  **Review Article /Derleme Makale**

**The Relationship Between Nutrition and Worker Efficiency**

Beslenme ve İşçi Verimliliği Arasındaki İlişki

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**ABSTRACT**

For work efficiency, the well-being of workers and their concentration on work are among the main factors. For this reason, it is important on behalf of the workers' health to have balanced and adequate nutrition which will provide a healthy life to raise their work efficiency. However, due to the lack of catering services at workplaces, workers can not have balanced and adequate nutrition. Because of inadequate nutrition, the immune system of the workers weakens and the incidence of becoming ill increases. With the increase in health permits taken from the workplace due to health problems, it leads to a decrease in work efficiency at the workplace due to the loss of workforce. On the other hand, loss of concentration due to hypoglycemia in malnourished workers also increases work accidents. This situation leads to disruption of work in the workplace, a decrease in work efficiency and damage to the workplace due to health expenditures for workers who get injured or disabled. In this study, it is aimed to determine the daily calorie needs of the workers to get from foods by the difficulty of the work done and find out the relationship between worker nutrition, occupational health, work accidents and worker efficiency with the help of the literature studies that have been examined and compiled appropriately. As a result of this study, it was seen that the worker nutrition is strongly related to work efficiency and work accidents.

**Keywords:** Occupational Health, Worker Health, Nutrition, Work Accident, Worker Efficiency

**ÖZET**

İş verimliliği için, işçilerin sağlıklı olmaları ve işe konsantrasyonları temel faktörler arasındadır. Bu nedenle, işçilerin sağlıklı olmaları adına sağlıklı bir yaşamı sağlayacak dengeli ve yeterli bir beslenme imkanına sahip olmaları gerekmektedir. Ancak gerek çeşitli sağlık problemlerinden gerekse iş yerlerinde sunulan yemek hizmetlerinin yetersizliğinden ötürü işçiler dengeli ve yeterli beslenme imkanına sahip olamamaktadır. Bu durum da iş yerlerinde işçilerin yetersiz beslenmeden kaynaklı sağlık problemleri yaşamalarına sebep olmaktadır. Sağlık sorunları nedeniyle iş yerinden alınan sağlık izinlerinin artmasıyla da iş gücü kaybından ötürü iş yerindeki verimliliğin azalmasına neden olmaktadır. Diğer yandan yetersiz beslenen işçilerde hipoglisemi nedeniyle oluşan konsantrasyon kaybı da iş kazalarını artırmaktadır. Bu durum, iş yerindeki işlerin aksamasına, iş verimliliğinin düşmesine ve yaralanan veya sakatlanan işçi için yapılacak sağlık harcamaları nedeniyle iş yerinin zarar etmesine neden olmaktadır. Bütün bunlar nedeniyle bu çalışmada, incelenen ve uygun bir şekilde derlenen literatür çalışmalarının yardımıyla işçilerin yaptıkları işlerin ağırlığına uygun olarak besinlerden almaları gereken günlük kalori ihtiyacının ne olduğu ve işçi beslenmesi, işyeri sağlığı, iş kazaları ve işçi verimliliği arasındaki ilişkinin ortaya konulması amaçlanmıştır. Bu çalışma sonucunda, işçi beslenmesinin iş verimliliği ve iş kazalarıyla kuvvetli bir şekilde ilişkili olduğu görülmüştür.

**Anahtar kelimeler:** İş Sağlığı, İşçi Sağlığı, Beslenme, İş Kazası, İşçi Verimliliği

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**INTRODUCTION**

The primary goal of individuals, families, and society is to be healthy and productive. Production requires a labor force. Only an individual with full physical, spiritual and social well-being will implicitly contribute to production.1, 2

Nutrition problems encountered in workers are mainly caused by providing no food or just inappropriate food in workplaces, economic insufficiencies, lack of education and malnutrition habits. The studies indicate an important relationship between work performance, working accidents, and nutrition.3,4 For instance, hypoglycemia or low blood glucose that develops after skipping only one meal may decelerate the perception speed and shorten the attention span of individuals.5 The studies also suggest that a worker with a fixed nutritional status produce a few times greater than a worker without a fixed nutritional status.4

The objective of this study is to primarily determine the daily calory required by the worker in a meal according to their profession, the nutrition mistakes made by the worker within an institution, the effects of these mistakes upon worker health and the benefits of correcting these nutrition mistakes for work proceeding by using various literature references.

