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ENERGY EXPENDITURE OF A SAFETY TECHNICIAN WORKING IN THE MINING INDUSTRY DURING A WORK SHIFT (Daily, Weekly, Monthly)

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Abstract
The energy expenditure of occupational safety personnel working in the mining industry was determined. The energy consumption of occupational safety workers during a single work shift, as well as weekly and monthly, was analyzed. The results were summarized and presented in a table. The study concluded with final remarks.

Keywords: Work shift, mining industry, physical fitness level of personnel, kcal, energy, standard.

Introduction

At present, studying the physical condition and work capacity of miners employed in the mining industry is considered highly relevant, as the difficulty and risk of professional activity are increasing under environmentally unfavorable and harmful external conditions.

Research objective: Based on the study of miners' physical condition and work capacity, it is necessary to develop a system of their professional physical training, as well as to create scientific and methodological foundations for effective methods and means of applying it in work activities to enhance the functional capabilities of the human body and strengthen health.

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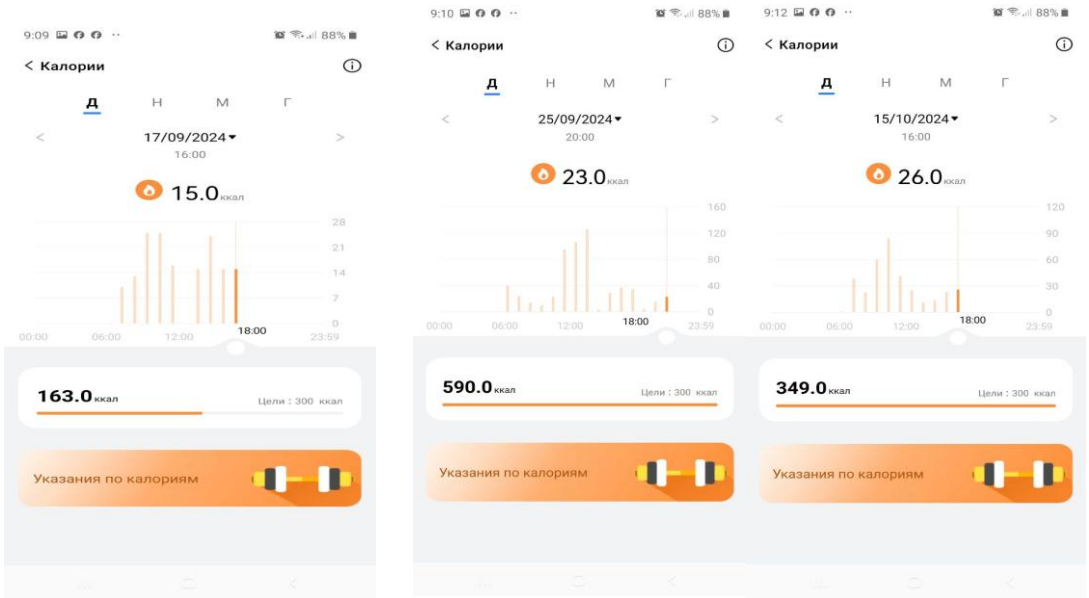
Regulatory data on the physical development and physical fitness of workers in the mining industry (including sports tests outlined in the "Organizational measures for the implementation of a system for assessing the physical fitness level of the population") are of particular importance. The physical characteristics of employees in this field have been insufficiently studied. Such research has also rarely been conducted among workers in other industrial sectors.

It is well known that in the mining industry, occupational safety is strictly monitored throughout the working day. The activities of safety inspectors are typically carried out during an 8-hour work shift, during which a certain amount of energy expenditure (measured in kilocalories) is observed.

In our study, we analyzed the kilocalories expended by a mining industry safety inspector over the course of one month of work shifts. The observations were conducted using a Samsung Health Polar monitoring device. The analysis revealed that inspectors expend varying amounts of energy during their daily work activities. While an average expenditure of about 300 kcal per shift is considered normal, the data showed fluctuations: on the first day, 163 kcal were expended; on the 12th day, 590 kcal were expended; and on the 30th day, 349 kcal were expended.

The analysis is as follows:



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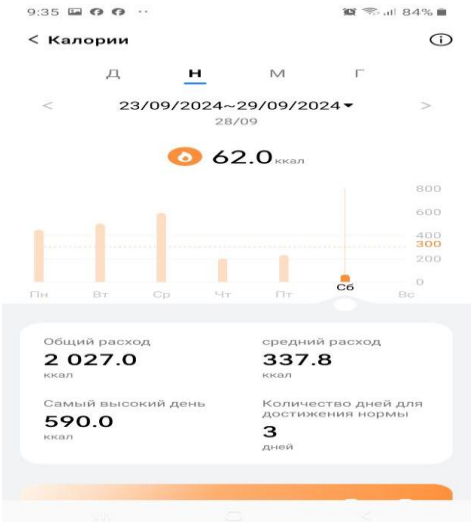
The analysis of the above data shows that on some working days the energy expenditure does not reach the standard level of 300 kcal, while on other days it exceeds this level.

