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Original Article

Effects of Psychological Intervention Based on the Self-Transcendence Theory on the Sleep Quality of Chinese Nurses

Wei Guofang [1], Wei Zhang [2], Zhen Zhu [3]

1. *Rehabilitation Nursing Department, Rainbow Fish College of Rehabilitation Nursing, Hangzhou Vocational and Technical College, Hangzhou, 310000, China*
2. *Nursing Department, Affiliated Hospital, Hangzhou Normal University, Hangzhou, 310015, China*
3. *Orthopedics Department, The Second Affiliated Hospital, Zhejiang University of Traditional Chinese Medicine, Hangzhou, 310053, China*

***Corresponding Author:** Email: jenny323232@163.com

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Abstract

Background: COVID-19 infection is transmitted easily and quickly, exposing medical care workers, especially nursing workers, to tremendous stress. Therefore, identifying the factors influencing the sleep quality of nurses and implementing corresponding interventions are conducive to improving the sleep quality of nurses and enhancing their nursing quality.

Methods: Form September to December 2022, a survey-based evaluation was conducted on 1074 front-line clinical nurses randomly selected from three hospitals in Zhejiang Province, China. Based on the survey results, 152 nurses were selected and randomly divided into the experimental group and the control group, with 76 nurses in each group. A 2-month psychological intervention based on the self-transcendence theory was conducted, and the two groups were compared before and after the intervention.

Results: The average PSQI score of nurses was 7.19±3.65, with 471 of them suffering from poor sleep (PSQI>7), accounting for 45.46%. In addition, 57.10% of the nurses were under excessive stress, whereas 62% of them had a Self-Rating Anxiety Scale score of ≥50. After the intervention, the PSQI score of the experimental group was significantly lower than that of the control group, with the difference being statistically significant (P<0.05).

Conclusion: Clinical nurses in tertiary hospitals have poor sleep quality and more severe stress and anxiety problems during COVID-19 than during non-epidemic periods. Clinical interventions based on the self-transcendence theory can effectively improve the sleep quality of nurses. Results of this study provide reference for enhancing the sleep quality of nurses and ensuring their physical and mental health during epidemic.

Keywords: Sleep disorder; Nurses; Epidemic; Self-transcendence theory

Introduction

The COVID-19 epidemic, characterized by rapid infection, a serious attack on the human immune system, and long treatment duration, has posed a serious threat to human lifestyle and health (1). Sleep is one of the basic physiological needs of human beings. Sleep-related problems not only

affect individuals' physical and mental health but also produce significant socio-economic impacts, shaping a serious public health issue (2). COVID-19 is highly contagious. Given their close contact with patients with COVID-19, nurses face a high risk of infection. In addition, their nursing work is characterized by high intensity and heavy occupational stress. They likely experience negative emotions and sleep problems under long-term high-level stress (3). The detection rate of sleep quality problems in nurses is 46.68%, with most of them experiencing difficulties falling asleep to different degrees, short sleep cycles, early awakening, and other problems (4). In a meta-analysis conducted, the sample included 3745 nurses, and the prevalence of sleep disorders was about 34.8% (1). However, few existing studies on the factors influencing the sleep quality of nurses have focused on the analysis of demographic data rather than on the effects of other relevant factors.

Self-transcendence refers to the spiritual activity whereby individuals extend their upper limit and adjust their views, goals, and behavior to surpass who they are without denying themselves and their existing values in search of the meaning, truth, value, and love of life (5). In recent years, self-transcendence has been applied to multiple fields, including medicine, psychology, and religious philosophy. Individuals suffering from severe illnesses have higher levels of self-transcendence than normal individuals (6). Self-transcendence is significantly and positively correlated with proactive difficulty coping and negatively correlated with adverse behaviors such as depression, stress, and avoidance of difficulties (7, 8). The results obtained by Liu (9) reveal a strong correlation between self-transcendence and adaptability, self-esteem, expectation, and happiness. In practice, interventions based on self-transcendence can enhance the interest and enthusiasm of nursing students in engaging in elderly care work. Under the guidance of the self-transcendence theory. Niu et al (10) used the focus group approach to intervene in the elderly and observed the effect of this approach in stimulating positive personal psychological resources in response to negative emotions. The self-transcendence theory has been applied to clinical interventions for different groups, such as patients with AIDS (11), patients seeking breast cancer rehabilitation (12), individuals with addictive behavior (13), and to improving nurse–patient relationships in elderly nursing centers (14). However, few studies have focused on the intervention effect of self-transcendence on the sleep quality of nurses.

