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Hygienic Analysis of Education and Peducation Conditions of Military Higher Education Schools

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Abstract This article presents the results of the hygienic analysis carried out to improve the health and educational conditions of the cadets of the military school at the Academy of the Armed Forces of the Republic of Uzbekistan. In the study, the microclimate, air composition, relative humidity and lighting level of the cadets' living and study rooms were studied. With the help of the Meteoscope-M equipment, air temperature and humidity deviations from the norms were noted, which could have a negative effect on the health of the cadets. Due to poor air exchange, the amount of carbon dioxide gas is higher than normal. It was found that the level of illumination is much higher than the specified norm, which can reduce the eye health and work ability of the cadets. In order to maintain the health of cadets, the article emphasizes the need to improve natural ventilation, adjust lighting and take other preventive measures.

Keywords Military schools, Hygienic analysis, Microclimate, Meteoskop-M, Air temperature, Relative humidity, Carbon dioxide, Level of illumination, Health of cadets, Ventilation system

1. Introduction

Training young people for the service of the Armed Forces of the Republic of Uzbekistan is a state-level task. To solve this task, pre-conscription initial training, including preparation for civil defense, is a mandatory subject in educational programs, which is carried out by teachers who teach pre-conscription training in general education, secondary special and vocational education institutions.

It is specified in Law 13 of the Republic of Uzbekistan on military service and general military obligations at the beginning of the courses or at the end of the graduation year. Taking into account the importance of this issue, the "Military education before conscription" direction is available in higher educational institutions, that is, the subject of "Military patriotism education" is one of the main subjects in the training of cadets.

At the stage of professional education, the education of military personnel based on the principles of a healthy lifestyle (STT) and the military education system, which includes the elements of hygienic education, is of great importance in the issues of maintaining and strengthening the health of the student, the commander (commander) (chief), medical service, physical training and It is difficult to assess the role of a sports specialist in the formation of a "healthy" personality of a military serviceman, in which STT is an integral element of achieving the quality of an acceptable factor in the biological, mental and social development of each learner for the development of a healthy military team at the modern stage [1,2,6,7,9,10,11,12,13,14].

The health of the cadets of the military higher educational institution is the main component of the educational process, on the one hand, they are the basis of the successful acquisition of the necessary amount of knowledge, skills and abilities, the formation of professional competence and a healthy lifestyle [9,10,11,12,13,14].

At the same time, the organization's microclimate indicators, air temperature, humidity, speed of movement, the amount of carbon dioxide gas in the air of the rooms and the level of natural and artificial lighting are considered one of the main factors affecting the health of cadets [9,10,11,12,13].

V.V. Klimov and others. (2020). The authors conclude on the need to develop a [health care system for cadets, which includes an assessment of educational conditions, a rating of factors that negatively affect the health of cadets, disease monitoring at the beginning and end of the educational process, a program of sanitary-hygienic and medical preventive measures [1,2,3,4,5,6,7,8].

Stresses, negative habits, living conditions of cadets, disordered eating, psycho-emotional stress affect the health condition of cadets. One of the urgent problems today is to ensure the standard level of the educational conditions of the rooms and their microclimatic parameters and lighting in military higher education institutions.

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The purpose of the research is to make a hygienic analysis of the educational and training conditions of military higher educational institutions.

2. Research Materials and Methods

Research work was carried out at the Academy of the Armed Forces of the Republic of Uzbekistan.

Determination of microclimate parameters (temperature, relative humidity and air movement speed) from the physical factors of the air composition in the complex of rooms of the Armed Forces Academy was carried out using Meteoscop-M equipment and SanQvaN №0341-16 "Sanitary-epidemiological requirements for educational conditions and organization in secondary schools" hygienically evaluated based on the standard level set in On-site measurement works "State standard 16000-1-2007 "Enclosed ambient air. Sampling and general conditions" was carried out taking into account the specific characteristics of the indoor environment listed in paragraph 3, using the measurement methods listed in paragraph 5, and knowing the types of indoor environments and sources of pollutants described in recommendation A of paragraph 9, and the results were statistically processed and submitted. Measurements were made from at least 3 points depending on the size of the room diameter and the results were returned.

A method of evaluating the microclimate factor.

Room temperature, relative humidity and air movement speed **Meteoskop-M** was evaluated using the apparatus.

In the Meteoscop-M equipment, indoor microclimate indicators such as air temperature (℃), relative humidity (%) and air movement (m/s) were measured while samples were taken simultaneously from surfaces. Microclimate factors were also determined at each air sample location. Measurements of microclimate factors were carried out based on the requirements specified in SanNvaQ №0324-16 "Sanitary-hygienic norms of the microclimate of production enterprises" [7].

The microclimate indicators of the classrooms were determined by the METEOSKOP-M device. Measurements were taken from 3 points. It is measured for 5 minutes at a height of 10, 100, 150 meters above the accepted floor. Results Tv - temperature; V - speed of air movement; RH – relative humidity; P – atm. pressure.

