

Prevalence and injuries treatment of East Azarbaijan earthquakes in summer 2012

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Abstract

Background: Earthquakes cause numerous losses and damages and victims enter to severe needy complex care and internal surgery. The study proposed to investigate the frequency of the fundamental strategies for reducing injuries and fatalities resulting from earthquakes.

Materials and methods: A cross - sectional study was carried out to determine the prevalence of trauma inflicted on the victims of the earthquake in Tabriz teaching hospitals in summer 2012. The researcher-made checklist was applied for data collection. The validity as well as reliability has been confirmed ($0.7 \leq \alpha$). The data were analyzed using computerized program SPSS 18.

Results: Out of 307 patients, 182 were women (59.28%) and 125 men (40.72%). Most casualties were in the age range of 30-60 years old; 118 cases (38.43 %). Rural areas had more patients (n = 259 (84.36%)) than urban areas, n = 48 (15.64%). Most patients were admitted for orthopedic wards (57%). Majority referrals of earth quake belonged to first two days (72.31%). Fractures were the most common injuries among casualties (62.77%) and lower extremities (29.29%) were the most affected area. Recovery rate was 97.39% as well as 8 (2.61%) victims were died due to extensive injuries.

Conclusion: Results of this study showed that most victims were women, rural residents and middle-aged people. Therefore, safety and retrofitting actions should be in placed for rural areas and necessary education for self- protection must be thought for middle-aged people and women. Orthopedic and surgical wards of hospitals hould always be prepared to deal with victims to decrease the event in earthquake situations.

Keywords: frequency of prevalence, earthquakes, Varzeqan - Harris and Ahar

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► Please cite this paper as:

Behzad Kazemi Haki, Faezeh Hafezi, Mohammad Rash. Prevalence and injuries treatment of East Azarbaijan earthquakes in summer 2012. *Jentashapir J Health Res* 2013;4(4):297-303

Introduction

The most common and destructive natural event is earthquake that due to leaving huge number of victims in instant time and eliminate the possibility of awareness and destroying infrastructure also lack of rapid access to relevant patients has great importance (1.) Iran in one of the countries with high risk of natural disasters and take a place in world's first line of earthquake-prone belt and it is considered as fourth country in terms of the occurrence of natural disasters and it is because of the geographical location of and proximity to fault belt (6-2). Every few years, a large earthquake occurs in the country. Roudbar, Tabas, Bam, Damgan and recent East-Azarbaijan earthquake can be mentioned as examples. Most of studies pointed out structural damage as the most important factor in injuries of an earthquake. Failure building in earthquakes leads large number of death and traumatic injury in a short time without previous warning or preparation. (7) Since earthquake often happen in urban populated areas and rural with inappropriate structures, death and injury rate are high and leave a lot of victims with traumatic injury. They are mechanical damage and often several parts of body are involved and exactly while local medical capacity is destroyed or reduced they need intensive care or internal surgery. (8) People as the first responders try to save casualties therefore professional rescue team will be the second group who come to scene which cause some absence of appropriate productivity and collaboration in disasters.(9)

Earthquakes in East-Azarbaijan were two relatively strong ones that happened on Saturday August 12th, 2012 in Ahar, Varzeqan and Harris. An earthquake occurred with a magnitude of torque 6.4 at 16:53 local time, 17 kilometers far from Ahar and another one with a magnitude of torque 6.3 at 17:04 local time, 10 kilometers far from Varzeqan that

306 people were destroyed and over 5,000 injured (10-14) some reasons of impact of natural disasters on human life may be high population growth, economic inequality, an increase geologic and climate change and urbanization (3) which led to social problems and multiple disabilities caused by earthquakes and other natural disasters that all these cases are important in the term of economy especially when crisis such as earthquakes, floods and other natural disasters are occurred. Necessity of assessment and determination of trauma in earthquake in this paper help to prediction and diagnostic therapeutic acts in crises and disasters in future.

