



Characteristics of Road Traffic Accidents Treated in an Urban Trauma Center

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Key words: road traffic accidents, urban trauma center

Abstract

Background: Road traffic accidents are the leading cause of accidental injury and death for persons under the age of 35. The medical literature presents surprisingly little information on the general characteristics of such accidents in the urban setting.

Objectives: To characterize RTA patients arriving at an urban trauma center.

Methods: We prospectively examined the charts of all patients admitted to the Tel Aviv Sourasky Medical Center due to RTA injuries during two periods in 1995.

Results: Of the 1,560 patients examined, the male:female ratio was 1:1 and median age was 27 years (47% aged 20–30 years); 51% of the accidents took place between 8 a.m. and 4 p.m. and on working week days; automobiles comprised 47.1% of the vehicles involved, motorized two-wheel vehicles 37.1%, bicycles 3.8%, and pedestrians 12%. The Glasgow Coma Scale was 15 on arrival in 98.7% of the patients. The trunk was the most commonly injured body part (84.7%); whiplash injury to the neck was diagnosed in 343 patients (22%), and brain concussion in 183 (11.7%). Computed tomography studies were performed in 34 patients (2.2%). The vast majority of patients (1,438, 92.2%) was discharged home; 14 (0.9%) were admitted to the intensive care unit, and 2 (0.13%) died during hospitalization. The average time spent in the emergency department in the morning shift was 2.1 hours.

Conclusions: We could identify distinguishing factors of this population: equal gender distribution, peak RTA incidence in the young adult working population during working hours, automobile drivers being the most injured subgroup, a disproportionate number of motorcycle and motor scooter involvement, and a relatively extensive amount of time and resources spent treating these injuries despite their generally minor nature.

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number of RTAs and the consequent cost to the community is increasing in Israel as well [2–4]. The medical literature presents surprisingly little information on the general characteristics of such accidents and on those specific to the urban setting. Accurate data are needed for appropriate planning of the emergency trauma care system, for reviewing its utilization and optimizing its efficacy, as well as for accident prevention strategies. Most available data on the nature of RTA injuries come from police and road safety authority reports, which are not always accurate [2,3,5] and do not necessarily contain essential medical information.

The Tel Aviv Sourasky Medical Center is a 1,100-bed tertiary care, university-affiliated general municipal hospital. It contains the only trauma center for the population of Tel Aviv, a city of 400,000 permanent inhabitants and some one million daily transients. The Emergency Department treats around 130,000 adult patients every year, of whom around 12,000 (9.2%) suffered RTAs (numbers retrieved from the hospital database for the year 2002). In the present study, we prospectively gathered data directly from the records of this ED during two seasons in 1995 and sought to characterize the demographics of RTAs in our urban setting.

Materials and Methods

In 1995 there were 106,080 visits, of which 10,761 were for RTA. We examined the charts of all patients admitted to the ED due to RTA injuries during the periods 1 March to 30 April (spring) and 15 July to 15 September 1995 (summer-autumn). The retrieved data included: age, gender, day and time of arrival to the ED, vehicular category, Glasgow coma score, site of injury, whether a whiplash injury had been diagnosed, prescribed length of rest, loss of consciousness and amnesia, performance of computerized tomography, hospitalization, surgery, and presence of fractures.

Statistical analyses were performed using one-way analysis of variance, the chi-square test and Student's *t*-test as appropriate. A *P* value less than 0.05 was considered significant. All variables were processed and analyzed using the SPSS statistical program version

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Road traffic accidents are the most frequent cause of accidental injury in both men and women and the leading cause of death for persons under the age of 35 [1]. As in other western countries, the