Clearly, nurses' sleep quality needs improvement, but only a few studies have focused on the factors influencing nurses' sleep quality during the COVID-19 epidemic. Additionally, the self-transcendence theory has rarely been used as a guide for intervention surveys.

Therefore, we aimed to investigate the sleep quality of Chinese nurses during the COVID-19 epidemic, analyze its influencing factors, and develop an intervention scheme based on the self-transcendence theory for practice, thereby providing an objective reference for improving nurses' physical and mental health in response to relevant public health events.

Materials and Methods

A questionnaire survey was conducted using convenience sampling on nurses in three comprehensive tertiary hospitals in Zhejiang Province. The questionnaire was filled out by clinical nursing workers anonymously. A total of 1074 copies of the questionnaire were distributed, and 1037 were retrieved, with a response rate of 96.6%. Of the participants, 101 were males, accounting for 9.7%, and 936 were females, accounting for 90.3%. The average age of the participants was 34.0±10.4 years old.

This study passed the Ethics Committee of by Hangzhou Vocational and Technical College (No.20220901). The investigation was conducted from September to December, 2022. Simultaneously, 152 volunteers were recruited from the hospitals for a sleep intervention experiment.

Research tools

The questionnaire regarding participants' demographic data included gender, age, education level, marital status, occupational title, working years, and night shift frequency.

The Chinese Perceived Stress Scale (15). The Perceived Stress Scale prepared by Cohen in 1983 and revised into the Chinese version in accordance with China's cultural background (16). This scale has a total of 14 items. A higher score indicates a greater psychological stress, with a total score of 0–28 indicating normal stress, a score of 29–42 indicating high stress, and a score of 43–56 indicating excessive stress.

The Pittsburgh Sleep Quality Index (PSQI) (17). PSQI is a self-rating sleep quality scale compiled by Buysse et al (17). The scale has good reliability and validity, with a Cronbach's α coefficient of 0.879. The total score ranges from 0 to 21 points. A higher score indicates worse sleep quality. In this study, PSQI>7 indicates the existence of a sleep disorder (18).

The Self-rating Anxiety Scale (SAS) (19). SAS was prepared by Zung in 1971, and this scale was primarily used to assess research participants' subjective perception of anxiety. Each item was scored by using a four-level scoring method in accordance with symptom frequency. A total of 20 items were included, with 15 positive scoring items and 5 inverse scoring questions.

Intervention method

In addition, a 2-month psychological intervention based on the self-transcendence theory was implemented in the experimental group. Weeks 1-2, cognitive education and psychological counseling: The participants were guided to understand their own negative emotional problems and correctly evaluate and handle their negative emotions. Moreover, self-stress relieving methods such as deep breathing and meditation were applied. Weeks 3-5, social support: The participants were assisted to establish nurse friendship meetings and organize regular online forums whereby they can share positive coping experiences with one another and establish favorable social relationships. They were guided to acquire empathy, thereby encouraging and motivating one another. Weeks 6-8, summarization and incentives: The participants were guided to recall wonderful past events, shape an optimistic psychological state, summarize the lessons, and perceive the happiness brought by these events. Facing the future: The participants were assisted to build confidence toward the future, make a short-term positive life plan, summarize their lessons in successfully executing the plan, and seek the full completion of their plan.

