Biruni Health and Education Sciences Journal (BHESJ)

**ISSN:** 2687-5608

**Volume 5/1 Spring**

2022 p. 40/55

# Effects of COVID-19 Lockdown on Sleep Quality and Nutrition Habits in Pregnant Women

# COVID-19 Karantinasının Hamile Kadınlarda Uyku Kalitesi ve Beslenme Alışkanlıkları Üzerine Etkileri

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**Özet**

Üreme sağlığı, pandemi sırasında yaşanan önemli bir halk sağlığı sorunudur; ancak yeni 2019 koronavirüs hastalığının (COVID-19) enfekte olmayan hamile kadınlar üzerindeki etkileri hala bilinmemektedir. Kısıtlamaların getirilmesiyle bu durum, normal rutinlerinin dışına çıkan bireylerin beslenme durumlarında değişiklikler olabileceğini düşündürmektedir. Dengeli ve sağlıklı bir diyete sahip olmak, COVID-19 gibi virüslerle mücadelede önemli olan vücudun bağışıklık sistemini güçlendirmeye yardımcı olabilir. Ayrıca, iyi bir uyku kalitesi, viral enfeksiyonlara karşı bağışıklığı artırmaya yardımcı olabileceğinden sağlık için de çok önemlidir. Bu nedenle hamilelikte iyi ve yeterli bir uyku hem annenin hem de bebeğin gelişimi için önemlidir. COVID-19 pandemi süreci, uyku kalitesini bozabilecek durumlarla da oldukça ilişkilidir. Bu derlemede COVID-19 karantinasının yeme alışkanlıkları ve uyku kalitesi üzerine olası etkilerinin anlatılması amaçlanmıştır.

**Anahtar Kelimeler:** COVID-19, beslenme alışkanlıkları, uyku kalitesi, hamilelik.

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**Abstract**

Reproductive health is an important public health problem during pandemics; however, the effects of new 2019 coronavirus disease (COVID-19) on non-infected pregnant women are still unknown. With the introduction of restrictions, this suggests that there may be changes in the nutritional status of individuals who go outside of their normal routine. Having a balanced and healthy diet can help strengthen the immune system of the body, which is important in fighting viruses such as COVID-19. In addition, good sleep quality is also very important for health as it can help improve immunity against viral infection. For this reason, a good and adequate sleep during pregnancy is important for the development of both mother and baby. The COVID-19 pandemic process is also highly associated with situations that can impair sleep quality. In this review, it is aimed to explain the possible effects of COVID-19 quarantine on eating habits and sleep quality.

**Keywords:** COVID-19, eating habits, sleep quality, pregnancy.

## INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was declared a pandemic by the World Health Organization in March 2020, and has been identified as a highly pathogenic virus (Yuen et al, 2020). The emergence and rapid spread of COVID-19 disease is considered a significant public health threat for all countries in the world (Han et al, 2020). Dietary habits and lifestyle changes threaten human health. Maintaining a healthy diet has become much more important, especially in a period like COVID-19, when the immune system must be strong (Di Renzo et al, 2020:10). Having a balanced and healthy diet can help strengthen the immune system of the human body, which is important in the fight against viruses (Wu et al, 2019).

In order to protect and maintain health during pregnancy, it is necessary for the mother to acquire adequate knowledge and education. A healthy diet plan, adequate physical activity and sleep, pregnancy diseases and reducing the symptoms and complications of these diseases are among the issues that the mother should know or be educated about (Mate et al, 2021).

The effect of micronutrients on immunity is a well-known fact. Vitamins A, B, C, D, E and trace elements such as zinc and iron play a major role in supporting the immune system during pregnancy. Vitamin-mineral deficiencies during pregnancy may cause pregnancy complications by increasing the risk and severity of infection (Nawsherwan, 2020; Rebecca et al, 2018).