In other hand, continues evaluating in therapeutic interventions and medical cares for injures to improve services quality provide such criteria that can be used for distinguishing deficiencies and weaknesses of hospitals, crisis management, rescue and etc. in country in order to realize efficiency and quality of health care - treatment steps.

Materials and methods

A cross - sectional and prospective study was conducted to find out frequency of traumas and performed treatments on patients who visited Tabriz teaching hospitals in 2012. Imam Reza (Orthopedic and General), Sina (Burns and Public) and Shohada (Orthopedic) are three teaching hospitals of Tabriz which were selected due to high visits of disaster victims; nearly all wounded who were referred to Tabriz. By studying the patients records their ICD (International Classification of Disease) were counted and 307 people who were injured in that earthquake were identified and entered in the study. The data gathering tool was a researcher-made checklist includes information on patients included age, sex, associated diseases, and therapeutic lesion in different parts of the body and treatments which were applied

on them and their recovery. Validity and reliability of the checklist used in previous studies within and outside the country had been confirmed (1, 10, and 17-15). Data were analyzed using descriptive statistics indices including frequency, mean, median, standard deviation by SPSS V18.

Results

Out of 307 patients 182 were women (59.28%) and 125 men (40.72%). Majority of them were middle-aged people in the range of 30-60, (n = 121 39/41%). frequency of the patients in age classification is given in Table 1. Rural areas had more injuries (259 cases or 84.36%) rather than urban areas (48 cases or 15/64%). Most common problems among them were hypertensive (n = 23), diabetes (n=7), asthma (n = 3), stroke (n = 2), hemophilia (n=1) and patients with heart problem (n=1) respectively. About administration in orthopedic (175 cases or 57%), surgery (50 cases or 16.29%), urology (22 cases or 7.17%), trauma (18 cases or 5.86%) and 42 cases (13.68%) were admitted in other sectors respectively. Majority of patients need intensive orthopedic cares and were admitted in Shohada Hospital and others were admitted in Sina and Imam Reza Hospitals. Maximum visit (72.31%) was in first two

days of earthquake in 12-13 august 2012. Fractures (204 cases or 62.77%), lacerations (47 cases or 14.46%) and injuries (N=28; 9.23%) respectively. Most common infected damages among the victims and other kind of damages are presented in table 2.

Damaged bottom parts frequency was more than the other parts of body that are shown in table 3. A total of 20 cases had trauma in different anatomic sites.

Patient who need surgery and other cares were treated by residents and professionals, so that 178 cases (60.92%) were treated by residents and professionals of orthopedic, 47 cases (15.31%) were treated by specialists and residents of neurology and general physician, 13 cases were treated by residents and professionals of ear, nose and throat, maxillofacial and plastic surgery. In addition, specialists and anesthesia residents were on duty for all patients who requiring surgery and intensive care. Other 60 patients (19.54%) who did not require surgical treatment were treated by residents and specialists in internal medicine. The received treatments by casualties referred to the three hospitals in Tabriz are shown in Table 4.

Recovery rate of injured patients admitted to hospitals was 97.39 percent (299 people) and 8(2.61%) Casualties were perished.

Table 1: Frequency of earthquake victims in Azerbaijan by age group

	newborn	baby	Young	middle aged	Old
Age group	0-2	2-18	18-30	30-60	60and more
Frequency	21	54	56	121	55
Percent	6.84%	17.59%	18.24%	39.41%	17.92%

Table 2: Injuries inflicted frequency of earthquake casualties referred to Imam Reza, Shohada and Sina Hospitals

Type of trauma	Fracture	Rupture	Sprain	Contusion	Infection	Dislocation	Burns	Crush	Body piercing	Tension	Bleeding	Spinal Cord	Injuries
Frequency	204	47	1	7	8	22	2	3	2	2	2	1	30
Percent	62.77%	14.46%	0.31%	2.15%	0.62%	6.77%	0.62%	0.92%	0.62%	0.62%	0.62%	0.31%	9.23%