RTA = road traffic accidents

ED = emergency department

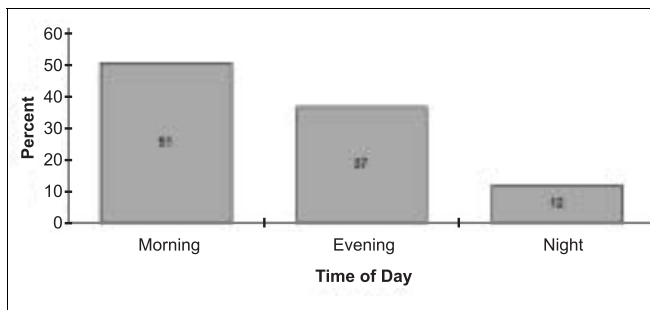


Figure 1. Distribution of road accidents according to time of day

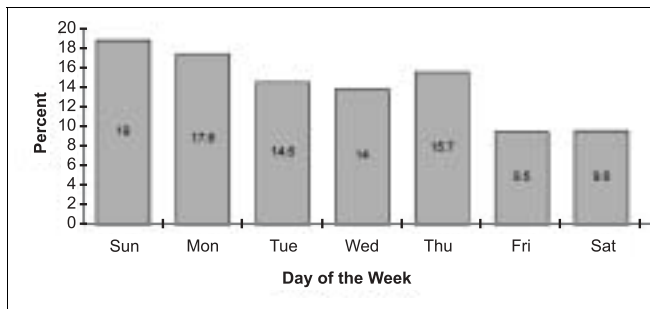


Figure 2. Distribution of road accidents according to the day of the week

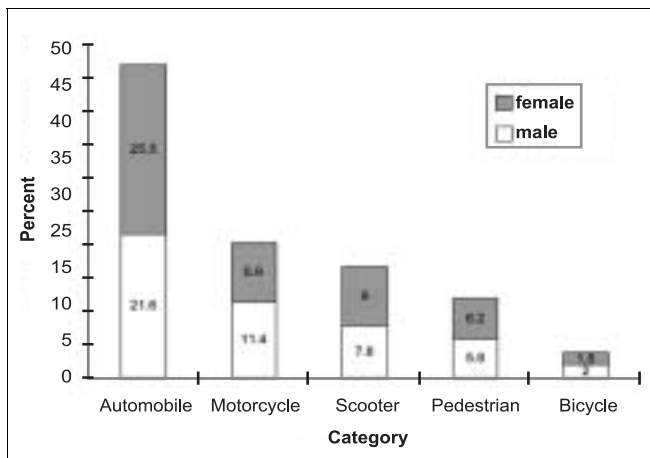


Figure 3. Distribution of road accidents according to gender and vehicle category

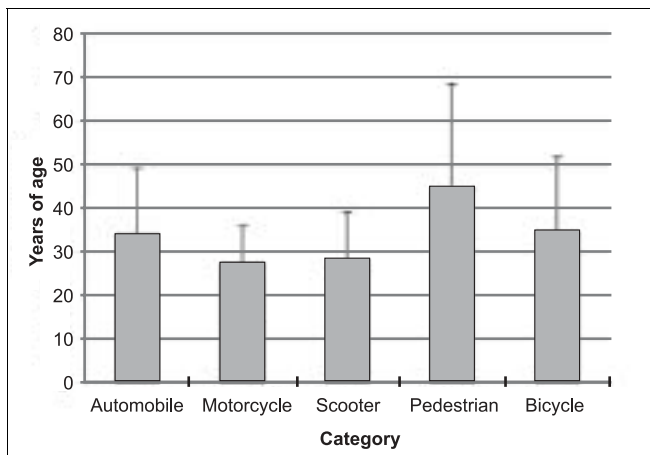


Figure 4. Age distribution of road accidents according to vehicle category

10 (SPSS Inc., Chicago, USA). Tables and graphs were prepared using Microsoft Excel version 5.

Results

The charts of 1,560 patients were examined. There was a similar gender distribution (51% females, 49% males). The median age for the study cohort was 27 years (mean 32.1 ± 15.4 , range 2–95 years), and 47% of the patients were in the 20 to 30 year age group.

Figure 1 shows the distribution of road accidents according to the time of day. Most of the accidents took place during the morning and early afternoon (8 a.m. to 4 p.m., 51%) while only 12% occurred after midnight (12 p.m. to 8 a.m.). The mean age of the victims was 34.2 ± 16.1 years for accidents that occurred between 8 a.m. and 4 p.m. and 27.5 ± 11.3 years for accidents that occurred between 12 p.m. and 8 a.m. ($P < 0.001$).

Figure 2 displays the distribution of accidents according to the day of the week. A relatively small proportion of accidents took place on weekends (Friday and Saturday in Israel), while the highest proportion occurred on Sundays (19%). The difference between weekdays and the weekends was seen for the daytime, with virtually similar proportions at nights.

The distribution of the type of vehicle involved was automobiles 47.1% (25.5% of females, 21.6% of males), motorized two-wheel vehicles 37.1% (motorcycles, motor scooters, etc., 17.9% females and males 19.2%), and 3.8% bicycles (1.8% females, 1.2% males), while 12% of the victims were pedestrians (6.2% females, 5.8% males). The gender differences within each group did not reach statistical significance [Figure 3]. The victims involved in automobile accidents were automobile drivers (70.9%) and passengers (29.1%). The relative proportions of the different vehicular categories remained constant throughout the day. Pedestrians were significantly older than the other victims ($P < 0.0001$) [Figure 4].

