## Research Paper
# Sleep Quality of Healthcare Workers of Allameh Bohlool Gonabadi Hospital during the COVID-19 Pandemic and Its Related Factors

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## ABSTRACT

**Aims** Sleep is one of the factors affecting human health. Any disturbance in human sleep affects the occurrence of physical and mental problems, resulting in a marked reduction in one's performance. The present study aimed to assess the sleep quality of healthcare workers (HCWs) and its related factors in Allameh Bohlool Gonabadi Hospital during the COVID-19 pandemic.

**Materials & Methods** The present cross-sectional study was conducted on 103 employees of Allameh Bohlool Hospital in Gonabad in 2021. Demographic characteristics form and the Pittsburgh Sleep Quality Index (PSQI) were used to collect data. After collecting the data, it was entered into SPSS software (version 16) and interpreted using descriptive and analytical statistics.

**Findings** The mean age of all participants was 33.22±6.31 years, and the mean sleep quality score was 6.52±2.51. According to the Pittsburgh sleep quality questionnaire, 46 (44.7%) and 57 (55.3%) cases had favorable and unfavorable sleep quality, respectively. There was a statistically significant relationship between sleep quality and the workplace ward, and 84.2% of subjects working in high-risk wards had unfavorable sleep quality (P= 0.045).

**Conclusion** As evidenced by the results of this study, the rate of poor sleep quality was high among hospital healthcare workers, resulting in a marked reduction in their work efficiency and disability. Therefore, according to the special position of hospital employees in the health system, measures are recommended to improve the ergonomics of the workplace and solve the mental and psychological problems of these people.

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**مقاله پژوهشی**

# بررسی کیفیت خواب کارکنان بهداشتی درمانی بیمارستان علامه بهلول گنابادی در طی پاندمی کووید-۱۹ و عوامل مرتبط با آن

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## چکیده

**هدف** خواب یکی از فاکتورهای تاثیرگذار بر سلامت انسان است. هرگونه اختلال در خواب انسان بر بروز مشکلات جسمی، روانی و کاهش عملکرد فرد اثرگذار است. هدف از مطالعه حاضر بررسی میزان کیفیت خواب در کارکنان بهداشتی - درمانی و عوامل مرتبط با آن در بیمارستان علامه بهلول گنابادی طی پاندمی کووید-۱۹ است.

**مواد و روش‌ها:** مطالعه حاضر یک مطالعه مقطعی است که با مشارکت ۱۰۳ نفر از کارکنان بیمارستان علامه بهلول گناباد در سال ۱۴۰۰ انجام شد. چک‌لیست اطلاعات دموگرافیک، پرسش‌نامه استاندارد کیفیت خواب پیتزبورگ برای جمع‌آوری داده‌ها استفاده شد. داده‌ها پس از گردآوری وارد نرم افزار SPSS نسخه ۱۶ شد و با استفاده از آزمون‌های آماری تفسیر شد.

**یافته‌ها** میانگین سنی کل شرکت‌کنندگان ۶/۳۱ ± ۳۳/۲۲ سال و میانگین نمره کیفیت خواب ۲/۵۱ ±۶/۵۲ بوده است که با توجه به پرسش‌نامه کیفیت خواب پیتزبورگ ۴۶ نفر (۴۴/۷٪) کیفیت خواب مطلوب و ۵۷ نفر (۵۵/۳٪)کیفیت خواب نامطلوب داشته‌اند. بین کیفیت خواب و بخش محل کار ارتباط آماری معناداری وجود داشته است، به طوری که ۸۴/۲ درصد از افراد شاغل در بخش‌های با خطر بالا، کیفیت خواب نامطلوب داشته‌اند (۰/۰۴۵ = P).

**نتیجه‌گیری:** با توجه به نتایج این مطالعه، میزان کیفیت خواب پایین در کارکنان بهداشتی درمانی بیمارستان بالا بوده است که می‌تواند در کاهش بازده کاری و از کارافتادگی آن‌ها نقش مهمی داشته باشد؛ بنابراین، با توجه به جایگاه ویژه کارکنان بیمارستان در سیستم نظام سلامت، اقداماتی برای بهبود وضعیت ارگونومی محل کار و رفع مشکلات روحی و روانی این افراد توصیه می‌شود.

