

Features of the traffic accidents happened in the province of Aydın between 2005 and 2011

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ABSTRACT

BACKGROUND: In this study, it was aimed to analyze the traffic accidents with postmortem examinations and autopsies.

METHODS: From the one thousand eight hundred and fifteen forensic autopsies, reports of 334 traffic accidents were searched. Features such as the scene of the accident, type of the accident, type of the vehicles involved in the accident, the year, season, day and hour of the accident, the positions of the victims in the traffic, concomitant orthopedic injuries, whether autopsy was performed, and cause of death were investigated.

RESULTS: Among the one thousand eight hundred and fifteen forensic death cases, observed cause of death was determined to be traffic accidents in 334 (18.4%) cases. Male cases accounted 84.1%, and male to female ratio was 5.3 to 1. From the reports, 32.6% of the accidents happened in summer and most commonly during holidays (33%). The rate of the accidents happened in the city center was 35.3% and 32.9% of these cases died due to pedestrian collision. Moreover, it was determined that the most injured person was the driver. Automobiles took the lead in the causes of the traffic accidents.

CONCLUSION: It is realized that traffic accident-related deaths have a substantial place among forensic deaths and continue to be an important public health problem. It is conspicuous that improving public education on traffic safety, increasing traffic management and control measures are of great significance.

Key words: Traffic accidents; forensic medicine; autopsy.

INTRODUCTION

World Health Organization (WHO) defines a road traffic injury as any injury caused by vehicle crashes on a public highway.^[1] Traffic accidents rank first among accidents leading to injuries worldwide.^[1,2] Although the number of traffic accidents has decreased in recent years as a consequence of efforts in developed countries, it is still among the most important public health problems in developing countries.^[1-3] In Turkey, thousands of people get injured or die each year due

to traffic accidents.^[4] Therefore, it is important to determine causes of death and the potential factors affecting death in traffic accidents. This is only possible with a detailed and attentive autopsy procedure and laboratory analyses.

The present study aimed to assess demographic characteristics of the subjects that died due to the traffic accidents in the province of Aydın, Turkey and to evaluate them in terms of forensic medicine, as well as to establish recommendations within the frame of data obtained.

MATERIALS AND METHODS

In the present study, subjects, who died due to traffic accidents, were selected among all forensic death cases referred to the Department of Forensic Medicine of Adnan Menderes University between January 2005 and December 2011. From the one thousand eight hundred and fifteen forensic autopsies, reports of 334 traffic accidents were searched. External examination/autopsy reports of the selected cases were reviewed retrospectively, and the following data including de-

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mographic characteristics of the dead subjects, scene of the accident, type of the accident, type of the vehicles involved in the accident, the year, season, day and hour of the accident, the position of the victims in the traffic, concomitant orthopedic injuries, whether autopsy was performed, and cause of death were evaluated. The data of the study were analyzed using the Statistical Package for the Social Sciences version 14 (SPSS, Inc., Chicago, IL, USA).

RESULTS

Among the one thousand eight hundred and fifteen forensic death cases observed within the 6-year period and covered by the present study, cause of death was determined to be traffic accidents in 334 (18.4%) cases, which were included in the study. Of these three hundred and thirty-four cases, 331 were citizens of Turkey, one was a citizen of the Netherlands, one of Lithuania, and the identity of one could not be determined. Of the cases, 281 (84.1%) were male and 53 (15.9%) were female with a male-to-female ratio of 5.3.

Deaths due to traffic accidents were observed to be most common in a group aged between 21 and 30, with a rate of 18.9% and least common in a group aged 81 and over, with a rate of 3.00%; the mean age of the dead cases was 44.39 years (minimum: 40; maximum: 93 years of age). Number of males was higher than that of females in each age group. The distribution of the cases among age groups is presented in Table 1. The evaluation of the distribution of cases over the years revealed that deaths were more prevalent in 2007 and 2008 with 57 (17.1%) cases in each year and least prevalent in 2010 with 31 (9.3%) cases.

Accidents occurred most frequently in summer with 109 (32.6%) cases and in autumn with 83 (24.9%) cases; 13.2% of the accidents occurred in July, 12.6% of the accidents occurred in September, and 10.8% of the accidents occurred in August. Accidents occurred least frequently in November (3.6%) and December (5.1%).

Table 1. Distribution of the dead cases according to age groups

Age groups (years)	n	(%)
0-10	12	3.6
11-20	29	8.7
21-30	63	18.9
31-40	54	16.2
41-50	47	14.1
51-60	42	12.6
61-70	39	11.7
71-80	38	11.4
≥81	10	3.0
Total	334	100.0

According to the distribution of traffic accidents over the days, it was determined that the accidents occurred most frequently on off days, Sunday (17.4%) and Saturday (15.6%), whereas the accidents occurred least frequently on Monday (11.4%), which is the first day of work. It was observed that the accidents were more common in rush hours between 12:01 and 18:00.