Table 3: Distribution of anatomic injured in earthquake victims who visit Imam Reza, Shohada and Sina Hospital

Damaged areas	Lower limb	Hand and Arm	Basin	.Spine	Rally	Abdomen	Chest	Neck	Different areas
Frequency	111	93	35	29	60	7	12	12	20
Percent	29.29%	24.54%	9.23%	7.65%	15.83%	1.84%	3.17%	3.17%	5.28%

Table 4: Type and frequency of treatment to Earthquake victims who are admitted in Imam Reza, Shohada and Sina Hospital

Treatment procedures	Frequency	Percent
Extremity splinting and stabilization	98	24.5%
Medications	45	11.25%
Reduction	43	10.75%
ORIF (Open Reduction and Internal Fixation)	36	9%
Conservative	27	6.75%
Casting	22	5.5%
Restoration	19	4.75%
Plating	14	3.5%
Washing	11	2.75%
Dressing	10	2.5%
Stitch	15	3.75%
Bandages	6	1.5%
Skin traction	13	3.25%
CXR (Chest X-Ray)	6	1.5%
Pinning	5	1.25%
Remove any foreign object	7	1.75%
Debridement	5	1.25%
PCP (Primary care physician)	2	0.5%
Exposion	1	0.25%
Screwing	1	0.25%
Ultrasound	1	0.25%
Advice Neurosurgery	1	0.25%
CT-scan	3	0.75%
Hemodialysis	2	0.5%
Intubation	7	1.75%

Discussion

Earthquakes are among the most harmful and deadliest natural disasters that often threaten human life. (15). Unfortunately two earthquakes in Azerbaijan took 306 people's life and left more than 5000 wounded (11). In most earthquakes there is often a significant relationship among older ages, elder ages or sex (18-16). In the present study, more patients aged between 30-60 years old, and infants and children up to 18 years old and females had

suffered the most damage. High injury rates among older people and youth especially children can be caused by being unable to care of them-selves in vulnerability of earthquakes convulsions. of the building and also limited mobility and inability to perform appropriate and timely response in times of disaster and fled from the earthquake and falling debris can mentioned another reasons of high rate of injury in old people. In most of the

studies rate of death in elderly population is higher in comparison to younger population after natural disasters (19). In addition, comorbidities in old people is more than others that cause reducing their resist on blunt trauma and reduce compatibility with environmental changes and being housewife and stay at home is the main cause of injuries for female. Results confirm necessitate of houses construction in engineering principles and standards to reduce vulnerability among females, the elderly and children. Rural areas had the most victims. Rural areas due to weak or non-standard construction of traditional houses have been destroyed and most of the residents had suffered trauma. In a study conducted on variety of structures, injuries in traditional structures were more than modern combined facilities so that modern facilities produced the least damages (20, 21). The results of this study is as same as the present findings. Earthquake can harmfully effect on hypertension which is mostly reported as co morbidities in current study's sample. Two weeks after Japan's earthquake in 1995 blood pressure of elderly patients were monitored and researchers found the most important findings that mean blood pressure that measured in the first days of earthquake raised to 14-16 mmHg for systolic pressure and 6-10 mmHg for diastolic pressure (22). Increasing mortality and Heart-Vascular morbidity after earthquake can be caused by physical and psychological stress next to active sympathetic nervous system or stopping consumption heart-vascular drugs. (23) Therefore, continuous monitoring of blood pressure, especially in elderly patients during hospitalization and days after the event is recommended. Two first days of disaster we had the maximum referring to hospital and 10 day after event they met the hospitals for more medical services. Study of Naghii shows 3-5 days after the earthquake victims were visiting hospitals to receive health care which in

