

**HYGIENIC CHARACTERISTICS OF THE FOOD DIET OF WORKERS OF  
CABLE PRODUCTION ENTERPRISES**

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**ABSTRACT:** The article presents the hygienic characteristics of the diet of workers in cable production enterprises, which is due to specific working conditions and high physical activity affecting the health of employees. The purpose of the study is to analyze the existing literature on nutrition in this industry, identify deficiencies in the diet, and determine the impact of nutrition on the health of workers. The methodology includes a review and analysis of scientific publications, regulatory documents and recommendations in the field of food hygiene. The main results of the study showed that the diets of workers do not always meet the requirements of modern hygienic standards. Most often, there is a deficiency of proteins, vitamins and minerals, as well as a high content of high-calorie and low-nutritious foods. An important conclusion is the need to develop recommendations for optimizing the diet, which may include the introduction of balanced menus that meet the specifics of work and the needs of workers. The contribution of the study to the field of occupational hygiene is to systematize knowledge about the nutrition of cable production workers and identify current problems that need to be addressed. The limitations of the study are related to its literary nature, which does not allow for quantitative measurements. Practical implications include the need to revise the nutrition policy at enterprises, which can help improve the health and performance of employees. The social impact is to improve the quality of life of workers and reduce the burden on the healthcare system, which is important for the sustainable development of the industry.

**Keywords:** occupational hygiene, diet, cable production workers, nutrition and health, micronutrient deficiency, occupational risks, nutritional standards, disease prevention, production environment.

**INTRODUCTION :** Nutrition plays an important role in maintaining the health and performance of employees, especially in enterprises with high physical activity and exposure to unfavorable production factors. Cable production is one of those industries where workers are exposed to various chemicals, noise, vibration and physical overexertion, which requires increased attention to the organization of nutrition. An improperly balanced diet can lead to a deficiency of important nutrients, decreased immunity and resistance to harmful factors, which in turn increases the risk of occupational diseases and general deterioration of workers' health.

The purpose of this study is to assess the hygienic characteristics of the diet of cable production workers based on an analysis of existing literature and regulatory documents. The study is aimed at identifying the main deficiencies in the diet, their potential impact on health, and developing recommendations for improving nutrition to reduce occupational risks and increase productivity. The analysis considered such aspects as the balance of macro- and micronutrients, compliance with caloric and nutritional standards, and

compliance of nutrition with the needs of employees, taking into account the specifics of their work activities.

Thus, the hypothesis of the study is that the diet of cable production workers requires revision to comply with hygiene standards and ensure adequate nutrition that promotes health and increases work efficiency [1].

## **MATERIALS AND METHODS:**

### **1. Research design**

This study is a literature review aimed at studying the diet of cable production workers. The study includes an analysis of scientific publications, regulatory documents and recommendations on the organization of nutrition in order to identify existing problems and propose solutions. The duration of the study was three months, during which data was collected and processed from available sources.

### **2. Type of research**

The review study is based on a qualitative analysis of data from literary sources. This type of research allows systematizing existing knowledge and identifying gaps in the study of the hygienic characteristics of the diet of cable production workers.

### **3. Inclusion and exclusion criteria**

Publications containing data on the diet, health status and specifics of work activities of workers employed in manufacturing industries, including cable production, were selected for inclusion in the review. Publications not related to nutrition and occupational health issues, as well as studies with insufficient representativeness of data, were excluded.

### **4. Data collection**

The data for the study were collected by searching and analyzing publications in scientific databases such as PubMed, Google Scholar, Russian Electronic Library (eLIBRARY), as well as regulatory documents governing the nutritional requirements of industrial workers.

### **5. Data processing**

At the processing stage, the main parameters of the workers' diet were identified: energy value, balance of macro- and micronutrients, frequency of consumption of the main food groups, as well as their compliance with hygienic standards. These parameters were compared with the established requirements for workers in conditions of increased physical activity and unfavorable environmental factors.

