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Epidemiologic survey of trauma and associated factors in Guilan

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ABSTRACT

Aims: By better understanding of trauma epidemiology and its confounding factors, appropriate strategies and programs including using preventive measures and organizing the delivery of services can be adjusted and quality of cares related to trauma can be improved. The aim of this study was "to determine trauma epidemiology and its associated ".

Methods: In a cross-sectional study , 577 patients with traumatic damage who were transferred by pre hospital emergency to Out Patient and Emergency Department (OPD&ED) of Poursina medical-educational center in Rasht were chosen by convenient sampling and by using a researcher-made record form in three shifts (morning, evening and night) in 2013. Data analysis was done by t-tests, one-way ANOVA and Chi-square.

Results: The majority of samples (82.7%) suffered from traumatic damages due to car accidents and disturbance of this trauma in men was 3.5 times higher than women. The mean age of the people was 35.17 years old and the maximum age group was 20-29 years. (67.6%) were the blunt trauma. The main road was the place where trauma was mostly occurred in them (71.8%) and most accidents happened out of the cities (89.9%). Majority of crash cars were light vehicles (48.5%). Revised of trauma score (RTS) in majority of samples (76.6%) was 12 .(29.8%) and (28.1%) were respectively drivers and passengers. The maximum amount of the accident was at 5 p.m. There was significant relationship between mechanism of trauma and age ($p<0.02$), RTS ($p<0.008$), trauma`s place ($p<0.01$) and position of victims at the scene ($p<0.00$). Also there was significant relationship between type of trauma and age ($p<0.02$), sex ($p<0.00$), RTS ($p<0.00$), trauma`s place ($p<0.006$) and the position of the victims at the scene ($p<0.01$).

Conclusions: Traumatic damages can be reduced by recognizing trauma associated factors, improving road traffic, public education for paying more attention to traffic rules and other procedures for preventing injuries.

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1. Introduction

Traumatic damages is a problem for public health all over the world [1] which happen due to accident, fall, sport injuries, occupational injuries and violence. Among this, road traffic accident is the most common problem threatening public health in developed and developing countries [2]. Social-economic developments, changes in lifestyle and increase of life expectancy have led to tragic changes in the kind of diseases of developed or developing countries. Data analysis in 2005 indicated that the main reasons of death are cardiovascular diseases (MI) (23%), the strokes (11.3%), road traffic accidents (10.3%), other vascular diseases (3.8%) and gastrointestinal cancer (2.6%) [3].

In the present situation, damages specially traffic accidents is the main cause of death, disability, hospital costs and economic damages to the society. Five million people lose their lives annually due to preventable damages (it means 570 people per hour) [2]. Traumatic damages is more common in young people specially in men (75%) that impose high cost to the society because of lost years of life [1]. The mean age of the people who lose their lives because of car accidents is 28 years old [4]. Property damage caused by traumatic brain injury in USA is annually about one hundred milliard dollars [5]; traumatic damages are increasing rapidly in a way that the world health organization states that until 2020, traffic damages is going to be the third global cause of death and disability [1].

Recently a road traffic accident is recognized as a public health concern in Iran. According to the study of national disaster disease organization by Ministry of Health and Medical Education in 2002, damages are recognized as the main cause of Disability Adjusted Life Years (DALYs) [3]; also in a study which is done by Naghavi in 2003, it is estimated that there is 44 deaths in every100 thousand people due to traffic accidents in Iran which is the highest rate of death in compare with other countries. This rate in America is estimated 19 in every 100 thousand people, in Eastern Mediterranean and North Africa 26, in Canada and Germany respectively nine and six deaths in every 100 thousand people and finally in all over the world in the mean it is estimated 19 in every 100 thousand people.

Annually more than 30 thousand people in Iran are dying because of road accidents which is even higher than the number of casualties in Bam Earthquake in 2003 [3].

