

Erectile dysfunction and quality of life of men affected by hostilities in the Russian-Ukrainian war

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Erectile dysfunction and the associated quality of life are a pressing social and medical problem for millions of people. The basis of the work was the results of a survey of 298 men injured as a result of combat operations (shrapnel and bullet wounds) using the questionnaires of the International Index of Erectile Function-5 (IIEF-5) and the SF-36 Health Status Survey (SF-36) questionnaire to characterize the quality of life. The research group was divided into two: men aged 20-39 years (group 1) and men aged 40-53 years (group 2). The control group consisted of 48 clinically healthy men without complaints of sexual dysfunction or cardiac, neurological or endocrinological pathology. It is shown that men aged 20-39 years have a mild form of ED where the total score is 19.57 ± 0.44 . Men of the 2nd group aged 40-53 years also have a mild form of ED, but the total score is much lower and is 17.74 ± 0.41 . Patients of both age groups affected by hostilities suffer from both mental and physical health components. Indicators such as general health, role functioning due to physical condition, and pain intensity have probably lower values compared to the control group. Lower indicators of role functioning due to physical condition indicate limitations in everyday life due to unsatisfactory physical condition. The decrease in the physical functioning index has statistically significant differences only in patients of the 2nd observed group. Thus, a mild form of erectile dysfunction is observed in men injured as a result of hostilities. No significant differences in the severity of erectile dysfunction were found between male war victims of two age groups. All IIEF-5 domains were significantly reduced in men affected by combat operations. It has been proven that the physical and mental components of health suffer in victims of hostilities. Against the background of a decrease in all indicators on the scales of the physical component of health, general health and role functioning caused by physical condition lag behind the most. In the psychological domain, the most pronounced changes are recorded in such components as mental health, vital activity and social functioning. Correlation analysis revealed the significant correlation between physical functioning and role functioning caused by emotional state ($r = +0.64$; $P < 0.05$).

Keywords: men with shrapnel and bullet wounds; erectile dysfunction; quality of life; SF-36.

Introduction

One of the most pressing social and medical problems for millions of people is erectile dysfunction (ED) and the associated quality of life (Shamloul & Ghanem, 2013; Yafi et al., 2016; Calzo et al., 2021; Salonia et al., 2021). In recent decades, the definition of health-related quality of life has become an important tool in studying the health status of patients, populations, and the quality of the health care system. ED occurs as a result of a pathological violation of the relationship between the nervous, vascular and smooth muscle systems, which are involved in the regulation of the processes of tumescence (increase in the volume of the cavernous bodies of the external genital organs and their acquisition of increased elasticity during sexual arousal) and detumescence (Yafi et al., 2016). The modern scientific understanding of ED indicates the predominant secondary nature of sexual disorders in relation to the diseases that cause them (Horpynchenko & Vorobets, 2010; Vorobets & Kodrov, 2011; Kozopas et al., 2021; Melnyk et al., 2023). This especially applies to military personnel who are participants in hostilities. Among the many pathological conditions that precede or are complicated by ED, neurotic disorders of the psyche/central psychogenic disorders, blood vessel diseases, metabolic disorders (diabetes mellitus, dyslipidemia, etc.) and partial androgen deficiency take precedence (Grover et al., 2006; Kupelian et al., 2006; Sun et al., 2006). ED is strongly correlated with the general health of men and can be a precursor to the development of cardiovascular diseases,

diabetes, determine the development of organic ED, etc. All the above mentioned stimulates interest in its comprehensive study. The development of ED is usually multifactorial, and there are several risk factors for it. Age and diabetes are the most important and frequent factors in the development of ED (Grover et al., 2006; Sun et al., 2006). Now there are a number of studies on the development of ED in combatants (Vietnam, Afghanistan, Iraq), which is associated with constant stress, injuries, etc.

Recent studies have shown that ED not only negatively affects sex life, but also impairs overall life satisfaction (Watts et al., 2007; Vorobets, 2010). Erectile function is increasingly recognized as an indicator of the general health of men (Vorobets & Kodrov, 2011; Shamloul & Ghanem, 2013; Yafi et al., 2016; Calzo et al., 2021), as well as an important marker of vascular diseases (Thompson et al., 2005; Watts et al., 2007). This has led to recommendations of the American Medical Association regarding the need to determine the risk of cardiovascular disease in patients with ED (Thompson et al., 2005; Watts et al., 2007; Horpynchenko & Vorobets, 2010). More than 600,000 men aged 40–69 in the US are estimated to suffer from ED, and with the availability of effective pharmacotherapy more patients seeking medical help.

