CERTAIN CHRONO-BIOLOGICAL CHARACTERISTICS OF SEVERE ROAD TRAFFIC ACCIDENTS IN THE REGION OF PLOVDIV, REPUBLIC OF BULGARIA

Dr Marin Kostadinov Baltov, PhD

Official address: Medical University Plovdiv, Department of General and Clinical Pathology and Forensic Medicine, St. George University Multi-Profile Hospital for Active Treatment EAD, Department of Forensic Medicine, 15[a] Vasil Aprilov Blvd., 4000 Plovdiv, Republic of Bulgaria, E-mail: dr.baltov@abv.bg

ABSTRACT

Over the last years, with the increase of the number of transportation vehicles, road traffic has become heavier and the number of incidents involving vehicles has been rising. The main causes of these incidents are motor vehicle drivers, whose behaviour is also influenced by factors of the environment.

OBJECTIVE: To examine the influence of seasons, months and days of the week on the number of victims of road traffic accidents.

MATERIAL AND METHOD: The object of this study are the cases of fatality in road traffic accidents in the region of Plovdiv over the period 2000-2014, registered and autopsied at the Department of Forensic Medicine of St. George University Multi-Profile Hospital for Active Treatment EAD, Plovdiv. Historical, statistical and graphic analysis methods have been used in the processing of the results.

RESULTS: A total of 1288 cases of fatality in road traffic accidents in the region of Plovdiv over the period 2000-2014 were studied. It was found that the number of fatalities during the period ranges from 8.7‰ to 15.43‰. This result is nearly twice as high as the result for the Republic of Bulgaria. The largest number of severe road accidents with deaths occur in the autumn (28.66%), and the risk months during the year are November, July and September. During the week, the number of victims increases from Monday and reaches its maximum on Sunday. The largest number of victims is registered in the second ten-day period of the month.

CONCLUSION: The conclusions made regarding the influence of climatic and time factors on the number of severe traffic accidents can be used to optimise the measures for their prevention.

KEY WORDS: *road traffic accidents, fatalities, season, month, day of the week.*

Modern life is strongly affected by the development of the means of communication. Over the last years, with the increase of the number of transportation vehicles, road traffic has become heavier and the number of incidents involving vehicles has been rising (13). Road traffic collisions, in addition to victims, leave behind a large number of people with various injuries. This is the reason for the detailed and comprehensive investigation of this problem in different countries (3, 4, 5, 6, 7, 8, 9, 10, 11, 12).

It is known that the main cause of these incidents are motor vehicle drivers, whose behaviour is influenced by various factors. One of them is the light falling onto the retina, which causes excitation that is transmitted to the hypothalamus in the brain, which is a centre of psychic energy distribution (2). In this way, meteorological factors affect the psychic condition of drivers and to a certain extent determine their behaviour on the road. Therefore, the study of the factors of the environment could improve the prevention of road traffic accidents.

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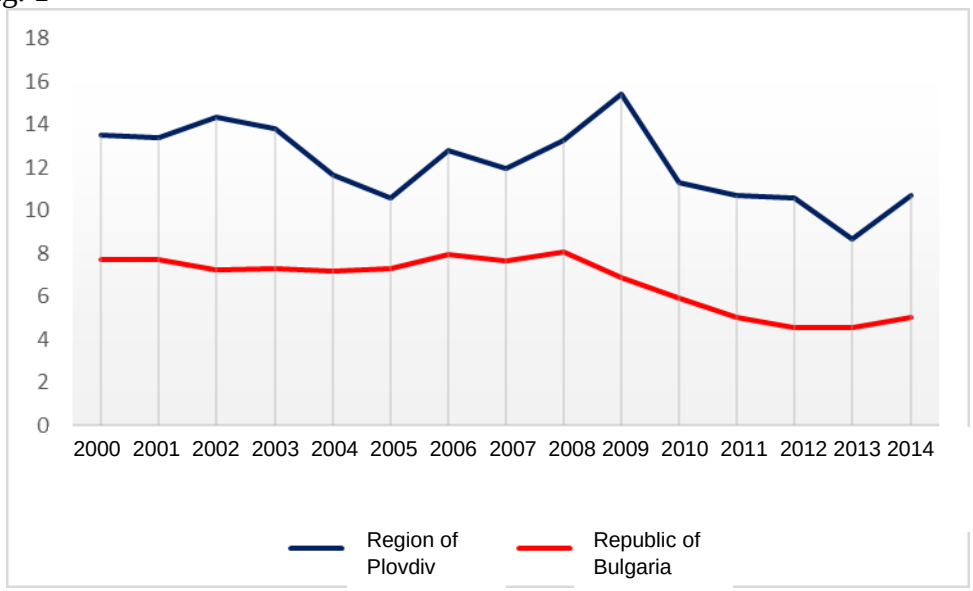
MATERIAL AND METHOD: The object of this study are the cases of fatality in road traffic accidents in the region of Plovdiv over the period 2000-2014, registered and autopsied at

