RESULTS OF GENERAL CLINICAL AND BIOCHEMICAL ANALYSES IN THE COURSE OF MAJOR BRONCHOPULMONARY DISEASES AMONG MILITARY PERSONNEL

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Abstract: Studying the prevalence of major bronchopulmonary diseases is one of the critical indicators of public health, including among military personnel. Data obtained from various studies show different results due to factors such as living and working conditions, methodology of data collection, diagnostic methods, and the availability of preventive measures. The aim of our research is to assess the results of general clinical and biochemical analyses in the course of major bronchopulmonary diseases among military personnel. To achieve this, we set out to study laboratory analyses related to community-acquired pneumonia and chronic nonspecific lung diseases (including chronic bronchitis, chronic obstructive pulmonary disease, and bronchial asthma) among military personnel. To gather comprehensive information about the primary symptoms and progression of these diseases, prospective studies were conducted in 2023 on patients treated at the Tashkent Central Military Clinical Hospital. The study included 273 military personnel who were categorized into the following age groups: under 29 years, 30-39 years, 40-49 years, and 50 years or older. Due to the limited number of cases observed among those aged 60 and 70, these individuals were not placed in separate groups. Among the participants, 33.7% (92 individuals) were relatively healthy with no lung diseases, 33.7% (92 individuals) had community-acquired pneumonia, and 32.6% (89 individuals) were diagnosed with chronic nonspecific lung diseases (CHNLD).

Keywords: military personnel, chronic non-specific lung diseases, bronchitis, bronchial asthma, COPD.

Military personnel represent a unique group for pulmonary evaluations. Despite the specific standards required to join the armed forces, pre-existing and commonly occurring pulmonary diseases such as bronchial asthma, chronic obstructive pulmonary disease (COPD), and chronic bronchitis can still be present among them [1;2].

Typically, military personnel are considered a physically healthy and active contingent due to their regular engagement in physical training. This may lead to earlier detection of disease symptoms compared to the general population. One of the most commonly reported complaints is shortness of breath during physical exertion. Diagnosing this condition poses challenges because symptoms are often atypical, and specific markers are not observed during pulmonary function tests.

Michael Morris, in his studies spanning over a decade, investigated military personnel who served in wars in Iraq and Afghanistan. He emphasized how their service introduced new

challenges to the medical field. In these conflicts, respiratory risks such as exposure to geological dust, burning pits, vehicle exhaust, industrial air pollution, and, in some cases, radiation were identified as potential acute and chronic pulmonary disease risk factors [3].

For military and civilian healthcare providers, assessing deployed military personnel to determine the presence of actual pulmonary diseases and understanding how these diseases correlate with the location of deployment has remained a persistent challenge.

General clinical and biochemical examinations are useful in assessing clinical epidemiological changes in these patients. The following table shows biochemical laboratory changes in patients with community-acquired pneumonia and chronic nonspecific lung diseases.

Table 1

Biochemical indicators of major bronchopulmonary diseases

Variables	Groups				p-value
	Control, N - 92	Pneumonia, N - 92	CHNLD, N - 89	Total, N - 273	
ALT					<0,001
Norm	92 (100%)	70 (76,1%)	79 (88,8%)	241	
Increased	0 (0,0%)	22 (23,9%)	10 (11,2%)	32	
AST					<0,001
Norm	92 (100%)	79 (85,9%)	85 (95,5%)	256	
Increased	0 (0,0%)	13 (14,1%)	4 (4,5%)	17	
Glucose level					0,001
Norm	76 (82,6%)	82 (89,1%)	57 (64%)	209	
Increased	16 (17,4%)	10 (10,9%)	32 (36%)	54	

Blood glucose levels were monitored in all military personnel, and the analysis revealed the following: an increase in glucose levels was observed in 17.4% of cases among respondents in the control group, in 10.9% of cases among those with community-acquired pneumonia, and in 36% of cases among those with chronic nonspecific lung diseases (CNSLD) (p<0.0001) (Table 1).

When examining glucose variations by age, the following trends were identified: an increase was observed in 2.7% of cases among those under 29 years, 4.4% in the 30–39 age group, 5.9% in the 40–49 age group, and 41.9% in those aged 50 and older. This indicates that as age increases, the likelihood of elevated blood glucose levels among military personnel also rises (Table 2).