According to modern ideas, the quality of life is an interdisciplinary concept that includes the overall characteristics of a person's physical, psychological, social, emotional, and material well-being. In other words, quality of life is defined as a subjective indicator of satisfaction of personal needs in life (Rosen et al., 1997; Cappelleri et al., 1999; Schallock, 2004).

The term quality of life refers to the subjective perception and satisfaction of a person with the level of his well-being (Yagensky et al., 2013; Lekhan, 2014). In recent decades, the study of quality of life has become a separate field of medicine, since it is impossible to draw conclusions about the final results of treatment without an assessment of quality of life. Assessment of the quality of life can serve to correct therapeutic treatment schemes and select a complex of medical and rehabilitation measures, which is extremely important for victims of hostilities. Data on the quality of life of war victims are also important for the social adaptation of patients.

The SF-36 Health Status Survey (SF-36) is the most widely used general quality of life questionnaire, which assesses all components of quality of life, including health-related ones, which are not specific to age groups, particular diseases, or treatment programs. SF-36 is considered the most tested and valid. The questionnaire is characterized by high informativeness and sensitivity. Simultaneously, it is an accessible and valid tool for assessing the main components of physical and mental health. The SF-36 allows to assess: a person's general state of health, physical functioning, role-based physical functioning, role-emotional functioning, social functioning, intensity of physical pain, life activity and mental health. SF-36 is used to assess the quality of life both in healthy individuals and in patients with various diseases, regardless of nosology (Jelsma et al., 2005; Campolina & Ciconelli, 2008; Motl et al., 2009; Pelle et al., 2013; Lins & Carvalho, 2016). Due to the growing interest in the problem of ED and the quality of life associated with it, the study of ED and the quality of life of war victims is important.

The purpose of the work is to find out the development of ED in men of different age groups who suffered as a result of combat operations (shrapnel and bullet wounds) in the Russian-Ukrainian war and to assess their quality of life.

Materials and methods

The research was carried out in compliance with the principles of medical ethics and the protection of patients' rights, human dignity and moral and ethical norms, in accordance with the principles of the Helsinki Declaration of Human Rights, the Council of Europe Convention on Human Rights and Biomedicine, the laws of Ukraine; permission of the Bioethics Committee of the Danylo Halytsky Lviv National Medical University. The study is based on the results of a survey of patients of the Military Medical Clinical Center of the Western Region (Lviv, Ukraine) who suffered as a result of hostilities. The study was carried out in September–December 2023. The article presents the results of a survey of 298 men injured as a result of combat operations (shrapnel and bullet wounds) using the questionnaires of the International Index of Erectile Function-5 (IIEF-5) and the "SF-36 Health Status Survey" questionnaire (SF-36) (Ware & Sherbourne, 1992; Rosen et al., 1997; Campolina & Ciconelli, 2008; Pelle et al., 2013). The patients were divided into two age groups: men aged 20–39 years (group 1) and men aged 40–53 years (group 2). The control group consisted of 48 clinically healthy men without complaints of sexual dysfunction or cardiac, neurological or endocrinological pathology. Among the men of the control group were 30 men aged 20–39 years (group 3) and 18 men aged 40–53 years (group 4).

The IIEF-5 questionnaire was created for a detailed and specific assessment of ED. The studies considered two main criteria for determining ED. The questions of the first criterion were based on the subjective general self-assessment of erectile function ("simple question"): a) how do you rate your confidence that you will be able to achieve and maintain an erection?; b) how often is an erection hard enough to penetrate during sexual stimulation?; c) how often are you able to maintain an erection after penetrating your partner?; d) how difficult is it to maintain an erection until the end of penetration?; e) how often are you satisfied with intercourse? The second criterion in differentiating the severity of ED was the sum of the points of answers to questions 1–5 and 15 of the IIEF-5 questionnaire which forms the domain of erectile function (EF-IIEF). According to the following scale: the value of IIEF-5 in the range of 21–25 points corresponds to normal erectile function, 16–20 points – to a mild form of ED, 11–15 points – to a moderate form of ED, 5–10 points – to a severe form of ED. Additional criteria included the ability to experience orgasm, as-

essment of sexual desire, assessment of satisfaction with sexual intercourse, assessment of satisfaction with sexual life.

