# Alcohol Addiction in War Veterans Treated in a In-patient Psychiatric Facility: Incidence, Comorbidity with PTSD Symptoms, Association with Combat Stressors

## Алкогольная зависимость у ветеранов войн, получающих лечение в психиатрическом стационаре: встречаемость, коморбидность с симптомами ПТСР, связь с боевыми стрессорами

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**Original research**

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**ABSTRACT**

**BACKGROUND:** The dearth of and inconsistency in the data on the prevalence, risks of occurrence, comorbidity, and causation of stress-related disorders and alcohol use disorders in Russian veterans of local wars constituted the background for this study.

**AIM:** To study the psychopathological structure, clinical changes, and the reasons for the mental disorders suffered by Russian veterans of local wars; in particular, to study the prevalence, pathogenic factors, comorbidity of alcohol addiction and alcohol abuse, together with symptoms of stress disorders, in Russian veterans undergoing inpatient treatment.

**METHODS:** Our observational case-control study included 685 patients who were undergoing treatment in the psychiatric department of a military hospital: *the Main group* (veterans) consisted of 264 veterans of armed conflicts who had undergone inpatient treatment from 1992 to 2010; *the Control group, 1*, 296 patients, all servicemen and military pensioners who had undergone inpatient treatment during a calendar year and had never taken part in combat operations in the past; *Control group 2*, 125 military personnel (regular and reserve) who had not taken part in combat operations and corresponded to the patients of the main group in terms of the mean age and age distribution curve. We performed a clinical and psychopathological analysis of the symptoms identified in patients from the compared samples and, then, compared them with the ICD-10 criteria of post-traumatic stress disorder (PTSD) and alcohol-related disorders. This allowed us to establish the significance of the difference in their frequency and degree of association at the stage of the data analysis.

**RESULTS:** We uncovered no difference in the prevalence of symptoms of alcohol addiction and alcohol abuse among veterans and other servicemen and military pensioners who had not taken part in combat operations. However, there was a tendency to underdiagnose alcohol addiction in veterans in general and those with symptoms of PTSD, in particular. That is, alcohol addiction was not diagnosed in most cases when the veterans displayed symptoms of stress or other mental disorders, in addition to the signs of alcohol addiction. In most such cases, a stress-related mental disorder or another mental disorder with identified signs was diagnosed and alcohol abuse was described as a concomitant disorder or a complication. There was no significant association between any form of alcohol addiction or abuse and the presence of stress disorder symptoms in our sample of veterans; on the contrary, symptoms of re-experience of trauma were more often observed in veterans who were not prone to frequent drinking. The incidence of combat stressors traced in the medical history did not differ in veterans with any form of alcohol abuse and veterans who were not prone to frequent drinking. However, the main group subjects with alcohol addiction more often displayed cases of addictive behavior during combat operations. Therefore, alcohol abuse during combat operations requires additional research to better establish its prognostic significance.

**CONCLUSION:** This Study found no difference in the incidence of alcohol dependence and alcohol abuse among veterans and other officers. In the sample of veterans, there was no significant association between alcoholism and the presence of PTSD symptoms or a history of combat stressors. It is possible that the same risk of alcohol addiction in different categories of military officers is due to a compact of social stressors that equally had a more significant adverse effect on the entire population of Russian military personnel in the 90s of the last century and the first years of this century, as well as the massive abuse of alcohol, which could also equalize the risks of developing alcohol dependence in all groups of militaries.

## АННОТАЦИЯ

**ВВЕДЕНИЕ:** Недостаток и противоречивость данных о распространенности, рисках возникновения, характере коморбидности и каузальной атрибуции расстройств, связанных со стрессом, и расстройств, вызванных употреблением алкоголя, у российских ветеранов локальных войн стали предпосылкой данного исследования.

**ЦЕЛЬ:** Изучение психопатологической структуры, клинической динамики, предпосылок возникновения психических расстройств у российских ветеранов локальных войн, и, в частности, изучение распространенности, патогенных факторов, коморбидности алкогольной зависимости и злоупотребления алкоголем с симптомами стрессовых расстройств у российских ветеранов, проходивших стационарное лечение.

**МАТЕРИАЛ И МЕТОДЫ:** В обсервационное исследование «случай-контроль» включены 685 пациентов, которые проходили лечение в психиатрических отделениях военного госпиталя: основная группа (ветераны) — 264 ветерана вооруженных конфликтов, которые получали стационарное лечение в госпитале с 1992 до 2010 год; 1-я группа сравнения, включала 296 человек — всех военнослужащих и военных пенсионеров, получавших лечение в госпитале в течение одного календарного года, никогда в прошлом не принимавшие участия в боевых действиях; 2-я группа сравнения — 125 военнослужащих (кадровые и запаса), которые не принимали участия в боевых действиях и соответствовали по среднему возрасту и кривой распределения возраста пациентам основной группы. В сравниваемых выборках проведен клинико-психопатологический анализ выявленных у пациентов симптомов с последующим соотнесением их с критериями МКБ-10 для диагностики посттравматического стрессового расстройства (ПТСР) и расстройств, вызванных употреблением алкоголя, что позволило на этапе анализа данных установить значимость различия их частоты и степени сопряженности.

**РЕЗУЛЬТАТЫ:** Выявлено отсутствие разницы распространенности симптомов алкогольной зависимости и злоупотребления алкоголем у ветеранов и других военнослужащих и военных пенсионеров, не принимавших участия в боевых действиях. Вместе с тем отмечена тенденция к гиподиагностике алкогольной зависимости

у ветеранов вообще и имеющих симптомы ПТСР в частности. То есть, диагноз алкогольной зависимости не ставили в большинстве случае, когда у ветеранов наряду с ее признаками, имелись симптомы стрессовых или других психических расстройств. В таких случаях чаще устанавливали диагноз психического расстройства, связанного со стрессом или другого психического расстройства, признаки которого были выявлены, а злоупотребление алкоголем характеризовали как сопутствующее или осложняющее. В выборке ветеранов не выявлено значимой связи между какими-либо формами зависимости или злоупотребления алкоголем и наличием симптомов стрессовых расстройств, напротив, симптомы повторного переживания травмы чаще отмечались у ветеранов, которые не были склонны к частому употреблению спиртного. Боевые стрессоры, которые прослеживаются в анамнезе, по встречаемости не имели разницы у ветеранов с любыми формами злоупотребления алкоголем и ветеранов, которые не склонны к частому употреблению спиртных напитков. Вместе с тем, у участников исследования основной группы, имеющих алкогольную зависимость, отмечено, что в период участия в боевых действиях у них чаще были случаи аддиктивного поведения. В связи с этим злоупотребление алкоголем во время боевых действий требует дополнительной проверки на предмет его прогностического значения.

**ЗАКЛЮЧЕНИЕ:** Исследование не выявило разницы частоты алкогольной зависимости и злоупотребления алкоголем у ветеранов и других военнослужащих. В выборке ветеранов не выявлено значимой связи между алкоголизмом и наличием симптомов ПТСР или боевыми стрессорами в анамнезе. Возможно, одинаковый риск алкогольной аддикции у разных категорий военнослужащих обусловлен комплексом социальных стрессоров, которые в равной мере оказывали более существенное неблагоприятное влияние на всю популяцию российских военнослужащих в 90-е годы прошлого века и первые годы текущего столетия, а также массовым в тот период времени злоупотреблением алкоголем, что также могло уровнять риски развития алкогольной зависимости во всех группах военнослужащих.

**Keywords:** *alcohol addiction; alcoholism; alcohol abuse; combat mental trauma; combat stress disorder; post-traumatic stress disorder; combat stress*

**Ключевые слова:** *алкогольная зависимость; алкоголизм; злоупотребление алкоголем; боевая психическая травма; боевое стрессовое расстройство; посттравматическое стрессовое расстройство; боевой стресс*

## INTRODUCTION

The accumulated experience in military psychiatry shows that alcohol and drug abuse, as well as addiction, is a huge issue affecting mental health among veterans of armed conflict and wars [1–6]. According to S.V. Litvintsev (1994), up to 22.7% of the professional servicemen who were admitted to the psychiatric departments of Central Army Military Hospital 650 in Kabul (MH 650) between 1981 and 1989 for treatment were diagnosed with alcohol addiction or with alcoholic psychoses. Cases of alcohol addiction or alcohol abuse were rare among military conscripts, but drug addiction was diagnosed more often: it accounted for 13.3% of all the junior enlisted personnel admitted for treatment to the psychiatric departments of MH 650. In addition, for the entire period of combat operations involving the Limited Contingent of Soviet Forces in Afghanistan (1979–1989), cases of alcoholism accounted for just 8.6% of all the diagnosed mental disorders among officers, while drug addiction accounted for 15.6% of all diagnosed mental disorders affecting military personnel admitted to front-line medical institutions [1].