In a study which was done by Montazeri (2000) in Iran, 15482 cases of death was due to accidents [7]; even the number of deaths due to accidents in the Nouruze of 2013 was more than 2012 according to the report of Iran's emergency chief, car accidents during Nouruze of 2013 had 31721 wounded people that among this, 27221 people were transferred to the hospital. Among 190 countries of the world Iran is ranked 189 regarding immunity and car accidents and just Sierra Leon is in the lower rank [8].

Lack of roads safety and broad structural problems in the part of transformation and failure to observe safety precautions are among the issues that has caused high rate of accidents in Iran [3].

Most of the accidents leading to death have happened in Guilan due to high population density (171 people per square kilometer), geographic location and light and heavy vehicles traffic [2].

Always the early prevention is recognized as one of the important ways for decreasing injuries and damages [9]. Most of the deaths that happen in the first hours of the accident are due to airway disorders, respiratory failure or uncontrollable bleeding and all of these three cases can be treated by using the basic principles [10].

In several studies, it has been cleared that many deaths and long-term disabilities can be prevented by strengthening trauma centers and emergency care [9]. Actually pre hospital emergency system is an important part of health care delivery system [11] ,when they are encountered with threatening life conditions out of the hospital, their main concentration is on preventing acute death and they can moderate the threatening life conditions and limit deaths through quick diagnosis and in time treatment [12].

By better understanding of trauma epidemiology and its confounding factors, appropriate strategies and programs including; using preventive measures and organizing the delivery of health services can be adjusted and in the end it can lead to improvement of cares quality related to trauma.

For example in some countries, accident is one of the causes of deaths and for decreasing damages due to that; they put preventive measures in the priority of their programs.

Among all the programs of dealing with trauma, preventive damage programs were the most economical one [13].

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Nurses by better understanding of traumatic damages situation of the society can take an effective step in improving early prevention by increasing awareness level of the society since their educational role is important.

From the other side, the quality of pre hospital cares which has been doing in most of the developed countries by the educated nurses of pre hospital emergency services is another important factor for decreasing death and complications due to trauma [14]. Studies also show that rapid and standard disaster relief can decrease death due to the accidents to about thirty percent and in addition it can prevent complication due to inappropriate measures and unprincipled displacement of the wounded people which leads to disability [15].

Conducting basic epidemiologic and clinical researches for reforming health care services of the country regarding trauma nursing in order to answer needs of the society seems necessary.

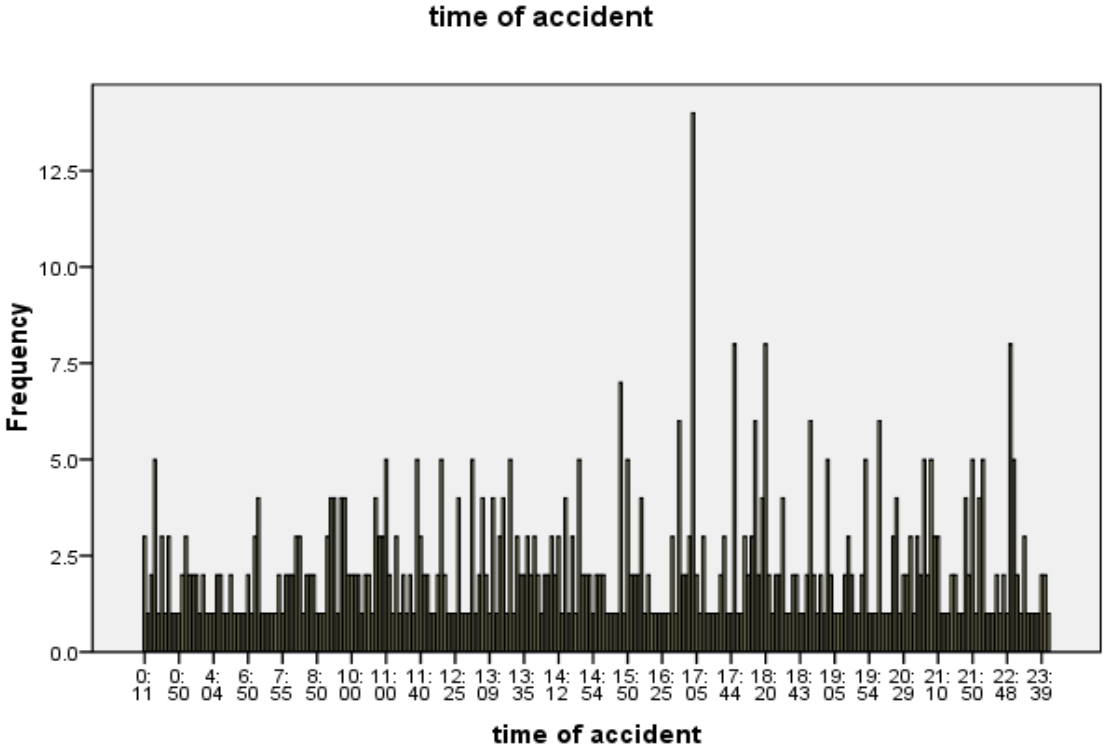
Since investigating prevalence of trauma and recognizing its associated factors can be useful in necessary planning for preventing trauma and providing services, conducting such studies seems to be necessary, so this study had been done with the aim of determining trauma epidemiologic and its associated factors in Guilan.