The assessment of the quality of life of the victims of hostilities was carried out using the questionnaire "SF-36 Health Status Survey", which was suggested to be filled out at the time of starting the treatment of patients (Hopman & Verner, 2003; Campolina & Ciconelli, 2008; Pelle et al., 2013; Lins & Carvalho, 2016). The questionnaire includes 36 items that highlight 8 concepts of health: 1) general state of health – the patient's assessment of his own state of health at the moment and treatment prospects; 2) physical functioning, which reflects the extent to which health limits the performance of physical activities – self-care, walking, climbing stairs, carrying loads; 3) role functioning determined by physical condition – the influence of physical condition on role functioning – work, performance of everyday activities; 4) role functioning caused by an emotional state – the influence of an emotional state on role functioning involves an assessment of a state in which an emotional state prevents the performance of work or other daily activities (including an increase in time spent, a decrease in the amount of work performed, a decrease in the quality of its performance, etc.); 5) social functioning is determined by the degree to which a physical or emotional state limits social activity, communication; 6) pain sensations – the intensity of pain and its impact on the ability to engage in everyday activities, including work; 7) vital activity – vitality includes feeling full of strength and energy or, on the contrary, exhausted; 8) mental health – self-assessment of mental health, characterizes mood (presence of depression, anxiety, general indicator of positive emotions).

The results are presented as the mean \pm standard error ($x \pm SE$). Analysis of variance (ANOVA) was used to compare the difference in the means between studied groups. To compare the difference between the parameters groups we used the Tukey test. Differences were considered statistically significant at $P < 0.05$. Correlation analysis was performed using the Pearson correlation coefficient.

Results

Based on a systematic approach, the state of sexual and mental health of patients affected by hostilities was studied using a questionnaire. This system is based on the principles of complexity, differentiation, sequence and phasing, consists of components, surveys using IIEF-5 questionnaires. The questionnaire includes 5 questions that allow us to assess the following 5 components of sexual function in men: erection, orgasm, sexual attraction, satisfaction from intercourse and general sexual satisfaction. Then the total score was calculated for each of these components; in addition, a special algorithm was used for clinical interpretation of the score. The main advantages of the IIEF-5 surveyor are considered relative brevity and ease of use, multifactorial assessment of sexual function, reliability and reproducibility of quantitative data. The IIEF-5 questionnaire was used for differential diagnosis between patients with and without ED, as well as for a clinically significant assessment of the severity of the detected symptoms (Table 1). According to the accepted gradation, the value of IIEF-5 in the range of 21–25 points corresponds to normal ED, 16–20 points to a mild form of ED, 11–15 points to a moderate form of ED and 5–10 points – to severe form of ED. It can be seen that men aged 20–39 years have a mild form of ED where the total score is 19.57 ± 0.44 . Men of the second group aged 40–53 years also have a mild form of ED, but the total score is much lower and is 17.74 ± 0.41 .

Table 2 shows the differences between the total scores of ED according to IIEF-5 questionnaires among men of different age groups in patients with combat trauma and men of the control group. It can be seen that total scores of ED according to IIEF-5 in men 20–39 years old are lower by 4.3 ($P < 0.001$) compared to the control group of the same age. Changes in of total scores of ED according to IIEF-5 are more expressed in men 40–53 years old. Total scores of ED are lower by 5.26 ($P < 0.001$) compared to the control group. There is also a statistically significant difference in total scores of ED according to IIEF-5 questionnaires between both age groups in patients with combat trauma. However, there is no difference in total scores of ED according to IIEF-5 between age groups in healthy men. The scores of individual 5 components of male sexual function and the scale of erection hardness were also lower in patients of

the both research groups compared to the control values. The ED-IIEF-5 domain decreases most significantly with the severity of ED (Fig. 1). All IIEF domains are significantly reduced in ED compared to the healthy group of respondents, but there is no differentiation by ED severity. That is, with ED of any severity, all other sexual functions simultaneously suffer – sexual desire, confidence in erection, firmness and maintenance of erec-

tion, pleasure from sexual intercourse and sexual life. The lack of gradation of the severity of impairment of these functions can be explained by the small number of questions that make up the respective domains. Perhaps, with a more comprehensive questionnaire, detailed violations of libido, ejaculation and sexual satisfaction in ED would have been revealed.