Air heat exchange in higher education institutions was compared and hygienically assessed based on SanQvaN 0341-2016.

On-site measurement work State standard 30494-2011 " Residential and public buildings. In the hot season of the year specified in clause 2.12 of the "Microclimate indicators of rooms", in the rooms of the 2nd category specified in clause 3 (engaged in mental and educational activities), 0.1, 0.4, 1.7 meters from the floor specified in clause 6.3 at a distance of 0.5 meters from the surrounding surfaces (in the center) at least 3 times, the results were statistically processed and presented as a scientific result.

Chemical factor estimation method. The amount of SO_2 in the air of the classrooms was measured with a Thermo-hydro SO_2 meter.

The main task of the device is to determine the level of anthropogenic air pollution and microclimate indicators of closed rooms.

Illumination assessment method.

The level of natural and artificial illumination of the rooms was measured with *a TES-1330A (Digital Illuminance Meter)* luxmeter.

Determining the level of illumination of educational rooms was carried out using the TES-1330A series luxmeter device. The main task of the device is to determine the level of illumination of the working surface.

On-site measurement works State Standard 24940-2016 "Buildings and structures. It was carried out on the basis of methods of measuring the level of illumination.

Designation of control points for measuring the minimum level of illumination of the buildings specified in clause 5.5 of this standard, determination of control points for measuring the average value of the illumination level of rooms and workplaces specified in clause B.2 (see Table 1) is carried out in accordance with the rules was increased and the results were statistically processed.

Table 1. Measurement procedure

Length of room or workspace (meters)	Maximum distance between control (measurement) points	Minimum number of measurement points
0.40	0.15	3
0.60	0.20	3
1.00	0.20	5
2.00	0.30	6
5.00	0.60	8
10.00	1.00	10
25.00	2.00	12
50.00	3.00	17
100.00	5.00	20

Statistical processing of research results was carried out using SPSS-IBM version 26.0, and interquartile range, median (median & inter-quartile range) and correlation (regression analysis) were used.

All laboratory equipment has a certificate of conformity issued by the Standard Agency of the Republic of Uzbekistan.

A comparative (Ct) method was used to quantify the differentiation of results, and a cycle threshold (Ct) of 40 or higher indicates negative results, while a Ct less than 37 indicates positive results. from 37 large, but less than 40 Ct suspicious that found and again checked.

Analysis of the obtained results. The results of hygienic assessment of microclimate parameters in the main and auxiliary rooms of the Academy of the Armed Forces of the Republic of Uzbekistan are presented in Table 2.

Table 2. Results of air temperature assessment of the main and auxiliary rooms of the Armed Forces Academy

t/r	Name of rooms	Standard (°C)	Result (°C)	Explanation
Department of national pride and patriotism				
1.	Teacher's room	19-25	20.6	
2.	Study room	18-24	23.3	
3.	Lecture room	18-24	23.4	
Faculty of material supply				
4.	Teacher's room	19-25	19.8	
5.	Study room	18-24	23.8	
6.	Lecture room	18-24	24.4	
2 cadet battalion dormitory				
7.	Bedroom	18-20	22.3	
8.	Shower room	25-28	21.1	
9.	Bathroom	25-28	21.7	
10.	Toilet	22-24	24.8	
Canteen of cadets				
11.	Dining hall	18-20	19.2	

Table 3. Indicators of relative air humidity in the rooms of the Armed Forces Academy

t/r	Name of rooms	Rate (%)	Result (%)	Indicator in % compared to the norm
Department of national pride and patriotism				
1.	Teacher's room	35-75	27.5	21.5% less
2.	Study room	35-75	24.5	30% less
3.	Lecture room	35-75	21.6	38.3% less
Faculty of material supply				
4.	Teacher's room	35-75	26.9	23.2% less
5.	Study room	35-75	22.9	34.6% less
6.	Lecture room	35-75	23.9	37.7% less
2 cadet battalion dormitory				
7.	Bedroom	40-70	25.5	36.2% less
8.	Shower room	40-70	23.4	
9.	Bathroom	40-70	26.1	
10.	Toilet	40-70	27.1	
Canteen of cadets				
11.	Dining hall	40-70	28.8	28% less

Table 4. Quantitative indicators of carbon dioxide in the main and auxiliary rooms of the Armed Forces Academy

t/r	Name of rooms	Rate (%)	Result (%)	Indicator in % compared to the norm
Department of national pride and patriotism				
1.	Study room	0.1	0.11	10% more
2.	Lecture room	0.1	0.25	150% more
Faculty of material supply				
3.	Teacher's room	0.1	0.01	90% less
4.	Study room	0.1	0.08	20% less
5.	Lecture room	0.1	0.11	10% more
2 cadet battalion dormitory				
6.	Bedroom	0.1	0.02	80% less

