Sugerman D, Pearson WS, Dulski T, et al. Guidelines for field triage of injured patients: recommendations of the National Expert Panel on Field Triage, 2011. *MMWR Recomm Rep* 2012; 61(RR-1): 1-20.
  26. Irani AD, Poorolajal J, Khalilian A, Esmailnasab N, Cheraghi Z. Prevalence of osteoporosis in Iran: A meta-analysis. *J Res Med Sci* 2013; 18(9): 759-66
  27. Larijani B, Resch H, Bonjour JP, Aghai Meybodi HR, Mohajery Tehrani MR. Osteoporosis in Iran, Overview and Management. *Iranian J Publ Health* 2007; Suppl: 1-13
  28. Moayyeri A, Soltani A, Larijani B, Naghavi M, Alaeddini F, Abolhassani F. Epidemiology of hip fracture in Iran: results from the Iranian Multicenter Study on Accidental Injuries. *Osteoporos Int* 2006; 17(8): 1252-7. DOI: 10.1007/s00198-006-0105-2