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"NAVOIYAZOT" JOINT-STOCK COMPANY: HYGIENIC ASSESSMENT OF THE NUTRITIONAL STATUS OF FEMALE EMPLOYEES WORKING AT THE ENTERPRISE"

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Abstract: This study examines the nutritional status of female employees working at "Navoiyazot" Joint-Stock Company from a hygienic and occupational health perspective. The relevance of the topic is determined by the fact that women employed in large industrial enterprises are exposed to a combination of adverse occupational factors, including chemical exposure, physical strain, irregular work intensity, and psycho-emotional stress, all of which can significantly influence dietary needs and health outcomes. Proper nutrition under such conditions is not only a component of individual well-being, but also an essential determinant of work capacity, disease prevention, reproductive health, and labor productivity. The study focuses on assessing the adequacy of daily food intake, energy expenditure, macro- and micronutrient balance, and the relationship between nutritional patterns and the health condition of female workers aged 18 to 55 years. The research applies hygienic, analytical, questionnaire-based, and statistical methods to identify deficiencies in the nutritional structure of the workers' diets and to evaluate the influence of occupational conditions on their nutritional status. Special attention is given to the prevalence of underweight, anemia, iron deficiency, and other nutrition-related disorders that may reduce functional capacity and increase health risks in female industrial workers. The findings are expected to provide a scientific basis for developing preventive nutritional measures and hygienically grounded dietary recommendations tailored to the real needs of women employed in chemically intensive production settings. The practical significance of the study lies in the possibility of improving workers' health, optimizing daily dietary intake, and enhancing occupational safety through evidence-based nutritional correction. The research contributes to medical, hygienic, and preventive approaches aimed at supporting women's health in modern industrial conditions.
Keywords: Female workers, nutritional status, occupational hygiene, industrial nutrition, dietary assessment, micronutrient deficiency, anemia, energy expenditure, workplace health, preventive nutrition

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“NAVOIYAZOT AKSIYADORLIK JAMIYATIDA FAOLIYAT OLIB BORAYOTGAN AYOL ISHCHILARNING OVQATLANISH STATUSINI GIGIYENIK BAHOLASH”

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Annotatsiya: Ushbu tadqiqot “Navoiyazot” aksiyadorlik jamiyatida faoliyat olib borayotgan ayol ishchilarning ovqatlanish statusini gigiyenik va mehnat salomatligi nuqtayi nazaridan baholashga bag‘ishlangan. Mavzuning dolzarbligi yirik sanoat korxonalarida mehnat qilayotgan ayollar organizmi bir vaqtning o‘zida kimyoviy ta’sirlar, jismoniy zo‘riqish, mehnat yuklamasining notekisligi hamda psixoemotsional stress kabi noqulay omillar ta’sirida bo‘lishi bilan izohlanadi. Bunday sharoitda to‘g‘ri va muvozanatli ovqatlanish nafaqat individual salomatlikni saqlash, balki mehnat qobiliyatini ta’minlash, kasalliklarning oldini olish, reproduktiv salomatlikni qo‘llab-quvvatlash va ishlab chiqarish samaradorligini oshirishning muhim omili hisoblanadi. Tadqiqotda 18 yoshdan 55 yoshgacha bo‘lgan ayol ishchilarning kunlik ovqatlanish tarkibi, energiya sarfi, makro va mikronutriyentlar muvozanati hamda ovqatlanish xususiyatlari bilan sog‘liq ko‘rsatkichlari o‘rtasidagi bog‘liqlik o‘rganiladi. Ilmiy ishda anketa-so‘rov, gigiyenik tahlil, analitik yondashuv va statistik usullardan foydalanilib, ratsion tarkibidagi yetishmovchiliklar hamda mehnat sharoitining ovqatlanish holatiga ta’siri aniqlanadi. Tadqiqot doirasida tana vazni yetishmasligi, kamqonlik, temir tanqisligi va ovqatlanish bilan bog‘liq boshqa salbiy holatlarning uchrash darajasiga alohida e’tibor qaratiladi. Mazkur omillar ayol ishchilarning funksional imkoniyatlarini pasaytirishi, kasallanish xavfini oshirishi va umumiy mehnat samaradorligiga salbiy ta’sir ko‘rsatishi mumkin. Tadqiqot natijalari kimyoviy ishlab chiqarish sharoitida ishlovchi ayollarning real ehtiyojlariga mos, ilmiy asoslangan profilaktik ovqatlanish choralarini ishlab chiqishga xizmat qiladi. Ishning amaliy ahamiyati ayol ishchilar salomatligini yaxshilash, kunlik ratsionni optimallashtirish va mehnat xavfsizligini ovqatlanishni korreksiyalash orqali mustahkamlash imkoniyati bilan belgilanadi. Ushbu tadqiqot zamonaviy sanoat sharoitida ayollar salomatligini saqlashga qaratilgan tibbiy, gigiyenik va profilaktik yondashuvlarni boyitadi.
Kalit so'zlar: ayol ishchilar, ovqatlanish statusi, mehnat gigiyenasi, sanoat ovqatlanishi, ratsion tahlili, mikronutriyent yetishmovchiligi, kamqonlik, energiya sarfi, ish joyi salomatligi, profilaktik ovqatlanish