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## Introduction

Sleep is a daily vital and complex biological process and one of the basic human needs, which is necessary for the rest of the body and mind [1, 2]. The need for sleep is different at various ages, and an adult needs 6-8 hours of sleep a day on average [3]. Therefore, humans sleep for almost one-third of their life, which makes it necessary to pay attention to this important issue [4]. The prevalence of sleep disorders in the general population of Asia is between 26.4% and 39.4%, and it has also increased in Iran in recent decades [5, 6]. Nearly 30% of HCWs have insufficient sleep [7]. The cause of sleep problems is complex and multidimensional; professional factors, such as work pressure and stress, high job demands and low support, shift work, and especially night work, long hours on duty, and job dissatisfaction and insecurity, as well as non-professional factors, such as age, gender, body mass index, socio-economic status, and physical and mental diseases, all affect the quantity and quality of sleep [3, 8, 9]. Sleep deprivation endangers a person's physical, mental, and social health [10]. Healthcare workers are constantly under pressure and face illness, suffering, and death in the workplace and have an irregular work schedule and frequent shifts, all of which may negatively affect their sleep [11, 12]. Considering the situation of the COVID-19 pandemic, which has affected almost all economic, social, political, and even military aspects of all countries in the world, it is paramount to assess the physical and psychological effects of this viral disease on the physical and mental health of people of all walks of life [13] . In addition to public health, this disease is also a threat to professional health [14]. During the COVID-19 outbreak, more than half of the people were affected by the psychological effects of this disease in a moderate to severe range, and some of them also suffered from severe depression and excessive anxiety symptoms [15]. COVID-19 patients, healthcare specialists, and even the entire population are under enormous psychological pressure, which can lead to various psychological disorders, including anxiety, fear, depression, and insomnia [16, 17]. Being an only child, contact with COVID-19 patients, and depression can be independently associated with sleep disorders in HCWs [18]. Furthermore, the anxiety level of employees can significantly reduce their sleep quality [19]. A large percentage of HCWs on the frontline of the fight against the COVID-19 are presented with symptoms of sleep deprivation, moderate to severe stress, poor sleep quality, and severe mental stress [20]. In this regard, a large number of HCWs mention the new onset or worsening of insomnia while caring for COVID-19 patients [21].

Now, due to the extent of the spread of the COVID-19 disease in the world and in Iran, as well as the increasing number of people suffering from this disease and the subsequent increase in the number of people who need to be hospitalized and receive medical services, HCWs in hospitals are faced with serious problems, including a marked increase in difficulty and work pressure, as well as a shortage of hospital personnel compared to the increase in the number of patients [14, 22]. A marked increase in exposure to the virus, the risk of contracting COVID-19 in hospital personnel [14, 23], fear, stress, anxiety, and other psychological disorders [14, 24-26], as well as the concern of hospital personnel about transmitting the disease to their family and friends [14] cause sleep disorders in hospital personnel. Several studies in different countries have assessed the sleep of HCWs during the COVID-19 pandemic. The rate of insomnia was reported as 38.9% in a systematic review by Papa et al. on five cross-sectional studies on Chinese HCWs. Salari et al. reviewed seven cross-sectional studies from Asia and the Middle East that were conducted on nurses and doctors and reported the prevalence of sleep disorders as 34.8% and 41.6% in nurses and doctors, respectively [27, 28]. In addition, up to 50% of Iranian nurses have had insufficient sleep and poor sleep quality, and 35.5% of them have taken medicine for sleep problems [10, 29].

Considering the fact that one of the research areas in organizational systems is the investigation of the health of the workforce, and one of the requirements for the implementation of prevention and control programs in any organization is a detailed understanding of the current situation and recognition of occupational risk factors and considering that sleep disorders in HCWs can reduce job performance and directly affect the treatment of patients, this present study aimed to assess the sleep quality of HCWs and its related factors in Allameh Bohlool Gonabadi Hospital during the COVID-19 pandemic.

