DOI 10.26724/2079-8334-2021-4-78-150-154
UDC 616.12-008.331.1-055.1-06:[355.24+355.11]

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FEATURES OF COMORBIDITY OF INTERNAL DISEASES IN MILITARY PERSONNEL PARTICIPATING IN THE ANTI-TERRORIST OPERATION/JOINT FORCES OPERATION

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Comprehensive assessment of comorbidity is an urgent problem of modern medicine and is aimed at prolonging the professional longevity of the working-age population. 183 military personnel participating in the Anti-Terrorist Operation/Joint Forces Operation who were undergoing treatment for arterial hypertension were retrospectively examined by random sampling. The features of comorbid pathology of internal organs were determined according to the Cumulative Illness Rating Scale (CIRS), depending on the stage of arterial hypertension. The results of the study are intended for medical and social justification of optimization of the functional and organizational model of comorbid pathology prevention to prolong the professional longevity of military personnel, their suitability for military service for health reasons.

Key words: arterial hypertension, comorbid pathology, chronic diseases, combatants, modern armed conflicts.

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ОСОБЛИВОСТІ КОМОРБІДНОСТІ ВНУТРІШНІХ ЗАХВОРЮВАНЬ У ВІЙСЬКОВОСЛУЖБОВЦІВ – УЧАСНИКІВ АНТИТЕРОРИСТИЧНОЇ ОПЕРАЦІЇ/ОПЕРАЦІЇ ОБ'ЄДНАНИХ СИЛ

Комплексна оцінка коморбідності є актуальною проблемою сучасної медицини і спрямована на подовження професійного довголіття працездатного населення. Методом випадкової вибірки було ретроспективно обстежено 183 військовослужбовця – учасника антитерористичної операції/операції Об'єднаних сил, які проходили лікування з приводу артеріальної гіпертензії. Визначені особливості коморбідної патології внутрішніх органів за кумулятивною шкалою захворювань (CIRS) залежно від стадії артеріальної гіпертензії. Результати дослідження призначені для медико-соціального обгрунтування оптимізації функціонально-організаційної моделі профілактики коморбідної патології задля подовження професійного довголіття військовослужбовців – їхньої придатності до військової служби за станом здоров'я.

Ключові слова: артеріальна гіпертензія, коморбідна патологія, хронічні захворювання, комбатанти, сучасні збройні конфлікти.

The study is a fragment of the research project "Epidemiological, therapeutic and pharmacoeconomic features of topical therapeutic pathology of servicemen and employees of the Armed Forces of Ukraine in the context of the Joint Forces Operation", state registration No.0120U101854.

Protecting and promoting the health of military personnel is an important component of the national security system. Maintaining the combat capability of the Armed Forces of Ukraine and other military formations is impossible without modern medical care for servicemen. This can be achieved with the active participation of the Ministry of Defense of Ukraine with the civilian health care system within a single medical space – a comprehensively balanced health care system, which, can perform its assigned tasks in peacetime and wartime based on the implementation of world best practices aimed at the optimal use of forces and means [4, 9].

The set of preventive, therapeutic, diagnostic, and rehabilitation measures for military personnel participating in the Anti-Terrorist Operation/Joint Forces operation (ATO/JFO) is one of the most important medical and social problems of today [1].

It is well known that existing comorbid internal diseases negatively affect the course of modern combat trauma, as well as combat trauma, has a negative impact on the course of these diseases [6, 8], which, in turn, negatively affects the health status of military personnel, their suitability for military service for health reasons – professional longevity. Today, the mechanisms and features of such mutual aggravating influence are not fully studied, which is extremely relevant for modern medicine, since it has a significant impact on prolonging the professional longevity of military personnel. Moreover, extending the professional longevity of a highly qualified (with combat experience, experience in eliminating the consequences of man-made disasters) serviceman even for 1 year gives a striking economic effect [3, 8].

In the available scientific and medical literature, there are only a few publications on the structure of primary appeals of military personnel during the ATO/JFO. According to them, respiratory diseases, digestive diseases, diseases of the skin and subcutaneous tissue, diseases of the musculoskeletal system and connective tissue, circulatory diseases, and infectious diseases occupy the leading places after injuries, poisonings, and some other consequences of external factors. [4].

The actual lack of research on the comorbidity of internal diseases in military personnel, which can negatively affect the course of modern combat trauma, as well as combat trauma can aggravate their course, determined the relevance of this study and its purpose.

The purpose of the study was to analyze comorbid pathology by methods of its quantitative assessment in military personnel participating in modern armed conflicts.