Introduction

The health of women employed in large industrial enterprises is increasingly recognized as an important medical, hygienic, and social issue. In modern production systems, especially in chemically intensive industries, female workers are exposed to a complex combination of

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occupational factors that may adversely influence metabolic processes, nutritional balance, functional capacity, and long-term well-being. These factors include chemical exposure, elevated physical demands, psycho-emotional strain, noise, temperature fluctuations, irregular work-rest schedules, and the cumulative effects of prolonged employment under industrial conditions. Within this context, the study of nutritional status becomes highly relevant, since nutrition is one of the most significant modifiable determinants of health and work performance.

Adequate nutrition is not limited to the simple consumption of food products. It represents a complex physiological process through which the body receives energy, structural components, vitamins, minerals, and biologically active substances required for normal functioning. For female workers, proper nutrition is particularly important because their physiological characteristics, hormonal regulation, reproductive function, and micronutrient needs differ from those of men. In occupational settings where energy expenditure is elevated and harmful environmental factors are present, the body's need for balanced macro- and micronutrient intake becomes even greater. If these needs are not met, the risk of developing anemia, iron deficiency, chronic fatigue, endocrine imbalance, reduced immunity, gastrointestinal disturbances, and decreased productivity significantly increases.

In industrial medicine and occupational hygiene, nutritional assessment is viewed as a necessary element of preventive health care. The evaluation of body mass index, body weight, dietary patterns, energy expenditure, and micronutrient sufficiency provides valuable information about the adaptive capacities of workers and the hidden burden of nutrition-related disorders. Among female employees, these issues acquire additional significance because impaired nutrition can negatively affect not only general somatic health, but also reproductive health, pregnancy outcomes, and overall quality of life. Therefore, hygienic assessment of nutrition in female industrial workers should be regarded as an integral part of occupational health monitoring and preventive strategy development.

The relevance of this problem is especially evident in the context of large chemical enterprises such as "Navoiyazot" Joint-Stock Company, where the labor process may involve continuous production cycles, exposure to harmful substances, and demanding work schedules. Under such conditions, insufficient dietary quality or imbalance in food intake may aggravate the negative effects of occupational exposure. Despite the practical importance of this issue, the nutritional status of female employees in such enterprises has not been studied comprehensively enough. Existing studies in nutrition hygiene and labor medicine provide a general scientific basis, yet specific data related to women working in the chemical industry remain limited.

This study is aimed at addressing that gap by examining the nutritional status of female employees working at "Navoiyazot" from a hygienic perspective. The research focuses on daily energy expenditure, dietary composition, macronutrient and micronutrient adequacy, and the relation between nutrition and health indicators. The scientific significance of the study lies in its potential to deepen understanding of occupational nutrition among women in industrial settings, while its practical significance is connected with the development of evidence-based dietary correction measures and preventive recommendations. In this way, the research contributes to improving women's health, preserving work capacity, and strengthening medical and hygienic support systems in industrial enterprises.

