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COMPARATIVE CHARACTERISTICS OF DAMAGE TO CLOTHING AND EXTERNAL DAMAGE TO A IMITATOR OF THE HUMAN BODY USING PISTOLS "FORT 12R" AND "AE 790G1"

Kusliy Yu. Yu.[1], Mishalov V. D.[2], Gunas I. V.[1], Shkolnikov V. S.[1], Hel A. P.[1]
[1]National Pirogov Memorial Medical University, Vinnytsya (56, Pirohov st., Vinnytsia, Ukraine, 21018),
[2]Shupyk National Healthcare University of Ukraine (9, Dorohozhitska st., Kyiv, Ukraine, 04112)

Responsible for correspondence:
e-mail: *dr.yurus@ukr.net*

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Annotation. *The spread of non-lethal firearms among different sections of the population of Ukraine and the increase of their varieties available for sale is another modern challenge for forensic examination. In this regard, there is an urgent need to study the characteristics of injuries caused by the newest types of traumatic guns, taking into account such a factor as clothing. The purpose of the study was to determine the features of the shape and size of damage defects caused by shots from "Fort 12R" and "AE 790G1" pistols from different distances depending on the covering material of the human body simulator. To achieve the goal, 120 gelatin blocks (60 for each gun) were shot, divided into 4 subgroups according to the coating: bare blocks, covered with cotton fabric, denim fabric, leatherette. Shots were fired from contact range, 25 and 50 cm. Subsequently, damage description and statistical processing of the obtained results were carried out in the licensed statistical package "Statistica 6.0". When analyzing the reliability of differences between the studied groups in the assessment of the area of the defect, mostly significant differences ($p<0.05$-0.01) were found both between different subgroups of blocks and between the corresponding groups of guns. Analysis of the defect shape indicator revealed both significant differences ($p<0.05$-0.01) and trends to differences ($p<0.076$) in all studied groups, except within the subgroup where bare blocks were used. Thus, the identified differences in the shape and area of defects allow us to use them to solve the issue of identification of shots from "Fort 12R" and "AE 790G1" pistols at close range, 25 and 50 cm distances and help to improve the understanding of the role of clothing in gunshot injuries. In further research, it is advisable to perform a comparative analysis using data on additional factors of the shot.*

Keywords: *gunshot injury, gunshot wound, forensic examination, non-lethal weapons, human body imitator, damage to clothes, firearms.*

Introduction

Firearms have long accompanied humanity and are an indispensable attribute of human life, having found their use in various fields: sports, hunting, military, etc. Firearms are used in most countries of the world by law enforcement agencies and, with certain restrictions, are available to citizens for self-defense.

Ukraine is no exception to the last point. Certain categories of citizens still have the right to own firearms, among which most of them are hunters and, to a lesser extent, journalists, judges and other categories that, in accordance with regulatory acts, have the right to purchase and carry them. However, there are still misunderstandings regarding the interpretation of many terms related to firearms, which may be eliminated if new draft laws are adopted, which were actively discussed both in society and within the walls of the Verkhovna Rada of Ukraine at the end of 2021 and the beginning of 2022 [7].

One of the reasons for this increase may be an attempt to stabilize the situation with firearms in the country, which has deteriorated significantly since 2014. Thus, the number of cases of criminal offenses involving illegal handling of firearms in 2013 was 4 341, in 2014 it was 5 012, and in 2015 - 5 734 cases. At the same time, the number of crimes involving the use of firearms increased, amounting to 761, 2 523, and 1 526 cases, respectively. In 8 months of 2017, twice as many illegal firearms were seized as in the same period of 2016 (1 551 and 793, respectively) [14].

If we take into account the foreign experience in this matter, the most indicative is the example of the USA, where access to firearms among the population is much wider, as well as the types of firearms available for purchase, which include more lethal types of firearms. Only the volume of domestic production of firearms increased by 1.7% in the period from 1996 to 2004, and by 13.8% from 2005 to 2013, surpassing more than 10 million units of weapons [22]. And all this taking into account the annual number of Americans who die from it at the level of 32 thousand people, and another 67 thousand are crippled, which in total costs the US medical system about 48 billion dollars [25].