the Department of Forensic Medicine of St. George University Multi-Profile Hospital for Active Treatment EAD, Plovdiv. Historical, statistical and graphic analysis methods have been used in the processing of the results (1).

The index of road traffic accident deaths has been defined as the number of victims per 100 000 persons of the population. The dates of the month have been grouped in three ten-day periods.

RESULTS: In the period 2000-2014, 1 288 autopsies of deaths caused by road traffic accidents were performed at the Department of Forensic Medicine of St. George University Multi-Profile Hospital for Active Treatment EAD, Plovdiv. Over the same period, 13 147 victims of road traffic accidents were registered in the country. The average rate of the index of road traffic accident deaths during this period for the region of Plovdiv is 12.19‰, and for the Republic of Bulgaria, the rate is 6.67‰. The index dynamics in the region and in the country is different, showing a tendency to decrease for the country, and being variable in the region. (fig. 1)

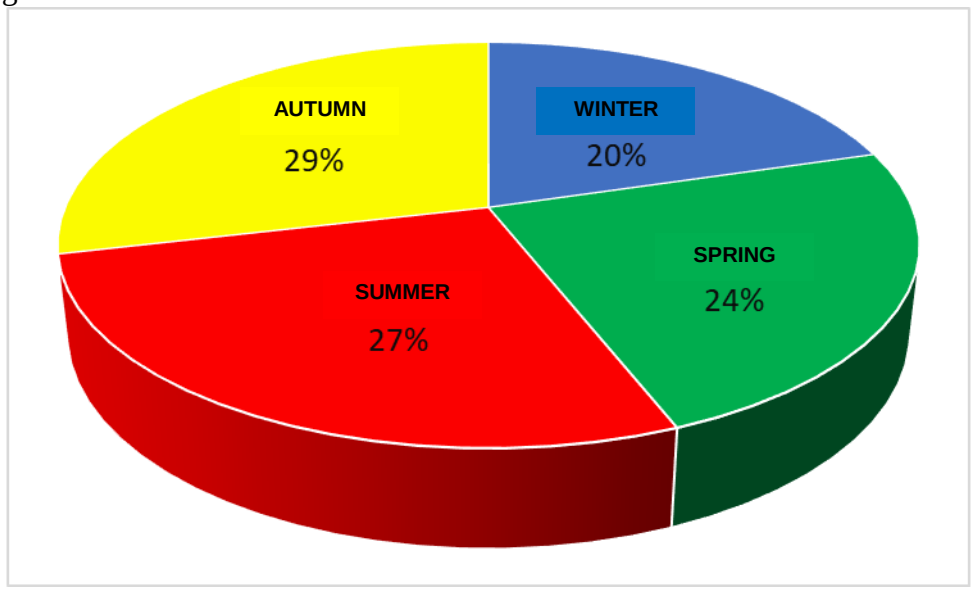
ROAD TRAFFIC ACCIDENT DEATHS DYNAMICS INDEX
IN THE REGION OF PLOVDIV AND IN THE REPUBLIC OF BULGARIA
Fig. 1



During the four seasons, the distribution of fatalities in road traffic accidents is different (fig. 2).