2. Methods

This cross-sectional study had been done in the emergency of Poursina medical-educational center in Rasht which is the biggest trauma center of Guilan. In this regard after approval of university's deputy of research and introduction to Poursina medical-educational center, patients who were transferred to this center by pre hospital emergency were considered as the samples of the study in the case of having inclusion criteria.

Inclusion criteria included all the trauma patients who referred to Poursina medical-educational center for treatment measures by emergency personnel. Patients with internal disease and neurological patients and patients with other diseases did not enter the study. After achieving accreditation from deputy of research, data were collected from trauma patients who were admitted in Poursina hospital from 10th November to 20th March 2012.

Data collection tools included a researcher-made questionnaire that assessed age (less than 10, 10 to 19, 20 to 29, 30 to 39, 40 to 49, 50 to 59 and higher



Graph 1: Frequency of the event time

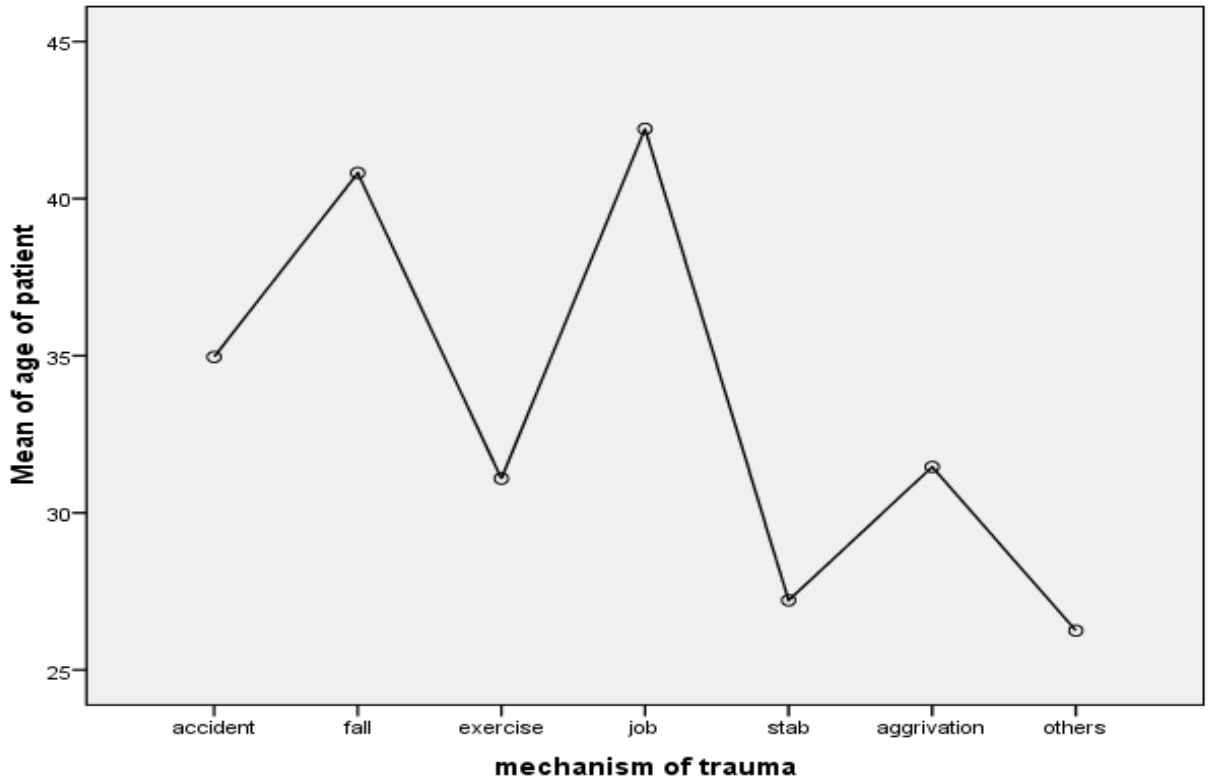
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than 60 years old), gender (male and female), event mechanism (accident, fall, sports injuries, occupational injuries, knife, violence and others), kind of trauma (penetrating and blunt), traffic roads (highway, freeway, main way, by-way, rural road), patient's conditions based on RTS (Revised Trauma Score) (four levels of RTS=0, RTS+1-9, RTS=10-11, and RTS=12 which is made of three GCS, respiratory number and systolic blood pressure criteria and lower score shows patient's deterioration so the amount of death is more), position of the victim at the scene (passer, passenger, driver, unknown, others), the place of incident (urbane, suburban) type of the victim's vehicle (car, truck, motorcycle, bicycle, others) and time of the event.

