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

Özet
Giriş: Bisikletler ulaşım, egzersiz ve eğlence için kullanılır. Bu çalışmada bisiklet yaralanmalarının epidemiyolojik, klinik ve ekonomik yönlerinin araştırılması amaçlandı. Gerçek ve Yöntem: Ocak 2008-Temmuz 2012 arasında acil servise bisiklet kazası nedeniyle başvuran hastalar çalışmaya alınmıştı.hasta yaş, cinsiyeti, kaza paterni, personel koruyucu kullanımı, yaralanmanın viyut bölümü, Glasgow Coma Scale (GCS) score, Revised Trauma Score (RTS), radyolojik bulgular, istenen konsültasyonlar, hastanede yatış süresi, yaralanma sezonu ve ortalamalı 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 yılı. 54 (18.8%) hasta kadındı ve ortalama yaşları 34.5±15.9 yıl idi. Erkeklerde bisiklet kazası oranı önemli derecede yüksekti (p<0.001). En sık yaralanma alt ve üst ekstremitelerde 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; Trauma

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 occurred 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 occurred in males and during summer months. The most common injuries was in the lower extremities.

Keywords
Emergency; Bicycle; Cost; Trauma
**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 on national economy makes it necessary to make more research 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 declared comply with Helsinki declaration.

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 bicycle, 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 (51.1%) 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. Glasgow 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 occurred during winter (n=34) (Table 1). There was a significant difference with respect to seasonal distribution of injuries (p<0.05).

<table>
<thead>
<tr>
<th>Season</th>
<th>Patient Number</th>
<th>%</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>63</td>
<td>21.5</td>
<td></td>
</tr>
<tr>
<td>Summer</td>
<td>130</td>
<td>44.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Autumn</td>
<td>66</td>
<td>22.5</td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td>34</td>
<td>11.6</td>
<td></td>
</tr>
</tbody>
</table>

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

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>
<thead>
<tr>
<th>Injured Body Part</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>59</td>
<td>20.1</td>
</tr>
<tr>
<td>Neck</td>
<td>10</td>
<td>3.4</td>
</tr>
<tr>
<td>Upper Extremity</td>
<td>66</td>
<td>22.5</td>
</tr>
<tr>
<td>Lower Extremity</td>
<td>135</td>
<td>46.1</td>
</tr>
<tr>
<td>Thorax</td>
<td>28</td>
<td>9.6</td>
</tr>
<tr>
<td>Abdomen</td>
<td>5</td>
<td>1.7</td>
</tr>
<tr>
<td>Pelvis</td>
<td>27</td>
<td>9.2</td>
</tr>
<tr>
<td>Lumbar</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

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]).
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 perceptual 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 occurring 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 the 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 were bicycle injuries since, to our opinion, bicycle is not a common transportation vehicle in our province.

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 limits access to detailed clinical information. Conflict of interest: No conflict of interest is present. The authors did not receive any financial support for the article.

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Competing interests

The authors declare that they have no competing interests.

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