Journal of Health and Rehabilitation Research 2791-156X JHRR

For contributions to JHRR, contact at email: editor@jhrlmc.com

Original Article

Exploring the Relationship Between Anxiety Levels and Sleep Quality During the Covid-19 Pandemic; A cross-sectional Survey

Sami Ur Rehman[1], Aqsa Faiz[1], Mubushara Afzal[1]*, Subita Kafeel[2]

[1]South City Health Care Educational Hub, Karachi, Pakistan.

[2]Liaquat National Hospital, Karachi, Pakistan.

Corresponding Author: Mubushara Afzal; Email: mubusharaafzal@gmail.com

Conflict of Interest: None.

Rehman SU., et al. (2024). 4(1): DOI: https://doi.org/10.61919/jhrr.v4i1.571

ABSTRACT

Background: The COVID-19 pandemic has exerted unprecedented stress on global health, with significant implications for mental health and sleep quality. Prior research has established a link between anxiety levels and sleep disturbances, yet the pandemic's full impact on these aspects remains underexplored, particularly among university students.

Objective: This study aims to investigate the relationship between anxiety levels and sleep quality among university students during the COVID-19 pandemic, providing insights into the prevalence of sleep-related issues and anxiety and their interconnection.

Methods: A cross-sectional survey was conducted at the South City Institute of Physical Therapy and Rehabilitation, involving 281 participants aged between 17 and 25 years. Data collection was facilitated through self-administered, online questionnaires, employing the Beck Anxiety Inventory and the Insomnia Severity Index to measure anxiety levels and sleep quality, respectively. The study utilized a convenience sampling technique, with SPSS version 25.0 employed for data analysis, including Pearson correlation tests to examine the relationship between sleep quality and anxiety levels.

Results: The study revealed that 82.9% of participants were female, with a significant portion of the population aged between 24 and 26 years. Regarding COVID-19 impact, 23.49% reported being affected by the virus. A majority (44%) reported obtaining 8-10 hours of sleep, while 55.2% exhibited moderate anxiety levels. A notable negative correlation ($r = -0.510$, $p < 0.01$) between anxiety levels and sleep quality was identified, indicating that higher anxiety was associated with poorer sleep quality.

Conclusion: The findings underscore a significant negative correlation between anxiety levels and sleep quality among university students during the COVID-19 pandemic. These results highlight the necessity for mental health and sleep hygiene interventions aimed at mitigating the adverse effects of pandemics on student populations.

Keywords: COVID-19, university students, anxiety levels, sleep quality, mental health, Beck Anxiety Inventory, Insomnia Severity Index, cross-sectional survey.

INTRODUCTION

Anxiety, an emotional response to perceived threats, plays a crucial role in driving adaptive behavioral changes essential for navigating environments safely. Under normal circumstances, these adaptations are beneficial, promoting survival and well-being. However, when the response to these threats becomes excessive or misplaced, the once adaptive mechanisms can turn maladaptive, leading to significant distress and dysfunction (1). Parallel to this, sleep—a complex physiological state marked by reduced consciousness, decreased muscle activity, and inhibition of nearly all voluntary muscles—is fundamental for health and well-being. Governed by intricate neurobiological processes, adequate sleep is indispensable for maintaining optimal health, yet it remains elusive for many, adversely affecting daily functioning and overall quality of life (2). The intersection between anxiety and sleep is notably significant, as sleep deprivation has been identified as a critical factor in escalating anxiety levels, underscoring a vicious cycle where each condition perpetuates the other.

The onset of the COVID-19 pandemic, initially identified as pneumonia of unknown origin in Wuhan City, China, on December 31, 2019, has markedly exacerbated this interplay between anxiety and sleep quality. The World Health Organization (WHO) declared

Journal of Health and Rehabilitation Research 2791-156X JHRR

the outbreak a pandemic on March 11, 2020, naming the disease COVID-19, which is caused by a novel coronavirus. This virus, characterized by its unique structural proteins, notably the spike protein, exploits the angiotensin-converting enzyme 2 receptor to enter host cells, primarily affecting the respiratory system (3). The ensuing global health crisis has not only presented unprecedented challenges in managing a novel infectious disease but has also precipitated widespread psychological distress, manifesting as anxiety, depression, and sleep disturbances, among other mental health concerns. Research from China, the epicenter of the outbreak, highlights how fear, uncertainty, and the relentless progression of the pandemic have contributed to significant mental health burdens (4).