This questionnaire was completed by the researcher and his colleague in three morning, evening and night shifts through observing trauma patients or asking questions from the staff of 115 emergencies in the clinic and the emergency of Poursina medical-educational center. Data collection was done by using convenient sampling method. Number of the samples was 577 people and sampling continued until the time that sample size is the considered amount. Data were analyzed by using descriptive and inferential statistics with SPSS 16 software.

Findings of this study were based on type of quality and quantity variables. Type of trauma and trauma mechanism were considered as the main variable and as the type of nominal quality and confounding factors (age, gender, RTS, traffic roads, the place of the event, position of the victim at the scene, type of the victim's vehicle and time of the event) were considered as the independent variables. Age, RTS and the time of the event were assessed as the quantitative variables and gender, traffic roads, the place of the event, position of the victim at the scene and type of the victim's vehicle were assessed as the nominal-qualitative variables.

For determining frequency of the kind of mechanisms and characteristics of the damages, frequency and also statistical indexes such as mean and standard deviation were used. For measuring relationship between the mean of age with the type and mechanism of trauma, t test and one way ANOVA were used and for assessing relationship of



Graph 2: relationship between the mechanism of damages and age

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the qualitative variables, Chi-square test was used. Significant level of the tests was considered $p<0.05$.

3. Results

Among all the 577 patients, 454 were male (78.7%), 123 female (21.3%). Men were about 3.5 times more than women. The mean age of the people was 35.17, the lowest age was three years old and the highest age was 94 years old. The most common mechanism of damage was accidents (82.7%) and then fall (8.5%). 67.6% were blunt trauma. Most of the traffic roads that trauma has happened in them was the main road (71.8%) and most of them were urbane (72.6%). Most of the victim's vehicle at scene were respectively light vehicles (48.5%) and motorcycle (32.2%). 76.6% of the patients had RTS=12.