Table 1
Results of the IIEF-5 questionnaire of men of different age groups ($x \pm SE$)

Indicator IIEF-5	Age group 20–39 years, n = 196	Age group 40–53 years, n = 102
How do you rate your confidence that you will be able to achieve and maintain an erection?	3.62 ± 0.10	3.24 ± 0.11*
How often is an erection hard enough to penetrate with sexual stimulation?	3.81 ± 0.11	3.46 ± 0.12*
How often are you able to maintain an erection after penetrating your partner?	3.96 ± 0.10	3.51 ± 0.16*
How difficult is it to maintain an erection until the end of penetration?	4.17 ± 0.18	3.82 ± 0.32
How often are you satisfied with intercourse?	4.00 ± 0.10	3.71 ± 0.47
Total score	19.57 ± 0.44	17.74 ± 0.41**

Note: * – $P < 0.05$; ** – $P < 0.01$ – changes are statistically significant compared to indicators in men 20–39 years old.

Table 2
Indicators of total scores of ED according to IIEF-5 questionnaires among men of different age groups ($x \pm SE$)

Age groups	Total scores of ED	
	patients with combat trauma, n = 298	control group, n = 48
Men 20–39 years old	19.57 ± 0.44***	23.87 ± 0.56
Men 40–53 years old	17.74 ± 0.41***##	23.00 ± 0.72

Note: *** – $P < 0.001$ changes are statistically significant compared to the control group; ## – $P < 0.01$ – changes are statistically significant compared to indicators in men 20–39 years old.

When asked simple questions about the subjectively assessed severity of ED, the results of the mean values of IEF domains depending on the severity of ED turned out to be almost identical (Fig. 2).

Patients of both age groups suffer from both mental and physical components of health (Table 3). Among physical components, indicators such as general health, role functioning due to physical condition, and pain intensity have probably lower values compared to the reference group. When analyzing the physical components of health in a comparative aspect by observation groups, it can be seen that on all scales the indicators are higher in the victims of the younger age group compared to the indicators in the older age group.

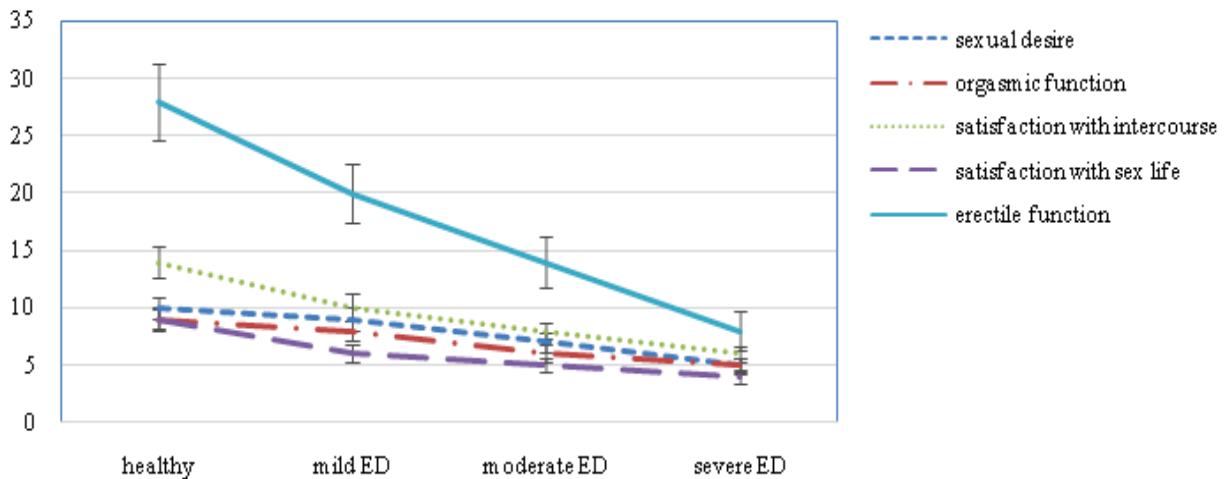


Fig. 1. Mean values of IIEF domains depending on the severity of ED according to ED-IIEF ($x \pm SE$, n = 298)

