

The rate of hand-held mobile phone use while driving in Kerman, Iran

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Abstract: *Background:* The use of mobile phones during driving is a known road accident risk factor. However, little research has been done in Iran to determine the actual rates of mobile phone use while driving. In the current study we try to estimate the rate in one major Iranian city. *Methods:* This cross sectional study was done in the fall of 2010. In nine streets in Kerman including three central city streets, three suburban main streets and three highways sites, both in the morning and afternoon, on two separate days; data was collected. In this study, all drivers passing from one side of the street were observed in terms of mobile phone use while driving; and gender, age range, type of the streets and hours were recorded. *Results:* Among the 30,733 drivers who were screened, 1118 cases (3.63%) used a mobile phone. There was no significant difference between men (3.67%) and women (3.16%) mobile phone usage ($p=0.25$). However there was a significant difference between use in youth ages (4.85%), middle ages (3.56%) and the elderly (1.92%) ($p<0.001$). In the main downtown streets 3.34%, suburban main streets 2.18% and the ring road 4.79% of drivers used mobile phones. Mobile phone use was significantly higher in the central city streets and the ring road ($p<0.001$). *Conclusion:* Comparing this study with similar statistics from other countries shows that the rate of mobile phone use in Kerman car drivers (as an example of the situation in Iran) is higher than some other countries. Tougher laws and more intense public education should be imposed to decrease the use of mobile phones among drivers.

Keywords: mobile phone, car driving, Kerman

Introduction

The major share of all injuries global wide is related to road traffic injuries. Road injuries kill 1,200,000 people each year and around 50 million are injured or disabled [1]. It is estimated that the global cost of road traffic crashes in the developing countries alone are 100 billion US dollars. Road traffic crashes are among the ten leading causes of DALYs in the global burden of disease [1]. In 1998 road traffic crashes were in the 9th position of DALY but it is predicted they will be in the 3rd position by 2020 [1]. The Eastern Mediterranean Region has one of the world's highest traffic fatality rates and from the year 2000 to 2020 it is predicted to rise 68%. In this region, in 2002 the mortality rate of injury was 2 times the rest of the world [1]. In Iran the factor causing the highest DALY rates in all ages and both sexes is injuries; which was 28% of the total DALY in 2003[2]. Several references have regarded using mobile phones or hand frees

during driving as a major road accident risk factor [3-4]. Nowadays, mobile phones are inseparable from our daily activities. Seems like individuals who travel frequently or have certain jobs and need to be contacted anywhere and at any time would be more prone to use their mobile phone while driving due to professional constraints [5].

Using mobile phones during driving can distract the driver's attention, decrease the driver's acuity and concentration, decrease the driver's skill and proper task execution, increase number of judgmental mistakes, lead to poor driving performance and prolong reaction time, cause variability of lane position and speed, and thus increase the rate of accidents [3-7]. Study shows a person using a mobile phone when driving is four times more likely to have a crash that will result in hospital attendance [4, 7]. There is also some evidence suggesting that drivers who use a

phone while driving are more prone to risk-taking behaviors, including speeding, driving after drinking alcohol and lack of seat belt use [7]. In other studies, drivers who were prone to accidents showed a higher self-reported accident rate resulting from mobile phone use. Also aggressive drivers were found to use mobile phones more frequently during driving [3]. In a study in Qatar, there was a 73.2% rate of mobile phone use among drivers who crashed [6]. In a study in Perth, Australia, 72% of participating drivers who were involved in a crash before, reported using a phone in the past while driving [4]. The world figures of mobile use shows increase in many countries. Eby et al's study found that driver hand-held cellular phone use has more than doubled between 2001 and 2005 in Michigan State and changed from 2.7% to 5.8% [8]. This change represents an average increase of 0.78 percent per year [8]. Due to safety issues and risk of a potential crash, use of hand held phones is illegal in most countries in the European Union (such as France [5], Australia, the Canadian province of Newfoundland and Labrador, and New York, New Jersey, and the District of Columbia in the United States [4,8], and Qatar [6] and Iran in the middle east.