Of the accidents, one hundred and eighteen (35.3%) occurred within the city limits, whereas 133 (39.8%) occurred outside city limits. Of the accidents occurred within the city limits, 17.4% occurred in downtown, 3.3% occurred in Nazilli County, 2.7% occurred in Çine County, and 2.1% occurred in Kuşadası County. The distribution of the scenes of accidents over the years is demonstrated in Table 2.

The present study determined that one hundred and forty-two (42.5%) cases experienced traffic accidents inside the vehicle, whereas 192 (57.5%) cases experienced traffic accidents outside the vehicle. It was observed that traffic accidents outside the vehicle mostly occurred within the city limits, whereas traffic accidents inside the vehicle mostly oc-

Table 2. Distribution of the scenes of accidents over the years

Years	Scene of accident			Total
	Within the city center	Outside the city center	Other	
2005	22	21	5	48
2006	16	27	10	53
2007	19	23	15	57
2008	19	21	17	57
2009	14	13	10	37
2010	10	10	11	31
2011	18	18	15	51
Total	118	133	83	334

Table 3. Distribution of accident types according to the scene of accident

Accident type	Crime scene			Total
	Within the city center	Outside the city center	Other	
Inside the vehicle	30	75	37	142
Outside the vehicle	88	58	46	192
Total	118	133	83	334

curred outside city limits. The distribution of the accident type according to the scene of accident is presented in Table 3.

In the present study, of the cases, one hundred and ten (32.9%) were pedestrians hit by a vehicle, whereas 175 were drivers and 16 were front seat passengers. Among the vehicles involved in the traffic accidents, automobiles ranked first (27.2%), followed by motorcycles (20.1%). Tractor accidents accounted for 8.7% and each of the bicycle and minibus accidents accounted for 4.2% (Table 4).

Among the cases, 41.6% died during clinical treatment, 29.0% died at the scene of the accident, 19.8% died during the first treatment in the emergency room, 9.3% died during transfer, and one case died after being discharged from the health care center.

Seventy-five (22.5%) of the cases underwent autopsy examination, whereas 259 (77.5%) underwent external examination; samples for histopathological examination were obtained from nine (2.7%) cases, and a causal connection was determined between death and traffic accident in six of them. Bone fracture was detected in 280 (83.8%) cases. It was observed that one hundred and fifty-two cases had a single bone fracture and 128 had multiple bone fractures. Skull fractures were the leading fractures present in one hundred and sixty-eight (50.3%) cases. The fracture was in the ribs in 37.7% of the cases, femur in 11.1% of the cases, tibia-fibula in 9.9% of the cases, pelvis in 8.4% of the cases, maxilla in 6.9% of the cases, humerus in 6% of the cases, clavicle in 5.7% of the cases, vertebra in 4.8% of the cases, sternum in 4.2% of the cases, wrist in 4.2% of the cases, radius-ulna in 3.3% of the cases, ankle in 3.3% of the cases, patella in 2.1% of the cases, and scapula in 1.5% of the cases.

The leading cause of death due to traffic accidents was whole-body trauma involving one hundred and forty-eight (44.3%) cases, followed by head trauma in 40.4% of the cases, chest trauma in 11.1% of the cases, and abdominal trauma in 1.8% of the cases. It was determined that two cases died of drowning, five cases died of myocardial infarction and one case died of pulmonary embolism. Since we were not informed about the overall results of analyses of blood samples obtained during autopsy or external examination, definite information

Table 4. Type of vehicles involved in deaths due to traffic accidents

	n (%)	Cumulative %
Pedestrian	110 (32.9)	32.9
Bicycle	14 (4.2)	37.1
Motorcycle	67 (20.1)	57.2
Automobile	91 (27.2)	84.4
Truck/pick-up	7 (2.1)	86.5
Minibus-bus	14 (4.2)	90.7
Tractor	29 (8.7)	99.4
Tanker	1 (0.3)	99.7
Ambulance	1 (0.3)	100.0
Total	334 (100.0)	–

about blood alcohol concentration of the dead subjects could not be obtained.