PERCENTAGE DISTRIBUTION OF FATALITIES IN ROAD TRAFFIC ACCIDENTS DURING THE SEASONS OF THE YEAR

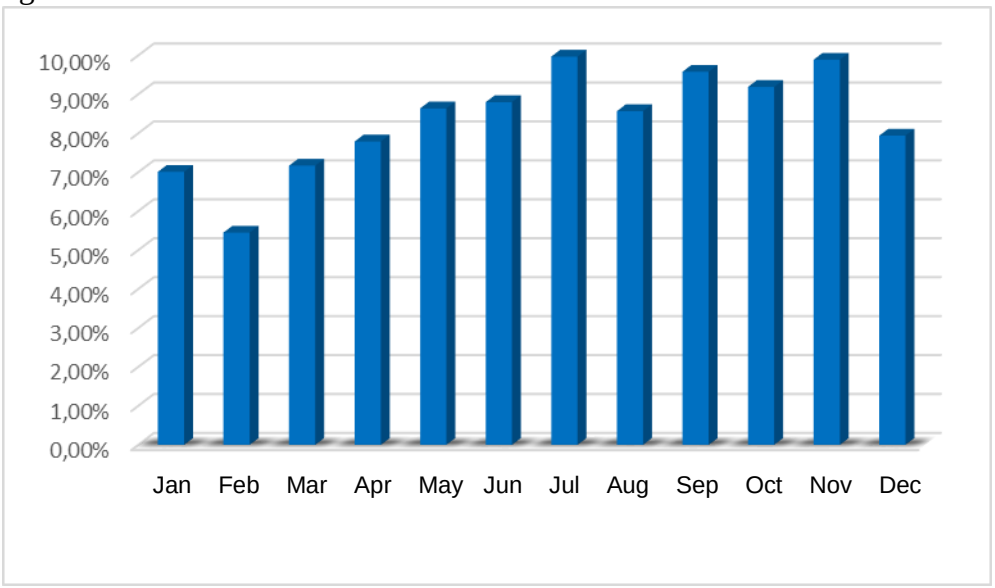
Fig. 2



Victim distribution in the different months of the year has been studied and presented in fig. 3.

IDENTIFICATION OF RISK MONTHS FOR SEVERE ROAD TRAFFIC ACCIDENTS

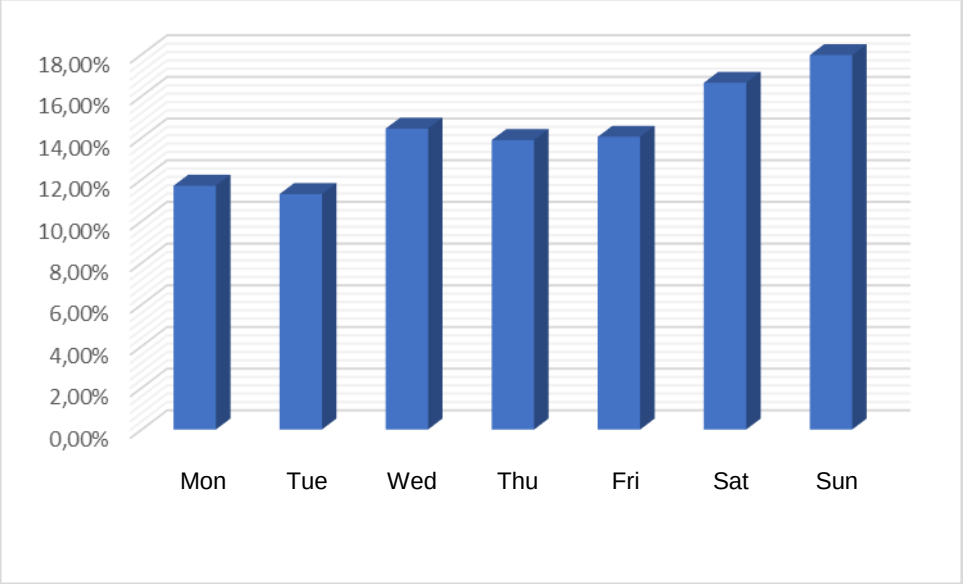
Fig. 3



The days of the week with the largest number of fatalities in road traffic accidents have been identified (fig. 4).

