

An Epidemiological Study of Traffic Accidents Leading to Pedestrians' Death in Ahwaz, Iran in 2015-2017

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Abstract

Background: Traffic accidents are considered a major public health problem in many parts of the world. This study aimed to investigate the epidemiology of the accidents leading to pedestrians' death in Ahwaz, Iran, in 2015-2017.

Methods: This descriptive cross-sectional study was conducted in 2015-2017. The statistical population was pedestrians who died in traffic accidents in Ahwaz city. The data collection source was the Forensic Medicine Organization. The data were analyzed using the SPSS 16 software using descriptive statistics and chi-square test.

Results: Among the 165 pedestrians who died in traffic accidents, 72.1% (119 people) were male and 27.9% (46) female. The mean age of the deceased subjects was 38.38 ± 2.44 . The highest frequencies of death in the age groups over 65, under 7, and 25-34 years old were 19.4% (32 people), 14.5% (24 people), and 14.5% (24 people), respectively. Most of the deceased were illiterate (34.5% (57 people)), self-employed (24.2% (40 people)). The final cause of death in more than half of the pedestrians was head trauma (64.8%) (107 people), and most of the deceased had died in hospitals (71.5%) (118 people).

Conclusion: Considering that young and older people are two high-risk groups in car accidents, training safety and improving pedestrian safety by creating a safer environment can play a significant role in reducing deaths.

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Introduction

Traffic accidents are considered a major public health problem in many parts of the world. Each year, more than 1.27 million people die from road accidents, and 50 million others are injured.¹ According to the predictions by the World Health Organization, if no serious action is taken to reduce traffic accidents until 2020, the resulting deaths will increase by 67%.² Road accidents are also predicted to be the second leading cause of death in low- and middle-income countries and the third leading cause of death in high-income countries by 2020.³ In Iran, the annual rate of traffic accidents (32 per 100,000 person)

is the second cause of death, the first cause of lost years of life due to early death, and the most common cause of injuries.^{4,5}

The most important consequences of traffic accidents happen to road users (any person or vehicle using roads). Among road users, pedestrians are the ones who lose their lives due to traffic accidents without using vehicles, so they make up a significant percentage of traffic fatalities.⁶ Previous studies in Iran showed that over 30% of deaths from traffic accidents happened to pedestrians, and the rate of pedestrian deaths in Iran is remarkably higher than developed countries and even more than some Middle

Eastern countries.⁷ Pedestrians have the lowest level of protection in road accidents. Hence, they significantly suffer the accidents and make a high percentage of injuries and deaths.⁸ Pedestrians are the most defenseless and vulnerable people in traffic accidents, so the likelihood of physical disabilities or death is high among them. Various studies conducted in different parts of the world showed that young pedestrians (children and adolescents) and the elderly are the two high-risk groups in these accidents.⁷

In his study, Kalhori stated that when crossing the roads, pedestrians are seen as either “disabled” people (having disabilities or illnesses, being old or unfamiliar with travel issues) or children with no restrictions on crossing the roads. As a result, they sometimes make complicated and misleading movements in front of drivers, which are very dangerous and cause harmful incidents. These movements, with factors such as the lack of pavement spaces, the occupancy of some streets by parked vehicles or by peddlers, or doing operations to improve the passageways and the lack of pedestrian passageways force pedestrians to use the streets.^{9,10}

Hosseini stated in his study that in traffic accidents, the rate of casualties caused by pedestrian accidents was high in Iran, so, according to available statistics, pedestrians accounted for 31.5% of the total number of deaths from accidents inside cities and also about 43% of the total number of deaths from accidents (urban and suburban).¹⁰ To compare, the rate of deaths from accidents in America was 11% to 13%, and in Australia, Denmark, Finland, France, and Germany, it was 15%, 14%, 13.1%, and 15.3%, respectively. At the same time, it was 42% in Kenya, a developing country.¹¹

Obviously, with the continuation of the current trend, we will witness a national disaster in near future. Given the importance of this issue and the fact that few studies have been carried out on this issue in Iran, its investigation is of particular importance. Khuzestan Province is one of the deprived provinces in terms of the safety of suburban roads and the roads inside cities, resulting in many deaths due to traffic accidents. Furthermore, the weather is hot, humid, and dusty in some months which reduces drivers' and pedestrians' horizontal visibility, resulting in traffic accidents and consequently an increase in the mortality caused by road accidents. Therefore, based on the existing conditions and the lack of accurate statistics and information on traffic accidents in this province, the present study aimed to investigate the epidemiological situation of the accidents leading to pedestrians' death in Ahvaz city.

