



FATAL INJURIES DUE TO BULLET FIREARMS

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Summary: *Injuries due to firearms are a major public health problem, especially because they occur more frequently in young people, lead to human loss or disability of the population, and the mortality due to these injuries is greatly high. The work aims to highlight the frequency, dynamics, structure as well as some general peculiarities of lethal traumas produced by bullet firearms. The analysis includes 36 cases of fatal trauma caused by bullet, investigated at the Center for Forensic Medicine, during 2019-2023. The study determines that lethal trauma from bullet firearms accounts for 1.3% of all violent deaths and 59 % of all firearm deaths. More frequently, in 86% cases, men are traumatized, from urban localities, mainly in winter and summer months, and being drunk, which can be explained by their more frequent use of firearms for various purposes or this being a conception of interpersonal supremacy between men, as well as supremacy over women, respectively. The seasonal frequency can also be incident to annual holidays, in association with the consumption of alcohol. Mostly, the fatal injuries produced by bullets are localized at the level of the head, as transfixing wounds, and the death more frequently occurs at the people's home (aggressor/sufferer).*

Keywords: *Firearm injuries, gunshot wounds, lethal trauma, violent death, traumatic objects*

Introduction: Injuries due to firearms are a major public health problem, especially because they occur more frequently in young people, lead to human loss or disability of the population, and the mortality due to these injuries is greatly high. [7]. They occupy an important place both in general medical pathology and in forensic practice, given the fact that most often of them result in the death of the victim, mainly in young people [8].

All over the world for the time being firearm injuries are widely accepted as a **public** health problem, due to their continuously increased incidence [1]. In this context, some contemporary forensic and social studies conducted in Central Asian countries indicate that firearm injuries represent an enormous burden and challenge for justice, health and national economies, given that they are predominantly produced for homicide purposes, including domestic assault, and the maximum incidence usually includes ages between 20-39 years, prevailing essentially men [6].

Similar research achieved in European countries regarding the rate of homicide by bullet firearms, shows that the number of victims due to this aggression is much higher in Eastern European countries (eg. Baltic countries, Bulgaria, Hungary, Croatia, Romania, Slovakia) compared to Western European countries, adding up to a correlation of 3:1, mainly among young people. [5].

Likewise, some authors note the presence of an exorbitant number of people who die every day from injuries caused by firearms, of which 59.07% are homicides, and the most common injured regions are: head, face and neck. [4].

Autochthonous and relatively similar researches have established that the incidence in the Republic of Moldova of cases of lethal head trauma by firearms integrates 0.3% of the total number of cadavers examined during the analyzed period, or 1.8% of the total violent death and 65.8% of the total number of deaths due to firearms. [3].

Asser H Thomsen and co-authors (2021), as a result of their research, show that most homicides in the world are caused by bullet firearms, and such as this field of investigation is of the legal medicine, a good understanding and elucidation of this phenomenon can be achieved by contribution of forensic medicine that provides scientific and practical evidence by using specific forensic investigations on death, the aspects that contribute essentially to the development of prevention policies: social, legal and medical in the field of interpersonal violence [2].

The obvious and existing problems of injuries by bullet firearms are multiple, difficult and quite complicated, and are attributed to forensic medicine for solving, by the criminal investigation officer, in order to assess and set the deed in the legal framework.

Thus, the high incidence of trauma produced by bullet firearms in association with increased mortality, reveals certain the medical-social importance of the problem in question and, respectively, it becomes obvious the need to study this problem, in order to establish and appreciate the frequency, dynamics, comparative structure, as well as the circumstances of occurrence of the fatal event.

Purpose of the research: The purpose of the paper is to highlight and appreciate the frequency, dynamics, structure, as well as some general peculiarities of lethal traumas caused by bullet based on forensic data from Chisinau, during 2019-2023.

Materials and methods: In order to achieve the goal, 36 observations of lethal traumas produced by bullet firearms, investigated in the Thanatology Department of the Center of Forensic Medicine, Chisinau, during 2019-2023, were studied. The selected material was introduced on individual information collection sheets and was analyzed by the following study methods: historical; analytical; comparative; mathematical-statistical; graphics. The processing of the material was carried out through the instrumentality of Excel, which allowed the calculation of rates, proportion indicators as well as testing the significance of relative and average values.