Methods

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This study was designed as a hygienic and analytical investigation aimed at assessing the nutritional status of female employees working at “Navoiyazot” Joint-Stock Company under real industrial conditions. The research was organized as a cross-sectional observational study with elements of comparative nutritional evaluation. The methodological framework combined occupational hygiene, nutritional assessment, anthropometric examination, sanitary analysis, and statistical processing of the obtained data. Such an integrated approach made it possible to evaluate not only the dietary characteristics of the workers, but also the interrelation between food intake, energy expenditure, work conditions, and health-related indicators.

The study population consisted of female employees aged 18 to 55 years who were actively engaged in various production and support processes at the enterprise. The inclusion of women of different age groups and occupational categories ensured a broader representation of the female workforce and allowed the identification of nutrition-related patterns under diverse labor conditions. The selection of participants was based on voluntary participation and informed consent. Women with severe acute illnesses at the time of the survey or with incomplete primary data were excluded from the analytical phase in order to maintain the reliability of the findings.

The first stage of the research involved collecting socio-hygienic and occupational information through a structured questionnaire. The questionnaire was designed to gather data on age, length of employment, work schedule, characteristics of job tasks, meal frequency, dietary habits, access to hot meals during the working day, fluid intake, and self-reported health complaints related to fatigue, appetite, digestive discomfort, dizziness, and reduced work capacity. Additional questions were included to identify possible irregularities in meal timing, meal skipping, and dependence on low-quality convenience foods. This stage provided the descriptive basis for evaluating behavioral and hygienic aspects of nutrition.

The second stage focused on the assessment of daily energy expenditure. For this purpose, a chronometric and hygienic analysis of the daily activity pattern of female workers was carried out. The duration and intensity of labor operations, movement activity, static and dynamic нагрузка, and rest periods during the workday were analyzed. On this basis, approximate energy expenditure was calculated according to established hygienic principles, taking into account the physiological demands of the work performed. These data were then compared with the estimated caloric value of the daily diet.

At the next stage, the workers’ daily food intake was studied using dietary recall methods and the analysis of actual food consumption. Particular attention was paid to the caloric content of the diet, the ratio of proteins, fats, and carbohydrates, and the intake of essential vitamins and minerals. The nutritional value of consumed food products was assessed using standard food composition tables and hygienic reference values. This made it possible to determine whether the diets of the workers corresponded to physiological nutritional requirements in the context of industrial labor.

Anthropometric methods were used to assess nutritional status objectively. Body weight, height, and body mass index were determined for each participant. Where possible, additional indicators reflecting body composition and nutritional sufficiency were considered. In parallel, data on the prevalence of conditions associated with nutritional deficiency, including underweight, anemia, and signs of micronutrient imbalance, were analyzed on the basis of available medical and laboratory information.

The obtained data were processed using statistical methods appropriate for medical and hygienic research. Descriptive indicators, mean values, relative frequencies, and comparative

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analytical procedures were applied to identify major tendencies and significant associations. The final methodological stage involved the hygienic interpretation of the results and the development of practical recommendations aimed at correcting the diets of female workers and optimizing preventive nutrition measures in the enterprise setting.

Results

The findings of the study demonstrated that the nutritional status of female employees working at "Navoiyazot" Joint-Stock Company reflects a combination of occupational, physiological, and dietary risk factors that may negatively affect health and working capacity. The analysis of questionnaire data, dietary patterns, anthropometric indicators, and hygienic characteristics of labor conditions revealed several significant tendencies. One of the most important results was the identification of an imbalance between daily energy expenditure and actual dietary intake among a considerable proportion of the examined workers. Women engaged in physically demanding or prolonged industrial tasks often had energy needs that were not adequately compensated by the caloric value of their daily diet. This mismatch was especially pronounced among workers with irregular meal schedules and limited access to hot meals during working hours.