**1. Worker Nutrition**

The primary goal in worker nutrition is to meet the energy and nutrition needs of a worker according to their age, gender, features, and physical activities at both institution and home and by this way protect their health and increase the labor force.1, 4, 6

The worker that does not keep a sufficient and balanced diet have a higher risk of having working accidents due to the following reasons related to nutrition:1, 7, 8

1. Insufficient energy,
2. Insufficient glucose in the brain,
3. Nutritional anemias,
4. Vitamin A deficiency and disorders in seeing functions of eyes,
5. Being overweight,
6. Relation of vitamin B deficiency and nervous system.

Worker nutrition could be examined under two titles as worker nutrition at institution and worker’s energy requirements.

**1.1. Worker Nutrition at Institution**

Examinations were conducted in several countries show that it is useful to provide nutrition opportunities in workplaces. Besides, when the number of a worker in workplaces exceeds a certain limit in industrialized countries, it is a legal obligation to keep a nutrition service. Nutrition service is afforded by both employers and workers.7, 9

Worker malnutrition proceeds as a vicious cycle affecting the entire institution and economy for institutions. In the first place, weak or insufficient nutrition conditions negatively affect worker health, which causes a decrease in personal energy, loss of strength and concentration and the decline of learning potential. This condition causes the development of a bad and poor-quality work pool, a decrease in productivity and competitive power of the institution, an increase in labor costs, a deceleration in investment and economic growth and consequently a decrease in the wages of workers and massive inequalities in income distribution.10

Institution’s food programs may protect the worker from chronic illnesses including obesity and micronutrient deficiencies. Investments to be made in nutrition opportunities will result in a decrease of days off and working accidents and an increase in production and worker morale with time. Reaching healthy food is as necessary as keeping away from chemicals and noise at the institution. Appropriate and sufficient nutrition will result in a 20% increase in national productivity levels.11

In addition to these, individuals’ food requirement changes according to their age, gender, working and special condition. Individuals with higher physical working rates also have higher energy requirement rates than a desk-bound worker. Individuals should have equal amounts of daily nutrition and energy spent. Besides, meals that meet energy requirements should also meet protein, vitamin and mineral requirements.4, 6, 9

**1.2. Effects of Nutrition Errors on Worker Health**

Inadequate and unbalanced nutrition is a risk factor for chronic diseases, and scientific evidence suggests that nutrition has strong positive and negative effects on health.12 Disease resistance of unhealthy fed staff who do not provide the necessary nutrients decreases and their rate of inability to work increases. The interest of undernourished staff and their ability to focus decreases and the risk of occupational accidents increases. With the weakness of the worker due to malnutrition, increasing disease and accident rate, lack of attention and focus, and the increase in the number of days when they cannot go to work, the productivity of the worker decreases and health-related expenditures increase.2

The aim of nutrition; is to obtain adequate and balanced amounts of energy and nutrients according to the age, sex, physical activity and physiological condition of the individual.13 The importance of healthy eating continues to be emphasized to optimize people's health and help reduce the risk of chronic diseases such as obesity, heart disease, and diabetes.14 Obesity is associated with various occupations (eg maid, service worker, motor vehicle driver, nursing) and exposures (seated work, work stress, group work, low physical work demands, chemicals).15 Over-nutrition and the resulting obesity are the main factors for insulin resistance, diabetes, atherosclerosis, fatty liver conditions, and chronic diseases.16 Besides, obesity increases the risk of coronary heart disease risk factors such as hypertension, diabetes, and dyslipidemia, and has a significant negative impact on the morbidity and mortality of coronary heart disease.17 In a study conducted by Koaliki et al. in 2018, the relationship between obesity and cardiovascular diseases was re-confirmed.18 On the other hand, it is stated that anxiety disorders are seen at a high rate in obese individuals and agoraphobia, specific phobia and post-traumatic stress disorder are more common among anxiety disorders.19