Materials and methods. The design of the study was a passive retrospective cross-sectional (transverse) study [11], performed on the clinical basis of the Ukrainian Military Medical Academy – in the National Military Medical Clinical Center "Main Military Clinical Hospital" (NMMCC "MMCH").

To study the features of comorbid pathology in military personnel participating in the ATO/JFO, a retrospective examination of 183 patients treated for arterial hypertension (AH) in the NMMCC "MMCH" during 2016–2018 was conducted by random sampling. All patients were male aged 27–59 years, with a mean age of 45.0±7.0 years. Existing comorbid pathology (causal diseases, complications of the underlying disease, and competitive diseases) were taken into account in the patients included in the study [14].

All retrospectively surveyed servicemen did not have any diseases limiting their fitness for military service before being exposed to extreme factors of military service.

Verification of diagnoses of internal diseases was carried out in accordance with the requirements of medical and technological documents on the standardization of medical care. The Cumulative Illness Rating Scale (CIRS) was used for a comprehensive assessment of comorbidity in military personnel [14].

The examination at the NMMCC "MMCH" included a wide range of clinical and laboratory, instrumental research methods and consultations of specialty doctors (cardiologist, endocrinologist, pulmonologist, gastroenterologist, neurologist, otorhinolaryngologist, vascular surgeon, and others).

Specialist doctors according to the generally accepted criteria of military field surgery and military field therapy [6, 8] carried out verification of modern combat trauma without blood loss.

StatSofr Inc. (USA) using parametric and nonparametric statistical methods [11] performed statistical analysis of the results in the standard statistical package (SSP) STATISTICA 10.0 for Windows.

The obtained data were divided into 2 groups: quantitative (numerical) and qualitative (categorical). The results of quantitative (numerical) data are presented as (M±s), where M is the mean (arithmetic mean) value of the indicator, s is the square mean (standard) deviation, and qualitative (categorical) – in absolute and relative (percentage) values [11].

The criterion for choosing a statistical method (parametric or non-parametric) was the type of data being compared. When comparing quantitative data, we used the parametric method – "One-way analysis of variance" ("ANOVA") of the module "Analysis of variance" ("ANOVA/MANOVA"), and when comparing qualitative data (relative frequencies) – the nonparametric method "Probability calculator" of the submodule "Other significance tests" of the "Basic statistics/Tables" module Statistica 10.0. To avoid the problem of multiple comparisons in statistical analysis using the parametric method of one-way analysis of variance (one-way ANOVA), we used the method of post–hoc comparisons of means, the criterion of least significant difference (LSD), and in statistical analysis using the nonparametric probability calculator method, we applied the Bonferroni correction when estimating the significance level p [11].

The results of the study and their discussion. In participants of the ATO/JFO, stage I hypertension was diagnosed in 126 out of 183 examined patients (69 %), stage II hypertension – in 29 % out of 183, and Stage III hypertension – in 2 % (3/183) of the examined patients. Stage III hypertension was diagnosed based on the occurrence of complications in the examined patients – acute cerebrovascular accident.

Statistical analysis comparing the frequency of diagnosis of different stages of hypertension in ATO/JFO participants showed that stage I hypertension was statistically significantly more often diagnosed than stages II and III hypertension ($p<0.05$ in both cases). In addition, there were no statistical differences in the frequency of diagnosis of stages II and III hypertension ($p>0.05$).

The total number of diagnoses, the number of diagnoses of causal, competitive diseases, and a point score on the CIRS scale, which is presented in the corresponding figures, evaluated features of comorbid pathology in hypertension in ATO/JFO participants.

The total number of diagnoses of comorbid diseases in hypertension in the participants of the ATO/JFO is presented in fig. 1.

The total number of diagnoses in patients with hypertension of military personnel participating in the ATO/JFO was from 2 to 14, with a mean of 6.2±2.2 diagnoses. In stage I hypertension, the total number of diagnoses was from 2 to 13, on average 6.0±2.0 diagnoses, in stage II hypertension – from 2 to 14, on average 6.6±2.7 diagnoses, and in stage III hypertension – from 4 to 10, on average 6.7±3.1 diagnoses. At the same time, no statistically significant differences were found in the total number of diagnoses of hypertension in ATO/JFO participants depending on the stage of hypertension (one-way ANOVA, P=0.2032).

Causal diseases are considered to be united by a single mechanism of development, the total number of which in hypertension in the participants of the ATO/JFO is presented in fig. 2.