The situation in Wuhan, where the disease initially presented symptoms akin to pneumonia but soon revealed severe complications such as acute respiratory distress syndrome (ARDS) and increased mortality, marked the beginning of an escalating global crisis (5). The spread of COVID-19 rapidly extended beyond China, affecting populations worldwide and leading to significant disruptions in daily life, healthcare systems, and the global economy. With over 23 million confirmed cases globally, including significant outbreaks in countries like Pakistan and the United States, the pandemic has underscored the critical need for effective disease management and mitigation strategies to control virus transmission (6).

Amidst this backdrop, the impact of the pandemic on mental health, particularly in relation to anxiety and sleep disturbances, has emerged as a pressing concern. The unprecedented stressors associated with COVID-19—ranging from health fears to social isolation and economic instability—have significantly influenced sleep patterns and mental well-being. This research aims to elucidate the relationship between anxiety levels and sleep quality during the COVID-19 pandemic, with a focus on university-level students. This demographic represents a group particularly vulnerable to the stressors introduced by the pandemic, including disruptions to academic routines, social interactions, and future uncertainties. By examining the specific impacts on this population, the study seeks to contribute valuable insights into the broader implications of the pandemic on mental health and well-being.

Recent literature has consistently highlighted the detrimental effects of the COVID-19 outbreak on both anxiety levels and sleep quality, indicating a decline in mental health associated with the pandemic. This study builds upon these findings, aiming to further delineate the specific correlation between heightened anxiety and impaired sleep quality in the context of COVID-19. By focusing on a cohort within Karachi, Pakistan—a region also significantly affected by the pandemic—this research endeavors to add to the growing body of evidence concerning the mental health ramifications of COVID-19, thereby informing strategies for mitigating these impacts in the face of ongoing global health challenges.

MATERIAL AND METHODS

This cross-sectional survey was conducted at the South City Health Care Educational Hub, specifically within the South City Institute of Physical Therapy and Rehabilitation (SCIPTR). The study enlisted the participation of 281 students from SCIPTR, with an age distribution ranging from 17 to 25 years and an average age of 21 years. Recruitment was achieved through a convenience sampling method, targeting individuals enrolled in the Doctor of Physical Therapy (DPT) program. The research utilized self-administered online questionnaires to collect data, employing the [Adopted version] Beck Anxiety Inventory (BAI) and the [Adopted version] Insomnia Severity Index (ISI) as primary tools for assessing anxiety and sleep quality, respectively. The BAI questionnaire includes 21 items designed to quantify anxiety levels based on the sum of the responses, with the total score ranging from 0 to 63 points. According to the scoring system, a total score within the range of 0-21 indicates low anxiety, 22-35 suggests moderate anxiety, and a score of 36 or above signals potentially concerning levels of anxiety. The ISI consists of 7 items rated on a Likert scale, evaluating the severity of insomnia over the preceding two weeks. The aggregate score is interpreted as follows: 0-7 signifies no clinical insomnia, 8-14 indicates sub-threshold insomnia, 15-21 denotes moderate insomnia, and 22-28 points to severe insomnia (3, 4, 7). Inclusion criteria were strictly defined to encompass students actively enrolled in the DPT program at SCIPTR, aged between 17 and 25 years. Conversely, the exclusion criteria were delineated to omit students from SCIPTR who were not enrolled in the DPT program or did not fall within the specified age range. Data collection was carried out over the span of one month, leveraging a web-based survey form distributed among undergraduate physical therapy students at SCIPTR. To ensure informed participation, a consent form elucidating the study's purpose, procedures, potential risks, and benefits was provided to all participants. This process was facilitated via a Google form, which also served as the medium for administering the informed consent and the questionnaires. Subsequently, the responses were compiled and subjected to thorough analysis.

For the analysis of collected data, the statistical package SPSS version 25.0 was utilized. Descriptive statistics were employed to detail the frequencies and demographic characteristics of the participants, presenting the data in terms of percentages and frequencies. To explore the relationship between anxiety levels and sleep quality, the Pearson correlation test was conducted, with significance set at a p-value of 0.01.

Journal of Health and Rehabilitation Research 2791-156X JHRR

Ethical considerations were meticulously adhered to throughout the study, in alignment with the principles outlined in the Declaration of Helsinki. Participants were assured of their autonomy in choosing to participate, with a clear understanding that their participation was voluntary and they could withdraw at any point without consequence. Privacy and confidentiality were upheld rigorously, ensuring that no personal identifiers were collected or disclosed. Moreover, all potential risks to participants were identified and mitigated, establishing a framework that prioritized the safety and well-being of the participants above all else.