The use of firearms is common not only in the United States. In El Salvador, the rate of murders committed with firearms is 52.4 people per 100,000 population, in Colombia - 38.1, in Eswatin - 13.5. Although relative to these countries, the rate of murders committed in the USA with the use of firearms is much lower and amounts to 3.55 people per 100 000 population [9].

Until 2014, the Ukrainian forensic medical and expert system in general did not encounter the massive use of firearms [17], which in turn revealed problems related to the examination of gunshot injuries. This concerns both the need to use the modern material and technical base in the current conditions [16], and the use of adequate scientific data regarding the characteristics of gunshot injuries of certain types of firearms.

In modern domestic scientific literature, there are works highlighting the peculiarities of gunshot injuries caused by lethal weapons. However, the works related to the study of non-lethal weapons are isolated and non-systematic in nature, which is a big problem, given the bills that plan to expand their use.

One of the ways to solve this problem may be to conduct an experimental study using popular models of non-lethal firearms. Given the impossibility of performing experimental shootings on the tissues or bodies of deceased persons, the most optimal and widespread is the use of non-biological imitators of human body tissues. An honorable place in this list is occupied by gelatin, which, depending on the peculiarities of preparation, can imitate different types of tissues. On the other hand, gelatin is a material with a pronounced temperature dependence, such as the temperature of preparation, storage, and use, which requires a certain scrupulousness from researchers [15]. Discussions are still ongoing regarding the creation of an ideal simulator of the human body that will allow it to be as close as possible to the real one. Such options offer combinations of non-biological imitators, animal imitators, etc. [3, 12, 19].

However, one of the factors that has practically not been taken into account in any publication so far is the consideration of a layer of clothing on a human body simulator [10, 11]. The use of a human body simulator complex together with a layer of clothing for ballistic research will not only increase the reliability but also the informativeness of the obtained results.

The purpose of the work is to compare the features of the area and shape of damage to different types of clothing and external damage to a human body simulator when fired at blocks with different covering material, from different distances using "Fort 12R" and "AE 790G1" pistols.

Materials and methods

The work was carried out as part of the research work of the National Pirogov Memorial Medical University, Vinnytsya at the expense of state funding of the Ministry of Health of Ukraine: "Characteristics of damage to human body tissue simulators caused by non-lethal weapons" (state registration number 0121U107924).

To imitate the tissues of the human body, according to the method of M. L. Fackler, & J. A. Malinowski, (1985) [8], 120 blocks measuring 30x15x15 cm were made for the study from a 10% solution of food gelatin type A 270 Bloom (TM "Junca Gelatines SL", Spain), which were previously stored for 48 hours in temperature +4oC. To inhibit the microbial flora, propionic acid was used in the amount of 5 ml/l of gelatin solution.

From the manufactured blocks, 2 main groups of 60 blocks were formed for each gun; in each of them, respectively, 4 subgroups according to the coverage of the block. To simulate the skin, all blocks were covered with a transparent polyethylene film 200 ?m thick. Subgroup 1 consisted of gelatin blocks that were not covered with clothing; subgroup 2 - blocks that were covered with cotton fabric; subgroup 3 - blocks that were covered with denim fabric; subgroup 4 - blocks that were covered with leather substitute.

Blocks were shot on the basis of the shooting range of the Vinnytsia Scientific and Research Expert Forensic Center of the Ministry of Internal Affairs of Ukraine at contact range, 25 and 50 cm (respectively, 5 blocks from each subgroup) using "Fort 12R" and "AE 790G1" pistols equipped with 9 mm cartridges (elastic bullets traumatizing action) within 30 minutes from the moment of removing the blocks from the refrigerating chamber with prior fixation of the gun in the pressures.

The objects and results of the study were photographed in accordance with the rules of forensic photography using a digital camera (Alpha A6000 Sony camera), followed by analysis of the shape and area of the defect formed on the covering material of the block or on the surface of the block itself, if it was bare.