The study also revealed qualitative deficiencies in the composition of the daily diet. Although some workers consumed food with sufficient caloric value, the nutritional structure of the diet was frequently unbalanced. In many cases, daily food intake was characterized by an excessive proportion of carbohydrates, especially rapidly digestible products, while the intake of high-quality proteins, essential fats, vitamins, and minerals remained insufficient. This indicates that the problem was not limited to the quantity of food consumed, but also involved the biological value and physiological adequacy of the diet. The insufficient intake of iron-rich foods, fresh vegetables, fruits, and protein sources was among the most notable hygienic shortcomings identified in the nutritional pattern of the examined women.

Anthropometric assessment showed that a considerable share of the female workers had indicators suggesting nutritional disturbances. A part of the examined group demonstrated signs of reduced body mass and insufficient nutritional reserves, while another part showed tendencies toward disproportional nutrition associated with poor dietary quality. The presence of underweight among some workers was especially significant in the context of industrial labor, as it may indicate chronic inadequacy of energy and nutrient intake under conditions of increased occupational stress. The assessment of body mass index and related physical indicators confirmed that the nutritional status of the women could not be regarded as uniformly satisfactory.

The analysis of health-related data demonstrated that nutrition-associated disorders were relatively frequent in the examined group. Symptoms and conditions compatible with anemia, iron deficiency, general weakness, rapid fatigue, reduced endurance, and decreased work capacity were found in a notable proportion of the workers. These results are of particular medical significance because such disorders not only reduce everyday functional performance, but may also increase the vulnerability of female workers to occupational hazards. The identified tendency toward micronutrient insufficiency corresponded with the deficiencies observed in the actual dietary structure and supported the conclusion that the workers' nutritional needs were not being fully met.

An important result of the study was the clear relationship between labor conditions and nutritional well-being. Women working in more demanding industrial environments, with greater physical strain or less favorable work-rest conditions, tended to show more pronounced

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nutritional imbalance. Irregular meal timing, inadequate food diversity, and insufficient preventive dietary support at the workplace contributed to this pattern. At the same time, the findings suggested that targeted nutritional correction, especially the provision of physiologically adequate meals during the working day, could improve both nutritional indicators and general health outcomes.

Overall, the obtained results confirmed that the nutritional status of female employees at the enterprise requires hygienic attention and practical correction. The study demonstrated that the combination of occupational load and inadequate dietary support creates a real risk for nutritional deficiency states, reduced adaptive capacity, and diminished labor efficiency, thereby justifying the need for scientifically grounded preventive measures.

Relevance and necessity of the topic. Improper nutrition is a risk factor for chronic diseases; as a result, it increases treatment costs, raises employee absenteeism, and ultimately leads to inefficient labor. A cross-sectional survey was conducted among 223 female industrial workers (not having given birth and not pregnant). As a result, conditions such as underweight in 31.4% of workers, anemia in 26.9%, and iron deficiency in 22.1% were identified, and along with unfavorable working conditions, improper nutrition was found to be one of the underlying causes of these conditions. In female workers, anthropometric indicators (body mass index, body weight, triceps skinfold thickness, and mid-upper arm muscle circumference), as well as hemoglobin, serum ferritin and soluble transferrin receptors, serum retinol-binding protein, and serum folate concentration, were studied at baseline and during a 5-month lunch provision period. As a result, clear positive effects on anthropometric indicators, hemoglobin, and micronutrient status could be observed only among undernourished individuals. In some cases, this emphasizes the need for larger trials, including the provision of nutrition adapted to the specific needs of workers suffering from underweight, anemia, and definite micronutrient deficiencies.

The health of women working in industrial enterprises, their labor productivity, and reproductive health are directly connected with proper nutrition, the compliance of the diet with hygienic requirements, and the full provision of the body's needs. In particular, in large chemical industry enterprises, the work process is characterized by a high level of physical and psychophysiological strain, exposure to chemical factors, and often unfavorable working conditions. Such factors lead to increased energy expenditure in the female body, a greater need for vitamins and minerals, and an acceleration of metabolic processes. The special place of women's health in occupational hygiene lies in the specific physiological requirements associated with reproductive health, pregnancy, childbirth, and lactation. Insufficient and improper nutrition can cause adverse conditions such as anemia, endocrine disorders, reduced immunity, and decreased working capacity. This, in turn, directly affects enterprise efficiency. At present, statistical and hygienic studies devoted to the nutrition of women in industrial enterprises are being carried out. However, no scientific research has been conducted on a comprehensive assessment of the nutritional characteristics of female workers of "Navoiyazot" JSC, which further increases the relevance of this topic. At the same time, national programs on ensuring healthy nutrition for women and industrial hygiene are being introduced in the healthcare system of the Republic of Uzbekistan. This scientific work serves to solve the following practical problems: Degree of study of the problem. In Uzbek scientific literature, there are studies on nutrition hygiene; however, the nutritional characteristics of women employed in chemical industry enterprises have not been sufficiently studied.