Sleep is identified as a naturally occurring and recurrent condition in which consciousness is completely lost or diminished, emotional activities temporarily cease, and almost all voluntary muscles are immobile (Kaur and Bhoday, 2017). Two biological mechanisms in the body; circadian rhythm and homeostasis work together to regulate sleep and wakefulness. Circadian rhythm; by working in sync with factors such as light and temperature, it controls the timing of sleep by stimulating metabolism and hormones. Melatonin is the main hormone of the circadian system, produced by the pineal gland at night. In humans, melatonin has a sleep-promoting effect. Sleep-wake homeostasis also reminds the body's need for sleep and regulates sleep intensity according to wakefulness time (Foster, 2020; Zhdanova, 2014). Therefore, sleep; It is vital for mental, emotional and physical well-being (Blanc et al, 2019). Sleep quality is defined as feeling fit, fit and ready for a new day after waking up (Üstün and Yücel, 2011). The COVID-19 pandemic process is highly linked to situations that can impair sleep quality (Altena et al, 2020). Good sleep quality is very important for health (Huang et al, 2020) and can help strengthen immunity against viral infections (Gamaldo et al, 2012).

Therefore, the increased risk of COVID-19 infection is seen as one of the important factors affecting the sleep quality of people (Xiao et al, 2020).

COVID-19 pandemic process is an important process that adversely affects the health system in the world. In this process, the nutritional habits and sleep qualities of the people are very important for the immune system to be strong. As one of the most vulnerable groups, the health of pregnant women infected with COVID-19 has raised great concern around the world. However, there is limited data on the health effects of the COVID-19 pandemic on a much larger group of non-infected pregnant women who also experienced major lifestyle changes during the quarantine period. The aim of this study is; It was aimed to explain the possible effects of nutritional habits and sleep quality on pregnant women during the COVID-19 pandemic process in the light of literature studies.

**1. COVID-19**

Coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is a newly discovered highly pathogenic virus that was declared a pandemic by the World Health Organization in March 2020 (Yuen et al, 2020). The new coronavirus, which emerged in Wuhan, China in December 2019, spread rapidly across China. The coronavirus, which spread all over the world within two months, was named COVID-19 (Catania, 2020).

COVID-19 affects people differently, and its most common symptoms are fever, dry cough, and tiredness (WHO, 2020a). As of November, 2020, almost 57 million people worldwide have been infected with SARS-CoV-2, and almost 1.4 million people have died due to COVID-19 (Grassin-Delyle et al, 2020). The emergence and spread of COVID-19 disease is considered a significant public health threat for all countries around the world (Han et al, 2020).

**2. Immune System and COVID-19 Infection During Pregnancy**

There is insufficient data on how often COVID-19 infection is experienced during pregnancy and what are the maternal-fetal effects of this infection. While the maternal immune system shows immuntolerance to the fetus, it must be active in order to protect the body against microbial changes. A proinflammatory immune system dominates the implantation and placentation stages in the initial phase of pregnancy. In the second trimester of pregnancy, a situation develops in which an anti-inflammatory immune system is dominant that will allow the fetus to grow. When it comes to the third trimester, the proinflammatory immune system will again occur to allow the birth to begin (Liu et al, 2020).

Pregnancy is an immunological process that requires a balance between immunity tolerance and suppression. The continuation of pregnancy depends on the interaction between the fetal tissues and the maternal decidua in the early period. A specific leukocyte population and cytokine expression are necessary to achieve this. A successful pregnancy can only be achieved by the balance of Th1 Th2, Th17 and Treg activities throughout pregnancy. The human endometrium secretes various cytokines in the proliferative period and secretory periods of the menstrual cycle. These cytokines play many important roles such as the regulation of the uterine environment, functional placental formation and preparation of the uterus for implantation (Ciraci et al, 2019).