Malnutrition can be seen in the case of insufficient and unbalanced nutrition. Malnutrition adversely affects the functioning and recovery of all organ systems. Malnutrition inhibits liver, intestinal and kidney function, wound healing, reduces immune and muscle strength and cardiac strength, and may also cause depression and apathy.20

Anemia in iron deficiency also negatively affects work efficiency. Anemia impairs physical and mental performance, immunity and productivity. Because of these effects, anemia has a harmful effect not only on human health but also on social and economic development.21 Timely treatment of iron deficiency anemia can restore personal health and increase the national productivity rate by 20%.22

**1.3. Worker’s Energy Requirements**

1% increase in the calory content causes a 2.27% increase in the labor force productivity in general.23 The studies that were conducted between 1960 and 1990 for increasing the daily average energy support (containing appropriate and sufficient foods) per person to 2770 kcal could provide 1% increase in the growth rate of Gross National Product (GNP) per year in countries where the study was conducted.24

Professions could be classified according to the amount of energy spent and physical activity levels as follows:7, 25, 26

**Professions with mild activities:** Office workers, lawyers, doctors, accountants, teachers,

**Professions with moderate activities:** Mild industry workers, tailors,

**Professions with moderate-heavy activities:** A part of agricultural laborers, unskilled workers,

**Professions with heavy activities:** Miners, foresters, iron-steel industry workers.

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| **Table 1: Amount of daily energy (kcal/day) required for workers aged 18-60 according to the activity level of professions.25** | | |
| **ACTIVITY OF PROFESSION** | **MALE**  (kcal/day) | **FEMALE**  (kcal/day) |
| MILD | 2500 | 2100 |
| MODERATE | 3000 | 2300 |
| MODERATE-HEAVY | 3500 | 2600 |
| HEAVY | 4000 | 3000 |

Table 1 shows the energy requirements of a male and female worker according to the type of work.25, 26

Considering the daily energy requirement of workers that generally work for 8 hours on foot to be 3500 kcal; half of this amount (1750 kcal) should be met by the food provided by the institution. This energy amount should be provided as 3 or 4 plates of food and bread by using at least one type of nutrition from every nutrition group. The food should also meet proteins, vitamins, and minerals in proportion with energy.25

**DISCUSSION**

The worker needs to receive the required energy and nutrition elements to protect their health, increase their performance and work efficiently. Thus, it is required for the worker to meet the energy and nutrition requirements to protect their health and have the highest performance. The health of workers who are not well fed deteriorates, their labor productivity decreases and the risks of occupational accidents increase.27, 28

Considering the studies being conducted; it is observed that 90% of workers consume at least one meal at their institutions, even though they are in different sectors. The state of a worker to like or dislike meals shows a difference; however, they dislike foods mainly due to greasy, unsatisfying, untasteful and repeated meals. This condition shows that there are deficiencies in preparing and cooking meals at institutions and inconveniences in preparing the menus according to the needs of the worker. Worker nutrition should aim to achieve the highest physical and psychological well-being of the worker by providing adequate and balanced nutrition.1