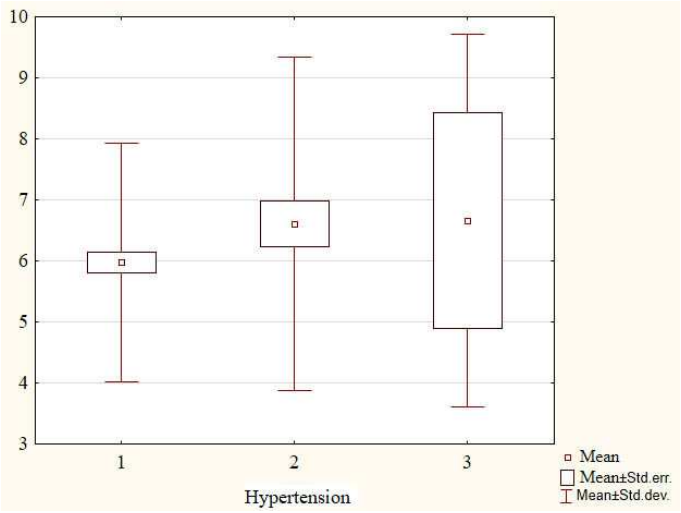

Fig. 1. The total number of diagnoses of comorbid diseases in military personnel participating in the ATO/JFO. Here and on the following graphs: Hypertension – Arterial Hypertension, 1 – Stage I of arterial hypertension, 2 – Stage II of arterial hypertension, 3 – Stage III of arterial hypertension, Mean – (arithmetic mean) value, Std. error – standard error of the mean, Std. deviation – mean square (standard) deviation.

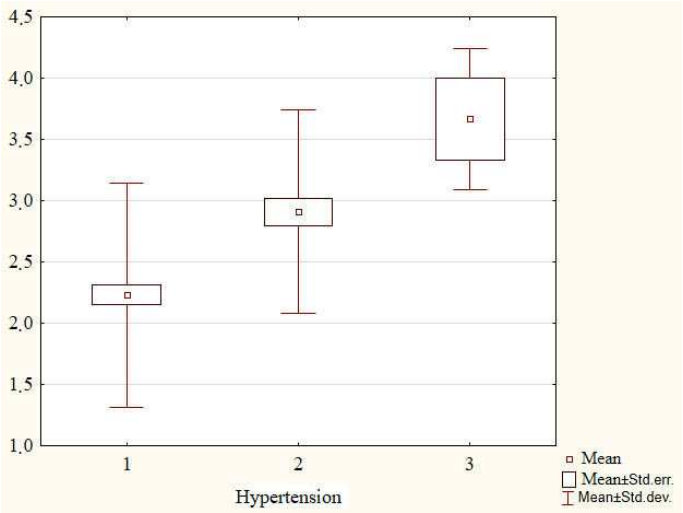

Fig. 2. The number of diagnoses of causal diseases in military personnel participating in the ATO/JFO.

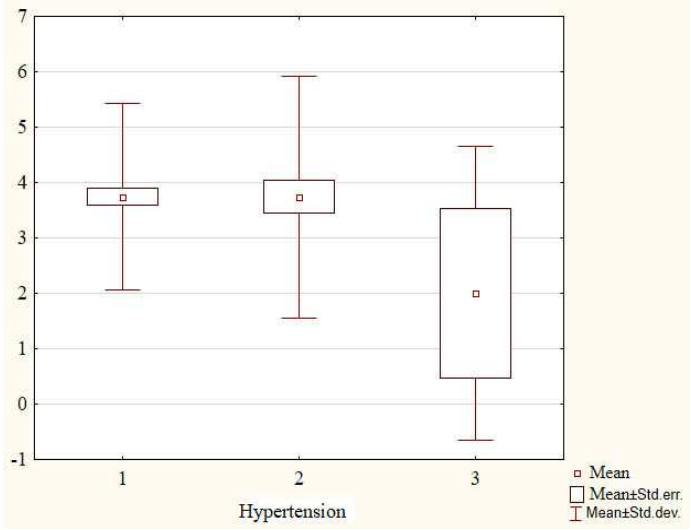

Fig. 3. The number of diagnoses of competitive diseases in military personnel participating in the ATO/JFO.