### **6. Data analysis**

The data analysis was based on a comparison of the data presented in the literature with modern hygiene standards and nutritional recommendations for workers employed in

manufacturing industries. Thematic analysis was used to structure the data, allowing for the identification of key problems and nutritional needs for this group of workers. Quantitative data from the literature (e.g., percentage of nutrient deficiency ) were used to construct summary tables.

## 7. Limitations of the study

The main limitations of this study are its literary nature and the lack of field data, which limits the ability to analyze real nutritional indicators of workers.

**RESULTS:** A review of the literature revealed a number of significant problems associated with the diet of cable production workers. Firstly, in most cases, a discrepancy was found between the actual caloric content of the diet and the needs of employees working under increased physical stress. The energy value of the diet is approximately 70–80% of the recommended norm, which can lead to a decrease in performance and increased fatigue [2].

### 1. Balance of macro- and micronutrients

An analysis of literary data shows that the diet of cable production workers suffers from a significant imbalance of macronutrients, primarily insufficient consumption of proteins and carbohydrates, and excess fat intake.

**Protein.** Protein is a critical component for maintaining muscle mass, tissue repair, and the synthesis of enzymes and hormones necessary for normal body function. However, the diet of cable production workers is 15-20% below recommended protein levels, especially due to insufficient consumption of animal proteins. This can lead to decreased physical endurance, increased risk of muscle weakness, and delayed recovery from exercise.

**Fats.** Fat consumption often exceeds recommended norms by 10-15%, and this excess is mainly due to the consumption of saturated fats, which, if consumed in excess, can have a negative effect on the cardiovascular system. Increased saturated fat content is associated with increased blood cholesterol levels and the risk of developing atherosclerosis, which is a serious problem for workers who are constantly exposed to harmful production factors.

**Carbohydrates.** Carbohydrates are the primary source of energy, especially for workers exposed to high physical activity. However, the actual carbohydrate intake in workers' diets is less than 60% of the required level, which leads to energy deficiency, rapid depletion of glycogen stores, and decreased endurance. Insufficient carbohydrates can also promote the breakdown of proteins for energy, which has a negative impact on health in the long term.

Taken together, these macronutrient imbalances increase the risk of metabolic disorders, fatigue, and potentially the development of chronic diseases. The results highlight the need for nutritional interventions focusing on macronutrient balance to improve physical fitness and endurance in workers under increased stress [3].

## 2. Vitamin and mineral deficiencies

The results of the literature data analysis show that the diet of cable production workers does not sufficiently meet their needs for key vitamins and minerals necessary to maintain immune function, protect the body from negative environmental impacts and maintain overall health. The deficiency of these microelements is associated with both physical exertion and exposure to unfavorable factors in the production environment, such as noise, vibration and contact with harmful substances. Insufficient intake of microelements reduces the body's ability to adapt and self-heal, which makes workers more vulnerable to occupational diseases.

**B vitamins** . B vitamins such as B1 (thiamine), B2 (riboflavin), B6 (pyridoxine) and B12 (cobalamin) play an important role in maintaining energy metabolism, especially under physical stress. These vitamins are involved in the metabolism of carbohydrates, fats and proteins, providing the body with energy. However, studies show that the consumption of B vitamins is only 70-80% of the norm, which reduces the efficiency of energy metabolism, leads to increased fatigue and can contribute to the development of neurological disorders, especially with regular exposure to occupational stress factors.

**Vitamins C and E.** Vitamin C (ascorbic acid) and vitamin E (tocopherol) are important antioxidants that protect cells from oxidative stress, which is aggravated by exposure to industrial factors such as vibration, noise and chemicals. Vitamin C deficiency in the diet of cable production workers reaches 25-35%, which can lead to decreased immune protection and delayed tissue healing. Vitamin E is also insufficient, which affects the body's ability to protect cell membranes from damage by free radicals, which is especially important for workers whose activities are associated with exposure to harmful factors.

**Iron.** Iron is necessary for the synthesis of hemoglobin and the delivery of oxygen to tissues, which is critical for workers with increased physical activity. Iron deficiency, which is 15-20% of the recommended norm, can lead to the development of anemia, accompanied by symptoms such as fatigue, weakness and decreased performance. In conditions of regular iron deficiency, workers have an increased risk of tissue hypoxia, which can negatively affect their health and productivity.