agreement of findings in the present study (24). Thus maximum demands for health care are in first week. Consequently login providers of health care, medical equipment and goods in this initial period after the earthquake, is more important. Based on the findings of this study, the most common orthopedic injuries inflicted on the victims' injuries were fractures, lacerations and injuries. Consequently majority of surgeries performed in the hospital were for orthopedic problems so that 187 (63.6 %) out of 294 performed procedures were in the field of orthopedics that is confirmed by Nejati's research. (25) Lower limbs, hands, arms and face anatomical areas most affected in the earthquake victims and were admitted in orthopedic surgery department mostly. In a study, conducted by Kurt in Turkey's Marmara earthquake fractures were 32.9 percent of victim's problem which was the common trauma in this earthquake (1). The most common type of trauma was fractures and bottom organs were the most common anatomical area which is injured in Mohebbi and collages study about military and civilian hospitals in Tehran (26). The results of these studies were consistent with the findings of the present study. The most common therapeutic procedure performed in hospitals which are under this study are limb splinting and stabilization that was in agreement of Mohebbi's findings that shows therapeutic procedure performed was the common treatment in Bam earthquake. In Conclusions This study showed that more women, adults and residents of rural areas were victims and it indicated the rural areas of the country were built out of engineering structural principles and buildings in rural areas did not meet the construction standards. Therefore, rural areas and safety measures should be taken to retrofit homes and residential areas and for vulnerable groups of society, including women, children and the elderly and other segments of society, as well as of the

respondents in scene of the incident have to educate the primary measures of self-protection and survival in times of natural disasters such as earthquakes (9). Since first days of the accident more orthopedics and fractures surgical requiring wards than in other wards, hospital's orthopedic surgery department must always be ready to face the huge flood victims and

equipped to the crisis to contain it and reduce the severity of its losses.

Acknowledgement

We would like to express our Gratitude and thanks to dean of research department and student research committee of Tabriz Medical Sciences and also staff of medical documents in researched hospitals.