Methods

This study has descriptive-analytical and cross-sectional

design in which the population consisted of all pedestrians who died from traffic accidents in Ahvaz city from March 2015 to March 2017. All the pedestrians who died due to traffic accidents in the city of Ahvaz were entered into the study through a census. The data collection source was the Forensic Medicine Organization. Following the law of the country, in some specific cases of death, the burial permission must be issued by the Forensic medicine organization. One of these cases is the deaths from traffic accidents (in any form, at any time interval from the accident). Therefore, the Forensic medicine centers collect the dead's information in some forms that include demographic information (age, sex, education), type of vehicle used, type of vehicle involved in the accident with pedestrians or vehicles and the deceased, spatial and temporal features, how the accident occurred, and the final cause of death. The Ethics Committee of Shiraz University of Medical Sciences approved this study. The data were analyzed by descriptive statistics and chi-square test through the SPSS software version 16. The significance level in all tests was considered 0.05.

Results

Among the 165 pedestrians who died in traffic accidents during the years of conducting this study, 72.1% (119 people) were male and 27.9% (46 ones) were female. The mean age of the deceased subjects was 38.38 ± 2.44 , ranging from under-one to 86 years. Table 1 shows the pedestrians' demographic characteristics. The highest frequencies of death in the age groups over 65, under 7, and 25-34 years old were 19.4% (32 persons), 14.5% (24 persons), and 14.5% (24 persons), respectively. Most of the deceased (58.8%) were married (97 persons), illiterate (34.5% (57 persons)), self-employed (24.2% (40 persons)), and residents of the city (38.8% (138 persons)).

Table 2 shows the frequency of the accident-related data of the deceased pedestrians. The highest rate of accidents that occurred to pedestrians was found in the autumn (29.1%) (48 persons).

In most deceased (45.5%), the trauma was to their heads (75 persons). In more than half of the pedestrians (64.8%), the final cause of death was head trauma (107 persons), and the second common cause of death was multiple fractures (17%) (28 persons). Most of the deceased had died in the hospital (71.5%) (118 persons), and the second-highest rate was the place where the accident had occurred (24.8%) (41 persons). The accident location was the roads inside the city in 75.15% of the cases. In terms of the type of vehicle involved in the accidents with pedestrians, 61.2% (101 persons) had died of collision with a passenger car, most of them (56 persons) had died of collision with Pride cars. The majority of the deceased (98.8%) were Iranian (163 persons), and 1.2% (2 persons) were Afghan.

The researchers used the Chi-square test to

Table 1: Demographic characteristics of pedestrians

Variable		N(%)
Age	Under 7	24(14.5)
	7-14 years old	13(7.9)
	15-24 years old	17(10.3)
	25-34 years old	24(14.5)
	35-44 years old	17(10.3)
	45-54 years old	21(12.7)
	55-64 years old	17(10.3)
	Over 65	32(19.4)
Gender	Male	119(72.1)
	Female	46(27.9)
Marital Status	Single	67(40.6)
	Married	97(58.8)
Education	Illiterate	57(34.5)
	Elementary	42(25.5)
	Middle school	31(18.8)
	High school/ diploma	29(17.6)
Occupation	University	6(3.6)
	Student	24(14.5)
	Housewife	26(15.8)
	Employee	4(2.4)
	Worker	15(9.1)
	Self-employed	40(24.2)
	Retired	16(9.7)
	Unemployed	10(6.1)
Place of residence	Other	30(18.2)
	City	138(83.6)
	Village	27(16.4)

