Original Article

Access this article online
Quick Response Code:

Website:
https://eurasianjpulmonol.org
DOI:
10.14744/ejp.2022.1205

Evaluation of insomnia in healthcare personnel after COVID-19 vaccination

İlker Yılmam, Bilkay Serez Kaya, Süreyya Temelli[1], Ebru Çakır Edis, Zerrin Yuluğkural[2]

ORCID:
İlker Yılmam: 0000-0003-4349-5771
Bilkay Serez Kaya: 0000-0002-4348-5197
Süreyya Temelli: 0000-0001-5340-3186
Ebru Çakır Edis: 0000-0002-8791-5144
Zerrin Yuluğkural: 0000-0002-0813-0403

Abstract:

BACKGROUND AND AIM: Sleep disturbances are common during Coronavirus Disease 2019 (COVID-19) infection. "Coronasomnia" is a concept used to identify sleep disturbances observed during the pandemic. Although coronasomnia has been described during and after coronavirus infection, no data on sleep disturbances seen after vaccinations have been found. The aim of this study was to detect the prevalence of sleep disturbances observed after COVID-19 vaccinations (specifically CoronaVac).

METHODS: In April 2021, healthcare personnel who had received the CoronaVac vaccine were administered questionnaires to investigate potential adverse effects of the vaccine and any sleep disturbances.

RESULTS: The study included 787 individuals, of whom 506 (64.3%) were women. The mean age was 35±9.6 (19–65) years. 303 (38.5%) healthcare workers reported adverse effects after vaccination. The most common adverse effects were exhaustion, muscle pain, and headache. At least one sleep disturbance (difficulty falling asleep, frequent awakening, difficulty maintaining sleep, excessive daytime sleepiness, and need to use sleeping pills) that did not exist before vaccination but occurred afterwards was found in 86 (10.9%) participants. Women had higher insomnia scores than men (p=0.02). An important result of the study is that the insomnia scores of healthcare workers who had COVID-19 are statistically higher than those who did not (p=0.02).

CONCLUSIONS: Adequate sleep is important for both protection from infection and the immune response against infection. Although coronasomnia developing after the COVID-19 variant that was identified at the beginning of the pandemic is well-defined, we believe that effects such as sleep disorders that may develop after vaccination should be monitored in the long term and in a large population.

Keywords:

Adverse effects, insomnia, sleep disturbances, vaccine

Department of Pulmonology, Trakya University Faculty of Medicine, Edirne, Türkiye, [1]Department of Econometrics, Trakya University, Edirne, Türkiye, [2]Department of Infectious Diseases and Clinical Microbiology, Trakya University Faculty of Medicine, Edirne, Türkiye

Address for correspondence:
Dr. İlker Yılmam, Department of Pulmonology, Trakya University Medical Faculty, Edirne, Türkiye.
E-mail: drilkeryilmam@gmail.com

Received: 16-12-2022
Revised: 11-01-2023
Accepted: 04-04-2023
Published: 12-05-2023

How to cite this article: Yılmam İ, Serez Kaya B, Temelli S, Çakır Edis E, Yuluğkural Z. Evaluation of insomnia in healthcare personnel after COVID-19 vaccination. Eurasian J Pulmonol 2023;25:191-6.

Introduction

Insomnia disorder is defined as a complaint of trouble initiating or maintaining sleep, which is associated with daytime consequences and is not attributable to environmental circumstances or inadequate opportunity to sleep. The disorder is identified as chronic when it has persisted for at least three months at a frequency of at least three times per week.[1]

Occasional, short-term insomnia affects 30% to 50% of the population.[2] The prevalence of chronic insomnia disorder in industrialized nations is estimated to be at least 5% to 10%.[3,4]

Coronavirus Disease 2019 (COVID-19), which is one of the most significant pandemics of the century, has infected more than 760 million people and killed more than 6.8 million people as of March 25, 2023.[5] There is currently no specific treatment for COVID-19. Therefore, vaccine studies aiming to reduce disease severity and mortality have gained momentum all over the world.