Respectively 29.8% and 28.1% of the victims were drivers and passengers. Mostly the event had happened at 5 p.m. (graph 1) and based on the cumulative frequency about 60% of the events had happened before this time.

Accidents were the most common mechanism of damages which have happened in the age range of 20 to 29 years old (84.8%). Also ANOVA test showed significant relationship between the mean age and the mechanism of the damages ($p<0.02$) (graph 2).

Also data show that the amount of the accidents in women (87%) was more than men (81.5%), but

Table 1: Relationship between mechanism of trauma and age, gender, RTS

Trauma mechanism Variables		Frequency (percentage)							Type of test and result
		Accidents	fall	Sport damages	Occupational damages	knife	Violence and conflict	Others	
age	<10	4 (66.7%)	2 (33.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	ANOVA p<0.02
	10-19	54 (83.1%)	5 (7.7%)	2 (3.1%)	0 (0%)	1 (1.5%)	2 (3.1%)	1 (1.5%)	
	20-29	167 (84.8%)	10 (5.1%)	4 (2%)	0 (0%)	10 (5.1%)	5 (2.5%)	1 (0.5%)	
	30-39	87 (79.8%)	9 (8.3%)	0 (0%)	4 (3.7%)	3 (2.8%)	4 (3.7%)	2 (1.8%)	
	40-49	77 (84.6%)	5 (5.5%)	5 (5.5%)	3 (3.3%)	0 (0%)	1 (1.1%)	0 (0%)	
	50-59	51 (84.4%)	6 (12.2%)	0 (0%)	2 (3.4%)	0 (0%)	0 (0%)	0 (0%)	
	>60	31 (74%)	12 (24%)	0 (0%)	0 (0%)	0 (0%)	1 (2%)	0 (0%)	
Mean (age)		35	41	31	43	27	30	21	
gender	male	370 (81.5%)	38 (8.4%)	9 (2%)	9 (2%)	14 (3.1%)	10 (2.2%)	4 (0.9%)	Chi-square NS
	Female	107 (87%)	11 (8.9%)	2 (1.6%)	0 (0%)	0 (0%)	3 (2.4%)	0 (0%)	
RTS	0	2 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	Chi-square p<0.008
	1-9	40 (95.2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (4.8%)	0 (0%)	
	10-11	61 (67%)	18 (19.8%)	0 (0%)	3 (3.3%)	5 (5.5%)	3 (3.3%)	1 (1.1%)	
	12	374 (84.6%)	31 (7%)	11 (2.5%)	6 (1.4%)	9 (2%)	8 (1.8%)	3 (0.7%)	

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Chi-square test did not show any significant relationship between these two variables.

In assessing relationship of RTS and mechanism of damage, data indicate that in the groups of accidents and fall with RTS=12 the mechanism was respectively 84.6% and 7% and RTS=1-9 and RTS=0 were observed only in the accidents group (95.2% and 100%) also Chi-square test showed significant relationship between these two variables (p<0.008) (table 1).

Most of the accidents have happened in the suburban group (89.9%), also chi-square showed the relationship significant (p<0.01). in assessing relationship between mechanism of trauma and the position of the victim at scene, most of the accidents have happened for the victims that were drivers (98.8%) and passengers (94.4%) and also Chi-square test showed significant relationship between these two variables (p<0.00) (table 2).

In assessing relationship between type of trauma and age group, data showed that in the age group of 20-29 years old, mostly (74.6%) blunt trauma have happened and the mean age (37.07±17.12) of the people who suffer from penetrating trauma is higher than the people who suffer from blunt trauma (34.26±15.06). also t-test showed significant relationship between mean age with the type of trauma (p<0.02) (graph 3).

In assessing relationship between type of trauma and gender, it was shown that penetrate damages in men (37.7%) was more than women and blunt damages in women (87%) was more than men. chi-square test showed Significant relationship between these two variables (P<0.00). Data show that the most penetrate damages (100%) had happened in people with RTS=0 and also RTS=12 (81%). Chi-square test shows significant relationship between two variables of RTS and type of trauma (p<0.00) (table 3).