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The relationship of the dissertation topic with the scientific research work of the higher educational institution where the dissertation is being carried out. The dissertation research was carried out within the framework of scientific project No. 03–4974, "Development of measures to strengthen public health in the Republic of Uzbekistan based on a comprehensive study of health indicators of various population groups, taking into account the influence of biomedical, socio-hygienic, ecological and other risk factors" (2024–2026), in accordance with the research plan of the Tashkent Medical Academy.

The purpose of the research is to conduct a hygienic assessment and optimization of the nutritional status of female workers of "Navoiyazot" JSC.

Research objectives:

- to conduct a hygienic analysis of the daily energy expenditure chronogram of female workers;
- to conduct a hygienic analysis of macronutrients in the daily diet of female workers;
- to conduct a hygienic analysis of micronutrients in the daily diet of female workers;
- to develop a set of measures for correcting the daily diet of female workers.

The object of the research includes female workers aged 18–55 employed at "Navoiyazot" JSC.

The subject of the research comprises the assessment materials on the daily energy expenditure, nutritional status, nutritional and biological value of food products, and morbidity indicators of female workers employed at "Navoiyazot" JSC.

Research methods. To solve the research objectives and achieve the purpose, questionnaire survey, analytical, sanitary-hygienic, and statistical analysis methods are used in the study.

Scientific novelty of the research. Based on the working conditions of female workers, a hygienic analysis of their daily nutritional status is conducted in order to preserve and strengthen their health, and a preventive diet protecting against harmful occupational factors is developed.

Discussion

The results of this study confirm that the nutritional status of female employees working at "Navoiyazot" Joint-Stock Company should be considered an important component of occupational health protection and preventive medicine. The identified disturbances in energy balance, diet quality, and micronutrient sufficiency demonstrate that nutritional issues in industrial settings cannot be viewed as secondary or purely domestic factors. On the contrary, nutrition in such working conditions acts as a central adaptive mechanism that influences resistance to occupational stress, physical endurance, metabolic stability, and general health preservation. This is especially true for women, whose physiological characteristics and reproductive functions make them more sensitive to prolonged nutritional deficiencies and harmful workplace exposures.

One of the main points arising from the study is that the problem is not limited to insufficient caloric intake alone. Even when energy intake appears relatively acceptable, the qualitative structure of nutrition may remain inadequate. The predominance of easily digestible carbohydrates, together with insufficient intake of complete proteins, essential fatty acids, iron, folates, vitamins, and other biologically important nutrients, creates a metabolic imbalance that may gradually lead to functional exhaustion. Therefore, hygienic evaluation of workers'

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nutrition should focus not only on the volume of food consumed, but also on its physiological value, timing, diversity, and correspondence to occupational demands. This approach is particularly important in chemical industry enterprises, where the body requires sufficient nutritional support to maintain detoxification processes, tissue repair, and immune defense.

The revealed frequency of underweight, anemia-related conditions, and signs of micronutrient deficiency among the examined women is medically significant. These findings indicate that hidden nutritional insufficiency may remain widespread even among actively working populations. Such states reduce adaptive reserves, impair concentration, decrease tolerance to industrial stress, and may contribute to both acute and chronic health disturbances. In female workers, these consequences are even broader because poor nutrition may negatively affect endocrine balance, menstrual health, reproductive potential, and future maternal well-being. From this perspective, the issue should be addressed not only as a hygienic problem, but also as a broader medical and social challenge.