Inactivated COVID vaccine (Coronavac) has started to be administered primarily to healthcare workers in the risk group in our country as of January 15, 2021. Although messenger RNA (mRNA) vaccines have been procured and implemented in a certain age group since then, healthcare workers received two doses of Coronavac vaccine at the first stage.[6]

Insomnia may be the first complaint of patients with COVID-19.[7] In some cases, sleep disturbances such as difficulty falling asleep or difficulty maintaining sleep may develop during the progress of the disease. Sleep disturbances in COVID-19 patients have generally been investigated through questionnaires that assess sleep quality, such as the Pittsburgh Sleep Quality Index or the Insomnia Severity Index (ISI). The prevalence of sleep disorders was found to be 34% in a meta-analysis that evaluates these studies, whereas in another meta-analysis, this rate was found to be 74.8%.[8,9] These differences in rates may be due to differences in methodology and populations used in the studies evaluated in the meta-analyses.

Approximately 2,000 healthcare workers have been vaccinated in our hospital. Complaints of insomnia, frequent and early awakening were found in the vaccinated individuals, especially after the second dose. There have been no studies conducted in this field in the literature. In this study, we plan to investigate the prevalence of insomnia after Coronavac vaccination.

Materials and Methods

Study population

This cross-sectional survey was approved by both the local ethics board and the Ministry of Health. (Trakya University, Dean's Office of the Faculty of Medicine, Scientific Studies Ethics Council: No: 09/24, Date: 12.04.2021). This study was carried out according to the ethical standards of the Helsinki Declaration. Adult individuals working in the Faculty of Medicine of Trakya University who had received the COVID-19 vaccine (Coronavac) and agreed to participate in the study were enrolled. Survey forms were distributed to participants enrolled in April, 2021, and both insomnia and other adverse effects were recorded. The forms were distributed to different departments of the Medical Faculty of Trakya University, including the record office, internal medicine, pediatrics, laboratory, intensive care, and so on. All participants were informed about the purpose and procedures of the study, and a consent form was received from each participant for the study.

Measures

ISI is commonly used to evaluate insomnia and sleep disturbances.[10] Its Turkish validation was performed by Boysan et al.[11] The index consists of seven questions, with index items taking values between 0 and 4. The index scores vary between 0 and 28, with scores at or above 15 being evaluated as indicating insomnia. However, studies conducted with COVID-19 patients have accepted scores at or above 8 as positive.[12] The participants simultaneously filled in this index.

Statistical Methods

The data obtained from the survey were analyzed using SPSS (Version 26.0, USA)[13] software. Descriptive statistics were used to define variables in terms of mean and standard deviation (SD), or number and percentage (%). Adverse effects after vaccination and sleep complaints before and after vaccination were examined using frequencies. The insomnia severity index was investigated by age, gender, and COVID-19 history. For this purpose, the Kolmogorov-Smirnov test was used to examine the normality of data, taking into account the sample size. Based on the normality test results, nonparametric tests were preferred to analyze the insomnia

severity index. While the Kruskal-Wallis test was used to examine the effects of age on the insomnia severity index, the Mann-Whitney U test was used to investigate the effects of gender and COVID-19 history. Due to the results of the Kruskal-Wallis test, Dunn's test was carried out to identify between which age groups the insomnia index differed. All tests were conducted as two-tailed with a significance level of 5%.

Results

Table 1 presents the characteristics of the participants. A total of 787 participants were included in the analysis, with more than half of them being female (n=506, 64.4%). The age range was 19–65 years, with a mean age of 35±9.67 years. While 35.5% of the participants were nurses, 24.8% were doctors. Two hundred thirty-six participants reported being smokers. The majority of participants did not have asthma (95%), depression (98.3%), or anxiety (97.7%). Among the participants, 119 (15.1%) had previously been diagnosed with COVID-19, and 31 (3.9%) reported contracting COVID-19 after vaccination.

Three hundred three healthcare workers (38.5%) reported adverse effects after vaccination. The most common adverse effects were exhaustion, muscle pain, and headache (Table 2).

Sleep-related complaints before and after vaccination were examined. In total, 86 participants (10.9%) reported experiencing at least one sleep disturbance (difficulty falling asleep, frequent awakening, difficulty maintaining sleep, excessive sleepiness during the daytime, and/or the need to use sleeping pills) that did not exist before vaccination but occurred afterwards. Excessive sleepiness during the daytime was found in 44 individuals, difficulty falling asleep was found in 33 individuals after vaccination, whereas frequent awakening was present in 37 individuals (Table 3).