References

- 1-Kurt N, Küçük HF, Celik G, Demirhan R, Gül O, Altaca G. [Evaluation of patients wounded in the 17 August 1999 Marmara earthquake]. *Ulus Travma Derg* 2001;7(1):49-51. [In Turkish]
- 2-Deadly history of earthquakes. BBC NEWS. Available at: URL:<http://www.newsvote.bbc.co.uk/mpapps/pagetools/print/news.bbc.co.uk/1/hi/world2059330.stm>.
- 3-Karami M. [Epidemiology of Disasters]. Tehran: Mehr; 2002. P. 28. [In Persian]
- 4-Hogan DE, Burstein JL. Disaster medicine. Philadelphia: Lippincott Williams & Wilkins; 2002. P. 163.
- 5-Khanpoormati kalae H. [Scientific understanding of earthquakes]. Publications: Adel Sanjesh; 2002. P. 4-46. ISBN: 964-94186-4-4 [In Persian].
- 6-United Nation. Disaster Response Plan for the Islamic Republic of Iran. Publisher; UN High Commissioner for Refugees publication Date; 1997. available at: <http://www.refworld.org/docid/3b00f216c.html>
- 7- Briggs S. Earthquakes. *Surg Clin North Am* 2006;86:537-44.
- 8-Bartels SA, VanRooyen MJ. Medical complications associated with earthquakes. *Lancet* 2012; 379(9817):748-57.
- 9-Kazemi Haki B. [Green cards, new ways of organizing and managing people in crisis, disaster relief and military forces (Innovations)]. Proceedings of The 1st Student Congress on Military Medicine and the Armed Forces Health Services Administration; 2013 February 11-12; Tehran, Iran. P. 4. [In Persian]
- 10-"The 4.7-magnitude earthquake in Varzeqan / Minister of Health: 306 killed, 3037 wounded / Harris Hospital is still not delivered, have been destroyed." *Khبرانلاین*. 23 August 2012. Archived from the original on March 6, 2013. Release Time: 10:28 - Monday, August 13, 2012. <http://www.khabaronline.ir/detail/235568/society/events>
- 11-"The increasing number of victims of the 5000 / rescued two people from the rubble after 21 hours." ISNA News Agency, August 12, 2012. Archived from the original on March 6, 2013. Revised on August 12, 2012. <http://isna.ir/fa/news/91052213545/> The increasing number of victims of the 5000 .
- 12-Magnitude 6.4 - Northwestern Iran ». *Geological America*. Archived from the original on 06 March 2013. Revised on August 11, 2012. http://www.bbc.co.uk/persian/iran/2012/08/120811_125_iran_ahar_earthquake.shtml
- 13-"The occurrence of large earthquakes in the East Azerbaijan province." *Euronews America*, August 11, 2012. Archived from the original on March 6, 2013. Revised on August 11, 2012. <http://persian.euronews.com/2012/08/11/scores-dead-in-iranian-earthquakes/>
- 14-"The severe earthquake struck the eastern city of Ahar in Azerbaijan." *Radio Farda*, August 11, 2012. Archived from the original on March 6, 2013. Revised on August 11, 2012. <http://www.radiofarda.com/archive/news/20120811/143/143.html?id=24673800>
- 15-Peek-Asa C, Kraus JF, Bourque LB, Vimalachandra D, Yu J, Abrams J. Fatal and hospitalized injuries resulting from the 1994 Northridge earthquake. *Int J Epidemiol* 1998; 27(3):459-65.
- 16-Armenian HK, Melkonian A, Noji EK, Hovanesian AP. Deaths and injuries due to the earthquake in Armenia: a cohort approach. *Int J Epidemiol* 1997; 26(4):806-13.
- 17-Doocy S, Daniels A, Aspilcueta D. Mortality and injury following the 2007 Ica earthquake in Peru. *Am J Disaster Med* 2009; 4(1):15-22.
- 18-Noji EK, Kelen GD, Armenian HK, Oganessian A, Jones NP, Sivertson KT. The 1988 earthquake in Soviet Armenia: a case study. *Ann Emerg Med* 1990; 19(8):891-7.
- 19-Pekovic V, Seff L, Rothman M. Planning for and responding to special needs of elders in natural disasters. *Generations* 2007-8; 31:37-41.
- 20-Ellidokuz H, Ucku R, Aydin UY, Ellidokuz E. Risk factors for death and injuries in earthquake: cross-sectional study from Afyon, Turkey. *Croat Med J* 2005; 46(4):613-8.

- 21-Asgharzadeh S, Zaeri S1, Holakouie Naieni K, Ardalan A, Ahmadnezhad E4. Deaths and Injuries due to the Earthquake in 2010 Damghan's Earthquake: A Case Study. *Iranian Journal of Epidemiology* 2012; 8(1): 54-61.
- 22-Kario K, Matsuo T, Shimada K, Pickering TG. Factors associated with the occurrence and magnitude of earthquake-induced increases in blood pressure. *Am J Med* 2001; 111(5):379-84.
- 23-Hata S. Cardiovascular disease caused by earthquake-induced stress: psychological stress and cardiovascular disease. *Circ J* 2009;73(7):1195-6.
- 24-Naghii MR. Public health impact and medical consequences of earthquakes. *Rev Panam Salud Publica* 2005; 18(3):216-21.
- 25-Nejati Vahid, Sayed Mohammad Ebrahim Mousavi, Mohammad Reza Soroush. Rehabilitation needs of orthopedic injuries in Bam earthquake. *Rehabilitation J* 2006; 7(4):36-40. [In Persian].
- 26-Hasanali Mohebi, Seyed Hamed Hosseini, SHAeban Mehrvarz, Farzad Panahi, Yunes Panahi, Yashar Muharram zad. Prevalence and treatment of lesions in the military and civilian victims of the Bam earthquake who referred to Tehran hospitals. *J Military Med* 2007;9(1):31-6. [In Persian]