RESULTS

In the conducted cross-sectional survey, a significant majority of the participants were female, accounting for 82.9%, while males represented a smaller fraction at 17.2%. The age distribution among participants revealed a predominant age range of 24 to 26 years, encompassing 54% of the respondents, followed by the 21 to 23 years age group, which accounted for 40%. A minor segment of the population fell into the younger age categories of 15 to 17 and 18 to 20 years, representing 1% and 5% of the participants, respectively (Table I). Regarding the impact of the COVID-19 pandemic on the study cohort, 23.49% of the participants indicated that they had been affected by the virus, contrasting with a majority of 76.51% who reported no affliction (Table I).

The examination of sleep patterns revealed a diverse range of experiences among participants. A notable 44% reported obtaining the recommended 8-10 hours of sleep, while 34.87% experienced shorter sleep durations of 5-7 hours. A smaller proportion of the participants reported longer sleep durations, with 9.60% achieving 11-13 hours and a marginal 1.06% sleeping for 14-16 hours (Table I). When queried about their satisfaction with current sleep patterns, a plurality of 30.6% expressed moderate satisfaction, closely followed by 29.2% who were satisfied. On the contrary, dissatisfaction was also prevalent, with 17.8% of participants indicating dissatisfaction and 15.7% reporting being very dissatisfied. A mere 6.8% of the cohort reported being very satisfied with their sleep patterns (Table II).

Further insights into the interference of sleep patterns with daily activities revealed that 33.5% of participants experienced little to no interference, while 27.4% stated that their sleep did not interfere with their daily functioning at all. However, a significant portion of the respondents indicated some level of interference, with 17.4% reporting much interference, 14.6% noting that sleep somewhat interfered with their daily activities, and 7.1% experiencing very much interference (Table II).

The quality of sleep (QOS) and level of anxiety (LOA) among participants were also rigorously assessed. The reliability of the measures used in the survey indicated a Cronbach's Alpha of 0.81 for QOS and 0.92 for LOA, denoting high reliability in the assessment tools employed (Table V). The QOS analysis detailed that a majority of participants reported no or mild difficulties across different aspects of sleep, including falling asleep, waking up too early, and staying asleep (Table III). Conversely, the LOA analysis highlighted that fears related to the worst happening and dying varied, with a significant portion of participants experiencing these fears mildly or not at all. Other symptoms such as hands trembling, inability to relax, hot/cold sweats, and heart pounding were prevalent to varying degrees among