The highest urbane blunt trauma was (70.9%). Also chi-square test showed significant relationship between type of trauma and the place of trauma (p<0.006). in assessing relationship between type of trauma and the position of the victim in the place of the event, the highest blunt damages (77.8%) is in the passenger group and the lowest one (33.3%) is in the unknown group it is while the unknown group had the highest blunt damages (66.7%). Chi-square test showed this relationship significant (p<0.01) (table 4).

4. Discussion

Table 2: Relationship between mechanism of trauma and the place of trauma, position of the victim at scene

Variables \ Mechanism of trauma		Frequency (percentage)							Type of the test and result
		Accident	Fall	Sport damages	Occupational damages	Knife	Violence and conflict	Others	
Place of trauma	Urbane	335 (80%)	44 (10.5%)	8 (1.9%)	3 (0.7%)	14 (3.3%)	12 (2.9%)	3 (0.7%)	**Chi-square p<0.01**
	Suburban	142 (89.9%)	5 (3.2%)	3 (1.3%)	6 (3.8%)	0 (0%)	1 (0.6%)	1 (0.6%)	
Position of the victim at scene	Passer	150 (98%)	2 (1.3%)	0 (0%)	0 (0%)	0 (0%)	1 (7%)	0 (0%)	**Chi-square p<0.00**
	Passenger	153 (94.4%)	7 (4.3%)	0 (0%)	0 (0%)	0 (0%)	2 (1.2%)	0 (0%)	
	Driver	170 (98.8%)	2 (1.2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
	Unknown	2 (66.7%)	1 (33.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
	Others	2 (2.6%)	31 (40.8%)	10 (13.2%)	9 (11.8%)	11 (14.5%)	10 (13.2%)	3 (3.9%)	

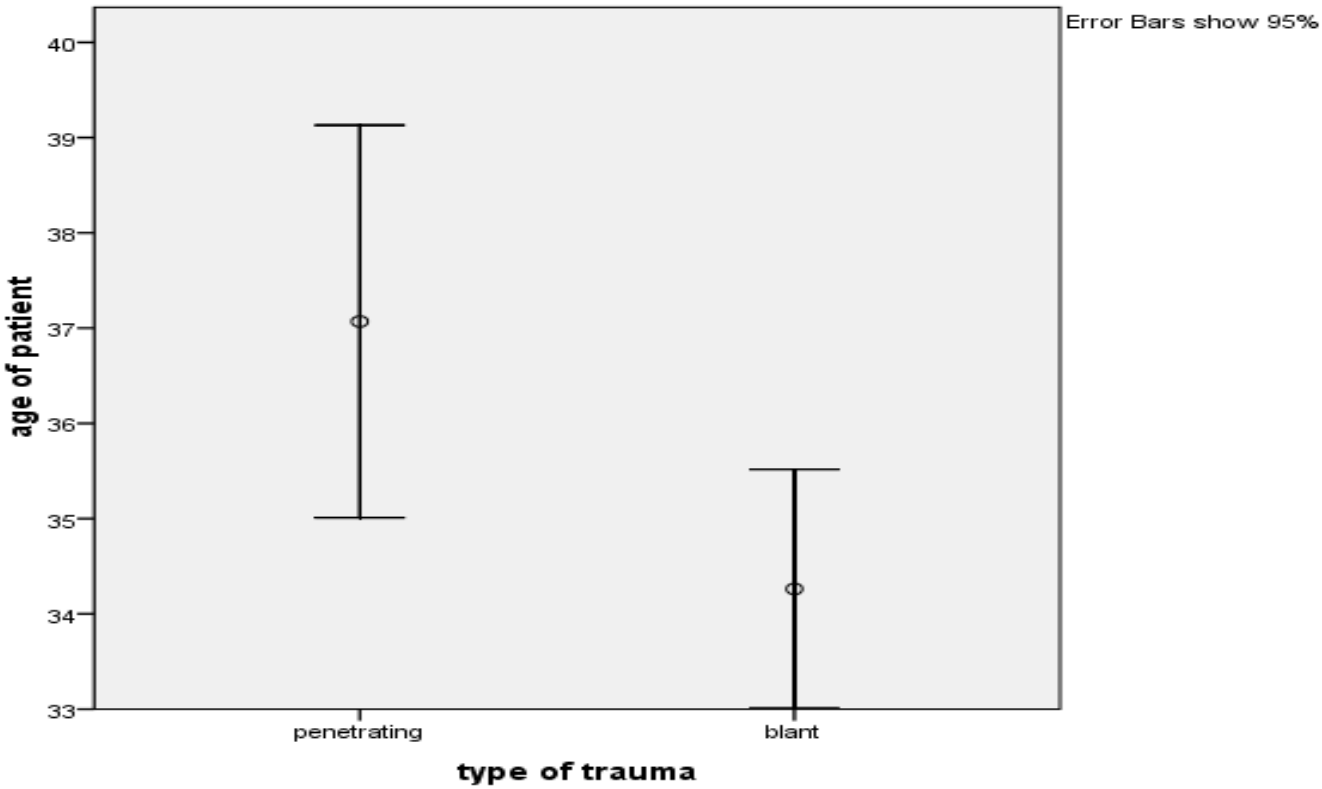
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Nowadays trauma is a basic problem of public health in all the societies. Trauma is the most common cause of death in the age range of 1-44 years old and is counted as the third common cause of death in all the ages [16]. Since damage was higher in some hours of the day, it is recommended that Poursina medical-educational center should be more prepared for providing health services for the trauma patients.