There was a high prevalence of alcohol and drug addiction, as well as psychoactive substance (PAS) abuse, among combat veterans. High levels of PAS abuse among soldiers serving in military units deployed in the combat zone in the Persian Gulf in 1993 persisted and even continued to grow after the soldiers had returned home [7, 8]. A similar trend was observed among American servicemen returning from Iraq [9]. An increase in the frequency of PAS and alcohol abuse and addiction over time has been documented regarding veterans of many other local wars [10], and, according to some researchers, this occurs in 60–80% of such veterans [11]. According to the electronic medical records of the U.S. Department of Veterans Affairs, up to 10% of former participants in the counter-terrorism “Operation Enduring Freedom”

in Afghanistan and "Operation Iraqi Freedom" have been diagnosed with an alcohol-related disorder [12]. According to the U.S. Department of Defense, 33% of respondents in a survey of military veterans admitted to drinking in the month preceding the survey [6]. However, there is an opinion holding that even massive alcohol consumption and the frequent use of drugs in war do not always result in the development of addiction. For example, the number of men who abuse alcohol turns out to be three times higher and that of women with the same affliction seven times higher among military reporters embedded in "hot spots" than among their counterparts employed in other areas of journalism. At the same time, the prevalence of alcohol addiction among military reporters does not exceed that of the American population [13]. A similar trend was observed amongst Soviet troops who abused alcohol in Afghanistan in 1979–1989 [2].

The prevailing view in the scientific literature is that psychiatric disorders caused by PAS abuse and post-traumatic stress disorder (PTSD) are highly comorbid and occur in the same person at a much higher frequency than would be randomly predicted given the respective prevalence of each disorder [4]. The correlation between post-stress disorder and alcoholism is corroborated by the fact that alcohol abuse is observed twice as often among veterans with symptoms of PTSD as among veterans who do not display signs of stress disorders [14]. According to various sources, 33% [12, 15] to 75% of combat veterans exhibit signs of a drug or alcohol-related psychiatric disorder along with PTSD [15–18]. Conversely, according to the U.S. Department of Veterans Affairs, 63% of veterans with alcohol abuse disorders and 76% with alcohol and other substance abuse disorders are diagnosed with PTSD [12]. Structured interviews reveal PTSD in 42.5% of patients enrolled in inpatient substance abuse treatment programs [19]. An increase in the incidence of alcohol consumption in a sample of Vietnam combat veterans was tied to an increase in PTSD symptoms severity [20].

However, some researchers question the assumption that the abuse of alcohol and other substances increases the likelihood of developing other mental disorders [21]. A number of publications refute the existence of a substantive association between the presence and severity of PTSD symptoms and alcohol craving intensity, withdrawal syndrome severity, or alcoholism relapse frequency [22, 23]. A correlation between the very fact of mental trauma and the development of alcohol addiction is also refuted in [24]. It has been suggested that the presence of alcohol addiction is characterized by the lowest level of stress compared with PTSD patients and patients with both symptoms of PTSD and alcohol addiction [25]. In a prospective long-term study of Gulf War veterans, PTSD proved not to be a clear predictor of heavy drinking, although it often preceded illicit drug use [26].

According to a number of researchers, the use of PSA in extreme conditions occurs as a secondary symptom to neurotic and affective disorders. It is regarded as coping behavior, and the PSA itself plays the role of a stress protector or a means of alleviating anxiety and helping to "escape from reality," thereby determining the motivation for its use [3, 27]. Alcohol and drug use may have contributed to the relatively low incidence of mental illness in the U.S. Army during the first three years of the Vietnam War (1964–1973) [1, 2]. However, the price of such "self-treatment" by the servicemen themselves was the gradual moral decay of individual servicemen and entire units witnessed then. The low frequency of reports of stress-induced reactions and neurotic disorders is very soon "compensated" by an increase in the number of reports of violations of military discipline, and even crimes [1]. By the end of the 1970s, the rate of instances of mental disorder amongst American troops in Vietnam had exploded from 3% to 60% of all hospitalized military personnel through the spread of drug addiction [1]. According to information by the former Head of Intelligence at the headquarters of U.S. Military Assistance Command, South Vietnam, about 65,000 soldiers and officers i.e., approximately one in eight military personnel of the U.S. military contingent used illicit drugs episodically or regularly in 1970 [ 28].

Alcohol and drug abuse during combat operations are often referred to by Russian specialists as variants of psychogenic disorders and are designated as "addictive behavior," which can be a type of pathological characterological reaction [1–3]. Following this hypothesis, drunkenness and illicit drug use in a war zone can be considered a specific type of adjustment disorder with behavioral distorsion [1, 2]. Moreover, both the alcohol problem and PTSD symptoms are more likely to occur in veterans who had been exposed to combat stressors at a younger age [12, 29].

In the American scientific literature, the combination of combat PTSD with alcohol and PAS-related disorders is often explained in terms of the concept of "self-medication" [5, 20, 26]. In that regard, the use of alcohol and other PAS after war is associated with anxiety and other manifestations of mental distress [30]. It is remarkable that the abuse of alcohol and of other PAS combines with the already existing symptoms of stress disorders, especially after the onset of increased excitability, when the increase in addiction occurs in parallel with an increase in the symptoms of the underlying disease [20]. This hypothesis is supported by the fact that the majority of patients who abuse alcohol or have an addiction problem use alcohol and PAS as a way of addressing emotional distress and symptoms of PTSD [20, 26, 31, 32]. Longitudinal studies of veterans support the self-medication hypothesis, which may explain why PTSD symptoms often recur after PAS abuse treatment [33]. Another explanation for the comorbidity of stress and alcohol-related psychiatric disorders may be the incidence of alcohol abuse on the likelihood of exposure to psychic trauma or the fact that it increases an individual's susceptibility to psychic stressors [34]. It may also be that the correlation between alcohol-related disorders and stress disorders does not have a causal basis, but that it is due to the presence of common risk factors or overlapping pathogenetic mechanisms [5]. This version is supported by the analysis of the mental health of twins, one of whom participated in the Vietnam War. The authors of the study substantiate the fact that genetic factors play a significant role in alcohol addiction development [24].

The study of the correlation between addictive pathology and stress-related mental disorders is further complicated by the fact that alcohol consumption is part of military culture: a means of group cohesion, relaxation, and stress relief [6].

The combination of PTSD and alcohol addiction often exacerbates the course of both disorders [5]. Alcohol addiction, especially after severe psychic trauma or during acute PTSD manifestation, increases the risk of maladaptive and aggressive behavior in veterans [35, 36], including severe violence [37], interference with the provision of medical care, thereby worsening the results of any real treatment of the mental and physical disorders [2, 23, 33].

The conflicting views on risk of occurrence, patterns of comorbidity, and causal attribution reflect the complexity of the relationship between the impact of mental stress and its consequences and alcohol use disorders, and they highlight the need to consider both the risk mechanisms and deterrents. Some researchers believe that the functional relationship between PTSD and alcohol abuse depends on the form of traumatic impact and type of disorder associated with the use of psychoactive substances [5].

Unfortunately, there isn't currently enough scientific evidence and there is very little agreement on the issue of how stress, alcohol, and PAS abuse in a combat environment relate to the subsequent development of mental disorders. Alcohol use among veterans of the Great Patriotic War is barely mentioned in the scientific work of Soviet psychiatrists based on that period. It is hardly mentioned in modern Russian scientific literature that addresses the issues of combat mental trauma. We do not have scientific data on the effect of alcohol on combat effectiveness or on the experience of stress; neither in our military personnel nor in the soldiers of foreign armies. Determining the true state of affairs among Russian war veterans is extremely difficult due to the lack of real continuity in their treatment and rehabilitation and, sometimes, the inability to follow up a serviceman who has received psychiatric or drug treatment at one of the stages of his medical evacuation [1, 2, 3].