Table 2: Frequency of accident-related data of deceased pedestrians

Variable		N(%)
Season	Spring	43(26.1)
	Summer	38(23)
	Autumn	48(29.1)
	Winter	36(21.8)
Involved organ	Head	75(45.5)
	Neck	1(0.6)
	Chest or abdomen	3(1.8)
	Pelvis	1(0.6)
	Leg	2(1.2)
	Two organs	38(23)
	Three organs	32(19.39)
	Four organs	11(6.6)
Cause of death	Five organs	2(1.2)
	Head trauma	107(64.8)
	Bleeding	20(12.1)
	Multiple fractures	28(17)
Location of death	Others (burn, choking, etc.)	10(6.1)
	In the accident location	41(24.8)
	While transferring to the hospital	4(2.4)
	Hospital	118(71.5)
Type of vehicle	Home	1(0.6)
	Unknown	1(0.6)
	Motorcycle	9(5.45)
	Passenger car (Pride)	56(33.93)
	Passenger car (Peugeot, Samand, Paykan, Tondar)	45(27.27)
	Pickup truck	16(9.69)
	Minibus and bus	6(3.63)
Truck and trailer	Truck and trailer	18(10.90)
	Other	18(9.09)

determine the relationship between the final cause of death and accident location and the type of vehicle involved in the accident. There was no statistically significant relationship between the final cause of death and the accident location ($P=0.24$) and vehicle type ($P=0.99$).

Discussion

This study aimed to investigate the epidemiology of the accidents leading to pedestrians' death in Ahvaz, Iran, in 2016-2017. In the present study, the highest rate of pedestrian deaths from car accidents was that of the age group over 65, and the lowest rates were seen among the age groups under 7 and 25-34. In an epidemiologic study of victims of traffic accidents in Iran conducted by Moradi et al., the rates of pedestrian deaths were higher in the two age groups of over 60 and lower than 10.⁷ Another study by Gorgin et al. on the pedestrians who died from traffic accidents in Kurdistan Province indicated that the highest death rate was related to people over the age of 65.¹² In other studies carried out in Australasia and New South Wales, 20% of the deceased pedestrians were under 20, and 29% of them were 20 to 40 years old.^{13, 14} Also, in the United States, the highest rate of deaths from accidents was found among the age group over 75.¹⁵ Older people and children are more likely to be victims of the severe consequences of traffic accidents because the former group is physically and visually impaired and shows fewer reactions, and the latter group has smaller and weaker bodies. Moreover, the number of young people in societies is higher, and consequently, the rate of traffic accidents will be higher for them compared to other groups.

In the present study, 72% of the deceased were male. In an epidemiologic study of the victims of traffic accidents in Iran conducted by Moradi et al., 72.7% of the deceased were male.⁷ In another study by Gorgin et al. entitled Demographic Characteristics of Pedestrians Died from Traffic Accidents in Kurdistan Province During 2004-2009, 70% of the deceased were male.¹² In the study by Heydari et al. to determine the epidemiological characteristics of fatal traffic accidents in Fars province, 78% of the deceased were male,¹⁶ which is consistent with the results of the present study. In the review by Ameratunga, the higher number of men in road accidents was globally mentioned as a common finding that could reflect gender differences in taking risks, exposure to risk, economic opportunities, and type of employment.¹⁷

The most common cause of pedestrian deaths in this study was head traumas. In the study by Moradi et al. on the victims of traffic accidents in Iran, and the study by Gorgin et al. on the demographic characteristics of the pedestrians died from traffic accidents in Kurdistan Province, the most common cause of pedestrian deaths was head traumas.^{7, 12} In the study by Heydari

et al. to determine the epidemiological characteristics of fatal traffic accidents in Fars province, the most common cause of death from all types of traffic accidents (pedestrians, motorcycle riders, cars, and passengers) was head traumas,¹⁶ which is consistent with the present study. In the present study, most of the deceased had died in the hospital, followed by dying at the accident location. In the study by Moradi et al. on the victims of traffic accidents in Iran, most of the deceased had died in the hospital and at the accident site.⁷ In the study by Izadi in Kermanshah, most of the deceased had died in the hospital and at the accident site, respectively,¹⁸ which is consistent with the present study and indicates the lack of timely assistance to accident victims throughout the country.