In Iran after the drop in sim card prices, the use of mobile phones increased dramatically. The recent statistics show that about 37 million sim cards have been sold in Iran [9]. In 2004 more than 3,400,000 Iranians owned a mobile phone line. This is a more than 3 fold increase in comparison to 2000 when only 960,000 owned a line [10]. Although using mobile phones is an important road accident risk factor and its use is increasing and many developed countries have various statistics about its use during driving, but no such information has been published from any Iranian city. Thus, we intended to conduct a cross sectional study based on the methods performed by Taylor et al [11] in Kerman, Iran. This is to our knowledge the first study about the rate of mobile phone use during driving in Iran. Kerman is a major city in the south east of Iran and the capital of the province. The population of Kerman according to the 1385 census is 596,976 [12] and there are about 199,000 permanent mobile phone lines and about 524,000 credit lines registered currently in Kerman. Many people in Kerman own more than one line.

Material and Methods

This study was a cross sectional observation study conducted in autumn 2010 in Kerman, Iran. The population under observation was all of the car drivers. Big and small trucks, vans, buses, minibuses and motorcycles were excluded. The roads of Kerman were divided into 3 groups. The main city streets, the main suburban streets and the highway (ring road). Three representative observation sites were chosen from each road type (a total of 9 sites). One day in the middle of the week (Tuesdays) was chosen for data collection. A day in the middle of the week was chosen to avoid the probable busy streets during the beginning and end of the weekdays. Weekends were avoided because the streets were too empty and did not represent a working day where people use their mobiles for business and job related tasks. Also, we did not aim to compare differences in mobile use between the days of the week, thus we did not choose various days.

Two observers (the first and second author) stood beside the road and between two intersections, where they had a good view of the drivers passing by. The intersections themselves were not chosen as sampling points because of the more likely presence of police traffic control officers which could change the driver's behavior. Observers were instructed to observe vehicles in only the lanes on the same side of the road and a single direction of traffic flow. This was due to concerns about proper concentration, limited visibility and density of traffic flow. Hand free use was not included, as it was sometimes difficult to distinguish. The drivers who were clearly using their phone while driving were recorded. One observer would count quickly and announce, the other would write the numbers. Observers recorded the total number of vehicles and the number of drivers using a hand held mobile. For drivers who were using a mobile phone the gender and approximate age group (young [less than 30 years], middle age [30–50 years] and seniors [more than 50 years]) would also be recorded. A similar method for age estimation was used in other studies [11]. Observers practiced a few pilots before starting.

Distinguishing male and females was easy because of the hejab (head cover) that women use in Iran, however similar to other studies [11,13] age was recorded based on the observers judgment and there could have been biases in guessing the age. The observations were done in two separate times, one in the morning (8:30 am to 9:30 am) and the other in the afternoon (3:30 pm to 4:30 pm) and on two separate days for each site. The time was chosen because the sampling was done during autumn and winter when the days were short and observation had to be done during day light to have a clear view of the driver. The morning hours were chosen at a time when the peak morning traffic had passed and it was easier and with less bias for counting the cars. The afternoon observation was done at 3:30 to 4:30 after mid day rest when people exit their homes for shopping or afternoon jobs and the traffic rises again. We tried to select hours in which the roads were neither too busy to make counting difficult nor too empty to take a long

time to count. The sample size was calculated during a pilot. Assuming that the prevalence was 0.02% and the error was 0.002, a sample size of 18,823 was needed. For more accuracy and because it was easy, possible and affordable, we counted more than 30,000 cars. The statistical analysis was done with SPSS 16, the prevalence and their confidence interval were determined; also the subgroups were compared by using X² statistics. No driver was approached and no identifying data was recorded in our study. Our observers stood in public places and were just watching people and collected unidentifiable data.

Results

After more than 36 hours observation 30773 drivers were screened, in which a total of 1118 people or 3.63% (95% CI 3.43-3.83) were using their mobile phones while driving. Results were also calculated based on gender, age group, time and type of road (Table 1).

Table-1: The prevalence of Mobile Phone use among different groups, in Kerman, Iran			
	The number of drivers using mobile phones during driving	The total number of cars screened	The percent of mobile phone use during driving (95% CI)
<u>Gender</u>			
Male	1051	28655	3.67 (3.45-3.90)
Female	67	2118	3.16 (2.50-4.00)
<u>Age</u>			
<30 years	302	6228	4.85 * (3.45-3.90)
30-50 years	746	20904	3.56 * (3.32-3.83)
>50 years	70	3641	1.92 (1.50-2.42)
<u>Road types</u>			
The city central streets	496	14834	3.34 * (3.06-3.65)
The suburban streets	119	5446	2.18 (1.81 – 2.61)
The ring road	503	10493	4.79 * (4.39- 5.22)
<u>Observation time</u>			
Morning	680	17523	3.88 * (3.61-4.18)
Afternoon	438	13250	3.30 (3.00-3.62)
Total	1118	30773	3.63 (3.43-3.83)
* significant , p less than 0.05			