The majority of injuries were minor in degree. The Glasgow coma scale was 15 on arrival in 98.7% of the patients. The trunk was the most commonly injured body part (1,170 patients, 84.7%), and automobile accidents were responsible for 38.7% of all trunk injuries ($P = 0.01$). Thirty-one patients (2%) had an isolated head injury, and 206 (13.2%) had combined head and trunk injury. Whiplash injury to the neck was diagnosed in 343 (22%) of the patients; this diagnosis did not correlate with injury to another body part. Brain concussion was diagnosed in 183 patients (11.7%); it was based on the presence of anterograde amnesia (2.8%) or brief loss of consciousness (4.2%), or both (4.7%). Head CT studies were performed in 34 patients (2.2%), chest CT in 9 (0.6%) and abdominal CT in 20 (1.3%).

The vast majority of patients was discharged home from the ED (1,438, 92.2%). Of these, 938 (60%) were judged to be well enough not to require any recommendation for time off from work, and 491 (31.5%) were judged to require 3 or more days of rest. Fourteen patients (0.9%) were admitted to the Intensive Care Unit. Two patients (0.13%) died during their hospital stay; each had a Glasgow coma scale of 6 upon arrival. Only 36 patients (2.3%) underwent surgical interventions of which 89% were orthopedic. Eighty-one patients (5.2%) suffered bone fractures.

The average time spent in the ED for the RTA patients who were eventually discharged was 2.1 hours for the morning shift, 3 hours for the evening shift and 1.8 hours for the night shift. A fixed fee of 500 shekels (US\$161 at the 1995 rate of exchange) was paid at the time of the study by the insurance companies for the ED treatment. Total direct RTA emergency department visit costs for the year were then 5,918,550 shekels (US\$1,909,000).

Discussion

The present study describes the demographics of RTA victims treated at a large urban trauma center. The conditions are representative of a bustling and crowded urban environment and do not necessarily reflect other settings.

Most of the RTA injuries involved the working population within the city limits. Most accidents occurred during working hours on working days, an observation that was also made in an RTA analysis of Riyadh city in Saudi Arabia [10]. Irregular shifts, overweight, and smoking while driving were previously suggested as possible reasons for this finding [11]. When inter-urban accidents are accounted for, on the other hand, a relatively higher RTA rate is reported for the weekends [9,12]. We found no gender difference, unlike other studies on the inter-urban scene that reported a usual male predominance [3,6–9]. This may be explained by the fact that women make up an increasing percentage of the national workforce. Weather is known to influence RTA incidence [10,12]; we chose to record the data for two periods of the year (spring and summer-autumn) when the weather in Israel is relatively stable and there is no rain and few heat waves. The mean age of our RTA victims was 34 years, which is comparable to statistics reported in other cities, specifically Riyadh [10], Honolulu city [12] and a Swedish municipality [5]. RTA injuries at night involved younger patients and did not show daily fluctuations.

Automobile drivers sustained the majority of RTA injuries. Motorcycle and motor scooter accidents constituted nearly 40% of injuries, while bicycle and pedestrian injury rates were relatively few. These results can be expected in a city like Tel Aviv, where most people come to work from outside the city and usually drive their own car; motorcycles are a very popular means of transportation, and there are relatively few bicycle routes. In Tel Aviv, the proportion of two-wheel motorized vehicles is 18,000/236,000 or 7.6% (2002 data from the municipality of Tel Aviv Transportation Authority). A recent report from the Israeli National Trauma Registry, which includes only hospitalized patients [3], showed different results, reflecting the greater severity of injury that justified hospitalization. In that report, 43% of the patients were injured in car accidents (22.5% as drivers, 20.8% as passengers); cyclists comprised 23% of patients (11% motorcycle or motor scooter, 12% bicycle), and 27.1% was accounted for by pedestrians. The report surveyed eight trauma centers in the country, but it must be noted that, by definition, it only included more severely injured casualties admitted to these centers. In a study carried out in a Swedish municipality, the most accident-prone group included cyclists and pedestrians [5]. An important difference between the Swedish study and ours is that their data came directly from surveying the general

population and included minor injuries that did not arrive at EDs. Motorcycle-related injury rate is higher in the inter-urban scene [2,6]. The age distribution among the different RTA categories (i.e., pedestrians tended to be older, motorcyclists tended to be younger) was as expected.