The mean ISI score of the participants was 4.83±4.79, and 192 (24.4%) participants had an insomnia score of 8 or higher. The insomnia score was examined according to age, gender, and COVID-19 history. As the sample size was large, the Kolmogorov-Smirnov test was used to examine whether the variables followed a normal distribution. Then, skewness and kurtosis coefficients were checked (Table 4). The test results showed evidence of non-normality, and based on this outcome, non-parametric tests were used. The Mann-Whitney U (M-W-U) test was used to investigate the effects of gender and COVID-19 history on insomnia score, while the Kruskal-Wallis H (K-W) test was used to examine the effects of age groups on insomnia score. Age was divided into four categories (19–29, 30–44, 45–59, and over 60 years) to explore differences among age groups, and Dunn's test was carried out to explore multiple comparisons. The Mann-Whitney U test result showed

Table 1: Characteristics of participants (n=787)

	n	%
Age (mean±SD)	35±9.67	
Gender		
Female	506	64.4
Professional title		
Doctor	195	24.8
Nurse	279	35.5
Other*	313	39.7
COVID-19 history		
Yes	119	15.1
Smoking		
Yes	236	30
Insomnia severity index (mean±SD)	4.83±4.79	
COVID-19 after vaccination		
Yes	31	3.9
Asthma		
No	748	95
Depression		
No	774	98.3
Anxiety		
No	769	97.7

*: Personnel, secretary, civil servant, chemist, pharmacist, laboratory assistant, security, biologist, technician, engineer, non-doctor faculty member. SD: Standard deviation

Table 2: Distribution of adverse effects after vaccination

Advers Effects	n	%
Exhaustion	164	20.8
Muscle pain	146	18.6
Headache	135	17.2
Chest pain	43	5.5
Nasal discharge	28	3.6
Fever	19	2.4

Table 3: Sleep-related complaints after vaccination (Coronavac)

Complaints	n	%
Excessive sleepiness during the daytime	44	5.6
Frequent awakening	37	4.7
Difficulty maintaining sleep	34	4.3
Difficulty falling asleep	33	4.1
Need for drug use to sleep after vaccination	4	0.6
Sleep disturbances	86	10.9

Table 4: Tests of normality

	Kolmogorov-smirnov			
	Statistic	p	Kurtosis	Skewness
Age	0.13	0.00	–0.31	0.64
Gender	0.32	0.00	–1.64	0.61
COVID-19-history	0.51	0.00	1.85	1.96
ISI	0.16	0.00	1.42	1.26

ISI: Insomnia severity index

a significant difference in the insomnia score between gender categories, with women having higher insomnia scores than men. An important result of the study was that healthcare workers who had a history of COVID-19 had statistically higher scores than those who had not (Table 5). The multiple comparisons test results indicated that the average ISI scores of young people (19–29 years) were higher than those of the elderly (45–59 years), and this difference was statistically significant (Table 6). However, no other age comparisons were found to be statistically significant.

Discussion

Adequate and quality sleep is crucial for the immune system. Although the effect of sleep on vaccine response has been investigated for other vaccines, our knowledge on this subject regarding COVID-19 vaccines is insufficient.[14] While post-COVID-19 insomnia (Coronasomnia) has been identified, information on post-vaccine insomnia is not yet available in the literature. This study examined sleep problems following the administration of the Coronavac vaccine. Sleep problems that were not present before vaccination but appeared after vaccination were detected in 10.9% of the healthcare workers who were vaccinated.

During the early stages of the pandemic, the prevalence of insomnia among healthcare workers was found to be 39%–50%.[12,15] In our study, sleep problems before vaccination were found in approximately 10% of healthcare workers, suggesting a decrease in anxiety levels among healthcare workers during the first year of the pandemic.

