An Analyses of Bicycle Accidents in Ankara: Analyses of 5 Years

Ankara'da Bisiklet Kazalarının Analizi: 5 Yılın Analizi

Bicycle

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Özet

Giriş: Bisikletler ulaşım, egzersiz ve eğlence için kullanılır. Bu çalışmada bisiklet yaralanmalarının epidemiyolojik, klinik ve ekonomik yönlerinin araştırılması amaçlandı. Gereç ve Yöntem: Ocak 2008-Temmuz 2012 arasında acil servise bisiklet kazası nedeniyle başvuran hastalar çalışmaya alındı.hasta yaşı, cinsiyeti, kaza paterni, personel koruyucu kullanımı, yaralanan vücut bölümü, Glasgow Coma Scale (GCS) score, Revised Trauma Score (RTS), radyolojik bulgular, istenen konsültasyonlar, hastanede yatış süresi, yaralanma sezonu ve ortalama maliyet kaydedildi. Hastalar 0-14 yaş ve 14 yaş üstü olarak 2 gruba ayrıldı. Bulgular: Hastaların 238'i (81.2%) erkekti ve ortalama yaşları 31.5±14.1 yıldı. 54 (18.8%) hasta kadındı ve ortalama yaşları 34.5±15.9 yıldı. Erkeklerde bisiklet kazası oranı önemli derecede yüksekti (p<0.001). En sık yaralanma alt ve üst ekstremitede görüldü. Hastane faturaları incelendiğinde ortalama hasta maliyetinin 175 $ olduğu görüldü. Tartışma: Bu çalışmada bisiklet kazalarının erkeklerde ve yaz aylarında fazla olduğu görüldü. En sık yaralanma alt ekstremitedeydi.

Anahtar Kelimeler

Acil; Bisiklet; Maliyet; Travma

Abstract

Aim: Bicycles are used for transportation, exercise and recreation. In this study we aimed to investigate the epidemiological, clinical and economic aspects of bicycle injuries. Material and Method: We included in the study who admitted to the Emergency Department with a bicycle accident between January 2008 and July 2012. Patient age and sex, accident pattern, presence of personal protective measures, injured body part, Glasgow Coma Scale (GCS) score, Revised Trauma Score (RTS), radiological findings, requested consultations, duration of hospital stay, season of injury, and average cost rates were recorded. The study population was divided into 2 age groups as 0-14 years and over 14 years. Results: A patients were 238 (81.2%) male and their mean age was 31.5±14.1 years. Fifty-five (18.8%) patients were female and their mean age was 34.5±15.9 years. Males had significantly higher rate of bicycle injury (p<0.001). The most common injuries occured to lower and upper extremities. Inspection of hospital bills revealed that median patient cost was $175. Discussion: In this study bicycle accidents were more common occured in males and during summer months. The most common injuries was in the lower extremities.

Keywords

Emergecy; Bicycle; Cost; Trauma

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Introduction

Although bicycles are two-wheeled vehicles, they cause a wide spectrum of injuries from soft tissue trauma to head trauma, leading to mortality and morbidity [1]. Increasing rates of traffic accidents and their effect of on national economy makes it necessary to make more reasearch on this subject and to take necessary measures [2]. Bicycles are used for transportation and also as a means of exercise and recreation. Riding bicycle is encouraged because its health and environmental benefits but its risk should not be overlooked [3].

In this study we aimed to investigate the epidemiological, clinical and economic aspects of bicycle injuries.

Material and Method

This study retrospectively evaluated hospital records stored in patient folders and hospital automation system (SARUS), which belonged to patients who admitted to the Emergency Department of Ankara Numune Training and Research Hospital after a bicycle accident between January 2008 and July 2012. Authors declerated comply with Helsinki decleration.

Patient age and sex, accident pattern, presence of personal protective measures, injured body part, Glasgow Coma Scale (GCS) score, Revised Trauma Score (RTS), radiological findings, requested consultations, duration of hospital stay, season of injury, and average cost rates were recorded. The study population was divided into 2 age groups as 0-14 years and over 14 years. The patients were divided into following 4 groups based on the mechanism of injury: bicycle rider, bicycle passenger, pedestrian hit by bicyle, and passenger/driver of vehicles that crashed with a bicycle.

Study data were analyzed with SPSS 19.00 (Statistical Package for Social Sciences for Windows) software package. Categorical variables were analyzed with Chi-Square test, continuous variables were analyzed with Student's t test, Mann-Whitney U test, and Kruskal Wallis test. A p value less than 0.05 was considered statistically significant.