If we consider the results obtained during the study on a weekly basis, the indicators demonstrate the following:

In the first week:

The total energy expenditure amounted to 1408.0 kcal, while the average expenditure was 201.1 kcal. The highest energy expenditure reached 476.0 kcal. The standard energy expenditure of 300 kcal was observed on only one day.

In the second week:



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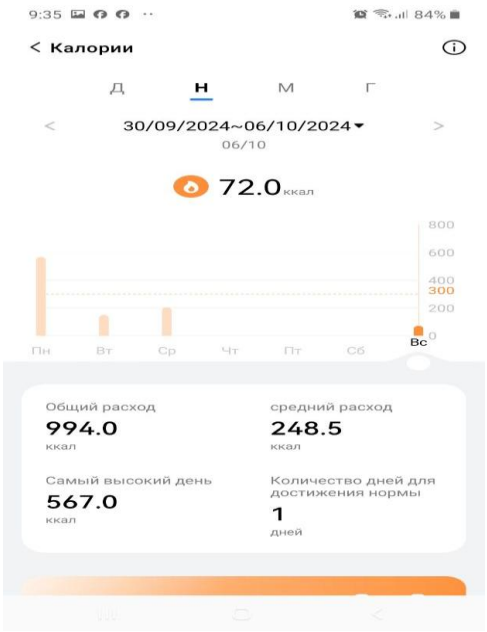
The total energy expenditure amounted to 2027.0 kcal, while the average expenditure was 337.8 kcal. The highest energy expenditure reached 590.0 kcal. The standard energy expenditure of 300 kcal was observed on 3 days.

In the third week:



The total energy expenditure amounted to 994.0 kcal, while the average expenditure was 248.5 kcal. The highest energy expenditure reached 567.0 kcal. The standard energy expenditure of 300 kcal was observed on 1 day.

In the fourth week:

The total energy expenditure amounted to 2595.0 kcal, while the average expenditure was 370.7 kcal. The highest energy expenditure reached 566.0 kcal. The standard energy expenditure of 300 kcal was observed on 5 days.

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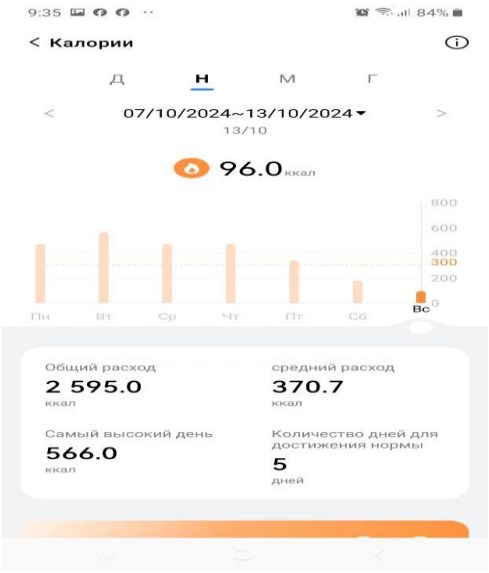

The analysis shows that during the 2nd and 4th weeks, energy expenditure exceeded the standard level, while in the 1st and 3rd weeks, an increase in energy expenditure was observed on only one day.

If we consider the analysis over the course of one month (from September 16, 2024 to October 13, 2024), the following results were obtained:

For the mining safety inspector, during one month of work shifts (4 weeks, 24 working days), a total of 7024.0 kcal of energy was expended. The average daily energy expenditure was 292.6 kcal. This indicator is 7.4 kcal lower than the standard level of 300 kcal.

The daily, weekly, and monthly energy expenditure of mining industry safety personnel is presented in the table as follows.

Date	***Total energy expenditure (kcal)***
From September 17, 2024 to October 13, 2024	7024,0 kcal
workday	***average per day***
24 working days	292.6 kcal
during the week	***average per week***
1- ***week***	337,8 kcal
2- ***week***	201.1 kcal
3- ***week***	248.5 kcal
4- ***week***	370.7 kcal

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Conclusion

In conclusion, it was observed that the energy expenditure of mining industry safety personnel during a work shift varies depending on the tasks performed during the working day. The increase or decrease in energy expenditure was found to be related to the distance covered by the respondent during work, the depth of the mine, and working conditions.

If we consider 300 kcal as the average energy expenditure for a single work shift, the overall result amounted to 292.6 kcal.

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