Overall, the monitoring and analysis of blood glucose levels highlighted significant variations, with 17.4% of respondents in the control group, 10.9% among those with

community-acquired pneumonia, and 36% among those with CNSLD exhibiting elevated glucose levels (p<0.0001) (Table 2).

Table 2

Changes in biochemical indicators of major bronchopulmonary diseases by age group

Variables	Groups by age				p-value
	<29, N - 75	30-39, N - 68	40-49, N - 68	50+, N - 62	
Glucose level					0,217
Norm	73 (97,3%)	65 (95,6%)	64 (94,1%)	36 (58,1%)	
Increased	2 (2,7%)	3 (4,4%)	4 (5,9%)	26(41,9%)	

When analyzing biochemical changes, it was found that ALT levels in patients with community-acquired pneumonia were increased in 22 (23.9%) of the military personnel, and normal values were found in 76.1% of the remaining 70. ALT levels were increased in 10 patients with CHNLD (11.3%). Thus, the effect of the body on internal organs was more pronounced in the course of community-acquired pneumonia. The odds ratio (OR) for the group with normal ALT levels in community-acquired pneumonia was 0.40 (95% CI: 0.17, 0.89), and the p-value was significant (p<0.029), indicating that community-acquired pneumonia was less common in these patients. (Table 2). It is not an exaggeration to say that similar changes were observed in the increase in AST. Among soldiers with community-acquired pneumonia, AST was increased in 14.1% of cases and in 4.5% of cases with chronic non-infectious lung diseases (p<0.001). For the group with normal AST levels, the OR was 0.29 (95% CI: 0.08, 0.85), p-value <0.035, indicating a significant reduction in the likelihood of developing community-acquired pneumonia.

In the analysis of community-acquired pneumonia vs CHNLD, 100% of soldiers in the control group were within the normal range.

When we examined the confidence interval for increased glucose, the OR was 4.03 (95% CI: 1.87, 9.32), p<0.001.

Table 3

Blood analysis indicators

Variables	Groups				p-value
	control, N < 92	pneumonia, N < 92	CHNLD, N < 89	Total: N < 273	

Hemoglobin					0,022
Norm	89 (96,7%)	85 (92,4%)	76 (85,4%)	250(91,6%)	
Decreased	3 (3,3%)	7 (7,6%)	13 (14,6%)	23(8,4%)	
Lymphocytes					0,114
Norm	80 (87%)	75 (81,5%)	81 (91,1%)	236(86,4%)	
Pathology	12 (13%)	17 (18,5%)	7 (7,9%)	37(13,6%)	
Leukocytes					0,002
Norm	80 (87%)	74 (80,4%)	58 (65,2%)	212(77,7%)	
Pathology	12 (13,0%)	18 (19,6%)	31 (34,8%)	61(22,3%)	
EEC					<0,001
Norm	92 (100%)	59 (64,1%)	71 (80,0%)	222(81,3%)	
Pathology	0 (0,0%)	33 (35,9%)	18 (20%)	51(18,7%)	

During the study, a complete blood count was performed on all military personnel, revealing normal hemoglobin levels in 91.6% of cases. Specifically, 96.7% of respondents in the control group, 92.4% of those with community-acquired pneumonia, and 85.4% of those with chronic nonspecific lung diseases (CNSLD) demonstrated normal hemoglobin levels.

Pathological conditions were identified in 8.4% of military personnel, with the highest incidence (14.6%) observed in cases of CNSLD. Among those with community-acquired pneumonia, a decrease in hemoglobin levels was noted in 7.6% of cases (p<0.022).

During the study, further blood analysis revealed notable trends among military personnel with respiratory diseases. In cases of community-acquired pneumonia (CAP), lymphocyte levels decreased by 18.5%, compared to a 7.9% decrease in chronic nonspecific lung diseases (CNSLD) (p<0.114). Pathological increases in leukocytes were more frequent in CNSLD, observed in 34.8% of cases, whereas CAP showed leukocytosis in 19.6% of cases, a 1.8-fold lower incidence (p<0.002).

Elevated erythrocyte sedimentation rate (ESR) was recorded in 35.9% of CAP cases and 20% of CNSLD cases, demonstrating that ESR increases were 1.8 times less frequent in CNSLD (p<0.001). A decrease in lymphocytes showed an odds ratio (OR) of 0.38 (95% CI: 0.14, 0.94) with a p-value of <0.043, indicating a statistically significant association.