Contradictions in views on the frequency and nature of the mutual influence of addictive disorders and post-stress disorders in war veterans, as well as a lack of data on their prevalence in our war veterans created the basis for *this study*: to assess the frequency, clinical, and psychopathological features of alcohol abuse and alcohol addiction in armed-conflict veterans and their correlation to adverse wartime factors.

## METHODS

### Study design

The observational case-control study included 685 servicemen and retired military personnel who had been treated in the psychiatric department of the Main Military Clinical Hospital named after. N.N. Burdenko from 1992 to 2010 (Figure 1).

The *inclusion criteria* for patients were as follows: male sex, military service under contract at the time of the examination or in the past, single or repeated examination and treatment in a psychiatric department of the military hospital. The included patients comprised 3 groups (Table 1).

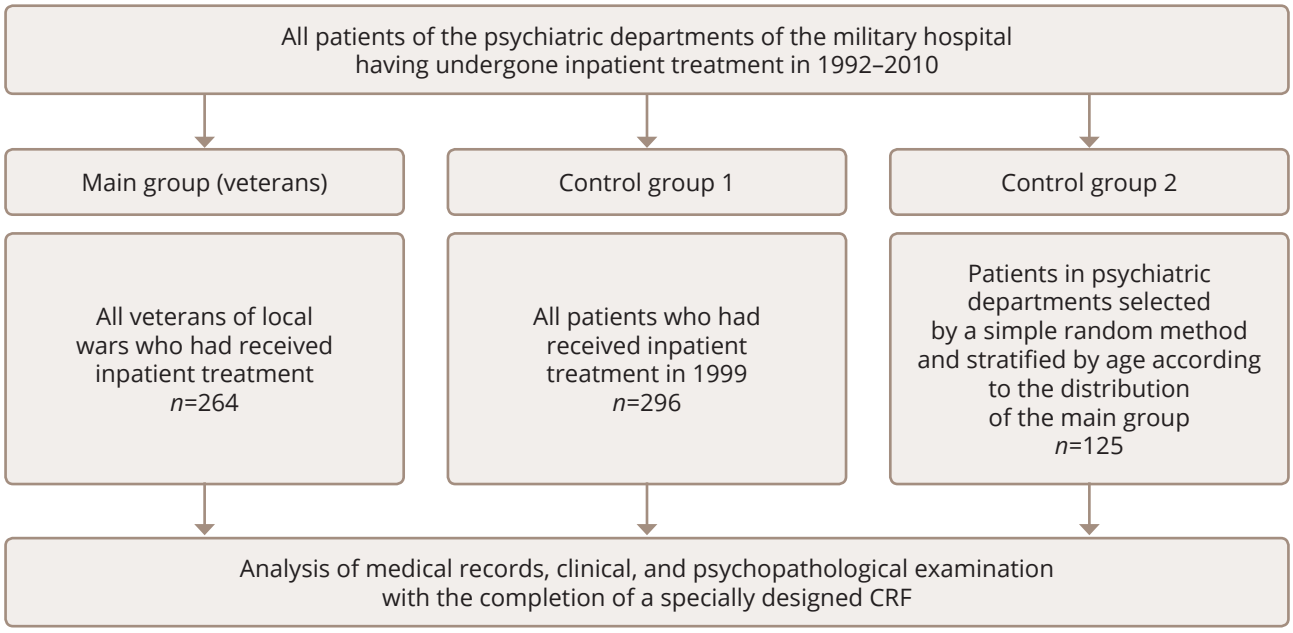


**Figure 1. Study Design.**

**Table 1. Groups of examined military personnel (regular and reserve) who were hospitalized in the psychiatric departments of the military hospital**

| | Main group (veterans) (A) | Control group 1 (B) | Control group 2 (C) | Total | Test statistic (ANOVA) | Pairwise comparisons using Tukey's Method | | |
|---|---|---|---|---|---|---|---|---|
| | (N=264) | (N=296) | (N=125) | (N=685) | | AB | AC | BC |
| Age at the time of assessment | 40.3 (sd 10.1) | 47.6 (sd 16.2) | 40.0 (sd 10.3) | 43.4 (sd 13.6) | F (2.682)=26.95, *p* <0.001 | t=-6.61 df=682 *p* <0.001 | t=0.190 df=682 *p*=0.980 | t=5.438 df=682 *p* <0.001 |
| Mean age at the time of the 1st hospitalization in a psychiatric hospital | 38.7 (sd 10.3) | 44.8 (sd 15.4) | 38.2 (sd 9.9) | 41.2 (sd 13.0) | F (2.682)=19.95, *p* <0.001 | t=-5.60 df=682 *p* <0.001 | t=0.362 df=682 *p*=0.930 | t=4.809 df=682 *p* <0.001 |

*Note:* sd — standard deviation; df — degrees of freedom; *p* — p-signifi cance level (p-value); F — the value of F-test.

The main group included 264 veterans that had participated in armed conflicts (hereinafter referred to as veterans) in which the Soviet or Russian military had been involved in 1979–2007. All surveyed veterans at the time of participation in combat operations were contract servicemen. The mean age of the patients in this group was 40 (sd 10.1) years.

Two control groups were created to compare the clinical features of alcohol abuse and addiction in war veterans with patients who had never seen combat operations. The first control group (a sample of patients treated in the psychiatric departments during one calendar year) was supposed to reflect the general structure of mental disorders in all the patients admitted for treatment. The other control group was a model that was fully equivalent to the main group in terms of age, which excludes the influence of age on psychopathology, the symptoms of mental disorders, and the social adaptation of patients.

Control group 1 included all 296 servicemen (regular and reserve) with no combat experience who had been treated in the hospital in 1999. The mean age of the patients in this group was 47.6 (sd 16.2) years, which, based on the Tukey's test, was significantly different from the age of the veterans of the Main group ($p$ <0.001) (Table 1).

Control group 2 included 125 servicemen who had undergone treatment in the psychiatric departments of the hospital from 1992 to 2009. They were included by random selection (randomization), with subsequent age stratification at the time of the first request for psychiatric help and with subsequent re-randomization. The mean

age of the patients was 40.0 (sd 10.3) years. The patients in Control group 2 were comparable (had no significant differences) in terms of mean age and the age distribution curve with the patients in the Main group ($p$=0.980).

A clinical and psychopathological study of each patient was carried out with a detailed description of the identified symptoms and syndromes. The source data were structured using a specially designed clinical and epidemiological map in which the identified symptoms were correlated, among other things, with the ICD-10 criteria for diagnosing stress-related disorders and alcohol abuse disorders. When analyzing the obtained material, we compared the established diagnoses, leading syndromes, and symptoms of mental disorders in their interconnection and we also studied the changes in the disease over time and the association of mental disorders with adverse wartime factors (history of combat wounds, injuries, handicaps, reactions associated with combat stress, captivity) and with some parameters of social adaptation (fitness for military service, employment after leaving the army, and the presence of a disability).

The clinical and demographic variables were analyzed using descriptive statistics with mean and standard deviations. Differences in continuous variables between different groups were assessed using univariate ANOVA, followed by an assessment of the significance of between-group contrasts, corrected for multiple comparisons using Tukey's method. The differences between groups in the frequency of occurrence of the trait were assessed by compiling contingency tables and assessing the significance of the differences using the $\chi^2$-test, followed by a pairwise comparison of frequencies between groups using the Wald test. The assessment of the reliability of the statistical tests was carried out with two-sided values at $p$ <0.05. The NCSS 2022 software package (NCSS 2022 Statistical Software (2022) was used for statistical processing. NCSS, LLC. Kaysville, Utah, USA, ncss.com/software/ncss).

### Ethical approval

Our non-interventional study of patients, which is routinely applied in medical practice, clinical and psychopathological studies, was carried out in the Main Military Clinical Hospital named after. N.N. Burdenko from 1992 to 2010 in accordance with the principles of the Declaration of Helsinki of the World Medical Association. The medical data of patients who had undergone examination and treatment at the Burdenko Main Military Clinical Hospital from 1992 to 2010 were entered into the medical records of the inpatient. The case report form and the non-interventional observational study protocol developed in 2010 were approved by the Independent Ethics Committee of the Main Military Clinical Hospital named after. N.N. Burdenko (Extract from minutes No. 5 dated Feb 16, 2011).