Most of the trauma mechanism in all the age groups has been the accidents and most of the accidents was in the age range of 20 to 29 years old ($p<0.02$). The mean age of the patients was 35.17 years old. This age group is counted as the young and active group of the society and due to their involvement in social activities, being bold and busy; they are at the risk of accident more than others. In the study of Zeng Haouvou in Singapore [17] and also in the study of Naghavi and Zargar [3, 18] such result has been stated. In a study which was done in the Rasoul-e Akram (s) hospital the mean age was 38.5±12.5 years old [15] and in another study in Singapore, the mean age of the people who were victims of traumatic events was 36 years old [17]; in another study by Vourli in 2007, the amount of damages in the age range of 15 to 29 years old included the highest amount [19].

Occupational damages were more (3.7%) in the age range of 30 to 39 years old that by considering the situation of life and their responsibility as the head of the family, such result is not surprising. Considering that most of the occupational damages have happened in the efficient and manufacturer group of the society, some measures can be considered for decreasing direct and indirect damages and their costs. First aid and trained staff can be helpful in this regard. Tools and machines of the workplace cause lots of blunt and penetrate damages; these damages should be decreased by observing preventive principles [13]. Fall after traffic accidents has been the most common cause of damages; high prevalence of fall is confirmed as the second cause of damages in other studies too [2,13,18,20,21].

In this study results show that men suffer from traumatic damages more than women that this finding is similar to most of the studies in this regard [2,3,7,13,20,22], but the amount of accidents



Graph 3: Relationship between type of trauma and the age groups

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Table 3: Relationship between type of trauma and age, gender and RTS