Statistical methods

EpiData3.02 was used for data entry, and SPSS 15.0 (Chicago, IL, USA) was used for data analysis. Qualitative data were expressed in case numbers and rates. A chi-squared test was used for comparison among groups, and binary unconditional logistic regression was used for multivariate analysis. $P<0.05$ indicates statistically significant difference.

Results

Sleep quality of participants

A total of 1037 valid copies were retrieved. Their average age was 34.0±10.4 years old, and their average PSQI score was 7.19±3.65. Among them, 471 had poor sleep (PSQI>7 points), accounting for 45.46%.

Comparison of sleep quality among different participants

The comparison of sleep quality among different participants is shown in Table 1. The results of univariate analysis indicate that sleep quality was associated with gender, age, education level, occupational title, working years, night shift frequency, work stress, and anxiety. Statistically significant differences were found among different participants ($P<0.05$). In addition, no statistical correlation was found between sleep quality and marital status (2=4.626, $P>0.05$).

Table 1: Comparison of sleep quality among different participants

Demographic data		*Sleep quality*		*Poor sleep Detection rate (%)*	*χ^2 value*	*P*
		Normal	poor			
Gender	Male	66	35	34.70	5.232	0.022
	Female	500	436	46.60		
Age	25 and below	170	127	42.80	25.38	<0.001
	26-35	214	124	36.70		
	36-45	114	141	55.30		
	46 and above	68	79	53.70		
Educational level	Technical secondary school	158	110	41.00	21.76	<0.001
	College	164	198	54.70		
	Bachelor's degree	229	146	38.90		
	Master's degree	15	17	53.10		
Marital status	Unmarried	200	156	43.80	4.626	0.201
	Married	351	291	45.30		
	Divorced	11	19	63.30		
	Other	4	5	55.60		
Occupational title	Nurse	60	81	57.40	30.905	<0.001
	Primary nurse	280	157	35.90		
	Nurse-in-charge	185	180	49.30		
	Associate chief nurse and above	41	53	56.40		
Working years	5 years and less	170	127	42.80	34.868	<0.001
	6-10 years	205	109	34.70		
	11-20 years	122	130	51.60		
	21 years and more	69	105	60.30		
Night shift frequency	No	119	35	22.70	43.84	<0.001
	1 time/week	232	194	45.50		
	2 times/week	191	206	51.90		
	3 times/week	24	36	60.00		
Anxiety	No	377	231	38.00	43.16	<0.001
	Mild	161	173	51.80		
	Serve	28	67	70.50		
Stress	Normal stress	329	194	37.10	60.6	<0.001
	High stress	161	176	52.20		
	Excessive stress	76	101	57.10		

Multivariate logistic regression analysis of sleep quality-related factors

With sleep quality (0=normal, 1=poor) as the dependent variable, gender (1=male, 2=female) and the variables that were statistically significant in multivariate analysis, including age, occupational title, working years, night shift frequency, stress, and anxiety, were analyzed. The results indicate that gender, education level, occupational title, working years, night shift frequency, anxiety, and stress were independently correlated with sleep quality (P<0.05) (Table 2).

Table 2: Multivariate logistic regression analysis of sleep quality-related factors

Independent variable	*B*	*S.E.*	χ^2	*P*	*OR*	*95% Interval of OR*	
						Upper limit	Lower limit
Gender	0.706	0.253	7.814	0.005	2.027	1.235	3.326
Educational level: Technical secondary school					1		
College	0.994	0.2	24.814	<0.001	2.702	1.828	3.996
Bachelor's degree	0.646	0.276	5.458	0.019	1.907	1.11	3.278
Master's degree	1.46	0.491	8.84	0.003	4.305	1.645	11.268
Occupational title: Nurse					1		
Primary nurse	-1.743	0.347	25.215	<0.001	0.175	0.089	0.345
Nurse-in-charge	-1.892	0.502	14.228	<0.001	0.151	0.056	0.403
Associate chief nurse and above	-1.933	0.629	9.454	0.002	0.145	0.042	0.496
Working years: 5 years or less					1		
6-10years	0.484	0.289	2.794	0.095	1.622	0.92	2.86
11-20years	1.038	0.365	8.082	0.004	2.825	1.381	5.779
21 years and more	1.784	0.456	15.323	<0.001	5.951	2.436	14.534
Night shift frequency	0.607	0.092	43.712	<0.001	1.835	1.533	2.196
Anxiety	0.586	0.11	28.239	<0.001	1.796	1.447	2.229
Stress	0.318	0.096	10.894	0.001	1.374	1.138	1.659