The statistical analysis of the obtained results was carried out in the licensed statistical package "Statistica 6.0" using non-parametric estimation methods. The reliability of the difference in values between independent quantitative values is determined using the Mann-Whitney U-test, and between qualitative values - according to the E. Weber formula:

$$t = \frac{P_1 - P_2}{\sqrt{\frac{N_1P_1 + N_2P_2}{N_1 + N_2} \times \left(100 - \frac{N_1P_1 + N_2P_2}{N_1 + N_2}\right) \times \frac{N_1 + N_2}{N_1N_2}}},$$

where, P_1 and P2 - percentages with which this or that indicator met;

N_1 and N_2 - the number of indicators in the studied groups.

Results. Discussion

The use of cameras to record the passage of a bullet through gelatin or other types of human body simulators in order to study the peculiarities of the formation of a temporary cavity are often found in the scientific literature, while similar instrumental studies concerning the passage of a bullet through clothing are isolated. However, already from these few works, it becomes clear that different types of clothing react differently to the passage of balls through them - some types of clothing, due to their properties, stretch as much as possible and only then let the ball pass through them, which forms small defects of an irregular oval shape, while in other cases the bullet immediately "knocks out" a piece of tissue, forming a large round or square defect [13]. In fact, the results obtained by us in this study fully correspond to the above-described material, which is clearly evidenced by the data on the features, or more precisely, the differences in the indicators of the area and shape of the defect when using different types of fabrics, different guns and shot distances.

Thus, the analysis of the indicators of the *defect* area showed that:

when firing from the *"Fort-12R"* at contact range, there is a tendency for larger values (p=0.076 in both cases) of the defect area on bare blocks compared to denim and leatherette (0.840±0.146, 0.676±0.133 and 0.428±0.3310 cm^2 respectively) and significantly larger values (p<0.05 in both cases) of the defect area when using cotton fabric compared to denim and leather substitute (0.994±0.161, 0.676±0.133 and 0.428±0.331 cm^2, respectively);

when firing from *"Fort-12R"* at a distance of 25 cm, significantly larger values (p<0.01 in all cases) of the defect area were found on bare blocks compared to denim fabric and leatherette (1.176±0.366, 0.810 and 0.476±0.054 cm^2, respectively), cotton fabric compared to leatherette (0.966±0.166 and 0.476± 0.054 cm^2, respectively) and denim compared to leatherette (0.810 and 0.476±0.054 cm^2, respectively);

when firing from the *"Fort-12R"* at a distance of 50 cm, significantly larger values (p<0.01 in all cases) of the defect area were found on bare blocks compared to denim and leatherette (1.552±0.502, 0.702±0.040 and 0.500 cm^2, respectively), cotton fabric compared to denim fabric and leatherette (1.060±0.229, 0.702±0.040 and 0.500 cm^2, respectively) and denim fabric compared to leatherette (0.702±0.040 and 0.500 cm^2, respectively);

when comparing the area of the defect at different distances of the shot from the *"Fort-12R"*, significantly lower values (p<0.01 in both cases) of the studied indicator were found when shooting at bare blocks from a contact distance compared to 50 cm (0.840±0.146 and 1.552±0.502 cm^2, respectively) and when shooting at denim from a distance of 25 and 50 cm (0.810 and 0.702±0.040 cm^2, respectively);

when firing from the *"AE 790G1"* at a contact distance, significantly larger values (p<0,05-0,01) of the defect area were found on bare blocks compared to leather substitute (1.418±0.599 and 0.502±0.088 cm^2, respectively), cotton fabric compared to leather substitute (1.170±0.155 and 0.502±0.088 cm^2, respectively) and denim compared to leather substitute (1.208±0.166 and 0.502±0.088 cm^2, respectively);

when shooting with *"AE 790G1"* at a distance of 25 cm, significantly larger values (p<0.05-0.01) of the defect area were found on bare blocks compared to denim and leatherette (1.870±0.501, 0.972±0.273 and 0.630 cm^2, respectively), cotton fabric compared to denim fabric and leatherette (1.506±0.199, 0.972±0.273 and 0.630 cm^2, respectively) and denim fabric compared to leatherette (0.972±0.273 and 0.630 cm^2, respectively);