Results

This study included 293 patients who presented to Ankara Numune Training and Research Hospital with bicycle injury between January 2008 and July 2012. Among the study patients, 238 (81.2%) were male and their mean age was 31.5±14.1 years. Fifty-five (18.8%) patients were female and their mean age was 34.5±15.9 years. The mean age of the entire study population was 32.0±14.5 years (age range 5-86 years). Males had significantly higher rate of bicycle injury ($p<0.001$); there was no significant difference between the genders with respect to mean age ($p=0.159$). Analysis by age group revealed that 18 (6.1%) patients were younger than 14 years and 275 (93.8%) patients were older than 14 years. Bicycle accidents involved an injury to the bicycle rider in 150 (51.19%) accidents, to a pedestrian in 83 (28.32%) accidents, to a driver and/or passenger of a vehicle that crashed with a bicycle in 56 (19.11%) accidents, and to a bicycle passenger in 4 (1.36%) accidents. None of the victims wore personal protective gears including a helmet, gloves, glasses, a kneepad, or protective clothing. Glascow coma scores (GCS) of the patients were between 3 and 15. Mean GCS was 12.8±3.9 (median 14). The maximum and minimum RTS were 7.8 and 0, respectively. Mean RTS was 7.1±1.7. Analysis of seasonal distribution of injuries revealed that most injuries took place during summer months (n=130) while the least number of injuries occured during winter (n=34) (Table 1). There was a significant difference with respect to seasonal distribution of injures ($p<0.05$).

Table 1. Seasonal distribution of bicycle injuries

Season	Patient Number	%	P value
Spring	63	21.5	<0.001
Summer	130	44.4	
Autumn	66	22.5	
Winter	34	11.6	

Analysis of the patients according to injured body part revealed that most injuries occured to lower and upper extremities whereas least injuries occured to abdomen (Table 2). Twenty-eight (9.55%) cases had trauma to more than one body part.

Table 2. Injured body part

Injured Body Part	n	%
Head	59	20.1
Neck	10	3.4
Upper Extremity	66	22.5
Lower Extremity	135	46.1
Thorax	28	9.6
Abdomen	5	1.7
Pelvis	27	9.2
Lumbar	6	2

Type of injuries included soft tissue trauma in 251 patients, extremity bone fracture in 42 patients, skin cut in 29 patients, cerebral contusion in 2 patients, epidural hematoma in 1 patient, hemopneumothorax in 1 patient, and lumbar vertebral fracture in 1 patient. A consultation was requested from another department in 25.3% of the study population. The most consulted department was orthopedics with 59 (79.7%) patients (Table 3).

Table 3. Requested consultations

		Number	%
Consulted Department (n=74)	Neurosurgery	6	8.1
	Orthopedics	59	79.7
	Thoracic Surgery	6	8.1
	General Surgery	1	1.4
	Plastic and Reconstructive Surgery	6	8.1
	Other	2	2.7

Two hundred and fifty-six (87,74%) patients were discharged from the emergency department after appropriate tests and treatments. Thirty-seven patients were admitted to hospital and stayed at hospital for an average length of 5.2±6.3 days. One patient who was injured as a bicycle passenger died 30 days after being hospitalized at intensive care unit for bleeding secondary to pelvic fracture.

Inspection of hospital bills revealed that median patient cost was $175, (median (min-max) $ [15-30000]).

Table 4. Cost distribution of bicycle injuries

Variable		Cost ($)	P value
		Median [Min – maks]	
Age	0-14	108 [27 – 30000]	p>0.05
	>14	183 [15 – 12500]	
Sex	Male	189 [15 – 30000]	p<0.05
	Female	125 [30 – 11000]	
Injury Pattern	Passenger/driver of vehicles that crashed with a bicycle	213 [15 – 660]	p>0.05
	Bicycle rider	166 [20 – 30000]	
	Bicycle passenger	132 [102 – 520]	
	Pedestrian hit by a bicycle	150 [40 – 12500]	

Discussion

Studies have shown that bicycle accidents occur more frequently in school-age children and males [4,5]. The reasons of higher ratio of children among victims of bicycle-related traumas include use of bicycle as a means of recreation and immaturity of perceptional ability of children. In our study 95.9% of the patients were of adult age and, consistent with the literature, 81.2% were male [3]. We think that the reasons of lower ratio of pediatric cases in our study were absence of departments of pediatrics and pediatric surgery in our hospital, and assignment of some other hospitals for pediatric trauma cases by health authorities.

Gonzalez et al reported that approximately 20% of accidents occuring in adolescence and childhood periods were bicycle accidents [3]. According to our results, only 0.29% of all traumatic injuries were bicycle injuries since, to our opinion, bicycle is not a common transportation vehicle in our province.

Studies from our country have reported that bicycle-related injuries most commonly occur during spring and summer months [1,6-8]. We also found a similar result (Table 1). We suggest that weather conditions are too harsh for bicycle riding during winter months, and milder and more favorable during spring and summer months, leading to more widespread bicycle riding and higher accident rates in spring and summer.

Puranik et al. reported that 94% of trauma patients were discharged, 0.4% referred to a tertiary center, and 3% died [6]. Of our cases, 87% were managed at and discharged from emergency department, while 0.3% died. We think that serious trauma cases were less in number in bicycle accidents because bicycles cannot reach high speeds since they are motorless.