PERCENTAGE DISTRIBUTION OF VICTIMS OF
ROAD TRAFFIC ACCIDENTS ACROSS THE DAYS OF THE WEEK

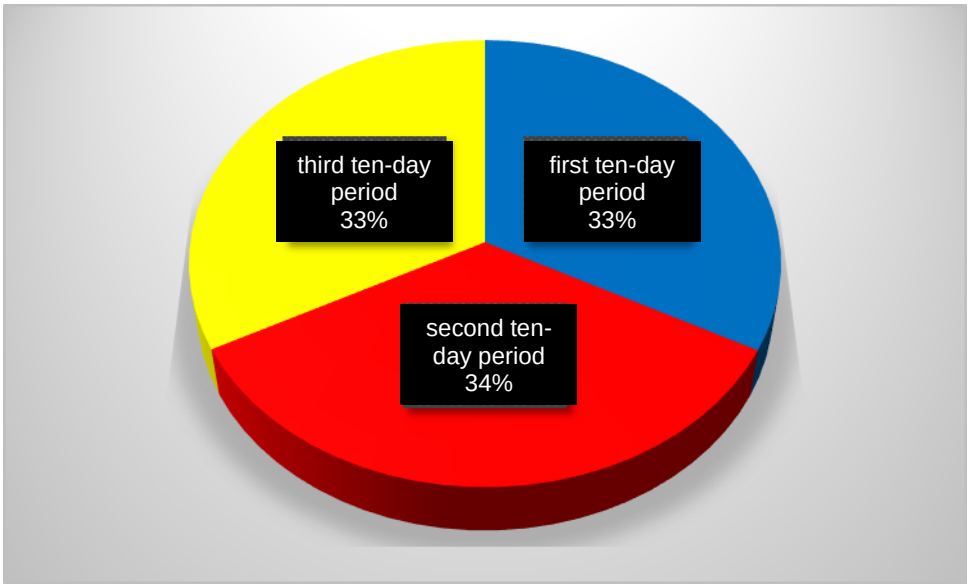
Fig. 4



The dates of the month with the highest probability for road traffic accidents have been defined and grouped in ten-day periods (fig. 5).

DISTRIBUTION OF VICTIMS OF ROAD TRAFFIC ACCIDENTS BY MONTH DATES
GROUPED IN TEN-DAY PERIODS

Fig. 5



DISCUSSION OF RESULTS: Evidence indicates that most of the severe road traffic accidents in the country occur in the region of Plovdiv. The rates of the index of road traffic accident deaths in the region of Plovdiv vary from 8.70‰ in 2013 to 15.43‰ in 2008, and

the rates remain higher than the rates for the country throughout the entire study period. The average index rate in the region of Plovdiv is nearly twice as high as the rate for the Republic of Bulgaria. The index dynamics is unstable, showing a decrease in the years until 2005, followed by an increase and reaching its maximum rate in 2009. In the years which follow, the index goes down again until 2013. The index of road traffic accident deaths in the Republic of Bulgaria rises until 2008, and falls until 2013. During the last year of the study period, an increase of the rate of the index of road traffic accident deaths is registered both in the country and in the region of Plovdiv.

One of the causes of severe road traffic accidents in the region of Plovdiv is its geographical location and the vicinity to the motorway with the heaviest traffic.

It is known that climatic conditions affect drivers' psychic condition, hence they affect road traffic accidents. The scientific literature data regarding the seasons with the largest number of severe road traffic accidents are not unambiguous. Some authors point summer as the season with the most traffic accidents (6, 10, 11), and others – winter (4). In the region of Plovdiv, this season is the autumn. There are differences regarding the month with the highest death rate in road traffic accidents as well. In India, this is April (10), in Fiji these are October and August (8), In Turkey – July and August (6), and in Russia – November (3). In the region of Plovdiv, mortality rate in road traffic accidents marks a peak in July, September and November, which is associated with the intensified road traffic and the deterioration of climatic conditions.

The data about the days of the week with the highest concentration of severe road traffic accidents also differs. Most of the studies show that this is Sunday, but other authors have found Friday to be a risk day (4, 5, 10, 12).

Most of the severe road traffic accidents in the region of Plovdiv occur on Sundays, when a large part of the population is coming back home. The number of victims rises from Friday to Sunday.

We could not find any scientific literature information about investigating the influence of the dates of the month on the maximum concentration of road traffic accidents. Our study has revealed that most of the fatalities in road traffic accidents in the region of Plovdiv occur on the 12^{th} and the 8^{th} day of the month, and least on the 3^{rd} and the 17^{th} day of the month. There is no date without a registered fatality. The distribution of the dates of the month in ten-day periods shows that most of the severe road traffic accidents occur during the second ten-day period of the month.

INFERENCES:

1. In the region of Plovdiv, the index of road traffic accident deaths during the period 2000-2014 is nearly twice as high as the rate for the Republic of Bulgaria.

2. Autumn road traffic accidents involving motor vehicles are marked with the largest number of fatalities.

3. The highest road traffic accident mortality is registered in July, September and November.

4. The number of victims of road traffic accidents increases during the week from Monday, reaching its maximum on Sundays.

5. The largest number of fatalities in road traffic accidents is registered during the second ten-day period of the month, of the 12^{th} and the 8^{th} day of the month, and least of the fatalities occur on the 3^{rd} and the 17^{th} day of the month.

CONCLUSION: The inferences made on the influence of climatic and time factors on the number of severe road traffic accidents can be used to optimise the measures for their prevention.

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