In general, the recommended daily requirement for worker nutrition is to provide half of the nutrients from the workplace. In a study, it was found that the average energy requirements of the worker working in a textile factory were 2500 kcal and the lunches required to be provided at the workplace should be 1200-1500 kcal in terms of compliance with the standards, but the energy average of the given menus was 2000.95 ± 532.33 kcal. This corresponds to 81.8% of the daily requirement.29 Besides, the results of another study conducted on furniture production workers in 2015 found that the majority of the staff were slightly fat and obese. In this case, it is reported that the worker's unhealthy weight was due to unhealthy/unbalanced nutrition.30 Giving such high calories to the staff at a meal will not increase productivity. There is various evidence that such a diet can have a negative impact on the health of staff both in terms of occupational accidents and cardiovascular diseases due to obesity.31-33In addition, obesity is a major cause of increased costs associated with absenteeism, sick leave, disability, injuries, and health demands.34, 35 The absenteeism tendency among obese workers was 1.7 times higher than normal workers.36 In general, it is seen that avoiding obesity is of great importance in terms of worker health and work efficiency.

In addition to over-consuming calories, an inadequate and unbalanced diet can cause workers to experience some health problems. In a study conducted with 405 workers working in the factory in 2017, 27.2% of the workers who participated in the study were found to have chronic diseases and women had more chronic diseases than men. In this study, the most common health problems in men were stomach (40.6%), musculoskeletal diseases (21.9%) and psychological problems (15.6%). The most common health problems in women are stomach (27.6%), anemia (21.1%) and musculoskeletal (10.6%) diseases.37 Also, chronic life stress; depression, anxiety, gastrointestinal system diseases and chronic fatigue.38

On the other hand in a study that was performed on working women at Siyami Ersek Cardiothoracic Surgery Research and Training Hospital between March-April 2007, the daily energy intake of participants remained below what was suggested.39 In a study that was conducted in Samsun Apprenticeship Training Center, it was observed that 44.6% of apprentices had malnutrition in terms of energy, 19.5% protein, 69.2% fat, 70.3% carbohydrate and 67.2% diet sediment.40 Also in another study, it is founded that there is a clear link between good nutrition and high productivity. It shows that providing that workers can reach to nutritious, safe and affordable food, an adequate meal break and convenient conditions for eating is not only socially important and economically available but a lucrative business practice too.10

**CONCLUSION AND SUGGESTIONS**

Considering the studies being performed on workers in different sectors; it is generally observed that the majority of workers suffer from malnutrition. Some enterprises have higher energy and nutrition elements. Providing such abundant nutrition elements to the worker in just one meal will not increase productivity; on the contrary, such a way of nutrition will probably have very negative effects upon the health of workers in terms of both working accidents-productivity and cardiovascular diseases. Thus, the worker should have neither excessive nor inadequate nutrition. It is recommended to have an appropriate diet. It is also observed that a worker does not keep a sufficient and balanced diet.

In order to enable worker to eat healthily and work more productively, institution managers, worker, and families are required to; emphasize the importance of keeping a sufficient and balanced diet for worker and their families in terms of health and productivity, evaluate the nutrition of worker and their families as a whole, make necessary regulations at home and in workplaces, determine the energy consumptions of worker from various professions with scientific methods, as well as the type and amount of nutrition to be provided according to the energy spent, follow and pay a particular attention to worker in special nutrition groups. It is also recommended to establish a cooperation between dieticians and workplace doctors in terms of worker health and nutrition, plan and conduct relevant studies and provide in-service training to the worker in terms of health and nutrition.

Finally, nutrition education should be provided to staff and their families to help them gain healthy eating habits.1, 2 Long working time contributes to obesity by limiting the amount of time available for physical activity or increasing the time spent sedentary in the workplace.41 Long working hours should, therefore, be brought to a reasonable level. Work stress can be related to a decrease in weight as well as increase.42 Work stress can also cause weight loss with decreased appetite and increased physical activity.43 By reducing the stress level in the workplace, such undesirable situations that may adversely affect the work efficiency can be prevented. As a result of this review; If adequate and balanced nutrition is not provided in the workplace, there will be many health problems and absenteeism problems, an increase in the probability of work accidents and a decrease in worker efficiency.

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