

Assessment and Management of Psychosocial Risks at Workplace

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Abstract—The result of the study, which was aimed at defining the psychosocial work factors and establishing their relationship with the health status of employees of electric locomotive building enterprise, shows the significance of these factors. Assessment of psychosocial factors is the basis of the management of psychosocial risks in the workplace.

Keywords—*psychosocial work factors, psychosocial risks in the workplace, employees of an electric locomotive building enterprise, management of psychosocial risks in the workplace.*

I. INTRODUCTION

Modern manufacture is characterized not only by professional risks associated with technological processes, but also by a considerable intensity of labor (high work rates, shift work, emotional stress, lack of job satisfaction, etc.). There are still risks in the workplace, but they are most often associated with work organization, and not with the influence of specific factors, and the ensuing harm affects psychological health more than physical [1]. In recent years, the paradigm of occupational health has changed from traditional ideas about the impact of harmful work factors on the health status of workers to the new paradigm of the 21st century, which takes the health and well-being of workers into account with psychosocial factors in the workplace [2]. National Standard of the Russian Federation "Risk Management. GOST R 55914-2013 [3] in 2014 for the first time legally validated the concepts of "psychosocial factor"

and "psychosocial risk". Psychosocial work factors have traditionally been more often studied in white collar workers. In recent years, there are scientific works devoted to the study of psychosocial factors in the workplace of both white and blue collar workers, which include work intensity, high work rates, emotional stress, lack of job satisfaction, relationships with management, conflicts at work, etc. [4, 5, 6, 7, 8, 9].

The impact of psychosocial risk factors on the health of workers is more often associated with the onset of cardiovascular diseases [10, 11, 12] and mental health disorders [13].

The impact of psychosocial work factors on the health status of workers should be considered to manage psychosocial risks in the workplace, maintain occupational health, and work longevity [14].

II. OBJECTIVE

Study the psychosocial work factors and assess their contribution to the health status (including biological age and cognitive status) of workers of electric locomotive building enterprise to manage occupational hazards in the workplace.

III. METHODOLOGY

The main research methodology of this theoretical study has been the identification and assessment of occupational risks for workers' health under the combined effect of work

factors. A complex of modern research methods was used: analytical, functional diagnostics, neuropsychological and mathematical statistics. This allowed to establish the connection between psychosocial work factors and indicators of the health status of workers.

IV. MATERIALS AND METHODS

After All the subjects are employees of an electric locomotive building enterprise, $n = 228$, males, average age - 42 ± 12 years, average work experience - 9.3 ± 5.95 . All the workers gave voluntary informed consent to participate in the study.

The identification and evaluation of psychosocial work factors were carried out using the short version of the second version of the Copenhagen questionnaire CoPsoQ II [15, 16]. The questionnaire was translated into Russian. The written consent from the developers of the questionnaire was obtained. According to the CoPsoQ II methodology, psychosocial factors were assessed on scales with different number of points, and on some scales higher values signified positive character, and on others – negative one.

For the following indicators higher values were positive: "influence on work", "new skill development", "meaningful work", "commitment to the workplace", "predictability", "appreciation & recognition", "role clarity", "leadership quality", "social support from superiors", "job satisfaction", "management/worker trust", "justice & respect", "self-rated health". For the following indicators higher values signified negative character: "quantitative work demands", "work pace", "emotional work demands", "work-family conflict", "burnout", "stress". To enable a comparative analysis of various levels of psychosocial factors, all indicators were ranked in quantitative form (from 0 to 1). At the same time, indicator 1 corresponded to the best value of the factor, and 0 - the worst, the average values were calculated as an extrapolation between the maximum and minimum on a scale. Each answer was interpreted in a qualitative system ("bad", "requires attention" "good"), depending on the respective quantitative assessment: 0-0.49, 0.49-0.72 and 0.72-1.0, respectively.

The Pulse Trace PCA 2 (UK, 2011) device was used to assess vascular function and biological age. This technique can be recommended for epidemiological and screening studies, as it is simple and fast (takes a few minutes). For the purpose of this study the photoplethysmographic sensor was placed on the distal phalanx. The calculation of indicators - stiffness index (SI), reflectance index (RI) and vascular age (VA per.) - was carried out on the basis of a contour analysis of the pulse wave.