In a meta-analysis report that included 33,062 participants and 13 studies evaluating anxiety, depression, and insomnia in healthcare workers during the COVID-19 pandemic period, insomnia was assessed in five of these studies, and the rate found to be between 38–9%.[16]

Table 5: Distribution of ISI scores by age groups, gender, and COVID-19 history

Characteristics	n	Insomnia scores Mean±SD
Age		
19–29 years	304	5.43±4.83
30–44 years	338	4.76±4.95
45–59 years	127	3.78±4.15
Over 60 years	11	2.82±2.96
		K-W=15.67, p=0.00
Gender		
Female	502	5.19±5.03
Male	277	4.21±4.25
		M-W-U=62334, p=0.02
COVID-19 history		
Yes	117	5.90±5.28
No	663	4.65±4.67
		M-W-U=44150, p=0.02

ISI: Insomnia severity index, SD: Standard deviation, K-W: Kruskal-Wallis H test, M-W-U: Mann-Whitney U test

Table 6: Investigation of ISI scores by age groups

	Dunn's multiple comparison test					
	4–3 p	4–2 p	4–1 p	3–2 p	3–1 p	2–1 p
ISI	1.00	1.00	0.77	0.47	0.00	0.09

Significance values (p) are adjusted by Bonferroni correction. Age is divided into four categories, which are as follows: 1) 19–29 years, 2) 30–44 years, 3) 45–59 years, and 4) over 60 years. ISI: Insomnia severity index

Healthcare workers have reported sleep complaints to our chest diseases outpatient clinic after vaccination. In this study, sleep disturbances were detected in over 10% of participants after vaccination. Excessive sleepiness during the daytime was found to be the most common complaint (5.6%) after vaccination, whereas difficulty falling asleep, difficulty maintaining sleep, and frequent waking problems were reported by 4%–5%.

Studies evaluating side effects after COVID-19 vaccination have been reported in the literature. In a study involving 6,524 university students, side effects after COVID-19 vaccination were evaluated. In the study, 81.4% of the vaccinated individuals received the BioNTech-Pfizer vaccine, 67.3% received two doses, and 35.9% had different health problems. The most commonly reported conditions were fatigue, cough, sleep problems, and psychological disturbances. It was also reported that 10.52% of female participants developed menstrual irregularity.[17]

In Israel, Mahamid et al.[18] reported a case of narcolepsy with cataplexy demonstrated by polysomnographic

method in a 51-year-old woman after receiving the BioNTech-Pfizer Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) vaccine.

Garrido-Suárez BB et al.[19] hypothesized that some COVID-19 vaccines may induce drowsiness by affecting the sleep-wake cycle with reactogenic inflammatory parameters and suggested that this should be taken into account in pharmacovigilance studies to maintain confidence in vaccines.

In a study investigating short-term side effects following the administration of Pfizer-BioNTech and Oxford-AstraZeneca vaccines in Saudi Arabia, which included 398 participants, side effects were found to be more common in women, young people, and after Oxford-AstraZeneca vaccination. The most frequently reported side effects were fever, pain, and swelling at the injection site. The study participants also reported rare symptoms (<10%), such as heaviness, sleep disturbance, fainting, blurred vision, palpitations, osteomalacia, and inability to concentrate. This study revealed that both Pfizer-BioNTech and Oxford-AstraZeneca vaccines were associated with mild to moderate, transient, short-term adverse effects.[20]

However, this study has some limitations. First, it was planned as a cross-sectional study to determine post-vaccination side effects in healthcare workers only. Second, there is no control group as the target group is limited to healthcare workers.

Considering the positive effects of sufficient sleep on vaccine response, this outcome is significant. It is recommended to evaluate insomnia parameters in further studies with a wider series that assess the adverse effects of the vaccine in this context.

Conflicts of interest

There are no conflicts of interest.

Ethics Committee Approval

The study was approved by the Trakya University, Dean's Office of the Faculty of Medicine, Scientific Studies Ethics Committee (No: 09/24, Date: 12/04/2021).

Financial support and sponsorship

Nil.

Peer-review

Externally peer-reviewed.

Authorship Contributions

Concept – İ.Y., B.S.K., S.T., E.Ç.E., Z.Y.; Design – İ.Y., B.S.K., S.T., E.Ç.E., Z.Y.; Supervision – İ.Y., B.S.K., S.T., E.Ç.E., Z.Y.; Materials – İ.Y., B.S.K.; Data collection &/or processing – İ.Y., B.S.K., Z.Y.; Analysis and/or interpretation – İ.Y., S.T., E.Ç.E.; Literature search – İ.Y., E.Ç.E.; Writing – İ.Y., S.T.; Critical review – İ.Y., B.S.K., S.T., E.Ç.E., Z.Y.