DISCUSSION

Traffic accidents are among the most important causes of death in developed countries.^[5-7] It is estimated that each year more than two million people die worldwide.^[8] In the countries of the European Union, 50,000 deaths and 1.5 million injuries are being reported each year due to traffic accidents.^[5] According to the 2010 data of Turkish Statistical Institute, a total of 116,804 traffic accidents occurred resulting in 4,045 deaths and 211,496 injuries.^[4] These injuries appear as an important public health problem not just due to high economic burden, but also to the relevant social problems.^[9]

Among the one thousand eight hundred and fifteen forensic death cases within the 6-year period covered by the present study, cause of death was determined to be traffic accidents in 334 (18.4%) cases. In other studies conducted in Turkey, this rate has been reported to be 35.9% by Tıraşçı and Gören,^[10] 47.8% by Çakıcı et al.,^[11] 48.7% by Karagöz et al.,^[12] 31.3% by Gören et al.,^[13] and 38.8% by Karbeyaz et al.^[14] A study from Sri Lanka has reported this rate to be 43.5%,^[15] while it has been reported to be 57.9% in a study from Nigeria^[16] and 18.6% in a study from Norway.^[17]

The present study comprised 281 (84.1%) male cases and

53 (15.9%) female cases with a male to female ratio of 5.3, which was consistent with the findings reported in the relevant studies.^[13,18-26] This was attributed to the higher male count in traffic. Studies conducted in Turkey have reported that the cases involved in traffic accidents are predominantly in the young age group.^[10,12,13,27,28] The present study also determined that traffic accident-related deaths occurred most frequently in the group aged between 21 and 30 (18.9%), followed by the group aged between 31 and 40 (16.2%). Likewise, traffic accident-related deaths have been reported to occur most frequently in the group aged between 21 and 30 (17.3%) in the study by Karbeyaz et al.^[14] On the other hand, Demirel et al.^[19] have reported traffic accident-related deaths to be most common in the group aged between 60 and 69 (20.5%). It has been stated that traffic accidents are one of the basic causes of death particularly among young population under the age of 50 years and is more prevalent in the age groups that are physically and socially more active.^[21]

Consistent with the findings reported in the literature, the present study determined that traffic accidents most frequently occurred on off days, in summer and between the hours of 12:01 and 18:00.^[5,13,14] This was attributed to heavier traffic at the weekends and in summer days.

The present study found that the accidents which occurred outside the vehicle (57.5%) were more prevalent than those which occurred inside the vehicle (42.5%). The accidents inside the vehicle occurred more commonly within the city limits, whereas accidents outside the vehicle occurred more commonly outside the city limits. These findings were also consistent with the findings of previous studies.^[13,14,18]

In the present study, evaluation of the vehicle types involved in traffic accidents resulting in deaths revealed that 27.2% were automobiles, 8.7% were tractors, 67 (20.1%) were motorcycles, 14 (4.2%) were bicycles, 4.2% were bus-minibuses, 2.1% were truck/pick-ups, one was a tanker, and one was

an ambulance, whereas 14 deaths occurred due to train accidents. It has been reported that automobile and minibus-bus accidents are frequent as these vehicles are widely found in traffic, motorcycle-bicycle accidents are frequent due to rare use of helmets by motorcyclists and cyclists, and tractor accidents are frequent due to uncontrolled use of tractors in the rural areas for both agricultural labor and passenger transport.^[13,14,29-33]

Evaluation of the position of the dead cases in the present study showed that 110 (32.9%) cases were pedestrians hit by a vehicle, 175 cases were drivers and sixteen cases were front seat passengers (Table 5). In other studies conducted in Turkey, the rate of pedestrians has been reported to be 55.5% by Gören et al.^[13] and 41.0% by Karbeyaz et al.^[14] In other studies around the world, this rate has been reported to be 46.2% by Sharma et al.,^[21] 77.1% by El-Sadig et al.,^[22] and 59% by Cameron et al.,^[23] and 57% by Hijar et al.^[34] The rate of pedestrian death is gradually decreasing in developed countries. However, pedestrian death, particularly in childhood, is more prevalent in developing countries due to the fact that children usually play in the streets with heavy traffic and are involved in economic activity.^[13,35]

In our study, 41.6% of the cases died during clinical treatment, 29.0% died at the scene of accident, and 19.8% died during the first treatment in the emergency room. Similar studies have reported that cases are usually brought dead to the health institution due to lack of knowledge and experience about first aid at the scene of accident and delayed patient transfer.^[13,14,21,36]

In Turkey, the prevalence of autopsy is low in traffic accident-related deaths.^[14,19,37] The rate of autopsy has been found to be 1.2% and 1.1% in the studies by Gören et al.^[13] and Karbeyaz et al.,^[14] respectively. Different from the findings of previous studies in Turkey, the present study determined that 75 (22.5%) cases underwent autopsy and 259 (77.5%) cases

Table 5. Distribution of causes of death according to the position of the dead cases

Causes of death	Location of the dead cases				Total
	Pedestrian	Driver	Front seat passenger	Other	
Head trauma	45	74	4	12	135
Chest trauma	10	20	2	5	37
Abdominal trauma	4	0	0	2	6
Whole-body trauma	51	75	10	12	148
Drowning	0	1	0	1	2
Myocardial infarction	0	5	0	0	5
Pulmonary embolism	0	0	0	1	1
Total	110	175	16	33	334

underwent external medical examination.