## RESULTS

The diagnosis of alcohol addiction syndrome (alcohol addiction, chronic alcoholism, alcohol withdrawal state, alcoholic delirium, alcoholic psychosis or alcoholic amnestic syndrome [F10.2-6]) or alcohol abuse was confirmed for 56 of the surveyed veterans (21.2%). In all cases where mental disorders associated with alcohol use were included in the main diagnosis, patients showed signs of addiction consistent with the ICD-10 diagnostic guidelines. In one case, the diagnosis was alcohol abuse, whose manifestations, however, corresponded to the first stage of addiction, since there were signs of all the addiction syndromes, except for the vegetative-neurological manifestations of the alcohol withdrawal syndrome.

Along with this, 80 veterans (30.3%) were diagnosed with cases of addiction and alcohol abuse, which became comorbidities or complicated the course of the other major diagnosed mental disorders. Moreover, 47 veterans (17.8%) displayed signs of alcohol addiction, although the latter was not considered the main diagnosis or was not included in the diagnosis at all. In the Main group, 33 subjects (12.5%) had a history of alcohol abuse but there were no convincing clinical signs of addiction. In all these cases, addictive disorders were accompanied by other mental disorders that dominated the clinical picture.

A comparison of the incidence of diagnosed alcohol addiction with other cases of alcohol addiction and abuse is presented in Table 2. Control group 1 included 105 subjects diagnosed with alcohol addiction (35.5%), while in Control group 2 the condition was diagnosed in only 37 subjects (29.8%). There were 27 patients (9.1%) in Control group 1 and 7 patients (5.6%) in control group 2 with identified but not diagnosed addiction; also, there were 24 patients (8.1%) in Control group 1 and 18 patients (14.4%) in Control group 2 who were known to abuse alcohol but did not display a clearly discernible addiction. The overall composition of the patients suffering from alcohol abuse is more clearly presented in Figure 2.

**Table 2. Structure of addiction and alcohol abuse in the compared groups**

| Diagnosis | Veterans (A) *n*=264 | | Control group 1 (B) *n*=296 | | Control group 2 (C) *n*=125 | | $\chi^2$-test (all df=2) | Pairwise comparisons using Wald test | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | | A vs B | A vs C | B vs C |
| Total number of patients with signs of alcohol addiction or abuse | 136 | 51.5% | 156 | 52.7% | 62 | 49.6% | $\chi^2$=0.343; *p*=0.842 | Q=0.396; *p*=0.934 | Q=0.498; *p*=0.911 | Q=0.822; *p*=0.819 |
| Including those with diagnosed alcohol addiction | 56 | 21.2% | 105 | 35.5% | 37 | 29.6% | $\chi^2$=13.846; *p*=0.001 | Q=5.341; *p*=0.001 | Q=2.513; *p*=0.177 | Q=1.624; *p*=0.484 |
| Including those with comorbid alcohol addiction | 47 | 17.8% | 27 | 9.1% | 7 | 5.6% | $\chi^2$=15.769; *p*=0.001 | Q=4.216; *p*=0.008 | Q=5.199; *p*=0.001 | Q=1.599; *p*=0.495 |
| Including those with comorbid alcohol abuse | 33 | 12.5% | 24 | 8.1% | 18 | 14.4% | $\chi^2$=4.628; *p*=0.099 | Q=2.388; *p*=0.210 | Q=0.817; *p*=0.821 | Q=2.618; *p*=0.153 |
| Total number of subjects with signs of alcohol addiction | 103 | 39.0% | 132 | 44.6% | 44 | 35.2% | $\chi^2$=3.736; *p*=0.154 | Q=1.884; *p*=0.377 | Q=0.998; *p*=0.755 | Q=2.536; *p*=0.172 |
| Total number of subjects with comorbid alcohol addiction and abuse | 80 | 30.3% | 51 | 17.2% | 25 | 20.0% | $\chi^2$=14.229; *p*=0.001 | Q=5.140; *p*=0.001 | Q=3.096; *p*=0.073 | Q=1.017; *p*=0.747 |

*Note: n* — sample size; f — sign frequency; % — relative sign frequency in sample n; $\chi^2$ — the value of Pearson's $\chi^2$ test; df — degrees of freedom; Q — Tukey test value; *p* — p-value (p-significance level).

All three diagrams in the Figure show the following ratio: 1) patients with no signs of alcohol abuse; 2) patients with an established main diagnosis of "alcohol addiction"; 3) patients with alcohol addiction indicated in the diagnosis as concomitant to the underlying mental disorder, or with addiction indicated in the medical records or in the description of the withdrawal syndrome; 4) with alcohol abuse as comorbidity with other diagnosed mental disorders and without signs of addiction. The first pie chart shows the data of the group of veterans, the second one shows Control group 1, and the third one shows Control group 2.

Our statistical analysis of the differences in the relative frequency values proves, and Figure 2 clearly demonstrates, that there are hardly any significant differences between the samples of veterans and the control groups: 1) the ratio of the total number of patients with alcohol addiction or abuse diagnosed but not included in the primary diagnosis, and patients in whom frequent alcohol use was not identified; 2) all patients with signs of alcohol addiction (established in the diagnosis and not diagnosed); and 3) the proportion of patients suffering from alcohol abuse without signs of addiction (Table 3). Thus, there were no differences in the incidence of signs of alcohol addiction and abuse in military personnel with past experience of participating in combat operations and those who did not have combat experience, and no data have been obtained that would provide grounds to suggest a relationship between any forms of alcohol abuse and participation in combat operations. At the same time, it follows from the presented data that the diagnosis of alcohol addiction in veterans was less common, while cases of addiction comorbid with other mental disorders were more common than in other military personnel and military pensioners. A statistically significant (Q=5.341; $p$ <0.001) difference in the probability of a diagnosis of alcohol addiction was uncovered between the sample of veterans and the sample of Control group 1, which included all patients who had received treatment in the psychiatric departments of the Main Military Clinical Hospital named after. N.N. Burdenko in 1999 and who were, on average, older. At the same time, undiagnosed alcohol addiction comorbid with other mental disorders occurred in veterans twice as often as in Control group 1 (Q=4.216; $p$=0.008) and more than three times more often than in Control group 2 (Q=5.199; $p$ <0.001).

The relationships between the symptoms of stress disorders and alcohol addiction (diagnosed and concomitant with other disorders) and alcohol abuse are presented in Table 3 and Figure 3A and 3B. As expected, considering the features of a diagnosis of alcoholism stated above, a diagnosis of alcohol addiction among all veterans who displayed any symptoms of any PTSD diagnostic clusters was three times less common than it was among veterans who did not display PTSD symptoms ($\chi^2$=16.532; $p$ <0,001), while comorbid variants of addiction and alcohol abuse in veterans with and without PTSD symptoms were observed with almost equal frequency.