Analysis of leukocyte levels revealed that normal leukocyte counts were observed in 77.7% of cases. The OR for pathological leukocytosis was 2.20 (95% CI: 1.13, 4.38) with a p-value of <0.022, indicating a significant association. Elevated ESR was observed in 18.7% of cases, with an OR of 0.45 (95% CI: 0.23, 0.88) and a p-value of <0.021, suggesting that the severity of pneumonia significantly influenced ESR levels.

Overall, the complete blood count findings indicated that hemoglobin levels decreased in 17.6% of cases, leukocytosis occurred in 34.8%, and ESR elevation was noted in 20% of CNSLD cases. In CAP, lymphocytopenia was observed in 18.5% of cases, while ESR was elevated in 35.3% of cases.

Table 4

Changes in biochemical parameters in patients with community-acquired pneumonia

Indicator	Groups					
	New resp, N < 55	SR, N <73	OF, N < 78	DC, N < 67	Total, N < 273	P
ALT	25 ± 19	56 ± 47	38 ± 25	38 ± 47	39 ± 38	0,054
AST	29 ± 15	37 ± 38	29 ± 13	29 ± 20	31 ± 24	0,593
Glucose	4,80 ± 0,62	4,83 ± 0,67	4,82 ± 0,68	5,41 ± 1,23	4,97 ± 0,86	**0,040**

1mean value ± standard deviation. 2 ANOVA-test

The average ALT level in the new recruits was 25 ± 19, which is significantly lower than in the sergeants (56 ± 47). The ALT level in the officers and discharged soldiers was 38 ± 25 and 38 ± 47, respectively. The results of the ANOVA test showed a p-value of 0.054, indicating that there are differences between the groups, but this is not statistically significant.

As for the AST level, the new recruits were 29 ± 15, sergeants - 37 ± 38, officers - 29 ± 13, and discharged soldiers - 29 ± 20. The AST levels did not show statistically significant differences between the groups, which is confirmed by the p-value of 0.593.

The average glucose level in newly recruited soldiers was 4.80 ± 0.62, and in sergeants (4.83 ± 0.67) and officers (4.82 ± 0.68) were similar. However, the glucose level in retired soldiers was significantly higher - 5.41 ± 1.23. The ANOVA test showed a p-value of 0.040, indicating that there were statistically significant differences between these groups, especially between retired soldiers and other groups.

Table 5

Biochemical indicators of CNSLD

Indicators	Groups					
	New resp, N < 55	SR, N <73	OF, N < 78	DC, N < 67	Total, N < 273	p
ALT	27 ± 8	31 ± 27	32 ± 18	29 ± 16	30 ± 20	0,930

AST	24 ± 5	24 ± 16	26 ± 9	23 ± 16	24 ± 14	0,887
Glucose	5,13 ± 0,58	5,34 ± 0,63	5,22 ± 0,64	5,80 ± 1,09	5,46 ± 0,85	0,049

1mean ± standard deviation; 2ANOVA test

Thus, the average ALT score for new recruits was 27 ± 8, for sergeants 31 ± 27, for officers 32 ± 18, and for retirees 29 ± 1. The ANOVA test showed a p-value of 0.930, indicating that there were no statistically significant differences between the groups.

The average AST score for new recruits was 24 ± 5, for sergeants 24 ± 16, for officers 26 ± 9, and for retirees 23 ± 16. In this case, the p-value was 0.887, which also confirms that there were no statistically significant differences between the groups.