References

1. Darien IL. International Classification of Sleep Disorders. 3rd ed. Darien, IL: American Academy of Sleep Medicine; 2014.
2. Ellis JG, Perlis ML, Neale LF, Espie CA, Bastien CH. The natural history of insomnia: Focus on prevalence and incidence of acute insomnia. J Psychiatr Res 2012;46(10):1278–85. [CrossRef]
3. Ohayon MM. Epidemiology of insomnia: What we know and what we still need to learn. Sleep Med Rev 2002;6(2):97–111. [CrossRef]
4. Ohayon MM. Observation of the natural evolution of ıinsomnia in the American general population cohort. Sleep Med Clin 2009;4(1):87–92. [CrossRef]
5. World Health Organization. WHO Coronavirus (COVID-19) Dashboard. Available at: https://covid19.who.int/ Accessed Apr 24, 2023.
6. Republic of Turkey Ministry of Health Covıd-19 Vaccination information platform. Available at: https://covid19asi.saglik.gov.tr/?_Dil=2 Accessed Apr 24, 2023.
7. Tony AA, Tony AEA, Ali SB, Ezzeldin MA, Mahmoud AA. Covid-19 -associated sleep disorders: A case report. Neurobiol 2020;9:100057. [CrossRef]
8. Jahrami H, BaHammam AS, Bragazzi NL, Saif Z, Faris M, Vitiello MV. Sleep problems during the Covid-19 pandemic by population: a systematic review and meta-analysis. J Clin Sleep Med 2021;17(2):299–313. [CrossRef]
9. Deng J, Zhou F, Hou W, Silver Z, Wong CY, Chang O, et al. The prevalence of depression, anxiety, and sleep disturbances in Covid-19 patients: A meta-analysis. Ann N Y Acad Sci 2021;1486(1):90–111.
10. Bastien CH, Vallières A, Morin CM. Validation of the Insomnia Severity Index as an outcome measure for insomnia research. Sleep Med 2001;2(4):297–307. [CrossRef]
11. Boysan M, Güleç M, Beşiroğlu L, Kalafat T. Psychometric properties of the Insomnia Severity Index in Turkish sample. Anadolu Psikiyatri Derg 2010;11:248–52.
12. Dong HS, Gao JJ, Dong YX, Han CX, Sun L. Prevalence of insomnia and anxiety among healthcare workers during the Covid-19 pandemic in Jilin Province. Braz J Med Biol Res 2021;54(9):e10602.
13. IBM SPSS Statistics for Windows. [Computer Software] Version 26.0. Armonk, NY:IBM Corp;2019.
14. Besedovsky L, Lange T, Born J. Sleep and immune function. Pflugers Arch 2012;463(1):121–37. [CrossRef]
15. Şahin MK, Aker S, Şahin G, Karabekiroğlu A. Prevalence of depression, anxiety, distress and ınsomnia and related factors in healthcare workers during Covid-19 pandemic in Turkey. J Community Health 2020;45(6):1168–77. [CrossRef]
16. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsi E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the Covid-19 pandemic: A systematic

review and meta-analysis. Brain Behav Immun 2020;88:901–7. Erratum in: Brain Behav Immun 2021;92:247. [CrossRef]

17. Akarsu GD. determining the health problems experienced by young adults in Turkey, who Received the Covid-19 vaccine. Vaccines (Basel) 2022;10(9):1526. [CrossRef]
18. Mahamid A, Bornstein RJ, Amir H. Pfizer/BioNTech SARS-CoV-2 vaccine as a potential trigger for the development of narcolepsy: A case report. J Clin Sleep Med 2022;18(10):2503–6. [CrossRef]
19. Garrido-Suárez BB, Garrido-Valdes M, Garrido G. Reactogenic sleepiness after COVID-19 vaccination. A hypothesis involving orexinergic system linked to inflammatory signals. Sleep Med 2022;98:79–86. [CrossRef]
20. Alzarea AI, Khan YH, Alatawi AD, Alanazi AS, Alzarea SI, Butt MH, et al. Surveillance of post-vaccination side effects of Covid-19 vaccines among Saudi population: A real-world estimation of safety profile. Vaccines 2022;10(6):924. [CrossRef]