Head traumas are prognostically important in bicycle accidents and thus special emphasis is put on them [7,8]. In United States of America an annual average of 140.000 cases of head trauma and 247 fatal cases of traumatic brain injury involve adults and children. Puranik et al. reported that head-neck and extremity injuries occured most commonly [6]. Our results were in accordance with that study (Table 2). To our opinion, head-neck and extremity regions are injured more since these are the body regions that make the first contact with ground in falls. Twenty-eight (9.55%) patients had more than one injured body part. Forty-two cases had bone fracture and 251 had soft tissue trauma.

Güzel et al. reported that victims of bicycle injuries were most commonly admitted to the department of neurosurgery followed by the department of orthopedics [2]. The fact that more traumas involved head region and musculoskeletal system explains why more consultations were obtained from the department of orthopedics. We also think that the number of cases in our study for which a neurosurgery consultation was obtained was low since our study population consisted of an adult population who tried to protect their heads during the incident and thus lowered the rate of head trauma.

A study reported that 74.5% of all deaths and 82.8% of all head traumas were avoidable with proper and regular helmet use [9]. Puranik et al. [6] reported a head trauma rate of 47% in bicycle accidents, and emphasized that only 1.4% of victims used helmets. Another study found that 43.6% of victims of bicycle accidents never used helmets, 30.7% seldom used helmets, and 25.7% always used helmets [10]. We found a head trauma rate of 20.1% in bicycle accidents and none of the victims wore a helmet. We believe that the number of head trauma cases with fatal outcomes can be reduced by generalizing helmet use.

A study from United States of America reported that the total cost of 2054 patients presenting to hospitals after bicycle accidents was 30.4 million Dollars [11]. Another study found that the cost of injuries to drink bicycle riders was higher than that of injuries to non-drink bicycle riders [12]. The median of bicycle accidents was$ 640. Considering the greater trauma severity in motor vehicle accidents, the average cost of bicycle accidents remains low compared to motor vehicle accidents. Use of helmet should be encouraged and public awareness should be raised to further reduce costs.

Conclusion

In this study bicycle accidents were more common in males and during summer months. Most injures involved lower extremities. Beginning from childhood period efforts should be focused on raising public awareness about helmet use and riding bicycles on bicycle roads.

Limitations

The limitations of this study was its retrospective nature that limites access to detailed clinical information.

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Competing interests

The authors declare that they have no competing interests.

References

1. Aşırdizer M, Yavuz MS, Zeyfeoğlu Y, Uluçay T, Dizdar MG, Aygün A. The evaluation of cases of Motorcycle/Motor-Bicycle or Bicycle accidents referred to outpatient clinic of department of forensic medicine, Celal Bayar University Medical Faculty between 2003-And 2009 years. Adli Tıp Derg 2009;23(3):17-26
2. Güzel A, Ersoy B, Doğrusoy Y, Küçükuğurluoğlu Y, Altinel T, Karasalihoğlu S. The evaluation of bicycle accidents that were admitted to a pediatric emergency department. Ulus Travma Acil Cerrahi Derg 2006;12(4):299-304.
3. Gonzalez Pacheco N, Maranon Pardillo R, Storch de Gracia Calvo P, Campos Calleja C, Mojica Munoz E, Rodriguez Saez MJ, et al. Bicycle accidents treated in emergency departments. A multicentre study. An Pediatr (Barc) 2014;80(4):242-8.
4. Thompson DC, Thompson RS, Rivara FP. Incidence of bicycle-related injuries in a defined population. Am J Public Health 1990;80(11):1388-90.
5. Cushman R, Down J, MacMillan N, Waclawik H. Bicycle-related injuries: a survey in a pediatric emergency department. CMAJ 1990;143(2):108-12.
6. Puranik S, Long J, Coffman S. Profile of pediatric bicycle injuries. South Med J 1998;91(11):1033-7.
7. Fife D, Davis J, Tate L, Wells JK, Mohan D, Williams A. Fatal injuries to bicyclists:

the experience of Dade County, Florida. J Trauma 1983;23(8):745-55.
8. Spence LJ, Dykes EH, Bohn DJ, Wesson DE. Fatal bicycle accidents in children: a plea for prevention. J Pediatr Surg 1993;28(2):214-6.
9. Sosin DM, Sacks JJ, Webb KW. Pediatric head injuries and deaths from bicycling in the United States. Pediatrics 1996;98(5):868-70.
10. Davison CM, Torunian M, Walsh P, Thompson W, McFaull S, Pickett W. Bicycle helmet use and bicycling-related injury among young Canadians: an equity analysis. Int J Equity Health doi: 10.1186/1475-9276-12-48.
11. Lopez DS, Sunjaya DB, Chan S, Dobbins S, Dicker RA. Using trauma center data to identify missed bicycle injuries and their associated costs. J Trauma Acute Care Surg 2012;73(6):1602-6.
12. Spaite DW, Criss EA, Weist DJ, Valenzuela TD, Judkins D, Meislin HW. A prospective investigation of the impact of alcohol consumption on helmet use, injury severity, medical resource utilization, and health care costs in bicycle-related trauma. J Trauma 1995;38(2):287-90.