Variables	Type of trauma	Frequency (percentage)		Type of test result
		penetrate	blunt	
age	10<	2 (33.3%)	4 (66.7%)	T test p<0.02
	10-19	27 (41.5%)	38 (25.4%)	
	20-29	50 (25.4%)	147 (74.6%)	
	30-39	31 (28.4%)	78 (71.6%)	
	40-49	29 (31.9%)	62 (68.1%)	
	50-59	28 (47.5%)	31 (52.5%)	
	60>	20 (40%)	30 (60%)	
	mean	37.07±17.12	34.26±15.06	
gender	male	171 (37.7%)	283 (62.3%)	Chi-square p<0.00
	female	16 (13%)	107 (87%)	
RTS	RTS=0	2 (100%)	0 (0%)	Chi-square p<0.00
	RTS=1-9	34 (81%)	8 (19%)	
	RTS=10-11	49 (53.8%)	42 (46.2%)	
	RTS=12	102 (81%)	8 (19%)	

in women was more than men that indicates women are more active in different areas and nowadays they are more involved out of the house than before, but there was no significant relationship between these two variables.

The mechanism which has caused the severest damage to a person with RTS=0 and RTS=1-9 is the accidents (p<0.008). It indicates the necessity of more accurate monitoring of the ways, observing driving rules and roads safety and the presence of pre hospital emergencies [23]. Improvement in trauma pre hospital care can be effective in minimizing death and disability due to traumatic damages in all the world specially in low-income and middle-income countries such as Iran that are encountered with traffic road damages [24]. Pre hospital care at scene of accident and during transportation to a treatment center is mostly provided by the medical emergency systems and this system is the first step in managing injured patients [14].

Data show that most of the accidents have happened in the main way and in the suburban group (p<0.01). So paying attention to the safety of roads and highways, observing traffic rules and planning for rapid treatment of the victims and increasing rescue team bases in the main ways are necessary. In contrast, in the study of Kiaid, most of the accidents were urbane accidents [20].

Data show that blunt damages were more and they had the highest level in the age range of 20 to 29 years old (p<0.02). So assessing factors that make

Table 4: Relationship between type of trauma and the place of trauma, the position of the victim at scene

Variables	Type of trauma	Frequency (percentage)		Type of test result
		penetrate	blunt	
Place of trauma	urbane	122 (29.1%)	297 (70.9%)	Chi-square p<0.006
	suburban	65 (41.1%)	93 (58.9%)	
The position of the victim at scene	passer	53 (34.6%)	100 (65.4%)	Chi-square p<0.01
	passenger	36 (22.2%)	126 (77.8%)	
	driver	59 (34.3%)	113 (65.7%)	
	unknown	2 (66.7%)	1 (33.3%)	
	others	31 (40.8%)	45 (59.2%)	

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blunt damages can be done for preventing these kinds of damages. Also data show relationship between gender and type of trauma ($p<0.00$).

Most of the blunt traumas by considering type of vehicle have happened in the people who were drivers or passengers of the vehicle ($p<0.00$). This study also shows that several damages in the victims due to car accidents, especially light vehicles and motorcycle are more frequent that is also in consistent with other studies by Salimi and Zargar respectively in the Golestan and Tehran hospital [13, 18].

Since most of the patients with RTS=12 suffer from blunt and minor trauma ($p<0.00$) and by considering similar studies that had high amount of traumas with low injury severity [13, 18, 20], patients' triage should be more attended to decrease trauma patients' unnecessary refer to level 1 health centers.

Considering findings of this study, it is recommended to focus on the amount of direct and indirect costs due to damages in the next studies to be able to state that in addition to physical and psychological damages to individuals, annually lots of financial losses are imposed to society which can be prevented.

5. Conclusions

Providing preventive programs for decreasing damage due to the accidents can be helpful. It can be done through increasing the amount of people's awareness by being trained by nurses and the necessity of more attention to traffic regulations such as observing the speed limits. Modifying environmental conditions such as accident-prone of the streets and roads are also important. Among this, the effect of the presence of pre hospital emergencies that nurses are most of their health providers should not be ignored at scene. Without pre hospital cares many of the patients who have the chance of being survived lose their lives at scene of the event or on the way to the hospital. Most of the deaths that happen in the first hours after the accident are due to airway disorder, respiratory failure or uncontrollable bleeding and all of these three cases can be treated by using first principles [10]; so different aspects of trauma nursing should be more attended.

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