

Psychological risks for shift workers in the Far North and south of Russia

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Abstract. The study was sponsored by the Russian President's grant for state support of young Russian scientists - PhD (MK-6409.2018.6). Climatic-geographical, production and social factors place demands on the body of a shift worker, exceeding his reserves. This excludes the possibility of complete adaptation of the organism to these conditions and causes the presence of occupational health risks. It has been revealed that professional work by the shift method in the Far North contributes to the formation of unfavorable functional states and the development of destructive personal qualities of workers. They lead to a decrease in the level of mental health, productivity and efficiency of work. The reference to the risk-oriented approach is conditioned by the need to predict the professional efficiency of shift personnel. By psychological risks in professional activity, we mean the probability of the emergence of negative psychological conditions, properties and qualities that will impede its implementation. Management of psychological risks in professional work is possible through the change of objective working conditions (environmental resource) and attitudes towards the conditions for the performance of a professional task, the goals of performing professional activity and self-assessment of the possibilities for performing professional activities. The study involved 70 workers in shift work in the Arctic and 70 workers in shift work in the south of Russia. Methods of research are questioning, psychological and psychophysiological testing, observation. As a result of the study, differences in the psychological risks of shift workers in the northern and southern regions of Russia were identified. Developed and tested measures to reduce the psychological risks of these workers.

Key words: *psychological risk; assessment; functional status; professional destructions; character accentuation.*

I. INTRODUCTION

80% of all Arctic oil and almost all gas are concentrated in the Russian Far North. A major role in the development of the Arctic is played by the attraction and preservation of the able-bodied population to these remote regions. To enable the exploration and mining of mineral resources in these difficult-to-reach regions with

extreme climatic and geographical conditions, a shift method of labor organization is used. When a shift organization of labor, enterprises must ensure not only the professional activities of workers, but also their optimal livelihoods in the places of rotation. In the studies of many authors, it has been established that shift workers in the Far North and the Arctic are influenced by three groups of factors: climatic and geographical, associated with the harsh Arctic climate; production, due to the danger and harmfulness of production, and social, determined by the conditions of group isolation. Climate-geographical factors are among the key factors in assessing the extremity of shift work, so it is important to evaluate the effect of their impact on workers. To this end, it is necessary to conduct a comparative study on the oil and gas production in the north and south of the Russian Federation in order to be able to control the variables associated with the conditions and organization of labor, and to identify the influence of an independent variable - climatic and geographical conditions. It has been revealed that professional activities on a shift basis in the conditions of the Far North contribute to the formation of unfavorable functional states and the development of destructive personal qualities of workers, which lead to a decrease in the level of mental health, productivity and efficiency of work. At the same time, in the south of Russia the shift method of labor organization is also used. In this connection, it is necessary to determine the difference in the effects of shift labor factors on workers, depending on the location of camps in the north or south of the Russian Federation.

This will make it possible to understand which technologies of psychological support for shift personnel, developed for enterprises in the north of Russia, can also be applied to organizations of the southern regions; the extreme of shift work is dictated to a greater degree by the organization of labor or by difficult climatic and geographical conditions.

Appeal to risk-based approach due to the need to predict the professional performance of shift personnel. By psychological risks in professional activity, we understand the probability of the occurrence of negative psychological states, properties and qualities that will hinder its implementation. Management of psychological risks in a professional activity is possible through a

change in objective working conditions (environmental resource) and attitudes towards the conditions for performing a professional task, the goals for carrying out a professional activity and self-assessment of the possibilities for performing a professional activity. Thus, the relevance of the study is the need to assess the combined influence of multidirectional psychological risk factors in professional activities, personal and environmental resources, followed by the development of technologies for the psychological support of labor and livelihood of shift personnel in the north and south of Russia. The goal is to determine the criteria for psychological risks of shift workers in the south of the Russian Federation in comparison with workers in the north of the Russian Federation.

II. RESEARCH METHODOLOGY

In medical concepts, occupational risk refers to the possibility of the employee's death or the loss of their working ability when performing their work functions (work obligations to the employer) due to a work injury or occupational disease [1].

Occupational hazards are subject to state legal regulation: among the regulatory documents, governing occupational risk management in the Russian Federation is "R 2.2.1766-03 Guidelines for the Assessment of Occupational Risk to Employee Health. Organizational and methodological foundations, principles and assessment criteria "[2] and the Manual "Occupational Risk to Employee Health", developed by the Research Institute of Occupational Medicine under the guidance of N.F. Izmerov and E.I. Denisov.