when shooting with *"AE 790G1"* at a distance of 50 cm, significantly larger values (p<0.05-0.01) of the defect area were found on bare blocks compared to denim and leatherette (1.492±0.521, 0.886±0.104 and 0.604±0.058 cm^2, respectively), cotton fabric compared to denim fabric and leatherette (1.214±0.156, 0.886±0.104 and 0.604±0.058 cm^2, respectively) and denim fabric compared to leatherette (0.886±0.104 and 0.604±0.058 cm^2, respectively);

when comparing the area of the defect at different distances of the shot with the *"AE 790G1"*, a significantly lower value (p<0.05) of the investigated indicator was found when shooting at blocks covered with cotton fabric from a contact distance compared to 25 cm (1.170±0.155 and 1.506±0.199 cm^2, respectively) and a slight tendency towards higher values (p=0.095) when shooting from a distance of 25 cm compared to 50 cm (1.506±0.199 and 1.214±0.156 cm^2, respectively), a significantly higher value (p<0.05) when shooting at blocks covered with denim fabric from a contact distance and 50 cm (1.208±0.166 and 0.886±0.104 cm^2, respectively), a significantly smaller value (p<0.05) when shooting at blocks covered with leatherette from a contact distance compared to 25 cm (0.502±0.088 and 0.630 cm^2) and a slight tendency to lower values (p=0.095) when shooting from contact range compared to 50 cm (0.502±0.088 and 0.604±0.058 cm^2, respectively).

No significant differences or trends toward differences were found when comparing blank shot defect area data between blocks and blocks covered with cotton fabric using both "Fort 12R" and "AE 790G1" at all distances tested.

A comparison of the data on the area of the defect between the "Fort 12R" and "AE 790G1" pistols revealed the following differences: significantly higher values (p<0,05-0,01) of the studied indicator when using the "AE 790G1" compared to the "Fort 12R" in all cases when firing at blocks covered with *cotton fabric* from a distance 25 cm (1.506±0.199 and 0.966±0.166 cm^2, respectively), blocks covered with *denim* from contact range (1.208±0.166 and 0.676±0.133 cm^2, respectively) and 50 cm (0.886±0.104 and 0.702±0.040 cm^2, respectively), blocks covered with *leatherette* from a distance of 25 cm (0.630 and 0.476±0.054 cm^2, respectively) and 50 cm (0.604±0.058 and 0.500 cm^2, respectively).

The analysis of indicators of the shape of the defect when firing at blocks covered with *cotton fabric* revealed the following:

when using *"Fort-12R"* at a contact distance, a tendency (p=0.076) was observed for a higher frequency of round defects than oval defects (40% and 0%, respectively);

when using *"Fort-12R"* at a distance of 25 cm, a square-shaped defect was detected more often (100%) than any other (0% in all cases) reliably (p<0.01);

when using *"Fort-12R"* at a distance of 50 cm, it was also reliably (p<0.05) more often a square-shaped defect was detected (80%) than round, rounded, oval and rectangular (0%, 0%, 0% and 20% in accordance);

when comparing the shape of the defect at different distances of the shot from the *"Fort-12R"*, a tendency (p=0.076) was found for the more frequent occurrence of a round defect when fired from a contact distance than 25 or 50 cm, and significantly (p<0.05) more frequent occurrence of the defect square-shaped when shot from a distance of 25 or 50 cm than contact distance;

when using *"AE 790G1"* at a contact distance, it was significantly more common (p<0.01) to detect a defect of a rounded shape (100%) than any other (0% in all cases);

when using *"AE 790G1"* at a distance of 25 cm, a rectangular-shaped defect (60%) was detected more often than a round or oval-shaped defect (0% and 0%, respectively);

when using *"AE 790G1"* at a distance of 50 cm, a square-shaped defect (100%) was detected significantly more often (p<0.01) than any other defect (0% in all cases);

when comparing the shape of the defect at different shooting distances with the *"AE 790G1"*, it was found that it was reliably (p<0.05-0.01) more likely to have a rounded defect when fired at contact range than from 25 or 50 cm, and a rectangular defect - when fired from a distance of 25 cm than contact and 50 cm and a square one - when shooting from a distance of 50 cm, than contact or 25 cm.