The number of diagnoses of causal diseases in patients with hypertension of military personnel participating in the ATO/JFO ranged from 1 to 4, with an average of 2.5±0.9 diagnoses. In stage I hypertension, the number of diagnoses of causal diseases was from 1 to 4, on average 2.2±0.9 diagnoses, in Stage II hypertension – from 1 to 4, on average 2.9±0.8 diagnoses, and in Stage III hypertension – from 3 to 4, on average 3.7±0.6 diagnoses. At the same time, statistically significant differences were found between the number of diagnoses of causal diseases at different stages of hypertension (one-way ANOVA, p=0.0001), in particular, at stages I and II hypertension (LSD, p=0.0001) and at stages I and III hypertension (LSD, p=0.0061), and no statistical differences were found at stages II and III hypertension (LSD, p=0.1506).

The number of hypertension complications in ATO/JFO participants was 1, with an average of 0.02±0.1, and was represented by acute cerebral circulatory disorders. Accordingly, there were no complications in stage I and II hypertension, and in Stage III hypertension, there were 1, on average 1.0 complications. There were no statistically significant differences between the number of complications at different stages of hypertension (one-way ANOVA, p=0.4922).

Unrelated diseases are considered competitive; their total number of hypertension in the ATO/JFO participants is presented in fig. 3.

The number of diagnoses of competitive diseases in patients with hypertension of military personnel participating in the ATO/JFO ranged from 0 to 10, with an average of 3.7±1.9 diagnoses. In stage I hypertension, the number of diagnoses of competitive diseases was from 0 to 9, on average 3.7±1.7 diagnoses, in Stage II hypertension – from 0 to 10, on average 3.7±2.2 diagnoses, and in Stage III hypertension – from 0 to 5, on average 2.0±2.6 diagnoses. At the same time, there were no statistically significant differences in the number of diagnoses of competitive diseases depending on the stage of hypertension (one-way ANOVA, p=0.2742).

Intercurrent are diseases that occur as an exacerbation of a disease with a chronic course. Intercurrent diseases were not detected in patients with hypertension – participants of the ATO/JFO, and therefore there were no statistical differences in the frequency of their diagnosis depending on the stage of hypertension (p=1.0).

The point assessment of comorbidity on the CIRS scale in hypertension in military personnel participating in the ATO/JFO is shown in fig. 4.

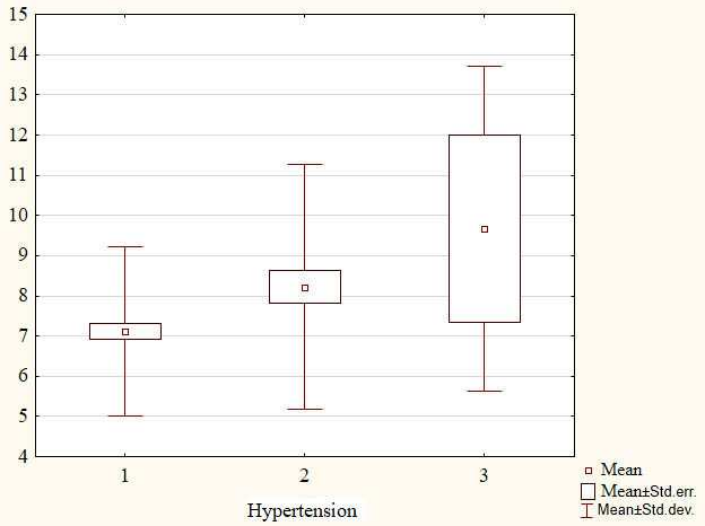

Fig. 4. The CIRS value in military personnel participating in the ATO/JFO.

In the examined patients with hypertension of military personnel participating in the ATO/JFO, the overall score on the CIRS scale ranged from 3 to 15 points, averaging 7.5±2.5 points. In stage I hypertension, the overall CIRS score ranged from 3 to 14 points, averaging 7.1±2.1 points, in Stage II hypertension – from 3 to 16 points, on average 8.2±3.0 points, and in Stage III hypertension – from 6 to 14 points, averaging 9.7±4.0 points. At the same time, statistically significant differences were found between the overall assessment of comorbid pathology on the cumulative scale of CIRS diseases depending on the stage of hypertension (one-way ANOVA, p=0.0071), in particular, in stages I and II hypertension (LSD, p=0.0060), and in stage I and III hypertension and stages II and III hypertension, no statistical differences were found (LSD, p=0.0755 and p=0.3195 respectively).