Comparison of sleep quality between two groups before and after the intervention

As shown in Table 3, no statistically significant difference in the total PSQI score was found between the two groups before the intervention (t=0.146, P=0.884). After 2-month intervention, both groups had low total PSQI scores, and the differences were statistically significant compared with the pre-intervention scores (P<0.05). The comparison of the PSQI total score between the two groups after the intervention and the decreases in the total PSQI score indicated a better effect on the experimental group than on the control group, with statistically significant differences (t=3.545 and 6.120 at P=0.001 and <0.001, respectively).

Table 3: Comparison of PSQI scores before and after the intervention

Index	*Group*	*Before intervention*	*After intervention*	*Difference before and after intervention*	*Comparison of P-values within the group*
Sleep quality	Experimental group	1.37±0.73	0.95±0.51	0.42±0.61	<0.001
	Control group	1.35±0.72	1.30±0.68	0.05±0.48	0.660
	t	0.170	3.590	4.156	
	P	0.865	<0.001	<0.001	
Time to fall asleep	Experimental group	1.57±0.75	0.99±0.76	0.58±0.71	<0.001
	Control group	1.51±0.72	1.27±0.73	0.14±0.52	0.043
	t	0.503	3.144	4.359	
	P	0.616	0.002	0.001	
Sleep time	Experimental group	1.27±0.95	0.86±0.75	0.41±0.74	0.004
	Control group	1.32±0.94	1.08±0.79	0.24±0.51	0.090
	t	0.326	1.761	1.649	
	P	0.745	0.080	0.101	
Sleep efficiency	Experimental group	1.23±0.78	0.84±0.77	0.39±0.61	0.002
	Control group	1.25±0.81	0.99±0.79	0.26±0.59	0.047
	t	0.155	1.185	1.335	
	P	0.877	0.238	0.184	
Sleep Disorders	Experimental group	1.36±0.94	1.02±0.78	0.34±0.52	0.016
	Control group	1.29±0.91	1.04±0.85	0.25±0.54	0.082
	t	0.466	0.151	0.930	
	P	0.642	0.880	0.354	
Sodium amytal	Experimental group	0.31±0.43	0.06±0.23	0.25±0.45	<0.001
	Control group	0.30±0.45	0.17±0.36	0.13±0.48	0.051
	t	0.14	2.245	1.59	
	P	0.889	0.026	0.114	
Daytime functional disorders	Experimental group	1.41±0.91	0.86±0.75	0.55±0.81	<0.001
	Control group	1.38±0.89	1.14±0.74	0.24±0.67	0.073
	t	0.205	2.317	2.571	
	P	0.837	0.022	0.011	
PSQI	Experimental group	8.52±3.37	5.58±2.68	2.94±1.73	<0.001
	Control group	8.40±3.21	6.99±2.84	1.31±1.69	0.005
	t	0.225	3.148	5.876	
	P	0.822	0.002	<0.001	