A comparison of data on the shape of the defect between the "Fort 12R" and "AE 790G1" pistols revealed the following differences: reliable for a rounded shape when fired at contact range (p<0.01) and a rectangular shape when fired from a distance of 25 cm (p<0.05) with "AE 790G1"; trends for a round shape when shooting at contact range (p=0.0763) and valid for a square shape when shooting from 25 cm (p<0.01) using "Fort 12R".

The analysis of indicators of the shape of the defect when firing at blocks covered with *denim* revealed the following:

when using *"Fort-12R"* at a contact distance, a tendency (p=0.076) was observed for a higher frequency of a square-shaped defect than a rectangular one (40% and 0%, respectively);

when using *"Fort-12R"* at a distance of 25 cm, a square-shaped defect was detected more often (100%) than any other (0% in all cases) reliably (p<0.01);

when using *"Fort-12R"* at a distance of 50 cm, a rectangular defect was detected reliably (p<0.01) more often (100%) than any other (0% in all cases);

when comparing the shape of the defect at different distances of the shot from the *"Fort-12R"* it was found that the occurrence of a rectangular defect was significantly (p<0.01) more frequent at a distance of 50 cm than at contact range or 25 cm, reliably (p<0.05-0.01) the occurrence of a square-shaped defect is more frequent at a distance of 25 cm than at close range or 50 cm and a tendency (p=0.076) towards a more frequent occurrence of a square defect at a contact distance than at 50 cm;

when using *"AE 790G1"* at a contact distance, a tendency (p=0.076) to the formation of a round defect (40%) than oval, rectangular or square (0% for all) was found, and significantly (p<0.05) more often the appearance of a round defect shapes (60%) than oval, rectangular and square (0% for all);

when using *"AE 790G1"* at a distance of 25 cm, tendencies (p=0.076) to the formation of a rectangular shape of the defect (40%) than oval, round or rounded (0% for all) were found, and significantly (p<0.05) the occurrence of a defect more often square-shaped (60%) than oval, round and rounded (0% for all);

when using *"AE 790G1"* at a distance of 50 cm, a square-shaped defect was reliably (p<0.01) detected more often (100%) than any other (0% in all cases);

when comparing the shape of the defect at different distances of the shot with the *"AE 790G1"*, tendencies (p=0.076) were found to form a round defect at a contact distance than of 25 cm or 50 cm, a rectangular shape - at a distance of 25 cm than 50 cm, a square shape - with shots from 50 cm than 25 cm, as well as significantly (p<0.05-0.01) more frequent formation of a rounded defect when shot at contact range than at 25 or 50 cm, square-shaped - at shots from 50 cm than at contact range and 25 cm than contact range.

A comparison of data on the shape of the defect between the "Fort 12R" and "AE 790G1" pistols revealed the following differences: significant for the rectangular shape of the defect when shot from 50 cm (p<0.01), trends towards differences for the square shape of the defect when shot from 25 cm (p=0.0763) from the gun "Fort 12R"; significant differences for the square shape of the defect when shot from 50 cm (p<0.01) and the tendency to differences for the rectangular shape when shot from 25 cm (p=0.0763) for the "AE 790G1" pistol.

The analysis of indicators of the shape of the defect when firing at blocks covered with *leather* substitute revealed the following:

when using *"Fort-12R"* at a contact distance reliably (p<0.05) more often round defects were detected (80%) than rounded, oval, rectangular or square (0%, 0%, 20%, 0%, respectively);

when using *"Fort-12R"* at a distance of 25 cm, it was reliably (p<0.05) more often detected round defects (60%) than rectangular or square (0% and 0%, respectively);

when using *"Fort-12R"* at a distance of 50 cm, oval-shaped defects (80%) were detected more often than round, round, rectangular or square (20%, 0%, 0%, 0%, respectively) at a distance of 50 cm;