Glucose levels show significant differences: new recruits 5.13 ± 0.58, sergeants 5.34 ± 0.63, officers 5.22 ± 0.64, and retired 5.80 ± 1.09. The ANOVA test shows a p-value of 0.049, which indicates that there are statistically significant differences between the groups, especially the retired servicemen with higher glucose levels compared to the other groups.
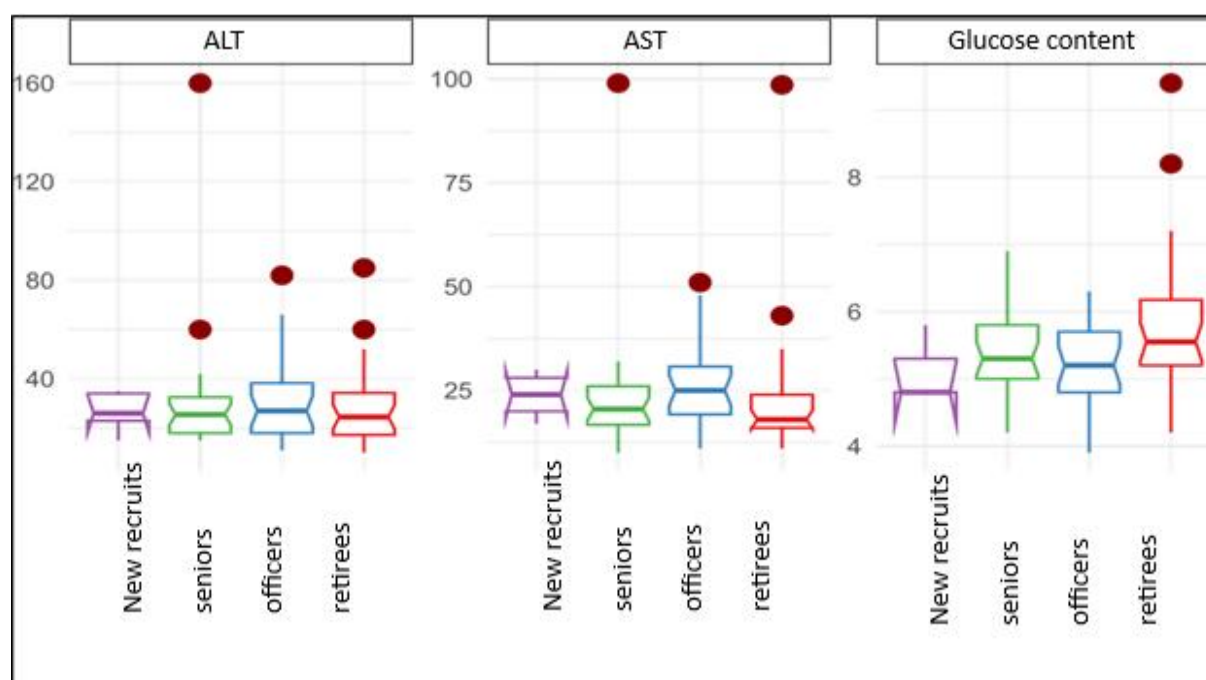

Figure 2. Blood test results in patients with community-acquired pneumonia

As shown in Table 6, the hemoglobin level among the military was 144 ± 11, with an average of 139 ± 10 for recruits, 150 ± 10 for sergeants, 146 ± 9 for officers, and 142 ± 11 for those who had left the service. The ANOVA test -value is 0.003, which indicates that there are statistically significant differences between the groups, especially between recruits and sergeants. The leukocyte level was 8.57 ± 5.03 for recruits, 7.13 ± 2.58 for sergeants, 6.80 ± 1.84 for officers, and 7.73 ± 3.58 for those who had left the service. However, the p-value of 0.335 showed that there were no statistically significant differences between the groups for these indicators. The level of lymphocytes was 29 ± 13 in newly recruited soldiers, 31 ± 10 in sergeants, 34 ± 8 in officers, and 30 ± 11 in retired soldiers.

These results indicate that there were no significant changes in the general blood count among soldiers with community-acquired pneumonia, and this is due to the fact that the conditions created for nutrition in the soldiers were sufficient.

The hemoglobin level in soldiers who underwent CHNLD was 154 ± 19 on average for newly recruited soldiers, 146 ± 14 in sergeants, 146 ± 11 in officers, and 139 ± 15 in retired soldiers.

ESR (erythrocyte sedimentation rate) was 11 ± 4 in newly recruited soldiers, 10 ± 9 in sergeants, 9 ± 8 in officers, and 14 ± 10 in retired soldiers. The p-value is 0.211, which confirms the absence of statistically significant differences, but it is necessary to pay attention to the increased ESR level in those who left the service.

So, in conclusion, it should be said that the reason why the increase and decrease in the amount of hemoglobin, leukocytes and lymphocytes among the military are within the normal range is that, despite the illness they have suffered, proper nutrition and a healthy lifestyle, maintaining immunity are the basis for keeping these indicators within the normal range.

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