Since the immune system is suppressed in pregnant women, susceptibility to viral infections occurs (Liang and Acharya, 2020). Viral infections affecting the respiratory system are common during pregnancy. However, the data explaining the incidence and effect of respiratory viruses, which are common other than influenza virus, are very limited. There is not enough evidence yet to develop effective preventive methods and clinical strategies (Englund and Chu, 2018). Physiological changes that occur during pregnancy make pregnant more vulnerable to severe infections (Goodnight and Soper, 2005). Changes in the respiratory system reduce maternal tolerance to hypoxia (O'Day, 1997). Mucosal edema and vasodilation increase in the upper respiratory tract due to the change in lung volume and vasodilation. In addition, changes in cell-mediated immunity contribute to the increased susceptibility of pregnant women to being infected by intracellular organisms such as viruses (Nelson-Piercy, 2015). It has been reported that viruses that cause severe acute respiratory syndrome (SARS-CoV) and middle east respiratory syndrome (MERS-CoV), which are members of the coronavirus family, have serious effects on pregnancy such as endotracheal intubation, intensive care unit admission, kidney failure, death (Wong et al, 2004; Alfaraj et al, 2019).

Chen et al. In their study, the symptoms (fever, cough, respiratory distress) of nine pregnant women in the third trimester who caught COVID-19 were found to be similar to those of non-pregnant patients. In this case series, fetal distress and premature rupture of membranes occurred in only two of nine pregnant women. Serious COVID-19 pneumonia and death were not observed in pregnant women (Chen et al, 2020). In another case study of nine pregnant women by Zhu et al., It was reported that coronavirus symptoms were not observed in the days close to birth. It has been stated that the symptoms are similar to those of non-pregnant patients. Fetal distress and preterm labor were reported in six of the newborns, and seven were born by cesarean delivery (Zhu et al, 2020).

In the study conducted by Wong et al., It was suggested that almost 50% of pregnant women with SARS were followed up in the intensive care unit, 33% required mechanical ventilation and the mortality rate increased up to 25% (Wong et al, 2004). It was stated that SARSCoV-2 and SARS agents were 85% similar (Schoeman and Fielding, 2019). It has been reported that mortality rates are not observed (Chen et al, 2020). In the guide published by WHO on 13 March 2020, it was stated that the incidence of COVID-19 in children and pregnant women is low. It was stated that there was no significant difference in the prevalence and clinical symptoms of the disease in pregnant and non-pregnant women or women of reproductive age. It is emphasized that it is important to consider the immunological and physiological adaptation process during and after pregnancy in pregnant women with suspected or diagnosed COVID-19. It was stated that the application of supportive care and treatment steps should be considered (Zhelezov, 2020).

**3. The Importance of Nutrition in Pregnant Women in the COVID-19 Pandemic**

Nutrition according to the definition of Tuber; It can be defined as the use in the body by consuming the nutrients necessary for the improvement, protection and development of health, sustaining life, improving the quality of life, ensuring growth and development and productivity. (TÜBER, 2015). Healthy nutrition is very important to protect from infections and strengthen the immune system (TÜBA, 2020). Dietary habits and lifestyle changes threaten human health. Maintaining a healthy diet is very important, especially in a period like COVID-19 when the immune system must be strong (Di Renzo et al, 2020). Having a balanced and healthy diet can help strengthen the immune system of the human body, which is important in fighting viruses (Wu et al, 2019).

Pregnancy is the period when sensitivity to infections is increased and the immune system is partially suppressed. During this period, a healthy and adequate nutrition of the pregnant is very important both for the protection of her own health and for the normal growth of the fetus and its physical and mental development. For this reason, the intake of necessary energy elements such as carbohydrate, protein, fat and daily vitamins during pregnancy is shown in studies that are important in some minerals (Uzdil and Özenoğlu, 2015).

Nutritional status and presence of dehydration of the pregnant woman should also be evaluated. There is very little available data on nutrition in COVID-19 disease. However, since the new coronavirus causes respiratory system disease, the recommended diet is preferred in respiratory system diseases. Pregnant women should be recommended a diet that strengthens the immune system, contains plenty of protein, plenty of liquid and calories. It is recommended

for a pregnant mother to consume fish, vegetables, fruits, nuts, oils containing polyunsaturated fatty acids such as olive oil and sufficient protein rich in legumes, high quality fats and low glycemic index carbohydrates (Mate et al, 2021). In addition, multi-vitamin and multi-mineral support should be given to strengthen the immune system against viral diseases (Eskici, 2020).