Results and Discussion: The study conducted allowed us to establish that the incidence of cases of lethal trauma due to firearms with bullets accounts for 0.32% of the total number of cadavers examined during the analyzed period (2019-2023). Furthermore, they add up to 1.3%, of the total violent death constituted, and 59% of the all-firearm deaths.

The incidence of this phenomenon, especially in the structure of violent death, comparing the data obtained by us with the research previously conducted by some authors [6], there is a decrease in cases of injuries by bullet firearms, which represents a commonwealth for the entire society in all aspects (social, medical, legal).

The examined cases during the research period had an oscillatory evolution, and their dynamics being fully presented and presented in Figure 1.

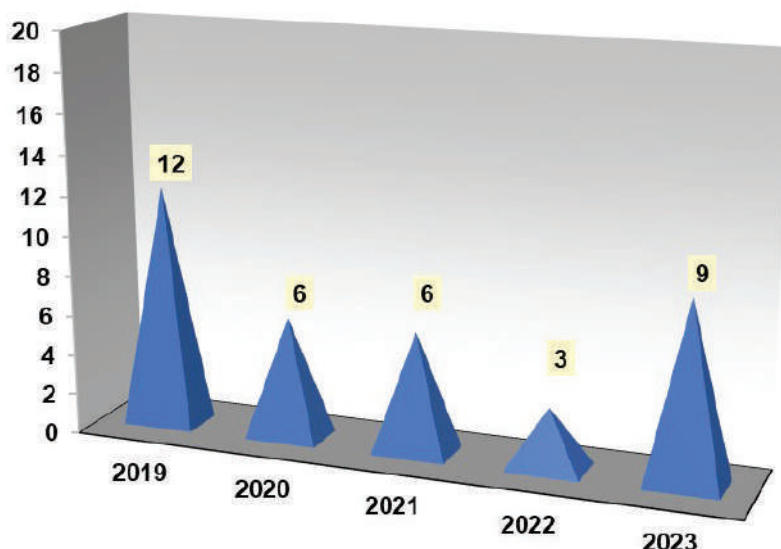


Fig. 1. Dynamics of lethal injuries by bullet firearms during 2019-2023 years.

Thus, according to the study carried out and as seen in the figure, the most common fatal injuries were produced in 2019 and 2023, therewith, in 2020 and 2021, the number of lethal cases produced by bullet firearms was equal, 6 cases for each year, and in 2022 only 3 cases were attributed to the analyzed lethal phenomenon.

The low number of cases overlaps with the social restrictions during the COVID-19 pandemic period, which demonstrates the social aspect and interpersonal relationships of firearm using.

Following the analysis of cases according to the gender criterion, it has highlighted the following important structural aspects, thus, it was found that, in 86% of cases, as a result of fatal injuries by firearms with bullet, male persons died, and in 14% of observations victims became females, similar results being obtained by other researchers of this phenomenon [6].

It was established that more frequently (72.2%) died people in urban localities, compared to rural ones, where death as a result of fatal injuries occurred in 27.8% cases, which shows that in cities firearms are used much more frequently for various purposes (self-defense, homicide, suicide, etc.).

Analyzing the research data according to the age of the victims, it was found that as a result of lethal traumas caused by bullet firearms the age groups of ≤ 19 years prevailed, such as 20-29, 30-39, 40-49 and 50-59 years, and their sum was 88.9% of the total number of cases registered, during the analyzed period. In the same research context, based on the residence, it was found that in cities the death of persons, as a result of injuries produced by bullet firearms, occurred much more frequently in men in 84%, compared to women 16% of observations, in rural areas also predominantly male deaths. Thus, men died in 87% of cases and women only in 13%, showing an approximate correlation of 3:1, and the differences between mortality from fatal injuries from bullet firearms on residential environments relative to the sex of victims were not statistically significant ($p > 0.05$).

Therefore, men are much more frequently exposed to injuries by bullet firearms, regardless of their residence, which is due to their more frequent use of given weapons for various purposes, or respectively this (the presence of weapons) could be a conception of interpersonal supremacy of men as well as women, including products also in the case of domestic violence.