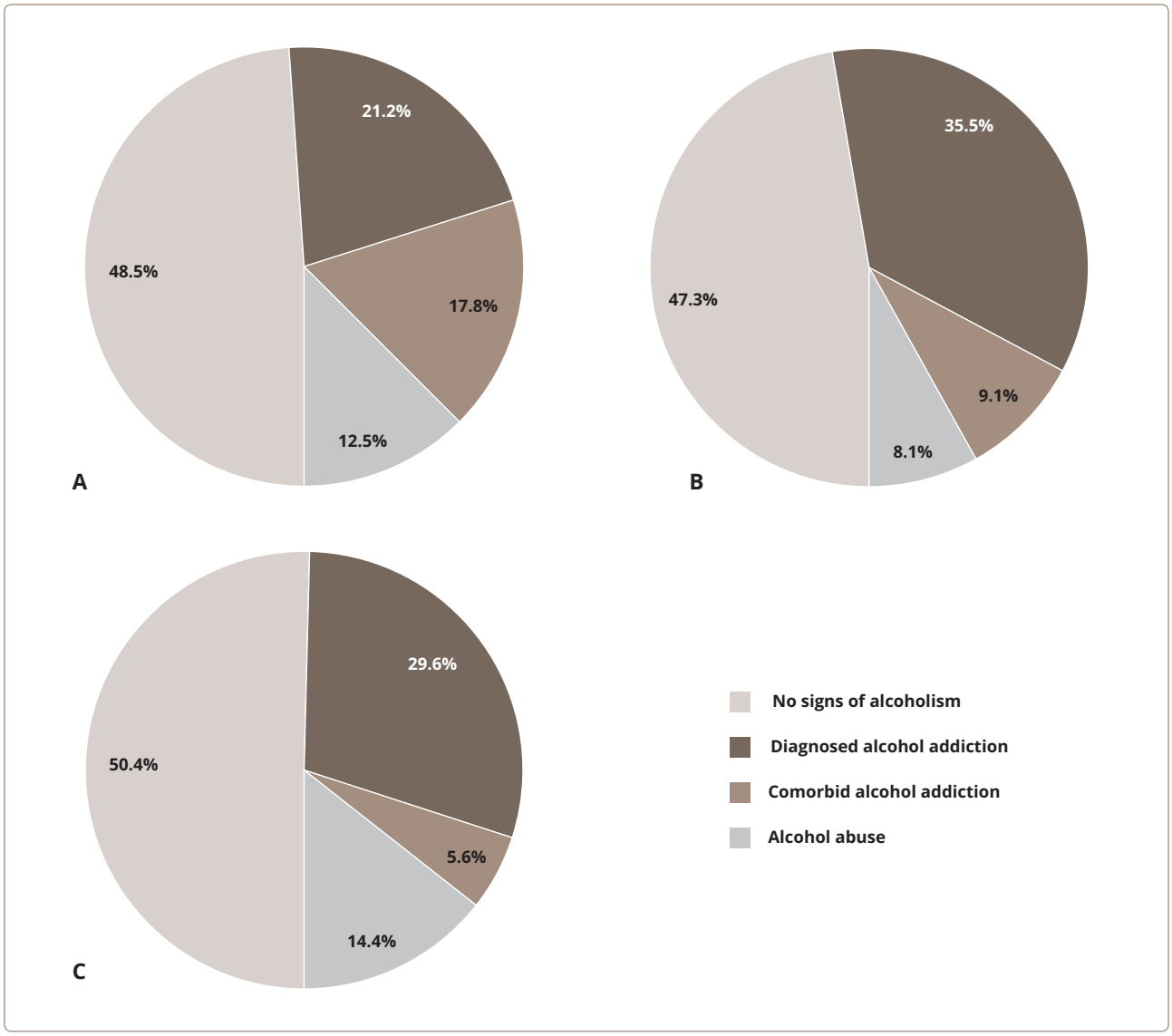


**Figure 2. Structure of forms of chronic alcohol intoxication in groups: A, main group (*n*=264); B, group 1 (*n*=296); C, group 2 (*n*=125).**

However, alcohol addiction was generally less common among veterans with manifestations of PTSD ($\chi^2$=7.344; *p*=0.007). Consequently, the differences in the prevalence of the issue of alcohol in groups of veterans with and without PTSD symptoms were determined mainly by the difference in the number of patients with glaring signs of alcoholism. Moreover, the identification of PTSD symptoms in veterans reduced the likelihood of diagnosing them with alcoholism. Thus, PTSD symptoms were observed twice as rarely in veterans diagnosed with alcohol addiction as they were in veterans with alcohol addiction which was not stated in the diagnosis but was comorbid with other diagnosed mental disorders (Q=4.883; *p*=0.003), as well as in veterans with alcohol abuse (Q=4.516; *p*=0.008) and veterans without alcohol abuse (Q=5.991; *p* <0.0001). Moreover, there was no statistical difference in the incidence of PTSD symptoms between other groups of veterans with or without alcohol abuse. The ratio of individual symptoms of PTSD (intrusion and personality changes) turned out to be similar (Table 4). In general, when comparing PTSD symptoms in the entire sample of veterans with addictive disorders with all veterans without signs of alcohol abuse, significant differences were found only in the prevalence of intrusion symptoms ($\chi^2$=4.256; *p*=0.039) while PTSD symptoms in general did not differ (Table 5).

**Table 3. Clinical variants of alcohol abuse and addiction in veterans with PTSD symptoms and veterans without PTSD symptoms**

| Diagnosis | Veterans with PTSD symptoms *n*=139 | | Veterans without PTSD symptoms *n*=125 | | $\chi^2$ test (all df=1) |
|---|---|---|---|---|---|
| | f | % | f | % | |
| Total number of patients with signs of alcohol addiction or abuse | 61 | 43.9% | 73 | 58.4% | $\chi^2$=5.013; *p*=0.025 |
| Including those with diagnosed alcohol addiction | 16 | 11.5% | 40 | 32.0% | $\chi^2$=16.532; *p*=0.001 |
| Comorbid alcohol addiction | 27 | 19.4% | 19 | 15.2% | $\chi^2$=0.816; *p*=0.366 |
| Comorbid alcohol abuse | 19 | 13.7% | 14 | 11.2% | $\chi^2$=0.367; *p*=0.545 |
| Total number of subjects with signs of alcohol addiction | 43 | 30.9% | 59 | 47.2% | $\chi^2$=7.344; *p*=0.007 |
| Total number of subjects with comorbid alcohol addiction and abuse | 46 | 33.1% | 33 | 26.4% | $\chi^2$=1.406; *p*=0.236 |

*Note: n* — sample size; f — sign frequency; % — relative sign frequency in sample n; $\chi^2$ — the value of Pearson's $\chi^2$ test; df — degrees of freedom; *p* — p-value (p-significance level).

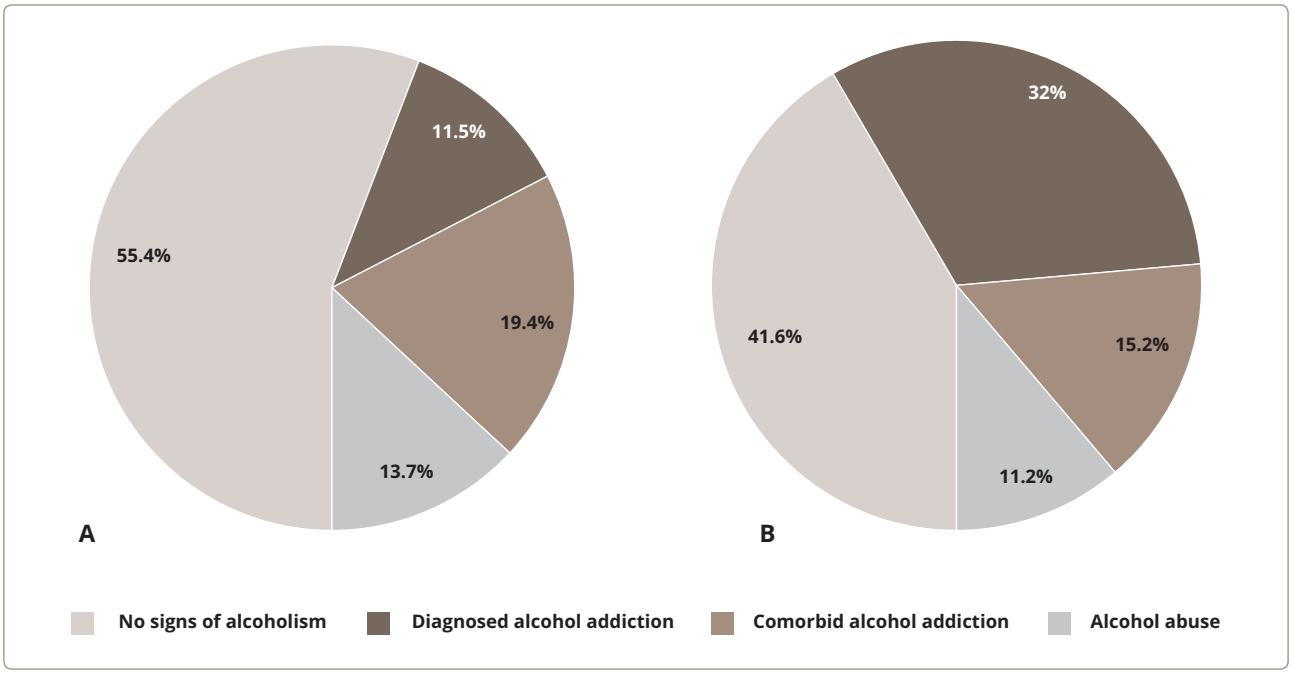


**Figure 3. Structure of forms of chronic alcohol intoxication in groups: A, veterans with PTSD symptoms (*n*=139); B, veterans without PTSD symptoms (*n*=125).**

Our analysis of the association between the diagnosis of alcohol addiction and PTSD symptoms (the results are presented in Table 6) showed that the absence of a diagnosis of alcoholism is associated with the detection of PTSD symptoms in general ($\chi^2$=19.075, df=1, *p*=0.000), and in particular the symptoms of re-experiencing the trauma ($\chi^2$=13.235, df=1, *p*=0.000) and personality changes ($\chi^2$=12.508, df=1, *p*=0.000), while the association of any manifestations of addictive behavior with PTSD symptoms showed only an association between the absence of signs of alcohol abuse and symptoms of re-experiencing trauma ($\chi^2$=4.256, df=1, *p*=0.039).

