

Evaluation of the impact of the month of Ramadan on traffic accidents

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Abstract

Background: In the Muslim society, long periods of hunger in the month of Ramadan affect physiological and psychological performance of fasting practitioners. Most of the traffic accidents are due to human factors.

Objective: To investigate the effects of the month of Ramadan on traffic accidents.

Materials and Methods: The study was carried out based on the traffic accident reports in a period of 1 year using the Turkish Statistical Institute data. In accordance with this report, the data were analyzed with respect to Ramadan and non-Ramadan months.

Result: In 2011, total of 3,835 persons were found dead and 238,074 injured in 312,878 traffic accidents. Total number of traffic accidents in Ramadan month was found to be 28,447 and that during non-Ramadan month's average was 25,857 ($p < 0.001$). Statistical analysis of the number of traffic accidents within the 12 months of 2011, when used χ^2 -test for goodness of fit, showed that the observed number of accidents was significantly higher ($p < 0.001$) than the expected number in June, July, August (Ramadan), and September. Death rate in Ramadan was found to be 1.5% and that in non-Ramadan months was 1.2% ($p = 0.001$).

Conclusion: The average number of traffic accidents was slightly higher in Ramadan than in non-Ramadan months. Also traffic accidents involving death and injury were slightly high and traffic accidents involving material damage was less. Total number of dead and injured persons was also found to be slightly high. Also, as expected, penalties due to drunk driving were found less in Ramadan.


KEY WORDS: Ramadan, traffic accident, traffic penalty

Introduction

Traffic accident can be described as an event that results in death, injury, and material loss due to the crash of one or more vehicles moving on roads. Traffic accidents are one of the most pressing international health and development

concerns in the world. The main cause of traffic accidents may be human factors and individual performance. The highway traffic law is issued in order to maintain traffic order with respect to security of life and property in highways and to specify the precautions to be taken for all aspects of traffic safety.^[1]

Ramadan is the ninth month of the lunar calendar and lasts 30 days. The dates of Ramadan show variation because of the moving backward approximately 10 days each year depending on the moon. In 2011, Ramadan occurred between August 1 and August 30. Approximately one billion Muslims around the world are fasting and they refrain from eating, drinking, smoking, and sex between sunrise and sunset. Depending on the season, duration of fasting may change from 13 to 18 hours. Although, Ramadan fasting is one of

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the five pillars of Islam, unhealthy and weak individuals are not allowed to fast. Effect on daily diet intake and metabolism was known of Ramadan might affect both cognitive and physical functions. For most people, if hunger occurs at night 8–10 hours is acceptable as normal.^[2] Biochemical and physiological parameters, sleep pattern, and eating habits of the fasting person change in the month of Ramadan. Some chronobiological studies showed that Ramadan fasting affects circadian distribution related to body temperature, cortisol, melatonin, and glucose. Night sleep, day alertness, and psychomotor performance decrease.^[3,4] People under medical treatment do not use their drugs regularly to be able to fast. Existing chronic diseases of fasting people are affected in Ramadan. Topacoglu *et al.*^[5] observed that the number of cases presented to the emergency department for diabetes, hypertension, and uncomplicated headache-related complaints increases during Ramadan. Ramadan affects an important portion of the world population and there are many studies related to its impacts on health. But there are fewer studies on its effects on forensic cases and traffic accidents. The aim of this study was to investigate the effect of the month of Ramadan on traffic accidents.

Materials and Methods

This study was conducted by evaluation of the data published by the Turkish Statistical Institute (TurkStat) reporting on traffic accidents in Turkey between January 1 and December 31, 2011. Ramadan is the ninth month of the lunar calendar. When it is adapted according to the Gregorian calendar, every year Ramadan comes 10 days earlier. Due to the Ramadan in 2011 was started at August 1th and it was ended at August 30th, only 2011 statistical data was chosen and we can comment all 2011 August data's as Ramadan.

According to the TurkStat reports, the accidents were classified as urban and rural depending on where it was occurred. In this study, these two data were analyzed together. All traffic accidents were classified by month and analyzed in three subgroups as accident number according to damage, injury, and death. Also, all accidents with regard to total number of dead or injured persons were analyzed into two subgroups. Statistical analysis especially death ratio was performed separately with total accident groups and total injury groups. All of the traffic accidents data were analyzed separately by month and according to the Ramadan (August)/non-Ramadan months, before and after the Ramadan subgroups. The penalties for drunk driving were provided from the "T.R. Security General Directorate Department of Traffic Services." The penalties for drunk driving were classified by month and analyzed in subgroups, Ramadan and non-Ramadan months.

Statistical analysis was carried out using Microsoft Excel 2010 program with 95% confidence intervals (CIs) and *p*-value <0.05 was considered statistically significant. All subgroups' data were presented as total number and percentage. Also histogram was performed. χ^2 -Test was used in the statistical analysis of categorical data and odds ratio was calculated.