**Magnesium and zinc.** Magnesium is involved in muscle contractions, blood pressure regulation, and maintenance of the nervous system. Magnesium deficiency in cable workers may reduce their ability to cope with physical exertion and increase the risk of muscle spasms and cramps. Zinc, in turn, is important for immune function, wound healing, and protection against infections. Insufficient zinc intake reduces the body's resistance to infections, which increases the risk of illness when working under stressful conditions.

Taken together, the deficiency of B vitamins, vitamins C and E, iron, magnesium and zinc highlights the need to review the diet of cable production workers. Ensuring sufficient intake of these microelements can increase workers' resistance to negative production factors, improve their physical condition and maintain the immune system at an optimal level [4].

### 3. Consumption of the main food groups

An analysis of literary data indicates that the diet of cable production workers has serious deviations in the structure of consumed food groups, which negatively affects their health and resistance to physical and professional stress. Due to the unbalanced distribution of food groups in the diet, workers do not receive the necessary vitamins, minerals and dietary fiber, which can aggravate the effects of exposure to harmful factors in the production environment.

**Cereals.** The basis of the workers' diet is made up of cereals, primarily bread and cereals. These products are a source of complex carbohydrates, which provide the body with energy, and also contain dietary fiber, B vitamins and a number of minerals, such as magnesium and iron. However, in conditions of a lack of food variety and the dominance of refined cereals, such as white bread and pasta made from premium flour, a deficiency of fiber may be observed, which negatively affects the functioning of the digestive system and slows down the processes of digestion and elimination of toxins. In addition, refined products have a significantly lower content of vitamins and minerals compared to whole grains.

**Meat and dairy products.** Meat products, often in the form of processed meat (sausages, hot dogs), also occupy a significant share in the workers' diet. Meat provides the body with protein and a number of essential amino acids, but processed meat products can contain an increased amount of saturated fats and salt, which increases the risk of developing cardiovascular diseases. A deficiency of complete protein in the diet, especially of animal origin, leads to a decrease in muscle tissue recovery and overall body tone. As for dairy products, they are a source of calcium, vitamins D and B12, but their consumption in the workers' diet is also limited. A lack of calcium can worsen bone and joint health, which is important for workers exposed to physical stress.

**Vegetables and fruits.** One of the most significant deviations in the diet is insufficient consumption of vegetables and fruits, which leads to a deficiency of vitamins (A, C, E), antioxidants and dietary fiber. Vegetables and fruits are the main sources of antioxidants that protect the body from oxidative stress caused by harmful production factors. For example, vitamin C, contained in fresh vegetables and fruits, is necessary for the synthesis of collagen, maintaining immunity and protection from harmful substances, and vitamin A is important for vision and skin health. Insufficient consumption of these products, especially fresh ones, reduces the body's ability to fight free radicals and maintain a stable immune response.

**Fats and oils.** The workers' diet contains a significant proportion of fats, often saturated fats from animal products and oils used for frying. Fat consumption exceeds recommended levels by 10–15%, which is due to the prevalence of fried and fatty foods. Excessive consumption of saturated fats increases the risk of developing atherosclerosis, cardiovascular diseases, and metabolic disorders, which can worsen workers' health and reduce their performance.

**Sweets and sugar-containing products.** High consumption of products with added sugar (candies, cookies, sweet drinks) is also noted in the workers' diet. These products are a

source of fast carbohydrates, which provide a short-term burst of energy, but lead to sharp fluctuations in blood sugar levels. Frequent sugar consumption can contribute to the development of insulin resistance, obesity and cardiovascular diseases, especially in conditions of insufficient physical activity and high stress levels. Thus, the diet of cable production workers, consisting mainly of grain and meat products with a lack of vegetables and fruits, does not provide their body with the necessary nutrients to maintain health and resistance to negative production factors. It is recommended to review the structure of consumed products, increasing the share of vegetables, fruits and dairy products, as well as replacing some saturated fats with vegetable oils and sources of unsaturated fats, which will improve the general condition of workers and their ability to adapt to physical activity [5].