It is thought that insufficient or excessive intake of necessary nutrients during pregnancy negatively affects the health of the pregnant and causes epigenetic changes in the fetus. It is known that pregnant women take the vitamins and some minerals that they need to take daily, as well as energy and nutrients. Vitamin A is shown to be important in the development of the immune system, cell differentiation related to embryonal development and growth, vision, and protein synthesis. A certain amount of vitamin C should be taken every day, depending on the metabolic rate that increases during pregnancy. Vitamin C, which is not stored in the body, has important roles in the synthesis of collagen, in the formation and development of connective tissue as an antioxidant, in the healing of wounds and in the prevention of anemia. It is also known to be protective against infections (Güler et al, 2019).

Iron is the most common micronutrient that affects pregnant women and results in anemia in their deficiency (Uzdil and Özenoğlu, 2015). While focusing on giving foods rich in iron and vitamin C to pregnant women to increase iron absorption, sunlight is required for the conversion of vitamin D. Approximately 90% of the required vitamin D is met from sunlight and 10% from food. In pregnant women, folate uterus enlargement is necessary for fetal growth, placental development and increase in red blood cell volume in pregnant women. Folic acid; It is well known that it is protective against the risk of miscarriage, low birth weight and fetal growth failure and protects the fetus from the risk of neural tube defects. Since the consumption of folate-rich foods (green leafy vegetables, orange juice, hazelnuts, beans) during pregnancy is not enough to meet the increasing need, the Ministry of Health recommends that women planning pregnancy be given folic acid supplements in addition to the diet, starting from the pre-pregnancy period (Maureen and Anat, 2017).

Emotional-based changes in eating behavior were observed during periods of natural disasters such as extreme (Kuijer and Boyce, 2012). However, the COVID-19 outbreak has not yet been reported. However, there is a high risk of emotion-based eating behavior during the COVID-19 pandemic, and it can have effects on pregnant women as well.

Dietary habits, food consumption habits and physical activity can help create more effective and efficient health policies during the quarantine period (Sánchez-Sánchez et al, 2020). In a study where Sidor et al. Aimed to assess whether their eating and consumer habits

were affected during COVID-19 quarantine in Poland, they suggested that a significant percentage of people may experience a change in eating habits and weight, which is manifested by eating and snacking more (Sidor and Rzymski, 2020). In the study conducted to evaluate the effects of the COVID-19 quarantine process on nutritional habits and lifestyle in the Spanish population, negative changes in nutritional behavior, decreased levels of physical activity, increased inactivity and weight gain were observed during the three-month quarantine period in Spain (López-Moreno et al, 2020). In a study in which Cheikh Ismail et al. Aimed to evaluate the impact of the quarantine process on the eating habits and lifestyle behaviors of people in the United Arab Emirates, the COVID-19 outbreak and the subsequent quarantine process, along with changes in nutrition and lifestyle behaviors, increased weight in about one-third of respondents (Cheikh Ismail et al, 2020).

Huber et al., in a cross-sectional study involving 1980 students from six different universities, aiming to investigate the effects of quarantine measures on young adults' eating habits; They observed that the COVID-19 quarantine process significantly changed eating habits in young adults (Huber et al, 2020). In the study, which aimed to investigate the effect on healthy eating behavior and lifestyle practices among Jordanian people during the COVID-19 quarantine process, it was found that there was a significant increase in body weight, appetite and smoking among Jordanians during the COVID-19 quarantine, and negative changes in healthy eating behavior (Al-Domi et al, 2021). Coulthard et al. aimed to examine the changes in eating habits and behavior during the quarantine in the UK, body mass index, demographic variables, eating styles, health anxiety, food insecurity and coping strategies, in the study that people experienced during the quarantine during the COVID-19 outbreak. It has been concluded that environmental and psychological factors may lead to changes in nutritional behavior (Coulthard et al, 2020).