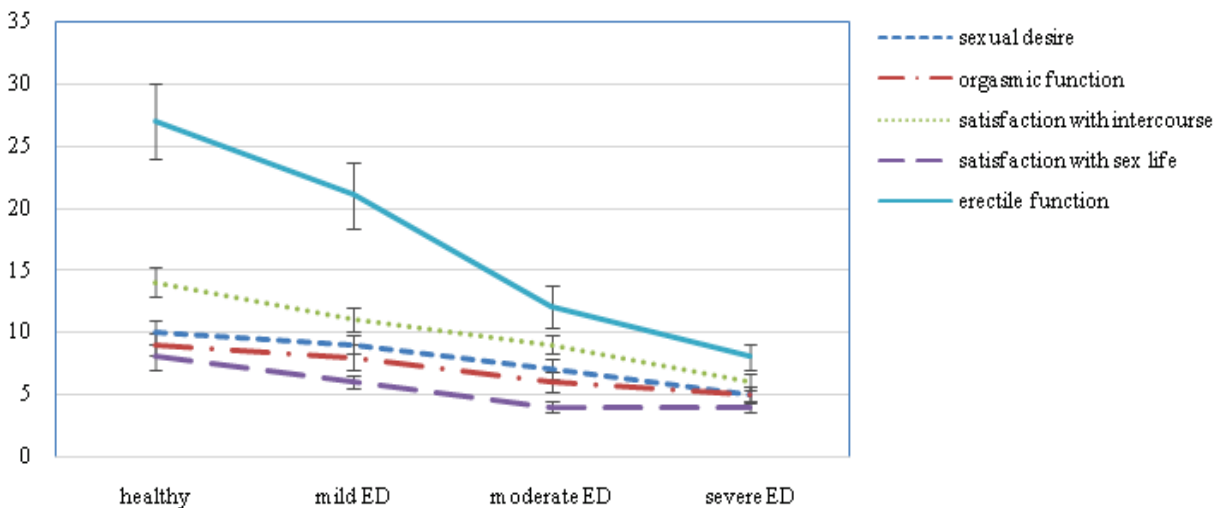


Fig. 2. Mean values of IIEF domains depending on the severity of ED according to the subjective general self-assessment of ED ($x \pm SE$, n = 298)

Table 3Results of assessment of patients' quality of life between observation groups according to the SF36 questionnaire ($\bar{x} \pm SE$)

Parameters	Studied group		Control group		Minimum and maximum value
	age group 20–39 years, n=196	age group 40–53 years, n=102	age group 20–39 years, n=30	age group 40–53 years, n=18	
General health	15.72 ± 0.21 ^{***}	14.25 ± 0.32 ^{***}	22.50 ± 1.52	20.76 ± 1.82	5–25
Physical functioning	22.26 ± 0.24	20.12 ± 0.22 ^{***###}	26.42 ± 2.04	25.77 ± 2.23	10–30
Role functioning caused by physical condition	5.38 ± 0.18 ^{***}	5.18 ± 0.23 ^{**}	7.54 ± 0.53	7.14 ± 0.57	4–8
Intensity of pain	6.36 ± 0.18 ^{***}	6.52 ± 0.44 ^{***}	11.78 ± 0.17	10.62 ± 0.21	2–12
Vital activity	13.86 ± 0.17 ^{***}	11.32 ± 0.35 ^{***###}	23.24 ± 0.32	20.24 ± 0.52	4–24
Social functioning	5.74 ± 0.10 ^{***}	5.15 ± 0.24 ^{***}	9.53 ± 0.76	9.05 ± 0.74	2–10
Role functioning caused by emotional state	3.96 ± 0.13 ^{***}	3.82 ± 0.22 ^{**}	5.82 ± 0.57	5.45 ± 0.42	3–6
Mental health	17.83 ± 0.35 ^{***}	14.72 ± 0.28 ^{***###}	27.62 ± 1.82	22.68 ± 2.92	5–30

Note: ** – $P < 0.01$; *** – $P < 0.001$ changes are statistically significant compared to the control group; changes are statistically significant compared to indicators in men 20–39 years old ### – $P < 0.001$.

When studying the psychological state, the most pronounced changes are recorded in such components as mental health, vital activity and social functioning. At the same time, the indicators of role functioning determined by the emotional state turned out to be close according to the assessment. Significantly lower indicators of social functioning compared to role functioning, caused by the emotional state, indicate the limitation of social contacts in social life, than in everyday activities. In general, victims of hostilities in the younger age group performed better on mental health scales, which may be due to their higher adaptability to their own health. The above indicates the need for a more in-depth study of the psychological state of victims of hostilities. It should be noted that changes in physical and mental health also occur in the reference group, and their components do not reach one hundred percent. However, among men in this group, physical functioning and mental health suffer more.