Results

According to the TurkStat reports total number of the traffic accidents involving death or injury in 2011 was reported as 131,846. Monthly distribution of the traffic accidents in 2011 was showed that the highest number of traffic accidents was in July (30,935) and the lowest number of traffic accidents was in February (20,548). The average number of traffic accidents was found to be 26,073 within 12 months. The number of traffic accidents in the month of Ramadan (August) was reported as 28,447; and when evaluated in terms of total number of traffic accidents, September was second (29,425) and Ramadan (August) was third. In addition, when we examined the monthly distribution of the traffic accidents with regard to death and injury, we found that the highest number was in July. The total number of dead persons was reported as 3,845 and 430 (11.2%) in the month of Ramadan, whereas the total number of injured persons was reported as 238,074 and 24,523 (10.3%) in the month of Ramadan. According to the T.R. Security General Directorate Department of Traffic Services reports in 2011, total numbers of driving license suspension penalties due to drunk driving were reported as 108,211. Monthly distribution of these penalties was showed that the highest number was found in October as 10,436 and the lowest number was in August (Ramadan) as 3,631. Table 1 shows the monthly distribution of traffic accidents in 2011 by properties (involving in death and injury), total numbers of traffic accidents, death persons, injured persons, and monthly distribution of the numbers of driving license suspension penalties due to drunk driving.

Analysis of the Accidents in Ramadan

In non-Ramadan period total number of the traffic accidents was found to be 284,431 and monthly average of traffic accidents was found to be 25,857 (8.3%). The number of traffic accidents in the month of Ramadan (August) was reported as 28,447 (9.1%) and it was slightly higher than the other months' average (χ^2 , *p* < 0.001, OR: 1.11, 95% CI: 1.09–1.13). Also, statistical analysis of the number of traffic accidents within 12 months of 2011, when used the chi-square test for goodness of fit, showed that the observed number of accidents was significantly higher (*p* < 0.001) than the expected number during summer holiday months in Turkey, which were June (8.8%), July (9.9%), August (9.1%), and September (9.4%).

When Ramadan and non-Ramadan months were compared with statistically by subgroups, traffic accidents involving death and injury were found slightly higher in Ramadan and material damage was found less. In Ramadan month 339 (1.2%) and in non-Ramadan months 2735 (1.0%) traffic accidents were involving death (χ^2 , *p* < 0.001; OR: 1.24, 95% CI: 1.11–1.39); whereas, 12,838 (45.1%) traffic accidents were involving injury in Ramadan month and 115,913 (40.8%) were in non-Ramadan months (χ^2 , *p* < 0.001; OR: 1.20, 95% CI: 1.17–1.23). About involving material damage, 15,270 (53.7%) traffic accidents were in Ramadan month and 164,762 (57.9%) were

Table 1: Monthly distribution of 2011 traffic accidents properties and total numbers

Monthly distribution	Traffic accidents count involving			Total count			Number of penalties due to drunk driving
	Material damage	Injury	Death	Traffic accidents	Injured person	Death person	
January	15,546	8,170	192	23,908	14,719	242	10,126
February	13,574	6,832	142	20,548	12,258	190	7,979
March	14,531	8,281	159	22,971	14,552	177	8,925
April	14,773	9,110	206	24,089	16,218	244	9,382
May	14,617	10,448	234	25,299	19,419	298	10,107
June	14,827	12,524	313	27,664	23,338	404	9,863
July	15,896	14,642	397	30,935	28,873	498	9,346
August	15,270	12,838	339	28,447	24,523	430	3,631
September	15,670	13,430	325	29,425	25,639	376	10,297
October	15,307	11,387	308	27,002	20,170	377	10,436
November	14,915	10,802	267	25,984	20,516	338	8,375
December	16,106	10,287	213	26,606	17,849	261	9,744
Total	181,032	128,751	3,095	312,878	238,074	3,835	108,211

in non-Ramadan months (χ^2 , $p < 0.001$; OR: 0.84, 95% CI: 0.82–0.86). Also when Ramadan and non-Ramadan months were compared with statistically by the number of death and injured persons, it was found slightly higher in Ramadan. The total number of death persons was reported as 430 (1.5%) in Ramadan and 3405 (1.2%) in non-Ramadan months (χ^2 , $p = 0.001$; OR: 1.19, 95% CI: 1.08–1.32), and the total number of injured persons was reported as 24,392 (10.3%) in Ramadan and 19,319 (8.2%) in non-Ramadan months average (χ^2 , $p = 0.001$; OR: 1.19, 95% CI: 1.08–1.32). The total number of driving license suspension penalties due to drunk driving was 3631 (3.4%) in Ramadan month and the monthly average number was 9507 (8.8%) in non-Ramadan months (χ^2 , $p < 0.001$; OR: 0.36, 95% CI: 0.35–0.38).