Most deceased in this study were illiterate, and the lowest number of the deceased were those with higher education. In the studies of Moradi et al. and Gorgin et al. on deceased pedestrians in Iran and Kurdistan, most of the deceased were illiterate.^{7, 12} In a study conducted by Rakhshani et al. to determine the pattern of mortality from road accidents and its related factors in the south of Iran, the majority of the deceased were illiterate, and the lowest percentage was related to the deceased with university education, and this is consistent with the results of this study.¹⁹ In another study by Erfanpoor et al. to determine the epidemiological causes of deaths from traffic accidents in Razavi Khorasan Province, most of the dead subjects had high school and lower education, and those with higher education had the lowest frequencies.²⁰

In the present study, most of the deceased were self-employed. In the study carried out by Soori et al. to determine the epidemiological pattern of traffic accidents in pedestrians across the country in 2014, self-employed pedestrians had the highest death rate in traffic accidents,²¹ which is consistent with the present study. One of the reasons for the higher number of deceased self-employed people is that they do not have specific work hours and can travel across the city throughout the day.

In this study, 61.20% of the deceased had died of collision with passenger cars, and a small percentage of them had died of collisions with minibusses, buses, and motorcycles. In the study by Moradi et al., 45.56% of the deceased pedestrians had died from accidents with passenger cars, and the rate of collision with minibusses and motorcycles was lower.⁷ In the study by Gorgin et al. on the pedestrians in Kurdistan, most people had died of collision with passenger cars, and the percentage of deaths due to collision with bicycles was low,¹² which is consistent with the present study. Regarding the seasons, the highest death rates was in the autumn and spring. In the study by Taravatmansh et al. to determine fatal traffic accidents in Sistan and Baluchestan province in 2012, the highest mortality

rates were observed in spring and autumn,²² which is consistent with the present study. In the study conducted by Izadi et al. in Kermanshah, the highest mortality rate was in summer and autumn.¹⁸ The higher rates of deaths in the autumn in the present study and the ones as mentioned earlier can be attributed to the coincidence of the beginning of new academic years in autumn and consequently, the increase in traveling to schools and universities. Among the limitations of this study was the lack of access to variables such as the speed of the vehicles, the use of alcohol, weather conditions, the state of consciousness or drowsiness of the drivers, and the type of culprits.

Conclusion

Given the fact that very young individuals and the elderly are two high-risk groups in the event of traffic accidents, also given that the deceased in this study had a low social status (mostly illiterate or having low levels of education), safety training could undoubtedly play a significant role in reducing pedestrian deaths. Improving pedestrians' safety can be achieved by making a safer environment for pedestrians by reducing the permitted speed and improving pedestrian vision. Furthermore, giving appropriate information to drivers and encouraging them to respect pedestrians' rights, and also constructing footbridges and underpasses that people of all ages can use, may reduce pedestrians' death to a great extent.