Head trauma has been reported to be the leading cause of death in traffic accident-related deaths, and particularly pedestrians, drivers, passengers not wearing seat-belts, and motorcyclists-cyclist not wearing helmets have been reported to be more prone to head trauma. In the present study, head trauma (40.4%) was the second leading cause of death after whole body trauma (44.3%). This rate has been reported to be 59.1% in the study by Gören et al.,^[13] 83.3% in the study by Karbeyaz et al.,^[14] and 61.5% in the study conducted by Hilal et al.^[18] In a study evaluating the cases presented to emergency rooms after traffic accidents in the province of Sivas, Turkey, head trauma has been detected in 18.6% of the cases.^[38] Çırak et al.^[39] have reported traffic accidents as the cause in 48% of head trauma cases presented to the emergency room. In the present study, skull fracture was detected in 168 cases. Pakiř et al.^[40] have reported abdominopelvic trauma in 22.78% of the traffic accident-related deaths, of which 51% were pelvic bone fractures. While blunt or penetrating abdominopelvic injuries could occur during traffic accidents, it has been reported that blunt injuries take the lead and are usually associated with seat-belt use known as “seat-belt syndrome”.^[41-43] In the present study, abdominal trauma alone was the cause of death in six cases and chest trauma alone was the cause of death in 37 cases. Costal fracture was detected in 126 cases, clavicle fracture in 19 cases, and sternum fracture in 14 cases. Cangir et al.^[44] have reported that the etiology was traffic accidents in 66.17% of thorax trauma cases presented to the clinic.

Conclusion

It is realized that traffic accident-related deaths have a substantial place among forensic deaths and continue to be an important public health problem. It has been concluded that automobiles are the vehicles most involved in traffic accidents, drivers neglect wearing seat-belts, motorcyclists-cyclists do not wear helmets, tractors are inappropriately driven by individuals of various ages both for agriculture labor and to transfer passengers, pedestrians, particularly children and the elderly, are frequently exposed to traffic accidents within the city limits, and accidents are more prevalent in summer and at the weekends due to heavy traffic. It is conspicuous that improving public education on traffic safety, building more public awareness on road safety, increasing traffic management and control measures, and educating drivers on traffic rules and regulations are the basic measures necessary to be taken for the prevention of and controlling traffic accidents. Moreover, we are in the opinion that safe playing areas and public gardens should be established for children, cycle tracks need to be constructed in cities, public transportation should be popularized, education on first aid should be generalized, and problems during patient transfer should be eliminated.

Conflict of interest: None declared.

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KLİNİK ÇALIŞMA - ÖZET

2005-2011 yıllarında Aydın ilindeki trafik kazalarının özellikleri

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AMAÇ: Bu çalışmada, ölü muayene veya otopsi yapılan trafik kazalarının irdelenmesi amaçlandı.

GEREÇ VE YÖNTEM: Adli nitelikli 1815 ölüm olgusu arasından, trafik kazası nedeniyle ölen 334 olgu seçildi. Seçilen olgularda olay yeri, kaza türü, kazaya karışan araçların cinsi, yıllar, mevsimler, günler ve saatle ile olan ilişkisi, kurbanların trafikteki konumları, birlikte olan ortopedik yaralanmaları, otopsi yapılıp yapılmadığı ve ölüm nedenleri araştırıldı.

BULGULAR: Çalışmanın kapsadığı 1815 adli ölüm olgusunun %18.4'ünün ölüm sebebi trafik kazası idi. Olguların %84.1'i erkek ve Erkek/Kadın oranı 5.3/1 olduğu saptandı. Kazaların en sık 109 (%32.6) olgu ile yaz aylarında ve en çok tatil günlerinde olduğu saptandı. Araç dışı trafik kazalarının şehir içinde daha sık görüldüğü, ölümlü kazaların ise en çok yayalara çarpma sonucu meydana geldiği ve kazalarda otomobillerin birinci sırada olduğu saptandı.

TARTIŞMA: Trafik kazasına bağlı ölümlerin önemli bir halk sağlığı sorunu olmaya devam ettiği anlaşıldığından, trafik güvenliği eğitiminin güçlendirilmesi, trafik yönetim ve kontrol önlemlerinin artırılması gibi konulara verilen önemin artırılarak devam etmesi uygun olacaktır.

Anahtar sözcükler: Adli tıp; otopsi; trafik kazaları.

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