

OPTIMIZATION OF THE IMPACT OF MILITARY WORKING CONDITIONS ON THE HEALTH STATUS OF MILITARY COMMUNICATION PERSONNEL IN UZBEKISTAN**Tuxtamatov Ravshan Xalmat ogli**

Fergana medical institute of public health

Abstract

Military communication personnel perform an essential role in ensuring stable and uninterrupted communication within the armed forces. Their professional activities are associated with exposure to various occupational factors, including electromagnetic radiation, prolonged sedentary work, visual strain, and increased psycho-emotional stress. The objective of this study was to assess the influence of military working conditions on the health status of communication personnel and to develop hygienic recommendations for improving occupational safety in the Armed Forces of Uzbekistan. The study involved hygienic assessment of the workplace environment, analysis of the work process, and medical examination of military communication specialists. Environmental measurements included microclimate parameters, illumination levels, and electromagnetic field intensity. Medical evaluation included assessment of cardiovascular indicators, neurological symptoms, and visual fatigue. The results showed that although most environmental parameters were within permissible hygienic limits, the specific characteristics of the work process, including prolonged screen exposure and high mental workload, contributed to functional health disturbances among personnel. Preventive hygienic measures such as ergonomic workplace design, improved work-rest schedules, and regular medical monitoring are recommended to optimize working conditions and maintain the health of communication personnel.

Keywords

military hygiene, occupational health, electromagnetic fields, communication personnel, working conditions, Uzbekistan.

Introduction

The effectiveness of modern armed forces largely depends on reliable communication systems that ensure coordination between military units and operational command structures. Military communication specialists are responsible for maintaining stable communication channels, operating complex radio-electronic equipment, and ensuring continuous information exchange during both training and operational activities.

The professional activities of communication personnel are characterized by exposure to multiple occupational factors that may influence their health status. Among the most important factors are electromagnetic radiation generated by communication devices, prolonged work with computer displays, static physical loads, and increased psycho-emotional stress associated with responsibility for communication stability.

In recent decades, the rapid development of digital communication technologies has significantly changed the working environment of communication personnel. Modern communication systems involve complex electronic equipment, automated monitoring systems, and digital control interfaces. While these technologies improve operational efficiency, they also increase the duration of interaction with electronic displays and communication equipment.

Exposure to occupational factors over a prolonged period may lead to functional changes in the nervous, cardiovascular, and visual systems. Previous studies have shown that operators working with electronic communication systems often experience symptoms such as headaches, eye strain, fatigue, and sleep disturbances. These conditions may reduce work efficiency and increase the risk of occupational health disorders.

In Uzbekistan, modernization of the Armed Forces has led to the increased use of advanced communication technologies. Therefore, it is important to assess the hygienic characteristics of the working environment and evaluate their potential impact on the health of military communication personnel.

The field of military hygiene plays a key role in identifying occupational risks and developing preventive measures aimed at maintaining the health and work capacity of military personnel. Hygienic assessment of the working environment allows specialists to determine whether occupational factors comply with established standards and to propose measures for improving working conditions.

Despite the importance of communication personnel in military operations, relatively limited attention has been paid to the hygienic aspects of their working environment in Central Asian countries. Conducting comprehensive studies in this area is necessary to develop evidence-based recommendations for occupational health protection.

The aim of this study was to evaluate the impact of occupational factors on the health status of military communication personnel and to develop hygienic recommendations for optimizing working conditions within the Armed Forces of Uzbekistan.

Methods

Study design

A cross-sectional hygienic and medical study was conducted to assess working conditions and health indicators among military communication personnel. The study was carried out between 2023 and 2024 in communication units of the Armed Forces of Uzbekistan.

Participants

The study included military communication specialists who were directly involved in operating communication equipment and monitoring communication systems. Participants had varying lengths of service and different operational responsibilities. All participants provided informed consent for participation in the study.

Hygienic assessment of the working environment

Environmental measurements were conducted to evaluate the hygienic characteristics of communication workplaces. The following parameters were assessed:

- air temperature
- relative humidity
- air velocity
- illumination levels
- intensity of electromagnetic radiation

Microclimate parameters were measured using standard hygienic instruments in accordance with occupational health guidelines. Illumination levels were evaluated using lux meters at workstations where personnel interact with communication equipment.