**Table 4. PTSD symptoms in veterans with different forms of alcohol use**

| Symptom | (A) *n*=56 f(%) | (B) *n*=47 f(%) | (C) *n*=33 f(%) | (D) *n*=128 f(%) | $\chi^2$ (p) | Pairwise comparisons using Wald test | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | A vs B Q (p) | A vs C Q (p) | A vs D Q (p) | B vs C Q (p) | B vs D Q (p) | C vs D Q (p) |
| Symptoms of re-experiencing (intrusions) | 2 (3.6%) | 14 (29.8%) | 6 (18.2%) | 34 (26.6%) | 14.869 (0.002) | 4.998 (0.002) | 2.849 (0.183) | 6.333 (0.000) | 1.590 (0.671) | 0.682 (0.923) | 1.255 (0.793) |
| Avoidance symptoms | 3 (5.4%) | 8 (17.0%) | 4 (12.1%) | 15 (11.7%) | 3.534 (0.316) | 2.513 (0.284) | 1.540 (0.692) | 1.739 (0.608) | 0.713 (0.918) | 1.374 (0.754) | 0.425 (0.958) |
| Symptoms of hyperexcitability | 10 (17.9%) | 23 (48.9%) | 16 (48.5%) | 60 (46.9%) | 16.170 (0.001) | 4.822 (0.004) | 4.232 (0.015) | 5.852 (0.000) | 0.052 (0.996) | 0.347 (0.967) | 0.245 (0.978) |
| Personality changes | 6 (10.7%) | 21 (44.7%) | 14 (42.4%) | 38 (29.7%) | 17.198 (0.001) | 5.598 (0.000) | 4.634 (0.006) | 4.320 (0.012) | 0.263 (0.976) | 2.581 (0.262) | 1.959 (0.509) |
| Any PTSD symptom | 15 (26.8%) | 28 (59.6%) | 20 (60.6%) | 75 (58.6%) | 18.554 (0.001) | 4.883 (0.003) | 4.516 (0.008) | 5.991 (0.000) | 0.106 (0.991) | 0.124 (0.990) | 0.233 (0.979) |
| Symptoms of PTSD cluster 1 and 2 (intrusions or avoidance) | 3 (5.4%) | 15 (31.9%) | 8 (24.2%) | 38 (29.7%) | 14.448 (0.002) | 4.870 (0.003) | 3.285 (0.093) | 6.262 (0.000) | 0.984 (0.866) | 0.480 (0.952) | 0.721 (0.917) |

*Note:* (A) — Veterans diagnosed with alcohol addiction; (B) — Veterans with comorbid alcohol addiction; (C) — Veterans with comorbid alcohol abuse; (D) — Veterans without alcohol addiction and abuse; *n* — sample size; f — sign frequency; % — relative sign frequency in sample n; $\chi^2$ — the value of Pearson's $\chi^2$ test; Q — Tukey test value; *p* — p-value (p-significance level).

**Table 5. PTSD symptoms in veterans with signs of alcohol addiction and abuse and those without alcohol abuse**

| Symptom | All veterans with alcohol addiction and abuse *n*=136 | | Veterans without alcohol abuse *n*=128 | | $\chi^2$ test p-value |
|---|---|---|---|---|---|
| | f | % | f | % | |
| Symptoms of re-experiencing (intrusions) | 22 | 16.2% | 34 | 26.6% | $\chi^2$=4.256; *p*=0.039 |
| Avoidance symptoms | 15 | 11.0% | 15 | 11.7% | $\chi^2$=0.031; *p*=0.860 |
| Symptoms of hyperexcitability | 49 | 36.0% | 60 | 46.9% | $\chi^2$=3.200; *p*=0.074 |
| Personality changes | 41 | 30.1% | 38 | 29.7% | $\chi^2$=0.007; *p*=0.935 |
| Any PTSD symptom | 64 | 47.1% | 75 | 58.6% | $\chi^2$=3.519; *p*=0.061 |
| Symptoms of PTSD cluster 1 and 2 (intrusions or avoidance) | 26 | 19.1% | 38 | 29.7% | $\chi^2$=4.011; *p*=0.045 |

*Note: n* — sample size; f — sign frequency; % — relative sign frequency in sample n; $\chi^2$ — the value of Pearson's $\chi^2$ test; *p* — p-value (p-significance level).

The results of our study of the medical history of veterans, with a comparison of the pathogenic factors of combat in the past and the presence or absence of signs of alcohol abuse or addiction in their current status, are presented in Table 7. The most significant determinants of the development of delayed stress disorders, such as direct participation in combat clashes with the enemy, enemy captivity, wounds or shell shock received in the war, psychopathological reactions suffered in the combat zone, were the least likely (with a statistical significance of differences) to be identified in veterans with an established diagnosis of alcohol addiction. In other subgroups of veterans, the same unfavorable factors in the medical history were detected almost with the same frequency. Veterans diagnosed with alcohol addiction suffered combat stress five times less frequently than veterans suffering from alcohol abuse, and eight times less often than veterans with no frequent drinking habit (Q=7.078; $p$ <0.001).

**Table 6. Correlation of various forms of alcohol abuse with PTSD symptoms**

| Symptom | Diagnosed alcohol addiction *n*=56 | | No diagnosed alcohol addiction *n*=208 | | $\chi^2$ *p* (all df=1) | All cases of alcohol addiction or abuse *n*=136 | | No signs of alcohol abuse *n*=128 | | $\chi^2$ *p* (all df=1) |
|---|---|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | | f | % | f | % | |
| Symptoms of re-experiencing (intrusions) | 2 | 3.6 | 54 | 26.0 | $\chi^2$=13.235; ***p* <0.001** | 22 | 16.2 | 34 | 26.6 | $\chi^2$=4.256; ***p*=0.039** |
| Avoidance symptoms | 3 | 5.4 | 27 | 13.0 | $\chi^2$=2.546; *p*=0.111 | 15 | 11.0 | 15 | 11.7 | $\chi^2$=0.031; *p*=0.860 |
| Symptoms of hyperexcitability | 10 | 17.9 | 99 | 47.6 | $\chi^2$=16.097; ***p* <0.001** | 49 | 36.0 | 60 | 46.9 | $\chi^2$=3.2000; *p*=0.074 |
| Personality changes | 6 | 10.7 | 73 | 35.1 | $\chi^2$=12.508; ***p* <0.001** | 41 | 30.1 | 38 | 29.7 | $\chi^2$=0.007; *p*=0.935 |
| Any PTSD symptom | 15 | 26.8 | 124 | 59.6 | $\chi^2$=19.075; ***p* <0.001** | 64 | 47.1 | 75 | 58.6 | $\chi^2$=3.519; *p*=0.061 |
| Symptoms of PTSD cluster 1 and 2 (intrusions or avoidance) | 3 | 5.4 | 61 | 29.3 | $\chi^2$=13.803; ***p* <0.001** | 26 | 19.1 | 38 | 29.7 | $\chi^2$=4.011; ***p*=0.045** |

*Note: n* — sample size; f — sign frequency; % — relative sign frequency in sample n; df — degrees of freedom; *p* — p-value (p-significance level).