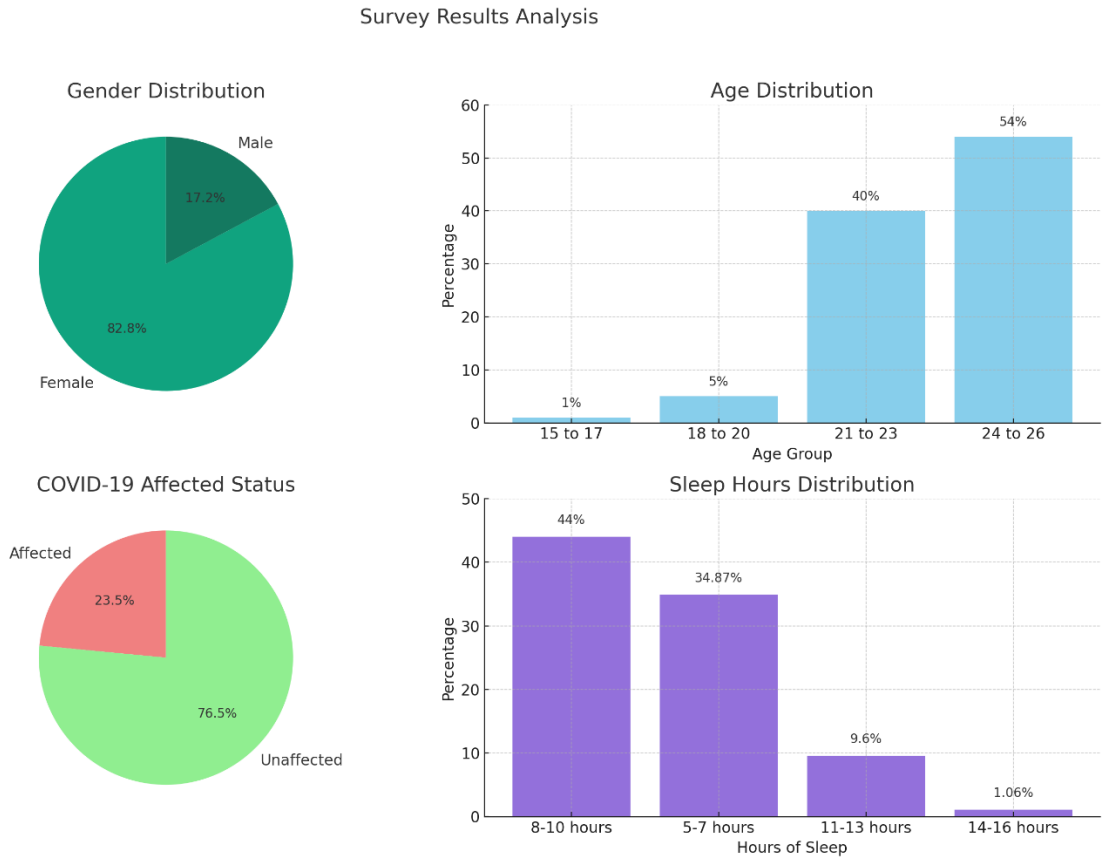

Figure 1 Demographic and Study Characteristics

Journal of Health and Rehabilitation Research 2791-156X JHRR

the respondents (Table III).

Moreover, the anxiety and insomnia scoring summary showcased that a majority of 55.2% of students exhibited moderate anxiety levels, while 33.5% faced concerning levels of anxiety. In terms of insomnia, 51.6% of students fell into the sub-threshold insomnia category, and 29.9% experienced moderate insomnia. Severe insomnia was reported by 13.5% of the participants (Table IV). The correlation analysis revealed a significant negative relationship between the quality of sleep and the level of anxiety, with a Pearson correlation of-0.510, indicating that as anxiety levels increase, the quality of sleep tends to decrease (Table V).

This comprehensive analysis underscores the intricate interplay between sleep patterns, satisfaction, and anxiety levels among university-level students during the COVID-19 pandemic, providing valuable insights into the psychological and physical well-being of this demographic.

Table I: Participant Demographics and General Findings

Description	Percentage	Number (N)
Gender Distribution		
Female	82.9%	-
Male	17.2%	-
COVID-19 Affected		
Affected	23.49%	66
Unaffected	76.51%	215
Sleep Hours		
8-10 hours	44%	153
5-7 hours	34.87%	98
11-13 hours	9.60%	27
14-16 hours	1.06%	3

Table II: Sleep Pattern Satisfaction and Interference in ADLs

Sleep Pattern Satisfaction	Percentage	Number (N)	Sleep Interference in ADLs	Percentage	Number (N)
Very Satisfied	6.8%	19	No Interference	27.4%	77
Satisfied	29.2%	82	Little Interference	33.5%	94
Moderately Satisfied	30.6%	86	Somewhat Interfered	14.6%	41
Dissatisfied	17.8%	50	Much Interference	17.4%	49
Very Dissatisfied	15.7%	44	Very Much Interfered	7.1%	20

Table III: Quality of Sleep and Level of Anxiety

Quality of Sleep Issues	None	Mild	Moderate	Severe	Very Severe	Level of Anxiety Symptoms	Not at All	Mildly	Moderately	Severely
Difficulty Falling Asleep	46.3% (130)	27.8% (78)	22.4% (63)	3.2% (9)	0.4% (1)	Fear of the Worst Happening	40.2% (113)	24.2% (68)	19.9% (56)	15.7% (44)
Waking Up Too Early	46.6% (131)	22.1% (62)	18.9% (53)	12.1% (34)	0.4% (1)	Fear of Dying	65.1% (183)	19.9% (56)	8.9% (25)	6.0% (17)
Difficulty Staying Asleep	62.3% (175)	21.7% (61)	11.4% (32)	4.6% (13)	0% (0)	Hands Trembling	61.9% (174)	28.1% (79)	7.1% (20)	2.8% (8)

Table IV: Anxiety and Insomnia Scoring Summary

Anxiety Level	Percentage	Number (N)	Insomnia Level	Percentage	Number (N)
Mild Anxiety (0-21)	11.4%	32	No Significant Insomnia (0-7)	5%	14
Moderate Anxiety (22-35)	55.2%	155	Sub-threshold Insomnia (8-14)	51.6%	145
Concerning Anxiety (>35)	33.5%	94	Moderate Insomnia (15-21)	29.9%	84
-	-	-	Severe Insomnia (22-28)	13.5%	38