Studying the incidence of lethal cases produced by bullet firearms, depending on the seasons of the year allowed to highpoint the following peculiarities: thus, in 42% of cases, death as a result of fatal injuries by firearms occurred in winter, in 28% fatal injuries were produced in summer. In third place, in 20%, are cases of injuries by firearms with lethal consequences, produced in autumn, and less frequently, in 10%, death occurred in spring.

Thus, based on the above, we can say that deaths by firearms with bullets have essentially prevailed in winter and summer and much less often in other seasons This seasonal features could also be explained by the fact that during these periods of time people are most often on annual vacations, holidays, being

associated with entertainment and excessive alcohol consumption, that can bring to the emergence of interpersonal conflicts and the use of firearms.

The calendar analysis of the data shows that bullet injuries were most commonly determined in December, January, February and July, followed by June, September, October and then less frequently the other months (Figure 2).

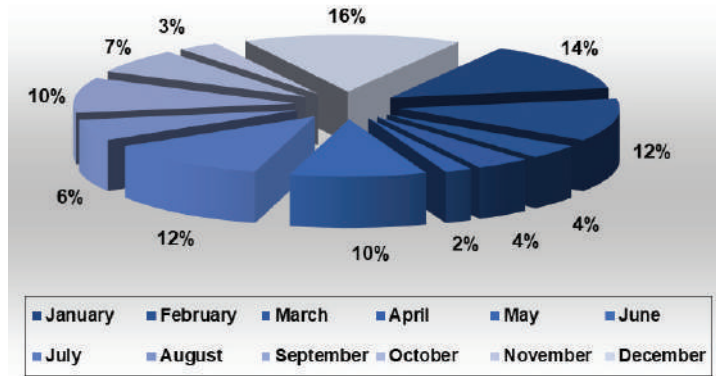


Fig. 2. Incidence of fatal injuries due to bullet firearms by month

Our research has established that lethal trauma caused by bullet firearms, depending on the anatomical region of the body, was localized diversified.

Thus, our study reveals that injuries produced by bullet firearms were found on various anatomical regions of the body and presented the following structure. (Figure 3).

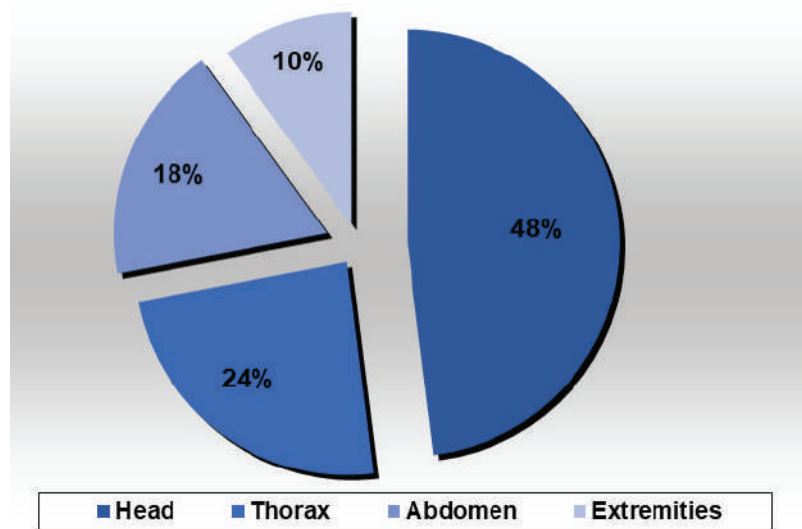


Fig. 3. Localization of injuries by bullet firearms depending on the injured anatomical region.

So, as can be seen in the figure presented, gunshot wounds were most commonly circumscribed on the head region (48% of observations), in 24% cases trauma by bullet firearms was found on the chest, and in 18% cases fatal injuries produced due to bullet were localized on the abdomen. Much less often this trauma was described on other regions of the body. The most common localization of bullet injuries on the head can be explained by using the both homicide and suicide manners, the cephalic region being the most accessible vital anatomical region of the body.

Our research has established that injures due to firearms with bullets were isolated in $68.21\% \pm 1.65\%$, at the level of the head, chest or abdomen Other observations $30 \pm 1.25\%$ there was an association of different anatomical regions, as head-thorax; thorax-abdomen; head-abdomen, etc.