Discussion

According to the TurkStat reports, in 2011 Turkey population was 74.7 billion people and the number of vehicles registered to traffic was 16 billion. Also the number of persons with driving license was 22.8 billion. In 2011, total number of accidents was 1.2 billion but only 3,095 accidents were involving death and 128,751 accidents were involving injury. In 2011, 3835 persons were died and 238,074 persons were injured in traffic accidents.^[1] Our study findings showed that the number traffic accidents in the month of Ramadan (August) was slightly higher than the other months' average and also the observed number of accidents was significantly higher than the expected number in June, July, August (Ramadan), and September, and an increase was observed in total numbers compared to other months. The number of accidents in the month of Ramadan was high with respect to some other months, but this seems to be due to an effect of the summer season itself. This may be due to the fact that people prefer summer season

for their vacations, and also it may be a result of the increase in number of vehicles in traffic, especially in high-populated cities; social activities of the people; and intercity trips.

There are some studies in literature, which reported a relationship between Ramadan and forensic cases. In a 4-year study in Turkey, Hussein et al.^[6] analyzed all forensic cases including traffic accidents, assaults, and suicides, and found that there was no significant difference between forensic cases presented in Ramadan and non-Ramadan periods. Likewise, Küçüker and Aksu^[7] found a similar ratio for injuries in traffic accidents. In this 1-year retrospective study, the number of accidents in the month of Ramadan was high with respect to some other months, but these increases were not separated from due to an effect of the summer season itself or effect of Ramadan. However, in United Arab Emirates, a 1-year retrospective study carried out by Bener et al.^[8] found that the number of persons who were injured by traffic accidents during Ramadan, which was at a non-summer season (March 28–April 26), was slightly higher than during other months. Unlike, Khammash and Al-Shouha^[9] found that the rate of the road traffic accidents during the Ramadan was significantly less. But in their study only two winter months (October and November), as Ramadan, were analyzed and 15 days ago and 15 days later periods were taken as control groups. In our study, we studied all months in a year and found that in Ramadan month traffic accidents were slightly higher than the other months' average. Also our study showed that, when compared to other months, the number of deaths and injuries in traffic accidents during the Ramadan month was significantly higher. Tahir et al.^[10] conducted a study about road traffic crashes in the Ramadan 2011 at Pakistan. They reported that 12,969 road traffic crashes were occurred and, like our study, they compared these with an average of non-Ramadan 10 months (11,573 road traffic crashes per month from January to August 2011) and they found that the number of

road traffic crashes in Ramadan month was statistically significantly higher than the non-Ramadan months' average.

Ramadan and fasting have lots of physiological changes on human body. When evaluated in terms of psychomotor performance we think that it can be decreased. There are some studies on human psychomotor performance in the literature. Al Suwaidi et al.^[11] state that external factors for fasting, food intake, and/or sleep time changes can affect circadian rhythm. Similarly in other studies, it has been shown that the sudden change in meal times in Ramadan effects sleep time and circadian rhythm.^[12] Night sleep, day alertness, and psychomotor performance decrease.^[13] As the literature suggests that Ramadan has an impact on personal performance, it is expected that an increase in traffic accidents may be observed during this period. Throughout this expectation, our study was showed that slightly statistically significant increase in the number of traffic accidents in Ramadan compared to non-Ramadan months. But we cannot separate to these increases from due to an effect of the summer season itself or effect of Ramadan. Also summer season seems to have a stronger effect on total number of accidents.

TurkStat reported that 339 traffic accidents involving death and 430 persons were died in Ramadan, and these numbers were considered statistically significant. Lots of factors can affect to the traffic accidents involving death, and drunk driving is one of them. Shih et al.^[14] found that morbidity due to traffic accidents was found to be higher in drunk drivers than in others. In our study in Ramadan, there was a decrease in drunk driving but death persons and injured persons rates were similar in non-Ramadan months. Although the month of Ramadan reduced reported alcohol intake in traffic, it had no positive or negative effect on the number of accidents and the number of accidents resulting in death. Although Ramadan seems to affect physiological parameters of fasting people, it does not seem to have an impact regarding traffic accidents.

Limitations

This study has several limitations. First of all, the non-Muslim drivers were not excluded from the study. Because of our country statistical storage status and ethical issues, we cannot access the religion statements of patients with accident. Religion is a private situation and not routinely questioned in patients. In addition, in Ramadan month we had no private information about his/her fasting situation. This is the second limitation of this study. As Turkey is a Muslim country, we accept that all the traffic accident victims were fasting.

Conclusion

The average number of traffic accidents was slightly high in Ramadan than in non-Ramadan months. Also traffic accidents involving death and injury were slightly high and traffic accidents involving material damage was less. The number of

dead and injured persons was also found to be slightly high. Also, as expected, penalties due to drunk driving were found less in Ramadan.

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