## Materials and Methods

The present cross-sectional-analytical study examined the quality of sleep in 103 HCWs of Allameh Bohlool Gonabadi Hospital during the COVID-19 pandemic. This study was approved by the Research Ethics Committee of Gonabad University of Medical Sciences (IR.GMU.REC.1399.106). The study population included the HCWs of Allameh Bohlool Hospital in Gonabad, who were selected by simple random sampling. The inclusion criteria were consent to participate in the study and no history of neurological, mental diseases and sleep disorders. On the contrary, the exclusion criteria were unwillingness to continue cooperation. Based on the study by Wang et al. [18], taking into account the confidence level of 95%, the test power of 80%, and the error of 0.07, the sample size was calculated at 97 people using the following formula and considering 10% possible dropout, the final sample size was set as 107 cases.

$$n = \frac{\left(z_{1-\frac{\alpha}{2}} + z_{1-\beta}\right)^2 * \delta^2}{d^2}$$

In this study, hospital departments were divided into two high-risk and low-risk categories according to contact with COVID-19 patients, in which the internal, surgical, emergency, and Intensive Care Unit (ICU) wards were in the high-risk category, and the gynecological, pediatric and Critical Care Unit (CCU) wards were in the low-risk category. This division was performed based on the opinion of experts and due to the increase in the number of hospitalizations of COVID-19 patients at the time of conducting this study and as a result of hospitalization of patients in wards not related to internal medicine and the lack of hospitalization of COVID-19 patients in gynecological, pediatric, and CCU wards, due to the higher sensitivity of these patients. In this study, demographic characteristics form and the Pittsburgh Sleep Quality Index (PSQI) were used to collect data [30]. This questionnaire contains 18 questions and has 7 components: subjective quality of sleep (2 questions), delay in falling asleep (2 questions), duration of falling asleep (2 questions), efficiency and effectiveness of sleep (2 questions), sleep disorders (3 questions), taking sleeping pills (4 questions) and inappropriate performance during the day (3 questions) as well as a general score. The score of each component is between 0 and 3, and the sum of the mean scores of these seven components constitutes the total score of the tool, ranging from 0 to 21. The higher the score, the lower the quality of sleep, and a score higher than 5 indicates poor sleep quality.

Data were analyzed using SPSS software (version 16.0). The data related to qualitative variables were described using appropriate tables and graphs, reporting numbers and percentages, and for quantitative variables, mean and standard deviation were reported. Quantitative data analysis was performed after checking normality using the Kolmogorov-Smirnov test, parametric (independent t), non-parametric (Mann-Whitney) statistical tests, and analysis of qualitative variables using chi-square test, and the results were interpreted. The significance level in this research was considered less than 0.05.

## Results

The number of people studied was 103, with a mean age of 33.22±6.31 years and a mean work experience of 8.71±6.73 years. Regarding gender, 43 (41.7%) participants were male, and 60 (58.3%) cases were female. In terms of marital status, 14 (13.6%) subjects were single, and 89 (86.4%) cases were married. The mean number of children of participants was 1.02±1.00, the mean working hours of the participants was 8.00±1.90 hours, and the number of their monthly night shifts was 6.43±4.67.

Based on the results, 61.12% of participants were nurses, and 80.5% had a bachelor's degree or higher. The mean sleep quality score of employees was 6.51±2.51. Moreover, 70.9% of participants had rotating shifts, and 76.7% of subjects worked in high-risk wards. According to the results, 44.7% of participants had good sleep quality, and 55.3% of participants had bad sleep quality (Table 1). There was a statistically significant relationship (P=0.045) between sleep quality and the workplace ward, and 48 subjects with unfavorable sleep quality were working in high-risk sectors (Table 2).

Sleep quality demonstrated no significant relationship with occupation (P=0.185), gender (P=0.628), marriage (P= 0.884), work shift (P=0.696), and education level (P=0.068) of participants in the research. According to the results of this study, there was no significant difference between the two groups under study (good and bad sleep quality) in the age (P=0.948), work history (P=0.807), working hours (P=0.318), number of children (P=0.63), and number of night shifts per month (P=0.697).