The CIRS system proposed by B.S. Linn, was a revolutionary discovery, as it allowed practitioners to assess the number and severity of chronic diseases in the case of comorbid status [3]. The scale was developed to assess the survival rate of men in points. When using the CIRS scale, a general assessment of the state of the body's systems (cardiovascular, respiratory, digestive, urinary and endocrine – metabolic disorders, diabetes) is carried out within the point categories: "0" – corresponds to the absence of diseases of the system, "1" – a slight deviation from the norm or a past disease, "2" – a disease that requires the drug therapy, "3" – a disease that caused disability, "4" – corresponds to severe organ failure that requires urgent treatment. The CIRS system evaluates comorbidity by the sum of points, which can vary from 0 to 56. According to its developers, the maximum results are not compatible with life.

The predominance of the frequency of diagnosis in the examined military personnel participating in the ATO/JFO of the initial stages of hypertension (AH stage I), in comparison with its stages II and III, can be explained by the so-called stress-induced hypertension, which is first diagnosed during modern combat operations and corresponds to the results of other studies [5, 10].

An actual aspect of the problem is the effective treatment of patients with comorbid diseases and the prevention of polypragmasia [7]. Individualization of therapy, taking into account the requirements of evidence-based medicine, is of great importance [12], which requires research taking into account comorbidity.

Comorbidity leads to increased costs for diagnosis and treatment, increases the length of hospitalization. Providing medical care to patients with comorbid conditions requires increased health care costs. For example, in the United States, more than 80 % of health insurance (Medicare) is used to cover the cost of medical care for patients with 4 or more chronic diseases [13].

For comparison, in servicemen who did not take part in the ATO/JFO, the overall assessment of comorbidity according to CIRS is 4.3±0.1 points [3], in participants in the liquidation of the consequences of the Chernobyl disaster – 10.3±2.9 [2], and in the general population – 2.7±0.3 points [13]. At the same time, the cumulative CIRS disease index ≥ 3 % in patients with hypertension increases the risk of fatal prognosis SCORE by 1.5–1.8 times [13].

In the future, they need to determine the organs and systems of the body that are most often affected by comorbid pathology in military personnel participating in the ATO/JFO for medical and social justification of optimizing the functional and organizational model of prevention of this comorbid pathology.

Comorbid internal diseases negatively affect the health status of military personnel, their fitness for military service for health reasons – professional longevity. In addition, extending the professional longevity of a highly qualified (with combat experience) serviceman even for 1 year gives a striking

economic effect [3, 8]. This problem is extremely relevant for both military and civilian national health care systems in a single medical space [4, 9], given the eighth year of hostilities in the East of Ukraine.

Conclusions

1. The total number of diagnoses in participants of the ATO/JFO with stage I hypertension, averaged 6.0±2.0 diagnoses, with Stage II hypertension – 6.6±2.7 diagnoses, and with Stage III hypertension – 6.7±3.1 diagnoses. There were no statistically significant differences in the total number of diagnoses with hypertension in the participants of ATO/JFO depending on the stage of hypertension ($p<0.05$).

2. In stage I hypertension, the overall score of comorbid pathology on the CIRS scale was 7.1±2.1 points, in Stage II hypertension – 8.2±3.0 points, and in Stage III hypertension – 9.7±4.0 points. Statistically significant differences were found between the overall assessment of comorbid pathology on the CIRS scale in stages I and II hypertension ($p<0.05$).

3. The number of diagnoses of causal diseases in stage I hypertension was 2.2±0.9 diagnoses, in Stage II hypertension – 2.9±0.8 diagnoses, and in Stage III hypertension – 3.7±0.6 diagnoses. There were statistically significant differences between the number of diagnoses of causal diseases in stage I and II hypertension and in stage I and III hypertension ($p<0.05$ in both cases).

4. The number of hypertension complications in ATO/JFO participants was 1, with an average of 0.02±0.1, and was represented by acute cerebral circulatory disorders. Accordingly, there were no complications in stage I and II hypertension, and in Stage III hypertension there were 1, on average 1.0 complications. There were no statistically significant differences between the number of complications at different stages of hypertension ($p>0.05$).

5. The number of diagnoses of competitive diseases in stage I hypertension was 3.7±1.7 diagnoses, in Stage II hypertension – 3.7±2.2 diagnoses, and in Stage III hypertension – 2.0±2.6 diagnoses. There were no statistically significant differences in the number of diagnoses of competitive diseases depending on the stage of hypertension ($p>0.05$).

6. Intercurrent diseases were not found in patients with hypertension of military personnel participating in the ATO/JFO, and therefore there were no statistical differences in the frequency of their diagnosis depending on the stage of hypertension ($p>0.05$).

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Стаття надійшла 17.11.2020 р.