Correlation analysis between various indicators of life quality in men affected by hostilities are presented below. According to the results of the correlation analysis, a positive correlation between general health and physical functioning ($r = +0.43$; $P < 0.05$), as well as general health and role functioning caused by emotional state ($r = +0.34$; $P < 0.05$) was found. The closest positive correlation was found between the physical functioning and role functioning caused by emotional state ($r = +0.64$; $P < 0.05$). There is also a significant positive correlation between mental health and life activity ($r = +0.34$; $P < 0.05$) and pain intensity ($r = +0.42$; $P < 0.05$). The correlation between the role functioning caused by emotional state and role functioning caused by physical state was negative ($r = -0.37$; $P < 0.05$).

Discussion

A lower score on the IIEF-5 questionnaire in patients with ED of both age groups indicates a significant psychological and pain burden caused by the man's awareness of sexual dysfunction even in the absence of somatic pathology. It is painfully experienced and negatively affects mental, social, overall health and the associated quality of life. These ED patients dramatize the severity of their problem, as reflected in low scores on the IIEF-5 questionnaire, in contrast to significantly higher scores in the controls. Lower indicators of role functioning due to physical condition indicate limitations in everyday life due to unsatisfactory physical condition. The decrease in the physical functioning index has statistically significant differences only in patients of age group 40–53 years. Physical activity is considered as the result of focusing physical ability on performing a certain type of activity (work) outside the home.

There are a number of studies on the quality of life of men with ED that use the same concepts, questionnaires and statistics that allows comparison. The main results obtained by us are consistent with similar data, which also revealed the association of ED with deterioration of health, emotional problems, stress (Laumann et al., 1999). Other studies indicate a relationship between psychological characteristics and ED – men with the highest levels of anger suppression and anger expression have a higher chance of developing moderate or severe ED than men in the general population, as well as men with severe depression (Melman & Gingell, 1999). It was found that men who seek medical help for ED and have a low level of satisfaction with their sexual life, after appropriate treatment, the level of satisfaction increases significantly (Fugl-Meyer et al., 1997).

A strong positive association between depression and ED was revealed (Araujo et al., 1998; Meana et al., 2008). Other interesting data using questionnaires regarding high social activity with pronounced ED are reflected in research work (Laumann et al., 1999). These data are difficult to interpret because they are not reproduced when using the IIEF-5 and ED-sq (simple question) questionnaires. Since the degree of ED determined by the ED-sq questionnaire does not fully correlate with the data of the IIEF-5 questionnaire, patients with moderately expressed ED (by IIEF-5) may be younger than men with moderate ED (by ED-sq).

American researchers, based on the experience of the war in Vietnam, Iraq, Afghanistan, pay attention to the problem of quality of life, ED, mental health of people who have survived combat trauma, which is a component of a wide field of stress research (Ehlers & Clark, 2000; Halligan et al., 2003; Watson & Shalev, 2005). Post-traumatic stress disorder is one of the most common and prominent illnesses in military personnel who have participated in combat operations, and not only the wounded (Fikretoglu et al., 2007). This stress disorder is most often understood as experiencing one's own injury or witnessing death in response to which feelings of helplessness and fear arise. It manifests as a series of symptoms that last at least a month and impair the quality of life associated with ED (McWilliams et al., 2005). Combat-related stressors have various sources, including self-injury, and a physiological example of stress is sexual (erectile) dysfunction (mental protection). Stress has both physical and behavioral manifestations. It can increase morbidity, particularly through immune system disorders (Adler et al., 2000; Hoge et al., 2004, 2006). Neurobiological factors play a leading role in the ability to withstand trauma and stress (Wang et al., 2000; Caspi et al., 2003). Heredity is 28–33%. A wide variety of hormones, neurotransmitters, and neuropeptides known to be activated by trauma and stress also influence psychological resilience and, consequently, quality of life (Chamey, 2004).

Conclusion

A mild form of erectile dysfunction is observed in men injured as a result of hostilities. No significant differences in the severity of erectile dysfunction were found between male war victims of two age groups. All domains of IIEF-5 are significantly reduced in men injured as a result of hostilities. It has been proven that the physical and mental components of health suffer in victims of hostilities. Against the background of a decrease in all indicators on the scales of the physical component of health, general health and role functioning caused by physical condition lag behind the most. In the psychological domain, the most pronounced changes are recorded in such components as mental health, vital activity and social functioning. Correlation analysis revealed the significant correlation between physical functioning and role functioning caused by emotional state ($r = +0.64$; $P < 0.05$).

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