According to the 2010 report of the International Labor Organization, psychosocial factors are now generally recognized as a matter of global importance, relevant to all countries, professions, and all workers. The increase in the number of violations related to stress at work is due to the proliferation of flexible and unstable forms of employment, and an increase in the intensity of labor [3]. Over the longer term, stress in the workplace can contribute to diseases of the musculoskeletal system and other types of diseases such as hypertension, peptic ulcer and diseases of the cardiovascular system. Among the possible negative effects of stress are violence, drug addiction, smoking and drinking alcohol [3].

According to the WHO, over 100,000 chemical substances and 200 biological factors, about 50 physical and almost 20 ergonomic conditions, types of physical activity, which are risk factors for the occurrence of certain diseases, are currently defined [4].

Among the factors affecting health, psychological and social problems are also mentioned in various documents, and among the negative consequences of psychological (or psychophysiological) status, stress is primarily referred to as stress, which, in turn, leads to such psychologically loaded sociopathies as violence, drug addiction, smoking and drinking [4]. All these changes in the psychological status cause, in turn, dissatisfaction with work, a sharp decrease in the sense

of well-being, and, consequently, a decrease in the quality of life (which is important for the employee) and a decrease in his working capacity (which is important for the employer). That is, the psychological factor is somehow taken into account in the system of occupational risk management, but this aspect in medical concepts is represented very little compared to the real share of negative consequences resulting from the onset of the risk-predicted situation.

These data allow us to conclude that it is necessary to introduce a psychological component into the risk management system in the professional activities of employees.

Psychological risk in professional activity is the likelihood of professional personal destructions and the formation of unfavorable functional states of workers during the performance of labor functions due to the long-term impact of negative social and production factors with insufficient personal and environmental resource.

The choice of criteria for psychological risks of adverse functional states and professional personal destruction is due to the large number of studies that point out their presence in workers of shift forms of work in the conditions of the Far North.

The development of adverse functional states are a criterion of psychological risks in professional activity, which signals the possibility of reducing the efficiency of labor.

Among the unfavorable functional conditions arising from workers of shift forms of labor are fatigue, monotony, tension, various forms of psychological stress and conditions caused by exposure to extreme factors of a physical nature.

In the process of research into the social aspects of the regulation of shift work A.G. Ananenko, O.P. Andreev, G.P. Stavkin et al. revealed the growth of accentuated personalities with an increase in the length of service in the North. It cannot be reliably asserted that the accentuations were the result of industrial activity, but it is possible that some workers already had borderline or close to borderline conditions at the beginning of work on a shift basis. The findings suggest that an increase in mental fatigue, increased emotional stress, and high susceptibility to stress factors entail not only personal disorganization, but also increased conflict, reduced performance, which can affect performance. In the case when a person compensates for non-compliance with the requirements of the profession due to the tension of internal reserves, this gives high professional efficiency, but affects the health of the employee [5].

The criterion of the most negative psychological formations in shift personnel is professional destruction, because they represent changes in the existing structure of activity and personality, which have a negative impact on labor productivity and interaction with other participants in this process [6]. According to the concept of E.F. Zeer, there are the following types of professional destructions: professional alienation; reduced motivation to achieve professional success;

learned helplessness; professional incompetence and conservation of professional experience; professional deformations; professionally conditioned accentuation. Objective: to determine the peculiarities of psychological risks of shift workers in the south of the Russia as compared with workers in the far north.

III. MATERIALS AND METHODS

To achieve this goal and objectives, a study was conducted in which 82 employees took part using the shift organization of labor in the south of the Russian Federation (the duration of a shift arrival is 30 days). Of which 75 are men and 7 are women aged 21 to 64 years old, 31 ± 11.180 , work experience on a shift basis from 3 years to 30 years (average length of service 8.021 ± 6.4503), shift work experience in the south from 1 year to 20 years (average length 3.543 ± 3.6660). The study was conducted from June-July 2018 (the duration of shift shifts is 14 days, the rest period is 14 days). Workers took part in the study with their personal consent; the selection of other parameters was not required.

Research methods are the study of documentation, observation of the workflow, questioning and psychological testing, statistical methods of data analysis. The developed questionnaire was aimed at obtaining information about the biographical data of the employee and the features of his work activity.

To achieve the objectives of the study, the following methods were used:

1. Complex visual-motor reaction performed using the psychophysiological testing device UPFT-1/30 "Psychophysiologicalist".

2. Variational cardiointervalometry performed using the UPFT-1/30 psychophysiological testing device "Psychophysiologicalist". This is an assessment of the functional state and adaptive capacity of the cardiovascular system according to the method of cardiointervalometry variational.

Evaluation of the functional state with the use of these instrumental techniques was carried out three times: at the beginning - 1-3 days, in the middle - 15-17 days and at the end of 25-27 days of rotation.