Depending on the type of wounds, it was found that more frequently (69%) transfixiant wounds occurred and only in 31%, bullet injuries were blind.

Our study reveals that in the structure of lethal cases by bullet, according to the place of death, it was established that more frequently, in 53% of cases death occurred at people's homes (aggressor/victim), followed by deaths in the street (32%) and only in 15% cases death occurred in medical institutions of different levels. On the same note, we mention that deaths produced by bullet firearms and localized on head occurred more frequently at home, in 49.43%, followed by deaths occurred on the street (33.33%), and much less often deaths due to head injury installed in hospitals. This fact can be explained by the injury volume and severity of trauma, practically incompatible with life in such cases. At the same time, deaths as a result of fatal injuries produced on the chest / abdomen were distributed practically equally, being present at home, street and medical institutions.

According to toxicological investigation of the blood of deceased persons, the victims consumed alcoholic beverages before the trauma only in 38% of cases. The distribution by alcoholemia of victims and clinical manifestation, usually associated with living persons, is as follows: 4% were under an insignificant influence of alcohol (less than 0,5‰ of alcohol in blood); 12% - slight inebriety (0,5-1,5‰) 14% - medium inebriety (1,5-2,5‰), and 5% - serious inebriety (2,5-3,0‰). There were also cases (3%) of serious alcoholic intoxication (more than 3,0‰), even lethal concentrations of ethyl alcohol up to 6‰. (Figure. 4).

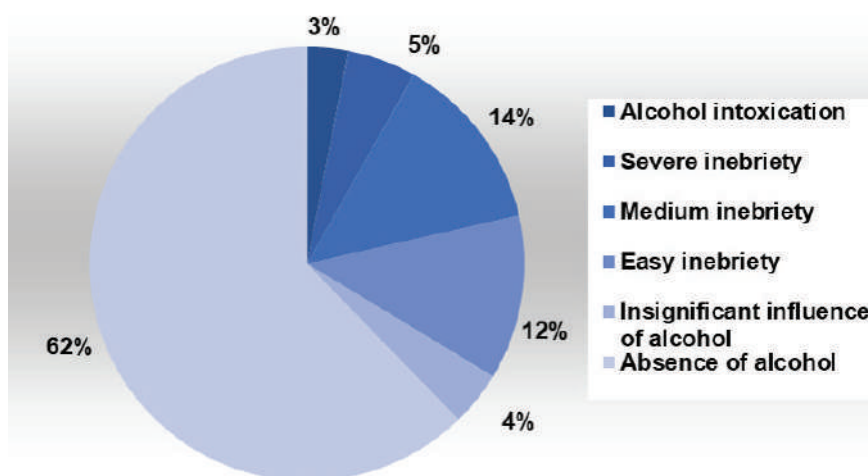


Fig. 4. Degree of alcoholemia, in deaths as a result of trauma by bullet firearms.

In the same context, research found that the most frequently the alcohol was used by women 58%, compared to men (42%), regardless of the residential environment, overall cases of alcoholemia being more frequently found in urban areas, but the differences were statistically insignificant.

The major incidence of more frequent alcohol use in women is due to the more changeable and labile behavior of women, to the action of various stressogenic factors, emotional impairment as well as due to domestic violence, including the background of alcohol use.

Conclusions: Our study established that the incidence of fatal trauma caused by bullet firearms accounts for 0.32% of the total number of cadavers examined during the analyzed period, 1.3% of all violent deaths and 59% of the deaths caused by firearms (bullet / shot)

Gunshot deaths less were registered during the Covid-19 pandemic period, which emphasizes the relational aspect of the phenomenon.

In 86% cases, as a result of fatal injuries by firearms died male persons, and only in 14% victims became females, more frequently (72.2%) died people of urban localities, and more frequently fatal injuries by bullet occurred in winter and summer, that amount to 70%.

Most frequently the lesions were localized on the head region (48%), less on the chest (24%), and much less on the other regions were established.

The place of lethal firearm events was more at the victim's or aggressor's home (53%), followed by deaths in the street (32%) and only in 15% cases death occurred in medical institutions of different levels. In 38% of observations, victims consumed alcoholic beverages before the trauma, and victims were predominantly in a state of slight and medium inebriety.

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