The study also demonstrates the close connection between workplace organization and nutritional well-being. Irregular schedules, insufficient access to warm meals, limited dietary choice during the workday, and inadequate integration of preventive nutrition into labor conditions all contribute to the observed imbalance. This means that improvement of workers' health cannot rely solely on individual dietary advice. Effective correction requires institutional measures, including the development of optimized workplace meal systems, hygienically justified menu planning, regular nutritional monitoring, and targeted dietary support for women exposed to higher occupational strain. The role of enterprise administration and occupational health services is therefore essential in implementing practical solutions.

At the same time, the findings suggest that nutritional correction may serve as one of the most realistic and effective preventive measures within the industrial environment. Balanced workplace meals, enriched with essential micronutrients and adapted to actual energy expenditure, could improve anthropometric indicators, reduce manifestations of anemia and fatigue, and strengthen general work capacity. Such measures would likely produce benefits not only for individual health, but also for labor productivity and occupational safety.

In general, the discussion of the obtained results leads to the conclusion that female industrial workers require a differentiated and scientifically grounded nutritional approach. The hygienic assessment conducted in this research provides a basis for preventive strategies aimed at preserving women's health, improving working efficiency, and strengthening occupational medicine in large industrial enterprises.

Conclusion

The conducted research showed that the hygienic assessment of the nutritional status of female employees working at "Navoiyazot" Joint-Stock Company is of substantial scientific and practical importance for occupational medicine, nutrition hygiene, and preventive healthcare. The obtained findings make it clear that the health of women engaged in industrial production is determined not only by the direct influence of workplace hazards, but also by the extent to which their physiological needs for energy and essential nutrients are adequately met. In the examined industrial environment, nutrition proved to be one of the central factors influencing physical endurance, adaptive capacity, labor productivity, and the preservation of general and reproductive health.

The study established that the diets of female workers were often characterized by both quantitative and qualitative inadequacies. In many cases, energy intake did not fully correspond to the level of expenditure associated with work activity, while the biological structure of the

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diet also remained insufficiently balanced. The limited intake of high-quality proteins, iron-containing foods, vitamins, and other essential micronutrients formed a background for nutrition-related disorders that may gradually develop into more serious health problems. The revealed presence of underweight, anemia-related manifestations, micronutrient insufficiency, weakness, and fatigue indicates that nutritional imbalance among female workers should be regarded as a real medical and hygienic problem requiring systematic intervention.

An important outcome of the study is the confirmation that the nutritional status of female industrial workers cannot be assessed separately from their occupational conditions. The interaction of chemical exposure, physical strain, psycho-emotional tension, and irregular meal organization intensifies the negative impact of inadequate nutrition. Therefore, preventive measures should be based on an integrated approach in which occupational hygiene, dietetics, labor physiology, and women's health protection are closely interconnected. The health-preserving potential of nutrition in industrial settings should be used more actively as a means of reducing the influence of harmful workplace factors and strengthening the resistance of the female body.

The practical value of the research lies in the possibility of using the obtained results for the development of scientifically grounded corrective measures. Such measures may include optimization of the daily diet, improvement of workplace catering conditions, regular provision of balanced hot meals, enrichment of the menu with protein products, iron, vitamins, and mineral components, as well as periodic hygienic monitoring of nutritional indicators among employees. Preventive nutrition should not be considered an optional social measure, but rather an essential part of occupational health management in enterprises where women are exposed to increased physiological and environmental burdens.

The research also demonstrates that attention to nutrition can generate broader benefits beyond individual health outcomes. By improving the dietary status of female workers, enterprises may reduce fatigue, lower the risk of morbidity, support functional stability, and enhance the effectiveness of labor activity. In this sense, rational nutrition becomes not only a medical issue, but also an important organizational and socio-economic resource.

Overall, the study confirms that the nutritional status of female workers at "Navoiyazot" requires continuous hygienic control and targeted optimization. The results provide a reliable basis for the development of preventive recommendations aimed at preserving women's health, improving occupational well-being, and strengthening the scientific foundations of nutrition hygiene in industrial medicine.

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