3. The method "Accentuation of character" G. Shmisheka, K. Leonhard [7].

Statistical analysis methods: descriptive statistics; multidimensional analysis of variance. Statistical data processing was performed using the IBM SPSS Statistics statistical package (license agreement No. Z125-3301-14 (NArFU named after M.V. Lomonosov)).

IV. RESEARCH RESULTS

The analysis of descriptive statistics data on the indicators of the functional status of workers in shift labor forms in the south of the Russian Federation allows us to draw the following conclusions. According to the level of the functional state, modified using the methods of "Comprehensive visual-motor reaction" and "Variational cardiointervalometry", all the examined were divided into four groups: with the maximum permissible, acceptable, close to the optimal and optimal level of functional states

(Fig. 1).

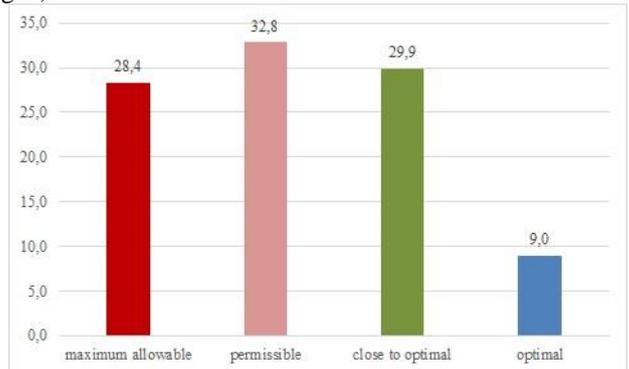


Fig. 1 The functional state level of workers of shift forms of labor in the south of the Russian Federation

Thus, according to the data of Figure 1, only 38.9% of the surveyed employees have an optimal level of functional state at the time of the survey. This is due to difficult working conditions: high intensity (12-hour work shifts), heavy physical work, adverse climatic conditions (the study was conducted in the summer, and therefore there was heat, wind, rain), etc. And lack of rest time on the restoration of internal resources of workers.

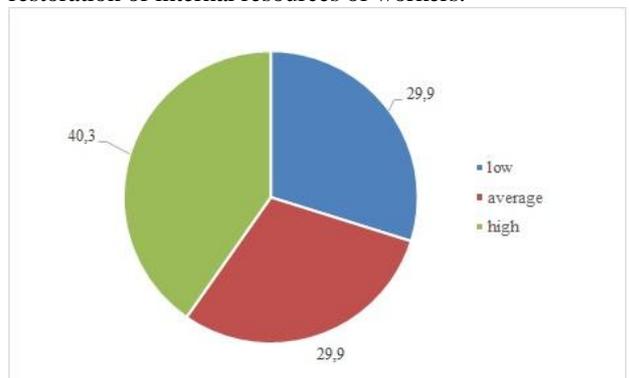


Fig. 2 The functionality level of workers of shift forms of labor in the south of the Russian Federation

From the data of Figure 2, we see that 29.9% of the surveyed employees have already exhausted their functionality. What can be connected with the lack of necessary days off and the desire of the workers themselves to work not only during the shift period, but also during the off-duty period as well which of course undermines physical abilities.

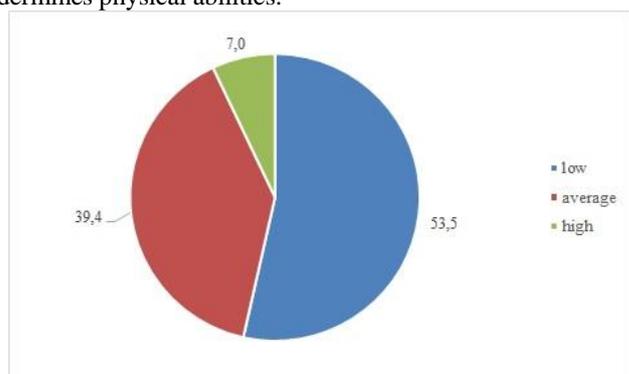


Fig. 3 The operator performance level of workers of shift forms of labor in the south of the Russian Federation

According to Figure 3, the level of operator performance is low among 53.5% of employees. Those most of the employees with difficulty can perform

intellectual work that requires concentration of attention efficiently and quickly. Thus, more than a third of employees belong to a risk group with a pronounced unfavorable functional state. That requires the development of additional recreational activities to restore functional reserves.