**Table 7. Pathogenic factors of wartime in the medical history of veterans with various forms of alcohol consumption**

| Factor | (A) *n*=56 f(%) | (B) *n*=47 f(%) | (C) *n*=33 f(%) | (D) *n*=128 f(%) | $\chi$2 (p) | Pairwise comparisons using Wald test | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | A vs B Q (p) | A vs C Q (p) | A vs D Q (p) | B vs C Q (p) | B vs D Q (p) | C vs D Q (p) |
| Personal participation in battles | 19 (33.9%) | 31 (66.0%) | 21 (63.6%) | 69 (53.9%) | 12.886 (0.005) | 4.723 (0.005) | 3.904 (0.030) | 3.594 (0.054) | 0.326 (0.970) | 2.005 (0.488) | 1.376 (0.753) |
| Captivity | 0 (0.0%) | 1 (2.1%) | 0 (0.0%) | 4 (3.1%) | 2.776 (0.428) | 1.009 (0.860) | 0.486 (0.951) | 1.250 (0.795) | 0.434 (0.957) | 0.101 (0.992) | 0.426 (0.958) |
| Combat stress reactions | 2 (3.6%) | 6 (12.8%) | 6 (18.2%) | 38 (29.7%) | 18.759 (<0.001) | 2.229 (0.392) | 2.849 (0.183) | 7.078 (0.000) | 0.961 (0.871) | 3.465 (0.068) | 1.798 (0.581) |
| Wounds or injuries in war | 7 (12.5%) | 9 (19.1%) | 6 (18.2%) | 26 (20.3%) | 1.635 (0.651) | 1.277 (0.786) | 1.079 (0.843) | 1.713 (0.619) | 0.065 (0.995) | 0.075 (0.994) | 0.142 (0.988) |
| Traumatic brain injury in war | 14 (25.0%) | 23 (48.9%) | 18 (54.5%) | 55 (43.0%) | 9.763 (0.021) | 3.566 (0.057) | 3.942 (0.027) | 3.379 (0.079) | 0.680 (0.923) | 0.999 (0.862) | 1.673 (0.636) |
| Alcohol abuse in war | 9 (16.1%) | 7 (14.9%) | 4 (12.1%) | 7 (5.5%) | 6.484 (0.090) | 0.179 (0.985) | 0.541 (0.944) | 2.910 (0.168) | 0.364 (0.965) | 2.530 (0.278) | 1.831 (0.566) |

*Note:* (A) — Veterans diagnosed with alcohol addiction; (B) — Veterans with comorbid alcohol addiction; (C) — Veterans with comorbid alcohol abuse; (D) — Veterans without alcohol addiction and abuse; *n* — sample size; f — sign frequency; % — relative sign frequency in sample n; Q — Tukey test value; *p* — p-value (p-significance level).

In contrast, frequent drinking while in a combat zone was three times likely among veterans with diagnosed alcoholism than among sober veterans. Table 8 shows no significant differences in the incidence of the combat pathogenic factors identified in the medical history between the general cohort of veterans with signs of alcohol addiction or abuse and veterans with no alcohol abuse issues. In these two groups, there was also a characteristic correlation between the occurrence of combat stress in the medical history and alcohol abuse during the war: veterans who were not inclined to drinking alcohol during the war had a significantly more acute reaction to stress ($\chi^2$=15.679; *p* <0.001) and fewer cases of alcohol abuse ($\chi^2$=6.128; *p*=0.013).

The association analysis showed no significant correlation with the considered pathogenic factors of the combat situation, with significant feedback between current alcohol addiction or abuse and acute reaction to stress experienced during the war ($\chi^2$=15.679, df=1, $p$=0.000), and a direct association with alcohol abuse during the period of participation in combat operations ($\chi^2$=6.128, df=1, $p$=0.013). None of the data above support the established opinion on a causal relationship between combat mental trauma and the subsequent development of alcohol addiction.

## DISCUSSION

A study of the medical history and clinical manifestations of alcohol abuse in patients in the psychiatric department of our Military Hospital showed that about half of the surveyed subjects abused alcohol in the compared samples of contract servicemen and military pensioners (veterans and the control groups consisting of servicemen who had never taken part in combat operations) (Figure 2), about half of the surveyed abused alcohol. Unexpectedly for us, the proportions of patients with signs of addiction (diagnosed and undiagnosed) and patients suffering from alcohol abuse turned out to be almost identical, especially in veterans and in Control group 2 subjects with the same age. All this information ruined our expectations and failed to confirm the of-cited hypothesis about the especially high prevalence of alcoholism and alcohol abuse among war veterans. At the same time, the difference between diagnosed and undiagnosed (comorbid with other mental disorders) alcohol addiction in the studied samples turned out to be obvious. So, the frequency of diagnosed alcohol addiction in the sample of veterans was lower than it was in other servicemen and military pensioners, although a statistically significant ($p$ <0.001) difference was established only between the sample of veterans and the sample of Control group 1, which were, on average, older. On the contrary, undiagnosed forms of alcoholism, including alcohol abuse and alcohol addiction comorbid with other disorders, were recorded significantly more often in veterans than in both control groups ($p$ <0.001; $p$ <0.05). This predominance seemed to have to do with the fact that the sample of veterans had more patients with signs of addiction, which was not reflected in the diagnosis and was considered concomitant with other mental disorders ($p$ <0.01; $p$ <0.001).

So, the main difference in the studied samples came down to the special proportion observed in war veterans between the relatively small number of diagnosed cases of alcohol addiction and the increased frequency of alcohol addiction which accompanied other mental disorders but was not stated in the diagnosis. Considering the similarity of the total relative number of patients with signs of alcohol addiction, which in different cases was either considered as the main diagnosis, or was assessed as comorbid with other disorders, in all compared groups, it must be assumed that veterans had underdiagnosed alcohol addiction.

**Table 8. Pathogenic factors of wartime in the medical history of veterans with signs of addiction and alcohol abuse and veterans who do not abuse alcohol**

| Factor | All veterans with alcohol addiction and abuse *n*=136 | | Veterans without alcohol abuse *n*=128 | | $\chi^2$ test |
|---|---|---|---|---|---|
| | f | % | f | % | |
| Personal participation in battles | 71 | 52.2 | 69 | 53.9 | $\chi^2$=0.077; $p$=0.782 |
| Captivity | 1 | 0.7 | 4 | 3.1 | $\chi^2$=2.027; $p$=0.155 |
| Wounds or injuries in war | 22 | 16.2 | 26 | 20.3 | $\chi^2$=0.758; $p$=0.384 |
| Traumatic brain injury in war | 55 | 40.4 | 55 | 43 | $\chi^2$=0.173; $p$=0.677 |
| Combat stress reactions | 14 | **10.31** | 38 | **29.71** | $\chi^2$=15.679; $p$ <0.001 |
| Alcohol abuse in war | 20 | **14.72** | 7 | **5.52** | $\chi^2$=6.128; $p$=0.013 |

*Note: n* — sample size; f — sign frequency; % — relative sign frequency in sample n; $\chi^2$ — the value of Pearson's $\chi^2$ test; $p$ — p-value (p-significance level).

One of the causes of the underdiagnosis may be the identification of a significant number of psychopathological disorders that do not belong to the main addiction syndromes, and considering the traumatic combat experience of veterans, in clinical practice they are unambiguously interpreted as manifestations of some other underlying mental disorder that alcohol addiction either aggravates or hides: i.e., alcohol addiction was qualified only as a complication of other diagnosed mental disorders more often in veterans than in other military personnel.

In the Main group, signs of alcohol addiction were accompanied by diagnosed organic mental disorders in 23 subjects (48.9%), neurotic and adaptation disorders in 13 subjects (27.7%), various organic mental disorders not associated with brain injury in 5 subjects (10.6%), diagnosed PTSD in 4 subjects (8.5%), and other mental disorders in 2 subjects (4.3%).

A comprehensive description of the mental disorders associated with alcohol abuse requires a separate analysis. Here, we only noted that veterans suffering from alcohol addiction comorbid with other diagnosed mental disorders showed signs of PTSD ($p$ <0.001), including symptoms of re-experiencing trauma ($p$ <0.001) and personality change ($p$ <0.001) much more often compared with veterans with diagnosed alcohol addiction, even in the absence of an established diagnosis (Table 4). The association analysis between the established diagnosis of alcohol addiction and various symptoms of PTSD (Table 6) showed the presence of feedback (association with the absence of diagnosed alcohol addiction) with the presence of PTSD signs ($\chi^2$=19.075, df=1, $p$=0.000), including intrusion symptoms $\chi^2$=13.235, df=1, $p$=0.000) and personality changes ($\chi^2$=12.508, df=1, $p$=0.000).