Evaluation of cognitive function was carried out using the Montreal Cognitive Assessment (MoCA). MoCA measures attention and concentration, executive functions, memory, speech, visuospatial ability, abstract thinking, counting and orientation within 10 minutes. MoCA is divided into seven subtests: visuospatial ability / executive function (5 points); naming (3 points); short-term memory (5 points for delayed recall); attention (6 points); language abilities (3 points); abstraction (2 points); and orientation (6 points). If the subject has <12 years of total study time, 1 point is added. The maximum possible number of points of this scale is 30; 26 points or more is considered normal.

Statistical processing of the results was carried out using adequate methods of mathematical statistics. The odds ratio (OR) and the 95% confidence interval (CI) were used to consider the connection between health issues and significant indicators. Additionally, a classification error matrix was analyzed determining the number of false positives, false negatives, true positives and true negatives. Correlation coefficients were calculated to estimate the strength of connection. The Pearson correlation coefficient was used to assess the correlation between the quantitative indices, and Spearman's rank correlation coefficient – to assess the correlation between ordinal indices. The relationship between the qualitative and the quantitative (or ordinal) indicators was analyzed using the Goodman-Kruskal gamma coefficient. The critical value of the level of statistical significance in testing null hypotheses was taken to be 0.05. Databases for storing information (primary material) were organized in Microsoft Excel 2010. Statistical analysis and processing of the collected data were performed in R (version 3.2, R Foundation for Statistical Computing, Vienna, Austria).

V. RESULTS AND DISCUSSION

It has been established that the most common psychosocial work factors for the subjects were high "work pace" (64.9%), lack of opportunities for "new skill development" (62.3%), low "influence on work" (43.9%) and requiring attention "self-rated health" (40.8%). Psychosocial factors in the workplace with the quality characteristic "requires attention" are ranked in the following order: self-rated health (40.8%), work pace (37.3%), degree of influence on work (25%), new skill development (24.1%). The imbalance between strain (demands) in the workplace and decision making freedom resulting from these factors can be regarded as a predictor of employee health disorders.

When analyzing the relationship between workers' health status and psychosocial factors in the workplace, the following data were obtained. A statistically significant connection was found between such factor as "self-rated health" and the development of cardiovascular diseases. An increase in the "self-rated health" by 1 unit leads, on average, to an 80% decrease in the chances of developing cardiovascular diseases (OR = 0.2; 95% CI: 0.05 - 0.69, $p = 0.01$). A reliable connection ($p = 0.03$) between the psychosocial factor "stress" and the formation of early signs of impairment (symptoms, signs and deviations from the norm, according to ICD-10 classification) was also established.

Comparison of the values of the passport and biological (vascular) age showed that in 78.4% of workers biological (vascular) age exceeded the passport age; The largest difference (more than 9 years) of passport and biological (vascular) age was found in 57.8%. Correlations have been established between the biological age of workers (according to the state of their vessels) and such psychosocial factor as "self-rated health" ($r = -0.24$; $p = 0.02$). The relationship is negative in nature: with a decrease in the "self-rated health" the indicator of vascular age increases.

According to MoCA, cognitive impairment is found in 43.4% of workers. The development of cognitive impairment is reliably associated with such psychosocial factor as

“emotional stress” (OR = 4.18; 95% CI: 1.07–17.54, $p = 0.04$).

An analysis of the association between morbidity indicators with temporary loss of workability (absence from the workplace) and psychosocial work factors revealed that a low level of “management/worker trust” was associated with the fact of attending work ($p = 0.04$), which can be regarded as presenteeism.

VI. CONCLUSION

Key psychosocial factors in the workplace were identified and assessed. The interrelation of these factors with the indicators of workers' health disorders (including vascular age and cognitive status) has been established. The data obtained can be used to manage psychosocial risks in the workplace and preserve the working longevity of the workers in the production sector.

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