The rate of mobile phone use during driving in men was 3.67% (95% CI 3.45-3.90) and in women was 3.16% (95% CI 2.50-4.00). The difference of mobile phone use between men and

women was not significant (p=0.25). The rate of mobile phone use during driving was 4.85 (95%CI 3.45-3.90) in young adults, 3.56% (95% CI 3.32-3.83) in middle age adults and

1.92% (95% CI 1.50-2.42) in seniors. The rate of mobile use in young adults was significantly higher than the two other groups, and the use in middle age adults was significantly higher than seniors ($p < 0.001$). In a comparison made between different road types, the rate of mobile phone use in the city central streets was 3.34% (95% CI 3.06-3.65), in the suburban streets was 2.18% (95% CI 1.81 – 2.61) and in the ring road was at a high rate of 4.79% (95% CI 4.39- 5.22). The rate of mobile phone use was significantly higher in the ring road in comparison to all other sites and was significantly higher in the central city streets in comparison to the suburban streets ($p < 0.001$). Comparing the different observation times in the morning and afternoon showed that the use of mobile phones during driving in the morning was 3.88% (95% CI 3.61-4.18) and in the afternoon was 3.30% (95% CI 3.00-3.62). The use of mobile phones was significantly higher in the morning in comparison to the afternoon ($p=0.007$).

Discussion

This study aimed to estimate the rate of mobile phone use while driving which is a risk factor for car crashes; in one Iranian city, Kerman. The use of mobile phones while driving is a growing traffic safety concern. It can distract a person from the initial task of driving [14]. Reports have shown some of the main road events involved with mobile phone related crashes are inattention to the traffic, striking another vehicle, failure to give way, failure to stop, running off the road, hitting the curb and hitting a pedestrian [13]. The magnitude of the potential risk posed by mobile phone use during driving is moderated by the amount of exposure to this risk, that is, how frequently cellular phones are used during driving [14]. In this study the average rate of using mobile phones at one site of the city and at a given time during the day was 3.63% in Kerman. This rate was reported to be 2% [11], 1.6% [15] and 1.5% [13] in similar Australian studies and 5.8% in similar American studies performed in Michigan [8] and 4.2 to 4.7 percent in Minnesota [14] by using similar methodology. Other direct observation studies of mobile phone use in several American states and the UK have shown that a percentage of about 5% or less of the drivers engage in hand-held phone conversations at a given time [8]. According to our results, the situation in Kerman as a representative of Iran is

better than the U.S and worse than Australia. Some studies have shown that mobile phone use is more frequently associated with a lack of safety belt use and traffic violations, which is probably due to the fact that these people tend to engage in risky driving behaviors more often than nonusers [6,14].

The site with the maximum recorded rate of mobile phone use in our study was the ring road with 4.79%, followed by the central city streets and then suburban streets. The reason for high rates in the ring road may be the less presence of police officers in the ring road. Also the fact that there are fewer obstacles (such as pedestrian crossing and traffic lights) in the highway and drivers feel safer to use their phones may also be contributory. Brusque et al commented that in their study by moving from a sparsely to a densely populated municipality, the percentage of mobile phone users increased [5]. Similar to this finding in our study mobile use was higher in the busy central city district than the suburban streets. Also, in Taylor's studies, mobile use was most common in the central business district of Melbourne, followed by metropolitan and freeway sites [11,15]. In our study the rate of mobile use in the morning was 3.88% that was significantly higher than the afternoon. This phenomenon is probably the effect of business hours. In Iran, governmental business hours start from 8am and often end at 2 pm. In Brusque et al's study specific business related jobs such as "Senior executive, Professional" and "Middle executive, Technician" and "Student or in search of a first job" used their phones more than the others during driving [5], confirming that many drivers use their phones for business related issues and more often in business hours. In Taylor's study, in 2002, there was significantly greater mobile use in the evening [11], but in 2006, the evening rate was significantly lower than the morning rate [15]. Taylor et al also suggested that the higher morning rate in their 2006 study may have been the result of a change in the nature of the calls being made; for example, more business calls in the morning.

Men more frequently (but not significantly) used mobile phones than women in our study.