Table 5. The level of illumination of the main and auxiliary rooms of the Armed Forces Academy of the Republic of Uzbekistan

t/r	Name of rooms	Norm (Lk)	Result (Lk)	Indicator in % compared to the norm
Department of national pride and patriotism				
1.	Teacher's room	300	425	41.6% more
2.	Study room	300	872	190.6% more
3.	Lecture room	300	590	96.6% more
Faculty of material supply				
4.	Teacher's room	300	402	34% more
5.	Study room	300	1094	264.6% more
6.	Lecture room	300	614	104.6% more
2 cadet battalion dormitory				
7.	Bedroom	300	407	35.6% more
Canteen of cadets				
8.	Dining hall	300	505	68.3% more

Although the air temperature of the main and auxiliary rooms of the Academy of Armed Forces of the Republic of Uzbekistan meets the hygienic requirements, it was found that the temperature in the shower and washing rooms is 2.3℃ and 2.9℃ less than the norm.

Despite the fact that the air temperature and its results are determined in all seasons of the year, it was determined in the periods when air conditioning was used for cooling in the warm season and central heating in the cold season of the year.

One of the main indicators of microclimate parameters is humidity. Humidity is low in hot climates.

Table 3 shows the indicators of relative humidity of the air in the places of education and residence of the cadets of the Armed Forces Academy of the Republic of Uzbekistan.

The results of the indicator of relative humidity of the air in the places of education and residence of cadets of the Armed Forces Academy show that it was 21-27.5% in the department of national pride and patriotism, and 22.9-26.9% in the faculty of material supply. It basically showed that it did not meet the established standard

It was found that the air movement speed in the places of residence and education of the cadets of the Armed Forces Academy of the Republic of Uzbekistan is equal to zero.

The amount of carbon dioxide in the main and auxiliary rooms of the Academy of the Armed Forces of the Republic of Uzbekistan was found to be excessive in all rooms, and it shows that the healthy exchange of air in these rooms has been derailed.

This mainly leads to derailment of their activities.

For this, it is necessary to implement measures aimed at regulating the amount of carbon dioxide. Otherwise, not only the daily routine of the students, but also their physical abilities and state of health, will lead to an increase in the level of respiratory system diseases and poisoning.

The results of the level of illumination of the main and auxiliary rooms of the Armed Forces Academy are presented in Table 5.

The high level of illumination of the main and auxiliary rooms of the Academy of the Armed Forces of the Republic of Uzbekistan was determined.

Based on the obtained results, it should be noted that no drastic changes were detected in the microclimate parameters of the Armed Forces Academy.

The excess amount of carbon dioxide in the air indicates that the medical ventilation system in the rooms is not well implemented. Washing in different seasons of the year and the low temperature in the shower rooms together with the damage to the physical ability and health condition of the cadets indicate the presence of defects in the communication system of these rooms.

In a series of studies, it was found that the level of artificial lighting in educational organizations is low and the presence of defects in the visual system that develops as a result of it, while the level of artificial lighting in the main and auxiliary rooms of the academicians of the armed forces was found to be high. This situation of extreme brightness leads to derailment of cadets' working ability and educational conditions.

3. Conclusions

1. Microclimate indicators were hygienically evaluated in the main and auxiliary rooms of the Academy of the Armed Forces of the Republic of Uzbekistan. The air temperature in some classrooms deviated from the norm (according to Table 2, the temperature in the classroom is 23.3℃, and the norm is 18-24℃). In particular, a low temperature (21.7℃ and 24.8℃, respectively) was noted in the washrooms and toilets, which may negatively affect the comfortable living conditions of the cadets.
2. It was found that the relative humidity level in the academy is significantly lower than the specified norm. The relative humidity in the classrooms is 24.5%, which is 30% less than the norm (35-75%) (Table 3). Also, in other rooms, the average humidity was 20-

30% lower, which indicates the negative microclimate conditions.

3. It was noted that the amount of carbon dioxide in the rooms of the academy increased compared to the norm (according to Table 4, it was 0.25% in the lecture room, and the norm was 0.1%). It shows that the carbon dioxide gas in the study and lecture rooms is 150% higher than the norm, which confirms that the ventilation system in the rooms is not working properly. Of this due to in cadets breath get system diseases development danger increases.
4. Study rooms illumination level from the norm much high that determined. Study in his room illumination level 872 Lk being, this fixed at 300 Lk 1906% above the norm (Table 5). This situation the eye cadets to do their best work ability to decrease take will come.
5. General recommendations: Cadets to live and study of the rooms microclimate conditions improve for natural ventilation system strengthening, temperature and relative humidity to the norm to bring and illumination level optimization necessary. These changes of cadets health to improve, study in the process stress to reduce and work productivity to increase help gives.

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