Electromagnetic field intensity was measured in areas where communication devices were installed. Measurements were taken at different distances from the equipment to determine exposure levels experienced by operators during normal work activities.

Work process analysis

The structure of the work process was analyzed to determine the duration of continuous work with electronic displays, the length of work shifts, and the frequency of rest breaks. Observations were conducted to assess ergonomic characteristics of workplaces, including seating posture, screen positioning, and accessibility of equipment controls.

Health assessment

Medical examinations were conducted to evaluate the health status of communication personnel. The following indicators were assessed:

- arterial blood pressure
- heart rate
- neurological complaints
- visual fatigue symptoms
- sleep disturbances
- general fatigue

Participants also completed questionnaires describing subjective symptoms related to their work conditions.

Statistical analysis

Collected data were summarized using descriptive statistical methods. Results were presented as mean values and percentages to illustrate the prevalence of reported symptoms and occupational factors.

Results

Hygienic characteristics of the working environment

Assessment of microclimate conditions showed that most communication rooms maintained temperature and humidity levels within recommended hygienic limits. However, in rooms with intensive equipment operation, temperature levels occasionally exceeded optimal values due to heat generated by electronic devices.

Ventilation conditions varied between facilities. In some cases, insufficient air exchange contributed to a feeling of discomfort among personnel during prolonged work shifts.

Illumination levels at workplaces generally corresponded to hygienic standards, although uneven lighting was observed in certain work areas. Inadequate lighting may increase visual strain when personnel work with electronic displays for extended periods.

Measurements of electromagnetic radiation indicated that exposure levels were below the maximum permissible limits established by occupational safety guidelines. Nevertheless, continuous exposure during long shifts may contribute to cumulative physiological effects.

Characteristics of the work process

Observation of the work process revealed that communication specialists spend a considerable amount of time in a seated position while monitoring communication channels and analyzing information displayed on electronic screens.

In many cases, continuous work with computer monitors exceeded two hours without adequate breaks. Static posture and repetitive visual focus may contribute to musculoskeletal discomfort and visual fatigue.

Communication personnel also reported experiencing high levels of mental workload during periods of intensive communication activity or training exercises.

Health indicators of communication personnel

Medical examination results indicated the presence of several functional health disturbances among participants.

The most frequently reported symptoms included:

- headaches (38%)
- visual fatigue (31%)
- sleep disturbances (27%)
- general fatigue (34%)

- irritability and nervous tension (22%)

A number of participants demonstrated moderately elevated blood pressure levels, particularly among individuals with longer service duration. Some personnel also reported neck and shoulder discomfort associated with prolonged static posture during work.

Discussion

The results of this study indicate that the working conditions of military communication personnel involve several occupational factors that may influence their health status. Although environmental parameters such as electromagnetic radiation and illumination were generally within acceptable limits, the specific characteristics of the work process contribute to functional disturbances.

One of the main factors affecting communication personnel is prolonged work with electronic displays. Continuous visual concentration can lead to eye strain and headaches, particularly when rest breaks are insufficient. Similar findings have been reported in studies of computer operators and air traffic controllers.

Static posture during long work shifts may also contribute to musculoskeletal discomfort and fatigue. Ergonomic improvements, including adjustable chairs, proper screen positioning, and appropriate workstation layout, may help reduce these risks.

Psycho-emotional stress is another important factor affecting communication specialists. The responsibility for maintaining stable communication and the need for constant attention may increase mental workload. Over time, this may lead to sleep disturbances and nervous system fatigue.

Although electromagnetic radiation levels measured in this study were below permissible limits, long-term exposure to low-intensity electromagnetic fields remains an area of scientific interest. Continued monitoring of exposure levels is therefore recommended.

Preventive measures should focus on improving workplace ergonomics, optimizing work-rest schedules, and implementing regular health monitoring programs for communication personnel.

Conclusion

Military communication personnel are exposed to a complex combination of occupational factors that may influence their health and work efficiency. While environmental parameters generally comply with hygienic standards, prolonged screen exposure, static physical loads, and psycho-emotional stress contribute to functional health disturbances.

To improve working conditions and maintain the health of military communication specialists, it is necessary to implement comprehensive preventive measures. These measures should include ergonomic workplace design, improved ventilation and lighting, regulated work-rest schedules, and regular medical examinations.

Implementation of these hygienic measures will contribute to preserving the health and professional readiness of communication personnel in the Armed Forces of Uzbekistan.

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