In trauma epidemiology, gender has consistently been found to be related to drivers' accident risk, with males having more accidents than females [3,16]. Similar to our study, in a Taiwan study the frequency of mobile phone use by males was significantly higher than that by females. A French study also showed strong a difference between males (40.2%) and females (22.7%) in using the phone while driving [5]. In an Australian study, the rate of hand held phone use for men in 2006 was significantly higher than for women [15]. And in the study from Qatar, males were 73.6% of drivers who used mobile phones while driving [6]. Young adults (less than 30 years) used mobile phones more than the other age groups in our study. The tendency of young and inexperienced drivers to use a phone while driving is a major safety issue; especially for young males, who already have a high risk of causing accidents [5]. In the Perth study most of the drivers who used mobile phones during driving were male and comparatively younger than 40 years [13]. Brusque et al found that in the male population, age is the main explanatory factor of using the phone while driving. Male drivers of less than 35 years of age were much more likely to use their phones than others [5]. In the French study, the level of mobile phone use decreased monotonically as the age of the respondent increased. In their study, among the population of drivers who were also mobile phone users, the group of 25-34 year olds stood out from the rest; this group reported both driving and mobile phoning six times more often than the oldest group (older than 59 years old) [5]. In Australian studies, significantly fewer older drivers used mobiles compared with both middle aged drivers and younger drivers [11,15]. In the Qatar study the highest percentage of mobile phone use was in the under 24 age group [6], although in the Taiwan study no significant results were found for age [3]. Our study had some limitations; one of them was the fact that determining age groups was based on estimation. In this study similar to other studies [11,13,15], the observers had to guess the age range of the drivers. In the pilots, observers noticed slight differences in age estimation between observers especially about women's age.

The other limitation of our study was not counting hand free mobile phone usage. Other authors did not include hand frees in their studies

either [8,11,15]. However, studies show using hands-free phones is not any safer than hand held phones [4]. Glassbrenner estimated that an additional 3% of drivers use hands-free devices while driving [8]. Our study did not have the limitation of self report such as Brusque and Chen's studies [3,5]. Self reports studies can be an unrealistic estimate, especially when using phones during driving is illegal. The patterns of mobile phone use while driving have mainly been studied by two approaches; roadside observations of traffic, and driver questionnaires and surveys [5]. Roadside counting can provide more real estimates of the proportion of drivers actually using their phones while driving. This study was to our knowledge the first mobile phone during driving study done in Iran. We did not find similar studies from any other city in Iran or other regional countries to compare with. Considering the increasing rate of mobile phone users in Iran and other countries and the dangers of using mobile phones during driving we suggest more studies about this topic should be conducted in the region. Due to lack of research, we have no idea which cities in Iran may have more or less use of mobile phones during driving and which maybe the most vulnerable groups or populations to enforce more educational interventions or more strict police law enforcement.

In order to decrease its use while driving, many suggest that an overall prohibition in mobile phone use (hand free and hand held) while driving is needed to reduce the corresponding number of traffic accidents [3]. However, the laws on mobile use during driving have been controversial and difficult to enforce. Also hands-free phone use, which has been shown to be equally distracting and also elevates crash risk, is usually exempted [8]. In Iran fines apply to people who use hand held mobile phones while driving. The current fine in Iran is 70000 rials equal to about 7 US dollars, which is low and affordable for many people. Many believe the fines need to be increased. In another country of the region, Qatar, The Road and Traffic Department has also banned the use of handheld mobile phones and a much higher fine of 375 Qatar Rials (equivalent to 100 US

dollars) is charged if drivers are caught using a phone while driving [6]. We do recommend that police and traffic control officers and cameras should screen drivers more frequently and efficiently for mobile use. Increasing plain-clothes police to identify offending drivers should also be pursued. Intense education through media and public enforcement campaigns can also have positive effects on decreasing mobile use [4]. The general public should learn to hang up and make their call again later if they discover that the responding person is driving [5]. Technological solutions are currently developing such as telephone answering systems that warn users the person they are calling is driving, technology that filters or delays calls [5] or changes in mobile phones so they cannot be used when vehicles are in motion [4]. Fortunately the Iranian government was able to provide cars with reduced prices in high numbers for people and has also made intense efforts to low the cost of mobiles phones and make it a product used by a wide range of

socioeconomic levels. These privileges if not used wisely can be dangerous. The effect that the simultaneous increase in cellular phone subscriptions and car owners will have on driver safety in Iran which already is paying high prices for road accident mortality is worrisome. With increasing world trends, phone use while driving will continue to be an important traffic safety issue, and this highlights the importance of continued effort to generate new ways of alleviating this potential road accident risk factor [8] especially in developing countries where road accidents already impose heavy psychological and financial burdens.

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