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References

- 1 Global status report on road safety: time for action. Geneva: World Health Organization, 2009.
- 2 Soori H, Royanian M, Zali AR, Movahedinejad A. Road traffic injuries in Iran: the role of interventions implemented by traffic police. *Traffic injury prevention*. 2009;10(4):375-8.
- 3 Seymour J. Trafficking in death [road accidents in developing countries]. *NEWSCIENTIST*. 1996; 151(2047).
- 4 Deputy of health ministry of health, treatment and medical education. Feature of death in 18 provinces of country. World Health Organization seat in Islamic republic of Iran: Tehran, 1991.
- 5 Zargar M, Khaji A, Karbakhsh M, Zarei MR. Epidemiology study of facial injuries during a 13 month of trauma registry in Tehran. *Indian Journal of Medical Sciences*. 2004; 58(3):109-14.
- 6 Ameri M, Karimnia AR. Epidemiology of fatal traffic injuries in pedestrian in Iran. *Rahvar*. 2014;11(26):31-49.
- 7 Moradi S, Khademi A, Taleghani N. An epidemiologic study of victims of traffic accidents in Iran. *Journal of Forensic Medicine*. 2003;9(30):75-81.
- 8 Ahmadian S, Rezaii M.A. Investigating the importance of pedestrians and the factors affecting their accidents, National Conference on sustainable architecture and urban landscape, Mashhad, 2014.
- 9 Zadvali khajeh Sh, Zadvali F. The Factors affecting pedestrians in traffic accidents in the city of Orumiye. *journal saientific and promotin*. 2014;11(27):27-51.
- 10 McIlvenny S, Mahrouqi F, Busaidi T, Nabhani A, Hikmani F, Kharousi Z, et al. Rear seat belt use as an indicator of safe road behavior in a rapidly developing country. *Journal of the Royal Society of Health*. 2004; 124(6): 280-3
- 11 Hasan pour Sh, Asadolahi R, Zabihi tari M. Analysis of accident data based on parameters affecting pedestrians in the country, The first national conference on traffic safety and enforcement strategies, Kerman Shahid Bahonar University, Kerman 2011.
- 12 Gorgin L, Salari lak Sh, Khorasani D, Ahmadi N. Demographic Characteristics of Pedestrians Died from Traffic Accidents in Kurdistan Province During 2004-2009. *Journal of scientific forensic medicine*. 2011;17(3):183-188.
- 13 Crawford R1. Trauma audit: experience in northeast Scotland. *British Journal of Surgery*. 1991;78(11):1362-6.
- 14 Maria E, Marvin L. NHTSA's Bike Safety Program Ancient history from 1999. National Highway Traffic Safety Administration Bicycle Safety: CDC, 2016. <http://www.helmets.org/nhtsaprg.htm>. Accessed, 10 April 2017.
- 15 Road traffic crashes in NSW: statistical statement for the year ended 31 December 2014. Centre for Roads safety Transport of New South Wales, 2011. http://roadsafety.transport.nsw.gov.au/downloads/cr_ashstats2014.pdf. Accessed, 10 April 2017.
- 16 Heydari ST, Hoseinzadeh A, Ghaffarpasand F, Hedjazi A, Zarenezhad M, Moafian G, et al. Epidemiological characteristics of fatal traffic accidents in Fars province, Iran: a community-based survey. *Public Health*. 2013;127(8):704-9.
- 17 Ameratunga S, Hajir M, Norton R. Road-traffic injuries: confronting disparities to address a global health problem. *The Lancet J*. 2006;367(9521):1533-40.
- 18 Izadi N, Najafi F, Khosravi A, Hashemi Nss, Salari A, Soori H. Estimation Of Mortality And Calculated Years Of Lost Life From Road Traffic Injuries. *Journal Of Mazandaran University Of Medical Sciences*. 2014;24(112):51-8.
- 19 Rakhshani T, Rakhshani F, Asadi Z, Hadiabasi M, Khorramdel K. Study of the pattern of mortality caused

- by Traffic Accidents(TAs)in The South of Iran. J pak Med Assoc. 2016;66(6):644-649.
- 20 Erfanpoor S, Hashemi Nazari SS, Ghadirzadeh M. An epidemiology study of fatal road traffic accidents in khorasan razavi province in 2011. Medical Journal of Mashhad University of Medical Sciences.2016;59(4):261-268.
- 21 Ebrahimi Kebria S, Soori H. Study of epidemiological pattern of pedestrian's road traffic injuries in 2014 and determination of related risk factors on severity of injury. Payesh. 2017;16(3): 293-302.
- 22 Taravatmanesh S, Hasheminazari S, Ghadirzadeh M, Taravatmanesh L. Epidemiology of fatal traffic injuries in the Sistan and Baluchestan province in 2011, Journal to promote safety and prevent injuries.2015;3(3):161-168.