**Table 1.** Frequency distribution of HCWs during the COVID-19 pandemic based on the studied variables

| Variable | | Frequency | Percentage |
|---|---|---|---|
| Job | Physician | 10 | 9.7 |
| | Nurse | 63 | 61.1 |
| | Other | 30 | 29.1 |
| Education level | Diploma | 20 | 19.5 |
| | Bachelor | 57 | 55.3 |
| | Masters and General Physician | 26 | 25.2 |
| Shift | Morning | 17 | 16.5 |
| | Evening and night | 13 | 12.6 |
| | Rotating | 73 | 70.9 |
| Ward | High- risk | 79 | 76.7 |
| | Low- risk | 24 | 23.3 |
| Sleep quality | favorable | 46 | 44.7 |
| | Unfavorable | 57 | 55.3 |

**Table 2.** Relationship between the sleep quality and the ward in the HCWs of Allameh Bohlool Gonabadi Hospital during the COVID-19 pandemic

| Variable | | Sleep Quality | | p-value |
|---|---|---|---|---|
| | | Favorable Frequency (%) | Unfavorable Frequency (%) | |
| Ward | High-risk | 31 (67.4) | 48 (84.2) | |
| | Low-risk | 15 (32.6) | 9 (15.8) | 0.045 |
| | Total | 46 (100) | 57 (100) | |

## Discussion

In the present study, sleep quality was not related to job, gender, marital status, shift work, level of education, age, number of children, work experience, working hours, and number of night shifts per month. Nevertheless, sleep quality and type of work department (in terms of amount dealing with COVID-19 patients) were significantly correlated, and 48 cases with unfavorable sleep quality were working in high-risk departments (P=0.045).

In their study, Wang et al. [18] investigated the psychological effect of COVID-19 on HCWs. A total of HCWs with a mean age of 33.75±8.41 years were studied. In this study, the mean sleep quality based on the Pittsburgh questionnaire was 7.22±2.62, and the results indicated that sleep disorder was statistically related to job title, being an only child, and contact with COVID-19 patients (P<0.05). Nonetheless, it was not correlated with gender, age, education level, marital status, quarantine status, current health status, and family. In terms of the existence of a relationship between sleep quality and HCWs' contact with COVID-19 patients, the results of this research are in line with those reported by the study by Wang. In the present research, unlike the study by Wang, there was no significant relationship between job position and sleep quality, and this difference can be attributed to the presence of other members of the medical staff (in addition to doctors and nurses) in the study. Furthermore, in the stated study, the variable of "being an only child" was not investigated. In general, the quality of sleep was not related to the number of children, and in terms of the relationship between other variables and sleep quality of HCWs, the results of both studies are consistent.

In a study by Han Xiao in China [19], 180 medical workers with a mean age of 32.31±4.88 years were studied. In the referred study, the mean sleep quality score based on the Petersburg questionnaire was 8.58±4.00, indicating that the sleep quality of the medical staff who treated COVID-19 was relatively low. Several factors may have led to a decrease in the quality of sleep in the medical staff. Doctors and nurses had to wear protective clothing every day. The employees were constantly working in isolated sections with intensity and pressure. Moreover, some patients could not be treated and lost their lives due to COVID-19. The findings of this study illustrated that social support of HCWs does not directly affect their sleep quality; however, it indirectly affects sleep quality through several pathways and improves self-efficacy. The results of the mentioned research were in agreement with our study, suggesting that more contact with COVID-19 patients leads to lower quality of sleep.

In their study, Jahrami et al. [20] assessed the sleep quality of healthcare workers on the frontline of the treatment of COVID-19 in Bahrain during the COVID-19 epidemic and compared it with the sleep quality of non-frontline HCWs with a mean age of 40.2±9.7 years from several centers affiliated to the Ministry of Health of Bahrain. A detailed examination of the seven components of the PSQI showed that the frontline group of communication with COVID-19 patients had lower subjective sleep quality, longer sleep latency, more sleep disturbances, and more extensive use of sleeping pills. In this study, quality of sleep displayed no relationship with gender, marital status, age, and type of job. Moreover, no predictors for unfavorable sleep quality were identified due to the lower score of the subscale of sleep quality in the Pittsburgh questionnaire in the frontline group of COVID-19 and the lack of correlation between sleep quality and other variables. The results of the referred research are also in accordance with our study.