Based on the abovesaid, we can conclude that the underdiagnosis of alcohol addiction in war veterans is determined not only, and not so much, by the insufficient severity of the actual "addiction" syndromes, but rather by the priority of facultative psychopathological symptoms in relation to the obligatory signs of addiction. That is, when a patient shows symptoms of stress disorders or other psychiatric disorders, preference is often given to a diagnosis of a non-alcohol-related psychiatric disorder, the symptoms of which appear to be the most relevant for evaluation and treatment. In this case, the use of alcohol with harmful consequences and even obvious symptoms of addiction are thought of as concomitant or as complicating the course of the disease. It should be noted that all of the veterans who were not diagnosed with alcoholism (those with undiagnosed alcohol addiction or abuse and those who did not reveal excessive drinking) showed no significant differences in the frequency of any of the PTSD symptoms. As a result, when comparing the general group of veterans with signs of addiction or alcohol abuse (including diagnosed and undiagnosed cases) and veterans who did not show signs of alcohol abuse, in general, no differences were found in the presentation of all PTSD symptoms, while significant differences were found only in relation to the frequency of re-experiencing trauma ($p$ <0.05). Our contingency analysis showed a significant association between just the absence of alcohol addiction and abuse and symptoms of intrusion in veterans ($\chi^2$=4.256, df=1, $p$=0.039). An inverse comparison of the representation of alcohol abuse and addiction in veterans with and without symptoms of PTSD showed that the number of patients with various forms of alcoholism among those with symptoms of PTSD turned out to be a quarter lower ($p$ <0.05), while the number of cases of diagnosis of addiction was almost three times lower ($p$ <0.001) than the one among those who had PTSD symptoms (Figure 3, Table 3).

All these findings, in our opinion, at minimum do not give grounds for the conclusion that the onset of PTSD symptoms creates any particular risk of developing alcohol addiction and certainly does not confirm the widespread thesis about the exceptional comorbidity of stress disorders and alcoholism. However, considering the conducted retrospective analysis, we do not exclude the possibility that the discovered relationship between PTSD symptoms and alcohol addiction can be influenced to some extent by the underestimation of symptoms of combat stress consequences in patients with alcohol addiction.

In order to clarify the relationship between alcohol abuse and alcohol addiction in veterans with combat mental trauma, we performed an analysis of the presence of significant combat pathogenic factors in their medical histories. Most of them (direct participation in shooting battles with the enemy, enemy captivity, wounds or concussions sustained in war, psychopathological reactions suffered in the combat zone) were observed in veterans with an established diagnosis of alcohol addiction much less frequently than in other veterans (Table 7). On the contrary, alcohol abuse during the war in patients with a subsequent diagnosis of alcohol

addiction was observed significantly more often than in veterans who were not prone to excessive alcohol consumption ($p$ <0.05). Most likely, the obvious clinical sings of alcohol addiction in the absence of pronounced signs of alternative mental disorder determines the direction of the clinical search by the psychiatrist and the selectivity in medical history collection, when signs consistent with it are identified in favor of the obvious diagnostic version, and optional ones are sometimes found only by chance and not as a result of active questioning. However, it is certainly not in the favor of the pathogenic role of combat stressors in the development of alcoholism that they are found with approximately equal frequency in veterans with undiagnosed addiction, in veterans with alcohol abuse, and in veterans who do not drink alcohol (Table 7).

A comparison of the general sample of veterans with signs of alcohol addiction or alcohol abuse and the sample of all veterans without signs of alcohol abuse did not show significant differences in the frequency of their exposure to combat stress factors in the past (Table 8). But, at the same time, there were significant differences in the frequency of combat stress reaction experienced during participation in combat operations and alcohol abuse during war: veterans suffering from alcohol addiction and abuse displayed less combat stress reaction ($p$ <0.001) and more alcoholism ($p$ <0.05). The contingency table showed no significant associations between the presence of any form of alcohol abuse and the combat pathogenic factors considered in the study (Table 9). At the same time, the presence of alcohol addiction or alcohol abuse showed a significant inverse correlation with the combat stress reaction experienced during war ($\chi^2$=15.679, df=1, $p$=0.000) and a direct association with alcoholism during wartime ($\chi^2$=6.128, df=1, $p$=0.013). Thus, the hypothesis of a significant correlation between alcoholism among veterans and adverse wartime experiences, according to our data, is not borne out.

## CONCLUSION

In their most general terms, the results of our study show no difference in the frequency of symptoms of alcohol addiction or abuse among veterans of wars and other servicemen and military pensioners who have never taken part in combat operations. However, there is a tendency to underdiagnose alcohol addiction in veterans in general, and in those with symptoms of PTSD, in particular. That is, alcohol addiction is not diagnosed in most cases when the veterans show symptoms of stress or other mental disorders in addition to the sings of alcoholism. There was no significant association between any form of addictive behavior and the presence of stress disorder symptoms in our sample of veterans; on the contrary, symptoms of re-experiencing trauma were more often observed in veterans who were not prone to frequent drinking. The incidence of combat stressors traced in the medical history did not differ in veterans with forms of alcohol abuse and in veterans not prone to frequent drinking.

**Table 9. Correlation between various forms of alcohol abuse and considered wartime pathogenic factors**

| Factor | Diagnosed alcohol addiction *n*=56 | | No diagnosed alcohol addiction *n*=208 | | $\chi^2$-test (all df=1) | All cases of alcohol addiction or abuse *n*=136 | | No signs of alcohol abuse *n*=128 | | $\chi^2$-test (all df=1) |
|---|---|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | | f | % | f | % | |
| Participation in battles | **19** | **33.9** | 121 | **58.2** | $\chi^2$=10.412; ***p* <0.001** | 71 | 52.2 | 69 | 53.9 | $\chi^2$=0.077; $p$=0.782 |
| Captivity | - | - | 5 | 2.4 | $\chi^2$=1.372; $p$=0.241 | 1 | 0.7 | 4 | 3.1 | $\chi^2$=2.027; $p$=0.155 |
| Wounds or injuries in war | 7 | 12.5 | 41 | 19.7 | $\chi^2$=1.542; $p$=0.214 | 22 | 16.2 | 26 | 20.3 | $\chi^2$=0.758; $p$=0.384 |
| Traumatic brain injury in war | **14** | **25.0** | 96 | **46.2** | $\chi^2$=8.123; $p$=0.004 | 55 | 40.4 | 55 | 43.0 | $\chi^2$=0.173; $p$=0.677 |
| Combat stress reactions | **2** | **3.6** | 50 | **24.0** | $\chi^2$=11.685; ***p* <0.001** | 14 | **10.3** | 38 | **29.7** | $\chi^2$=15.679; ***p* <0.000** |
| Alcohol abuse in war | 9 | 16.1 | 18 | 8.7 | $\chi^2$=2.644; $p$=0.104 | 20 | **14.7** | 7 | **5.5** | $\chi^2$=6.128; ***p*=0.013** |

*Note: n* — sample size; f — sign frequency; % — relative sign frequency in sample n; df — degrees of freedom; $\chi^2$ — the value of Pearson's $\chi^2$ test; $p$ — p-value (p-significance level).

There was only a slight difference in that among the pathological reactions in a combat situation, addictive behavior was more often observed among veterans abusing alcohol and, therefore, the phenomenon of alcohol abuse in war requires additional testing to determine its prognostic value.

Alcohol abuse and the development of addiction in veterans seem to have mechanisms common to all other patients, and in this regard, we should recall the thought once expressed by T.A. Mellman et al. (1992) that persistent disease states associated with PTSD progress over time to symptoms that are increasingly autochthonous in their pattern of occurrence [38]. Perhaps, the same frequency of alcohol addiction in the compared categories of military personnel, as well as its weak correlation in veterans with PTSD symptoms and a history of combat pathogenic factors, could partly be explained by the action of powerful social stressors. The latter equally had a significant adverse effect on the entire population of Russian military personnel in the 1990s and the first years of the current century, and their long-term effect may have outweighed the effects of wartime mental trauma. It also seems of importance to us that the massive alcohol abuse at that time affected all segments of the Russian population, which could also equalize the risks of developing alcohol addiction in the various groups of military personnel. The similarity of the results in different groups is partly due to the fact that all the examined subjects were in military service under contract, while it is quite possible that different data can be collected amongst conscripted military personnel. Finally, it must be acknowledged that a much more accurate assessment of the involvement of various adverse factors in the development of stress and addictive disorders is achievable in prospective studies that reduce the contribution of subjective components.

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