when comparing the shape of the defect at different distances of the shot from the *"Fort-12R"* it was found that the formation of a round shape of the defect was significantly (p<0.05) more frequent when fired at contact range than at 50 cm and oval shaped when fired at 50 cm than at contact range and 25 cm;

when using *"AE 790G1"* at a contact distance reliably (p<0.05) round defects (60%) were detected more often than oval or square defects (0% and 0%, respectively);

when using *"AE 790G1"* at a distance of 25 cm, it was reliably (p<0.01) more likely to detect a round defect (100%) than any other (0% in all cases);

when using *"AE 790G1"* at a distance of 50 cm, it was reliably (p<0.05) more often a round defect was detected (80%) than a round, oval, rectangular or square defect (20%, 0%, 0%, 0%, respectively);

when comparing the shape of the defect at different shooting distances with the *"AE 790G1"*, only one tendency (p=0.076) was found for the more frequent occurrence of a round defect when shooting from 25 cm than at contact range.

Comparison of data on the shape of the defect between the "Fort 12R" and "AE 790G1" pistols revealed the following differences: reliable for the oval shape of the defect when fired from 50 cm ($p<0.05$) using the "Fort 12R"; round shape when shot from a distance of 50 cm ($p<0.05$), as well as a tendency for a round shape of the defect when shot from a distance of 25 cm ($p=0.0763$) when using the "AE 790G1" pistol.

When firing from both "Fort 12R" and "AE 790G1" at bare blocks, the shape of the defect was round in all cases.

When analyzing the domestic literature, it is possible to find some publications related to our research topic. When firing at cotton fabric fixed on a frame, using "Fort-12RM", P. Yu. Bobkov and co-authors (2019) [2] noted different nature of its damage at different distances of the shot. When fired at close range, the size of the defect was 1.0x1.0 cm. At a shot distance of 25 cm and 50 cm, the size of the defect ranged from 1.0x1.0 to 1.1x1.0 cm. In all cases, the defect had a square shape.

The use of a leather substitute fixed in a frame using a "Fort-17R" pistol at close-range, 20- and 50-cm shot distances revealed the following features: in all cases, the shape of the defect was rounded, the dimensions ranged from 0.5x0.5 cm (close-up) to 0.8x0 .8 cm (20 and 50 cm) [1].

V. I. Gunas and co-authors (2021) performed a series of close-up shots at gelatin torso simulators of an adult man dressed in cotton knitwear using "Fort-12RM" [11]. Of the 48 shots fired, 11 formed clothing defects of a rounded shape with an average diameter of 1.35 cm, and 37 - oval-shaped with an average size of 1.67x1.38 cm.

As for the works where combat pistols of the "Fort" series were used - both belong to the pen of V. V. Shcherbak (2015) and were made with the "Fort-12" pistol. The first study revealed differences in the damage to different types of fabrics fixed in the frame, when fired at close range. Features of the damage to the cotton fabric: star-shaped, the size of the central damage is 1.2x1.1-1.3x1.2 cm, the size of the defect is 0.3x0.2-0.6x0.4 cm. When the denim fabric is damaged, the shape was also star-shaped, the dimensions central damage 1.0x0.9-1.2x1.0 cm, defect sizes 0.3x0.2-0.4x0.3 cm [20]. In the second study [21], shots were fired only at cotton fabric, but from different distances. At a shot distance of 50 cm, the size of the defect was 0.7x0.7 cm.

Differences in the input and output defects of the biological simulator of the human body when using cotton clothing were noted during experimental shots using 9 mm Remington ammunition. The largest injuries were observed when shooting a naked simulator, while the smallest injuries were observed when using 1 or 2 layers of clothing [6].

T. Stevenson et al. (2019) performed a series of studies on biological [24] and non-biological simulators of the human body [23] to study the effect of military clothing on the morphological features of the wound channel, but the authors did not take into account the features of damage to the tissue itself or the surface of the simulator. At the same time, the authors made a conclusion regarding the existence of the influence of layers of clothing and its characteristics on the peculiarities of bullet passage.