Journal of Health and Rehabilitation Research 2791-156X JHRR

Table V: Reliability and Correlation Analysis

Measure	Cronbach's Alpha	N of Items	Pearson Correlation	Sig. (2-tailed)
Quality of Sleep (QOS)	0.81	7	1	.000
Level of Anxiety (LOA)	0.92	21	-.510**	.000

DISCUSSION

In the study conducted at the South City Institute of Physical Therapy and Rehabilitation (SCIPTR) in Karachi, the interplay between anxiety levels and sleep patterns among undergraduate Doctor of Physical Therapy (DPT) students was examined during the peak periods of the COVID-19 pandemic, which significantly impacted global health and well-being. The sample comprised 281 students, predominantly female (82.92%), with an average age of 21 years. This demographic composition mirrors the broader societal roles and stresses that potentially influence psychological and physical health outcomes during pandemic conditions. Despite the majority of participants (76.51%) not being directly affected by COVID-19, the prevailing lockdown measures and the pervasive atmosphere of uncertainty appeared to markedly disrupt sleep patterns, potentially escalating anxiety levels among students (8-11).

This study underscores the critical relationship between sleep duration and health, corroborating previous findings (12) that both short (<6 hours) and long (>9 hours) sleep durations are associated with increased mortality and morbidity rates. Notably, 34.87% of our participants reported sleeping 5-7 hours, and 9.60% exceeded 11 hours of sleep, suggesting a significant deviation from optimal sleep durations. However, a comforting majority managed to achieve the recommended 8-10 hours of sleep, indicating a balanced sleep pattern among a significant portion of the study population (13-16).

Utilizing the Beck Anxiety Inventory (BAI) and the [Adopted version] Insomnia Severity Index (ISI) to measure anxiety and sleep quality, respectively, the study revealed a concerning degree of moderate sleep satisfaction (30.6%) among participants. This aligns with findings from a study on Chinese individuals (4), which reported poor sleep quality among one-third of its participants. The comparative analysis of the BAI in this study with the Depression Anxiety Stress Scale (DAS-21) used in a Turkish study (17) highlights the BAI's higher internal consistency, indicating its robustness in assessing anxiety levels within the context of our research (5, 18-21).

Our findings also resonate with those of Wang et al. (2020) and Veqar et al. (2020), who assessed sleep quality and insomnia using different scales (9, 10). A significant portion of our study participants (51.6%) reported sub-threshold insomnia, echoing broader patterns of sleep disruption and quality deterioration observed globally during the pandemic (22). The surge in anxiety and depression symptoms, particularly among adolescents and young adults (23), further illustrates the profound psychological impact of the pandemic, as reflected in our study's identification of moderate to severe anxiety levels in a majority of the participants (1, 12, 22-24).

The rigorous methodological approach adopted in this study, encompassing a well-defined sample and the application of validated psychological instruments, constitutes a significant strength, ensuring the reliability of the findings. However, the study's limitations, including its restricted sample size and the singular geographical focus, constrain the generalizability of the results. The relatively short duration of data collection also limited the depth of analysis possible regarding the longitudinal effects of the pandemic on mental health and sleep patterns.

Given these considerations, future research should aim for a more extensive and diverse sample, potentially incorporating longitudinal study designs to capture the evolving impact of the COVID-19 pandemic on mental health and sleep quality across different populations and regions. Moreover, public health interventions and educational programs focusing on mental health support and sleep hygiene could mitigate the adverse effects identified, emphasizing the need for comprehensive strategies to address these intertwined challenges in the post-pandemic era (2, 6, 17).

Top of Form

CONCLUSION

The study highlights a significant interrelation between sleep quality and anxiety levels among university students, accentuated during the COVID-19 pandemic. The findings suggest that elevated anxiety correlates negatively with sleep quality, underscoring the need for targeted interventions in the healthcare sector to address mental health and sleep hygiene. This necessitates the development and implementation of comprehensive mental health support and sleep management programs within educational institutions and broader healthcare frameworks. Such initiatives could greatly contribute to improving the overall well-being and academic performance of students, emphasizing the critical role of mental health services and sleep education in human healthcare systems.