With the COVID-19 pandemic, the prevalence of food insecurity has increased from 10.5% to 23% in all US households and to 30 in households with children (Schanzenbach and Pitts, 2020). Changing the diet due to food insecurity and failure to maintain a healthy diet may increase a pregnant woman's risk of contracting COVID-19 (Dolin et al, 2021).

**4. Effects of COVID-19 Pandemic on Sleep Quality of Pregnant Women**

Sleep is identified as a naturally occurring and recurring state in which consciousness is completely lost or diminished, emotional activities are temporarily stopped, and almost all voluntary muscles are immobile (Kaur and Bhoday, 2017). Sleep is a reversible behavioral state of perceptual detachment and unresponsiveness to the environment (Blanc et al, 2019). Sleep

is an essential factor of human health that supports a wide variety of systems, including immune function, metabolism, cognition, and emotional regulation (Coulthard et al, 2020). Of sleep; It has an important place in health promotion, disease prevention and basic quality of life (Oliver and Datta, 2019).

Sleep quality is identified as feeling fit, fit and ready for a new day after waking up (Üstün and Yücel, 2011). Sleep quality; It includes various criteria such as sleep latency, sleep efficiency, number of awakenings per night and sleep duration (Liu-Ambrose and Falck, 2019). Good sleep quality is very important for health (Huang et al, 2020) and is known to help improve immunity against viral infection (Gamaldo et al, 2012). The increased risk of COVID-19 infection has become one of the important factors affecting the sleep quality of people (Xiao et al, 2020). In a cross-sectional study of 2,410 employees aged 17 and over, in which Yang et al. aimed to investigate the prevalence of poor sleep quality among employees returning to work during the COVID-19 epidemic and the related factors, it was reported that poor sleep quality was common in employees (Yang et al, 2020). In another study examining psychological distress, sleep quality and influencing factors in adults related to the COVID-19 pandemic process, it was suggested that the COVID-19 epidemic negatively affected the psychological distress and sleep quality of adults (Duran and Erkin, 2021).

Marelli et al., In a cross-sectional study with 307 students and 93 university administrative staff, aiming to examine the effect of COVID-19 quarantine process on sleep quality on university students and administrative staff, found that sleep quality worsened compared to pre-COVID-19 (Marelli et al, 2020). In a cross-sectional study involving 207 nursing students, in which Romero-Blanco et al. Aimed to determine whether university students would experience changes in sleep quality during quarantine compared to normal times, they reported that overall sleep quality was worse during quarantine (Romero-Blanco et al, 2020).

In a cross-sectional study evaluating the sleep quality of 251 Tunisian medical students during the quarantine process due to the COVID-19 pandemic, it was shown that poor sleep quality was common in medical students (Saguem et al, 2021). Both cross-sectional and longitudinal studies have shown that <8 hours / day sleep time and poor sleep quality can increase anxiety during pregnancy (Yu et al, 2017).

Inadequate sleep time, irregular and late sleeping are common in modern society. These poor sleep health behaviors cause and worsen major health problems, including cardiovascular disease, obesity, diabetes, mood disorders and immune disorders (Watson et al, 2015).

Additional research is needed to evaluate the impact of sleep health behaviors on well-being and health outcomes.

**Conflict Of Interest**

None of the authors has any potential financial or commercial conflict of interest associated with this research manuscript (review article).

**CONCLUSION**

We are going through a long period of pandemic in which we do not have sufficient information about the fetal and neonatal effects and there is no specific treatment. For the immune system, which is important in fighting viruses, people's eating habits and sleep quality are very important. Maintaining adequate sleep and a healthy diet can help maintain immunity during pregnancy and maternal and infant health later on. Evaluating the nutritional habits and sleep qualities of individuals to strengthen the immune system and establishing health policies in this direction can ease the burden of the health system. More studies are needed to investigate the effects of COVID-19 on sleep quality and nutritional habits of pregnant women.

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