It has been proven that the type of tissue is one of the factors that affects the features of the formation of the soot pattern around the incoming gunshot damage, and in general affects the deposition of additional factors of the shot, forming specific characteristics, even allowing to identify the type of firearm that was used [4, 18, 26].

Also, certain types and combinations of clothing can play a protective role when fired with a firearm. K. Cail and E. Klatt (2013) when performing experimental shots from different distances using a shotgun established that clothing causes a protective effect at a shot distance of 36.6 meters and more [5].

Conclusions and prospects for further development

1. The analysis of the obtained data showed the presence of numerous reliable and trending differences in the studied indicators of the area and shape of the defect in most of the comparison groups according to the type of tissue, the distance of the shot and the gun used and revealed the following patterns in addition:

- higher values of all reliable differences and trends of differences in the defect area indicator when fired with "AE 790G1" compared to "Fort 12R";
- no significant differences or trends of differences in the defect area index between bare blocks and blocks covered with cotton fabric, for all groups of shot distances and both guns under study;
- the same shape (round) of the defect when firing at a bare block from all distances both when using "AE 790G1" and "Fort 12R".

The next stage of research, which will allow a better understanding of the role of different types of clothing in the context of gunshot injury and will allow to improve the identification of the distance of the shot or weapon, is the study of additional factors of the shot, namely soot and the action of powder gases using visual research methods.

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ПОРІВНЯЛЬНА ХАРАКТЕРИСТИКА ПЛОЩІ ТА ФОРМИ ДЕФЕКТІВ ОДЯГУ ТА ІМІТАТОРА ТІЛА ЛЮДИНИ ПРИ ПОСТРІЛАХ З ПІСТОЛЕТІВ "ФОРТ 12Р" І "AE 790G1"

Куслій Ю. Ю., Мішалов В. Д., Гунас І. В., Школьніков В. С., Гель А. П.

Анотація. *Поширення вогнепальної зброї нелетальної дії серед різних верств населення України та збільшення її різновидів, доступних до продажу, є ще одним сучасним викликом для судової експертизи. У зв'язку з цим існує гостра необхідність у вивченні особливостей пошкоджень, що викликають новітні види травматичних пістолетів з урахуванням такого фактору як одяг. Метою дослідження стало визначення особливостей форми та розмірів дефектів пошкоджень, викликаних пострілами з пістолетів "Форт 12Р" і "AE 790G1" з різних відстаней залежно від покривного матеріалу імітатора тіла людини. Для досягнення поставленої мети виконано відстріл 120 желатинових блоків (по 60 на кожний пістолет), розділені* *на 4 підгрупи відповідно до покриття: голі блоки, вкриті бавовняною тканиною, джинсовою тканиною, шкірозамінником. Відстріли проводили з відстаней впритул, 25 та 50 см. У подальшому виконували опис пошкоджень і статистичну обробку отриманих результатів у ліцензійному статистичному пакеті "Statistica 6.0". При аналізі достовірності відмінностей між досліджуваними групами при оцінці площі дефекту виявлено здебільшого достовірні відмінності (p<0,05-0,01) як між різними підгрупами блоків, так і між відповідними групами пістолетів, а також відстаней пострілу. Аналіз показника "форма дефекту" виявив як достовірні відмінності (p<0,05-0,01), так і тенденції до відмінностей (p=0,076) в усіх досліджуваних групах, окрім всередині підгрупи, де використовувалися голі блоки незалежно від відстані пострілу чи пістолету, що використовувався. Таким чином, виявлені відмінності у формі та площі дефектів дозволяють використовувати їх з метою вирішення питання ідентифікації пострілів з пістолетів "Форт 12Р" та "АЕ 790G1" на дистанціях впритул, 25 та 50 см і допомагають покращити розуміння ролі одягу при вогнепальній травмі. У подальших дослідженнях доцільним є виконання порівняльного аналізу з використанням даних щодо додаткових чинників пострілу.*

Ключові слова: *вогнепальна травма, вогнепальні ушкодження, судово-медична експертиза, нелетальна зброя, імітатор тіла людини, пошкодження одягу, вогнепальна зброя.*