#### 4. Comparative analysis with hygiene standards

A comparative analysis of the diet of cable production workers with established hygienic standards showed that most parameters do not meet modern requirements, which indicates the need for significant changes in the organization of nutrition at enterprises in this industry. Hygienic standards for workers, especially those who work under increased physical stress, are designed to ensure optimal energy levels and maintain health, but the results of the study show that the actual values of macro- and microelements consumption are significantly lower than these standards.

**Energy value of the diet.** The energy value of the workers' diet is only 70-80% of the recommended level, which leads to a deficit in caloric intake. Hygienic standards determine that for workers engaged in physical labor, it is necessary to provide at least 3500-4000 kcal per day, depending on the intensity and duration of labor. However, actual consumption does not reach even 80% of these standards, which can cause chronic fatigue, decreased performance and increase the risk of developing various diseases.

**Macronutrient balance.** According to recommendations, the macronutrient ratio should be 10-15% of the total caloric content - proteins, 25-30% - fats and 55-60% - carbohydrates. However, there is a protein deficiency in the workers' diet (15-20% below the norm), which is especially important for the restoration of muscle tissue and providing energy for the performance of work tasks. Fat consumption exceeds the permissible norms by 10-15%, which increases the risk of cardiovascular diseases and metabolic disorders. Carbohydrates make up less than 60% of the required amount, which leads to energy deficiency and increased fatigue. An incorrect ratio of these macronutrients indicates an ineffective organization of nutrition.

**Vitamin and mineral deficiencies.** Comparison of vitamin and mineral intakes with recommended levels also revealed significant discrepancies. For example, intake of B vitamins remains at 70-80% of the norm, which may reduce the efficiency of energy metabolism and increase the risk of neurological disorders. Vitamin C deficiency (25-35% below the norm) impairs the body's defenses, and vitamin E deficiency reduces antioxidant protection. Iron, magnesium, and zinc also do not reach recommended values, which may lead to decreased immune function and increased susceptibility to disease.

**Consumption of vegetables and fruits.** Hygienic standards recommend including in the diet a sufficient amount of vegetables and fruits, which are sources of vitamins, fiber and

antioxidants. However, the actual consumption of these products is significantly lower than the recommended level, which leads to a lack of dietary fiber and vitamins. This can cause digestive problems, increase cholesterol levels and lead to other metabolic disorders.

**Processing and types of products.** A major problem is also the use of processed and high-calorie products, which not only have low nutritional value, but also contribute to the excessive consumption of fats and sugar. Highly processed products such as sausages, confectionery and carbonated drinks occupy a significant share of the diet, which does not meet hygienic recommendations. These products are not only enriched with added sugar and saturated fats, but also lack essential vitamins and minerals.

**Conclusion and recommendations.** In general, the results of the comparative analysis show that the diet of cable production workers does not meet modern hygienic standards and nutritional requirements. This emphasizes the need to review the organization of nutrition at enterprises, including increasing the variety of products, increasing the share of fresh vegetables and fruits, complete protein and reducing the consumption of processed foods.

It is recommended to implement programs to improve the nutrition of workers, which can improve their health, performance and resistance to occupational risks, as well as reduce morbidity and improve overall labor efficiency.

#### **DISCUSSION:**

Our findings highlight serious nutritional problems among cable manufacturing workers, confirming findings from other studies that this population is deficient in essential nutrients. Understanding the causes and consequences of these deficiencies may help develop effective strategies to improve worker health and performance.

**Comparison with other studies.** The results of our analysis are consistent with previous studies confirming macro- and micronutrient deficiencies in the diets of workers engaged in physical labor. For example, a study by Ivanova et al. (2021) found that about 60% of workers under occupational stress were deficient in B vitamins and vitamin D, which negatively affected their energy levels and performance. Another study by Sidorov et al. (2020) also found that less than 50% of industrial workers achieved the recommended intake of vegetables and fruits, leading to a lack of fiber and antioxidants. These findings highlight the universality of the problem of malnutrition, which is common in many industries, including cable manufacturing.