A distinguishing aspect of urban RTA injuries is their minor degree of severity. The vast majority of patients was discharged home from the ED (92.2%) and 60% of patients were judged to be well enough not to require any recommendation for time off from work. This observation was reported in other studies as well [8]. The Glasgow coma score was 15 upon arrival in the vast majority (98.7%) of our patients. This is in accordance with the recent validation of the Glasgow coma score as the only pre-hospital parameter clinically differentiating between those patients admitted (13 ± 4) and those discharged (15 ± 0.5) from the ED [13]. In another study, the likelihood of death following hospitalization was 0% among patients who arrived to the ED with a Glasgow coma score >8 [14]. In our study, the two patients who died each had a Glasgow coma score of 6 upon arrival.

Despite the minor degree of urban RTA injuries, the time spent in the ED was relatively long (up to 3 hours). Mohanty et al. [15] suggested that this could be attributed to the inefficient use of CT scans for the evaluation of minor head injuries [15]. In our ED, however, only a small number of patients underwent CT scans (2.2%). Moreover, most patients did not suffer from head injury, and only 22% of patients were diagnosed as suffering from whiplash injury. Thus, the availability of medical staff and routine imaging studies (e.g., the night shift) were probably the most influential parameters. It is possible that designated minor trauma units will be more cost-effective. However, it must be emphasized that every victim undergoes a thorough evaluation prior to being declared "lightly" injured. Such an evaluation is efficiently performed in the setting of the general hospital emergency department, with available radiology, CT, neurosurgery, etc.

The most common site of urban RTA injuries was the trunk, and these injuries were mostly sustained by automobile drivers and passengers. This finding was also seen in a Swedish municipality [5], where automobile drivers were injured mainly in the chest, back and pelvis. In that study, however, pedestrians and cyclists were responsible for most RTA injuries seen at the ED, which would explain why injuries to the extremities occurred in 68% of their RTA cases.

We had a very low number of severely injured patients (0.9%), and only two patients died during their hospital stay. The low mortality figure is in agreement with previously published Israeli data [3].

Conclusions

We have described RTA demographics of patients arriving at an urban trauma center. While this report is essentially descriptive, we could delineate distinguishing factors of this population: equal gender distribution, peak RTA incidence in the young adult working population during working hours, automobile drivers being the most injured subgroup, a disproportionate number of motorcycle and motor scooter involvement, and a relatively extensive amount

of time and resources spent treating these injuries in the ED despite their generally minor nature. This information may provide a basis for comparison to other centers, as well as for the implementation of public policies aiming at reducing RTAs and medical costs.

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Capsule

Estrogen receptors act in atherosclerosis

Men experience a more rapid progression of atherosclerosis, but the basis for this gender difference has not been clear. The prostacyclin PGI₂ prevents many processes associated with the formation of atherosclerotic lesions, and the atheroprotective effect of estrogen in women may be via stimulation of PGI₂ production. Egan and collaborators demonstrated in a mouse model of atherosclerosis that estrogen acts through the estrogen receptor subtype to generate PGI₂ through cyclooxygenase 2

(COX-2). Female mice lacking a receptor for PGI₂ developed atherosclerosis as rapidly as male mice and had a poor response to estrogen therapy. This mechanism may be important in assessing the effects of hormone replacement therapy and selective COX-2 inhibitors.

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E. Israeli

Capsule

How antibiotics can make us sick

Stephanie J. Dancer addressed the problem of antibiotics overuse. Antimicrobial agents are associated with side effects, which are usually tolerated because the benefits of treatment outweigh the toxic effects. Clinicians know about these side effects but are less likely to understand additional adverse events, such as the overgrowth of resistant microorganisms. Overgrowth can itself precipitate a secondary infection that can be more difficult to treat. Resistant organisms then spread to other patients and the environment and contribute to increasing antimicrobial resistance worldwide. Organisms exposed to antibiotics undergo molecular changes that might enhance

virulence. Enhanced pathogenicity would affect patients, particularly if the organism is also multiply resistant. Clinicians have a responsibility to select the correct antibiotic as soon as they have diagnosed infection, but an absence of microbiologic understanding and ignorance of the potential environmental effects have contributed to inappropriate prescribing. The less obvious results of antimicrobial consumption probably go unrecognized in routine clinical care.

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