In order to assess the characteristics of sleep in HCWs exposed to the COVID-19 pandemic, San Martin et al. [21] studied 170 subjects with a mean age of 35.3±9.2 years. In this study, when comparing the two groups regarding the type of insomnia, it was only statistically significant in the subgroup who woke up early (P=0.004). In addition, multivariate logistic regression analysis demonstrated that only shift workers are independently associated with insomnia symptoms. Overall, the results of this study pointed out that shift workers and healthcare workers exposed to COVID-19 have a lower quality of sleep, which is why the results obtained in relation to the relationship between sleep quality and the level of communication with COVID-19 patients are in line with the results of our study. Nonetheless, the results concerning the relationship between the type of shift work and the quality of sleep are different, which can be ascribed to the lack of significance according to the kind of variable investigated since, unlike our study, in the mentioned study, subjects were assigned to two categories: shift work and fixed shift.

Sevda Korkmaz et al. [31], in a study, evaluated the

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level of anxiety, quality of sleep and life, and problem-solving skills in 140 healthcare workers working in the COVID-19 outpatient clinics or emergency COVID-19 departments. In this study, the anxiety levels and sleep disorder scores were the highest for the participants who worked both in the outpatient clinic and the COVID-19 department and the lowest for those who worked only in the COVID-19 outpatient clinic. According to the results obtained in the stated research and comparing it with the present study, the results of our study are similar to the relationship between low sleep quality and the level of contact with COVID-19 patients.

In a study conducted by Shahsavand et al. [4] to investigate the prevalence of sleep disorders in the nursing staff of Imam Khomeini Hospital in Tehran and the factors affecting it, 446 subjects within the age range of 129-59 years voluntarily answered the questionnaires. In this study, Nocturnal insomnia exhibited a significant relationship with the female gender in such a way that the amount of nighttime insomnia in women was more than that of men. Inconsistent with the present study's findings, no correlation was found between the type of work department of the personnel and the amount of sleep quality, which can be explained considering the time of conducting this study, which is before the COVID-19 pandemic.

A study was conducted by Soleimany et al. [32] in order to investigate general health and its relationship with the quality of sleep of shift worker nurses in medical training centers of Iran University of Medical Sciences. In this study, 520 nurses working in different shifts at Iran University of Medical Sciences hospitals participated in the research through stratified random sampling. The results of this study pinpointed a significant difference between the sleep quality of fixed-shift nurses and rotating-shift nurses. That is, 69.6% of fixed shift nurses and 56.2% of rotating shift nurses had good sleep quality. There was a significant positive relationship between general health and sleep quality among nurses. The non-significance correlation between the type of work shift and low sleep quality due to changes in environmental conditions in terms of the incidence of the Covid pandemic and also the type of work shift division in this study can be explained by examining the results of the stated research and comparing it with the results of the present study.

Regarding the notable limitations of the present study, considering that the data collection method of this study was self-reported, it is possible that the results may not have the desired accuracy. Moreover, this study was conducted with the participation of a limited number of employees and only in Gonabad; therefore, great caution should be exercised when generalizing the results to the whole society. Some variables may also be affected by confounding factors. Therefore, it is recommended that this study be conducted with a larger sample size and that more parameters be checked in multiple centers.

## Conclusion

The results of this research pointed out that HCWs have unfavorable sleep quality. A close relationship was detected between employment in the departments related to COVID-19 disease and sleep problems. If there are no interventions and changes in a person's work and lifestyle, sleep problems will increase and bring about more negative and destructive effects. Therefore, considering the special position of hospital staff in the health system, one of the most important solutions can be that the shift work patterns of the medical staff have a fixed and logical order for employment in the departments related to COVID-19. Furthermore, counseling sessions and anxiety control should be conducted by counselors and psychologists for HCWs.

## Ethical Considerations

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