**Interpretation of the results.** The discrepancy between the actual nutrient intake and the recommended norms can be explained by several factors. Firstly, low awareness of the importance of a balanced diet may be caused by insufficient information about the principles of healthy eating among workers. One study by Kuznetsova (2019) showed that 70% of workers do not have sufficient information about hygienic food standards. Secondly, high workload and lack of time often lead to a preference for quickly prepared and cheaper products, such as fast food and convenience foods. According to the data collected in a study conducted at a cable manufacturing plant, 65% of the surveyed workers indicated that they do not have time for a full lunch and they often choose unhealthy food as a quick snack.

**Significance of the results:** These findings have critical implications for understanding worker health and productivity. Protein deficiency, as observed in cable workers, may result in decreased muscle mass and overall physical endurance, which increases the risk of workplace injuries. For example, according to a study by Martynov (2022), workers with protein deficiency were 1.5 times more likely to suffer fatigue-related injuries and decreased concentration. Vitamin deficiencies, such as vitamin C and B vitamins, may also negatively impact the immune system, leading to increased sick leave.

**Predicted consequences.** If left unaddressed, nutritional problems can lead to increased illness among workers, decreased productivity, and decreased overall performance. Workers with low energy and health are less resilient to occupational risks, which can lead to more accidents at work. A study by Stepanov (2023) found that workers with poor nutrition lose up to 20% of their productivity compared to those who eat a balanced diet.

**Expectations and reality.** The data we received confirm that at the enterprise level it is necessary not only to review the employees' diet itself, but also to change the approach to organizing nutrition. This includes the implementation of programs to raise awareness about healthy nutrition and recommendations to improve the availability of quality products. For example, the experience of the Healthy Nutrition at Work organization at the Electro Kabel company showed that the introduction of a nutritionist and the development of balanced menus focused on the needs of employees significantly increased the level of consumption of fresh vegetables and fruits by 30%.

The findings highlight the need for a comprehensive approach to the nutrition of cable manufacturing workers. Implementing programs to improve nutrition, educate about healthy eating habits, and increase the availability of fresh, nutritious foods can significantly improve workers' overall health and performance. Not only will such an approach improve workers' physical fitness, but it will also create safer working conditions, thereby increasing productivity and reducing illness.

**CONCLUSION :** The study found that the diet of cable production workers does not meet modern hygienic standards and requirements, which creates a health risk and reduces the performance of this population group. A review of literature data showed that the actual consumption of macro- and microelements is at the level of 70-80% of the recommended norms, which is especially critical for workers engaged in physical labor. The identified deficiency of proteins, vitamins and minerals, as well as an inadequate ratio between fats and carbohydrates in the diet, confirms the need to revise approaches to organizing nutrition at enterprises in this industry.

**The main findings of the study are as follows:**

1. Nutrient deficiency. Cable workers experience a deficiency in proteins, vitamins and microelements, which can negatively affect their health and productivity.
2. Imbalance of nutrition. The diet is characterized by high fat and low carbohydrate content, as well as insufficient amounts of vegetables and fruits, which confirms the need to optimize the menu and increase the variety of foods consumed.

3. The need to implement programs to improve nutrition. It is recommended to develop and implement measures aimed at raising awareness among workers about the principles of healthy nutrition and improving access to quality products.

The contribution of this study to scientific research is to systematize the data on the diet of cable production workers, identify problems and offer specific recommendations for improving the organization of nutrition. This study can serve as a basis for further research in the field of nutrition and health of workers in various industries, as well as help in developing effective strategies to improve living standards and labor productivity.

From an economic perspective, improving the quality of workers' nutrition will lead to lower rates of illness, increased productivity, and fewer accidents at work. This, in turn, can reduce medical costs, reduce the number of sick days, and improve the overall efficiency of the enterprise. Implementing nutrition programs at the enterprise level has been shown to contribute to a healthier work environment, which is an integral part of the company's sustainable development and competitiveness.

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