Journal of Health and Rehabilitation Research 2791-156X JHRR

REFERENCES

1. Jimenez JC, Su K, Goldberg AR, Luna VM, Biane JS, Ordek G, et al. Anxiety cells in a hippocampal-hypothalamic circuit. 2018;97(3):670-83. e6.
2. Grandner MAJSmc. Sleep, health, and society. 2022;17(2):117-39.
3. Zu ZY, Jiang MD, Xu PP, Chen W, Ni QQ, Lu GM, et al. Coronavirus disease 2019 (COVID-19): a perspective from China. 2020;296(2):E15-E25.
4. Zhao X, Lan M, Li H, Yang JJSm. Perceived stress and sleep quality among the non-diseased general public in China during the 2019 coronavirus disease: a moderated mediation model. 2021;77:339-45.
5. Rothan HA, Byrareddy SNJJoa. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. 2020;109:102433.
6. Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. 2020;54(24):1451-62.
7. Xiao H, Zhang Y, Kong D, Li S, Yang NJMsmimjoe, research c. Social capital and sleep quality in individuals who self-isolated for 14 days during the coronavirus disease 2019 (COVID-19) outbreak in January 2020 in China. 2020;26:e923921-1.
8. Tu Z-h, He J-w, Zhou NJM. Sleep quality and mood symptoms in conscripted frontline nurse in Wuhan, China during COVID-19 outbreak: A cross-sectional study. 2020;99(26):e20769.
9. Veqar Z, Hussain MEJIjoam, health. Validity and reliability of insomnia severity index and its correlation with pittsburgh sleep quality index in poor sleepers among Indian university students. 2020;32(1).
10. Wang Y, Zhu L-Y, Ma Y-F, Bo H-X, Deng H-B, Cao J, et al. Association of insomnia disorder with sociodemographic factors and poor mental health in COVID-19 inpatients in China. 2020;75:282-6.
11. Wu K, Wei XJMsmbr. Analysis of psychological and sleep status and exercise rehabilitation of front-line clinical staff in the fight against COVID-19 in China. 2020;26:e924085-1.
12. Kripke DF, Garfinkel L, Wingard DL, Klauber MR, Marler MRJAogp. Mortality associated with sleep duration and insomnia. 2002;59(2):131-6.
13. Sher LJSm. COVID-19, anxiety, sleep disturbances and suicide. 2020;70:124.
14. Simonetti V, Durante A, Ambrosca R, Arcadi P, Graziano G, Pucciarelli G, et al. Anxiety, sleep disorders and self-efficacy among nurses during COVID-19 pandemic: A large cross-sectional study. 2021;30(9-10):1360-71.
15. Stanton R, To QG, Khalesi S, Williams SL, Alley SJ, Thwaite TL, et al. Depression, anxiety and stress during COVID-19: associations with changes in physical activity, sleep, tobacco and alcohol use in Australian adults. 2020;17(11):4065.
16. Taber KSJRise. The use of Cronbach's alpha when developing and reporting research instruments in science education. 2018;48:1273-96.
17. Elbay RY, Kurtulmuş A, Arpacıoğlu S, Karadere EJPr. Depression, anxiety, stress levels of physicians and associated factors in Covid-19 pandemics. 2020;290:113130.
18. Plichta SB, Kelvin EA. Munro's statistical methods for health care research. 2013.
19. Rosen Z, Weinberger-Litman SL, Rosenzweig C, Rosmarin DH, Muennig P, Carmody ER, et al. Anxiety and distress among the first community quarantined in the US due to COVID-19: Psychological implications for the unfolding crisis. 2020.
20. Saraswathi I, Saikarthik J, Kumar KS, Srinivasan KM, Ardhanaari M, Gunapriya RJP. Impact of COVID-19 outbreak on the mental health status of undergraduate medical students in a COVID-19 treating medical college: a prospective longitudinal study. 2020;8:e10164.
21. Sheng X, Liu F, Zhou J, Liao RJNFykdxxbJoSMU. Psychological status and sleep quality of nursing interns during the outbreak of COVID-19. 2020;40(3):346-50.
22. Marelli S, Castelnuovo A, Somma A, Castronovo V, Mombelli S, Bottoni D, et al. Impact of COVID-19 lockdown on sleep quality in university students and administration staff. 2021;268:8-15.
23. Huang Y, Zhao NJPr. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. 2020;288:112954.
24. Killgore WD, Cloonan SA, Taylor EC, Fernandez F, Grandner MA, Dailey NSJPr. Suicidal ideation during the COVID-19 pandemic: the role of insomnia. 2020;290:113134.