Another important criterion of psychological risks of shift workers is the pronounced and professionally determined character accentuation. Accentuations of character are excessively reinforced and expressed individual character traits or their combination, manifested in a selective attitude of a person to psychological influences of a certain kind, making a person vulnerable to the psychotraumatic effects of the environment with good or even increased resistance to other aspects of reality [8]. Accentuations are recognized by scientists of the extreme variants of the norm, bordering on psychopathy [8; 9]. From which they are distinguished by the absence of a simultaneous manifestation of the triad peculiar to psychopathy: character stability in time, totality of its manifestations in all situations, and social maladjustment [10]. Identification of the severity level and type of accentuation of the nature of shift workers in arctic conditions as a criterion of psychological risks will allow the development of optimal measures for their management. The severity of character accentuations of shift workers in the south of the Russian Federation is shown in Fig. 4.

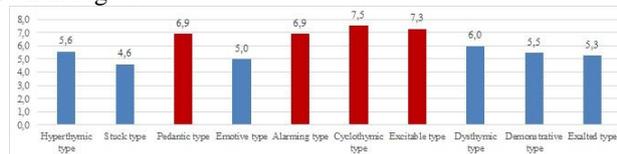


Fig. 4 Accentuations of employee character of shift forms of labor in the south of the Russian Federation

As can be seen from the data of Figure 4, the following types of character accentuations prevail in shift workers in the south of the Russian Federation: cyclothymic, anxious, excitable, and pedantic.

Workers with a pronounced cyclothymic type of character accentuation have the following features: they have frequent mood swings, on which their well-being and performance depend on, their perception of their own future and the structure of the world; high sensitivity to praise and criticism; sociability. Positive traits: sincere, direct, positive, faithful. Disadvantages: hard to suffer losses, have extremely low resistance to stress; not ready to deal with difficulties, may abandon the goal.

For employees with an anxious type of character accentuation is peculiar: friendliness, loyalty, sense of duty and self-criticism. Mood is often reduced, timid, does not defend their interests, and needs support.

The following features distinguish workers with a pronounced excitable type of accentuation of character: tend to show dissatisfaction and irritability; propensity to previously established order in things, affairs and relationships; acts are guided only by their own opinion. Therefore, they may overstep the norms of morality, especially in a fit of anger; making decisions, guided by common sense and logic; hard to adapt to the new situation. The positive traits of workers of this type are

scrupulousness, heightened accuracy, care for their health, the ability to benefit, the ability to defend their interests. Energetic and active in matters of maintaining order, which can become part of the profession - managers, managers. Disadvantages: violent bouts of anger, after which they cool for a long time, sullenness, intolerance to contradictions, lack of respect for the opinions of others. These sides of character provoke discontent of others, frequent conflicts in the family and at work.

Workers with a pronounced pedantic type of accentuation of character are distinguished by accuracy, strict compliance with the rules, reliability, conscientiousness, and peace-lovingness. However, often boring, grumbling, not work - bureaucracy is noted.

These features of character accentuations lead to excessive use of internal resources, excessive emotional involvement in activities and communication, and imply additional stress associated with anxiety over the correctness of tasks and tasks.

Even with a relatively low degree of group isolation when living in a camp on the territory of human settlements, this method of behavior and solving professional problems leads to a decrease in productivity and efficiency. Work is required on the formation of conscious mechanisms of adaptation to professional activity, the adjustment of the individual style of activity, as well as training in the methods and skills of self-regulation and replenishment of internal reserves.

If we compare the results obtained with the data obtained during the survey of shift workers in the north of the Russian Federation, where the degree of group isolation is very high (the far distance of industries from settlements) and the harsh climatic conditions of the Arctic, we can see similar data on the level of functional states. The 42% of the surveyed workers have an unfavorable functional state [11].

Also, in a previous study, we found that employees of an oil and gas production enterprise under shift labor organization in the Arctic were classified into two clusters depending on the combination of the severity of types of accentuations of character: exalted demonstratively stuck and anxiety-cyclothymic [11]. These results are consistent with the present study: we can assign employees with anxious and cyclothymic types of character accentuation to the second cluster (anxiety-cyclothymic), and employees with an excitable and pedantic type to the first cluster (exalted with a demonstrative stuck).

The results confirm our assumption that regardless of the degree of group isolation and climatic and geographical conditions of the field location, shift workers of the south and north of the Russian Federation have similar psychological risks that must be identified at the stage of professional selection.

V. CONCLUSIONS

1. The criteria for psychological risks in the professional activities of shift workers are unfavorable functional states and professionally determined character accentuation.

2. One third of workers in shift forms of labor in the south of the Russian Federation have pronounced

unfavorable functional states and reduced functional capabilities. For the majority of employees in the south of the Russian Federation, such types of character accentuations are characteristic of cyclothymic, anxious, excitable, and pedantic. These results correlate with our earlier data from oil and gas fields in the Arctic.

3. The obtained results indicate that it is possible to identify the psychological risks for shift workers in the south and north of the Russian Federation, which must be identified at the stage of professional selection.

VI. ACKNOWLEDGEMENT

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