Discussion

Sleep quality of Chinese nurses

In this study, the average PSQI score of clinical nurses in tertiary hospitals was 7.19±3.65. Among them, 471 had poor sleep (PSQI>7), accounting for 45.46%, which is consistent with the detection rate of 43% shown in the study conducted by Al Maqbali et al (20). With PSQI>7 as the reference threshold for adults' sleep quality problems in China (21), the clinical nurses in tertiary hospitals included in this study had poor sleep. Therefore, more effort should be made to improve the sleep quality of clinical nurses in tertiary hospitals during epidemics, which is consistent with the research results already (22,23). The reason lies in the strong infectivity and wide spread of the virus, caused psychological trauma to different groups in society at varying degrees. The COVID-19 epidemic, characterized by rapid onset, strong infectivity, and wide spread, has brought different levels of psychological trauma to different social groups. Most nurses have rarely experienced sudden infectious disease emergencies in person, thereby failing to make a fast and effective response. Under the dual physiological and psychological stress, nurses are more prone to a series of negative emotions such as fear, anxiety, and depression, leading to their neuroendocrine disorders and ultimately undermining their sleep.

Analysis of factors influencing the sleep quality of Chinese nurses

In this study, the sleep quality of male nurses was significantly better than that of females, consistent with the results reported by Fatima et al (24). This difference in sleep quality is due to the following reasons: 1) male nurses, in virtue of their physical advantages, have better sleep quality than female nurses, who are subject to the impact of special physiological periods; 2) female nurses need to take more responsibilities such as caring for the elderly and children at home in addition to work at ordinary times. Female nurses are more physically and mentally exhausted and more likely to have a sleep disorder (25). In addition, a statistically significant difference in the PSQI score is found among nurses with different education levels, with those who have a master's degree having the highest score. Nurses with a master's degree, as the backbone during the epidemic, have more nursing tasks and responsibilities, which is also the main cause of their poor sleep quality. Occupational title is also an important factor affecting the sleep quality of nurses. In this study, a higher occupational title leads to fewer sleep problems, indicating that occupational title is an important factor affecting the sleep quality of Chinese nurses. Furthermore, nurses with more working years have poorer sleep quality, which is consistent with the investigation results reprobated by Kim-Godwin et al (26). A nurse with more working years is faced with more influential responsibilities and corresponding high levels of stress. The results of this study also indicate that night shift frequency affects sleep quality. A higher night shift frequency leads to poor sleep quality, which is basically consistent with relevant research results (27). Nurses work frequently on shifts, and night shift workers have poor sleep quality when sleeping during the daytime because of factors such as light and low quietness that interfere with sleep.

The anxiety and stress scores of clinical nurses are all at high levels within the normal range, with 57.10% of them suffering from excessive stress. In this study, 62% of the participants have an SAS score of ≥50, which is higher than 56.32%. The results of this study show that the anxiety, stress, and night shift frequency of clinical nurses were positively correlated with their sleep quality. Those who have higher anxiety, greater stress, and more night shifts suffer from poorer sleep quality. The outbreak of the epidemic has caused panic in the entire society, and as a major stressor, it has brought psychological impact at varying degrees to the public. According to Selye's stress theory, stress reaction mainly activates the hypothalamic-pituitary-adrenal axis, leading to physiological reactions such increased blood stress and faster heart rate. Stress reaction can also cause psychological and emotional changes in the body

by affecting the Limbic system, resulting in negative emotions such as anxiety, tension, depression, and fear (28).

Self-transcendence theory can effectively improve the sleep quality of nurses

The implementation of psychological intervention guided by the self-transcendence theory could effectively alleviate anxiety and depression, and positive psychological intervention can render and cultivate positive and optimistic thinking patterns. The results of this study indicate that the PSQI score of the experimental group is significantly lower than that of the control group after 2-month intervention. The self-transcendence theory can make front-line medical workers calm down, relax, and stimulate their positive psychology. When entering a positive recalling state or focusing on work, individuals reduce their participation in irrelevant stimuli and passive tasks, weaken psychological or physiological arousal, and improve sleep quality (29). The intervention scheme in this study could enhance positive emotions, reduce negative emotions, and promote sleep quality. In addition, the self-transcendence theory can effectively alleviate anxiety and depression (30). This result indirectly provides the theoretical support for this study. The main causes of sleep disorder among front-line nursing workers during the epidemic are as follows: first, they have a feeling of self-blame when they are powerless to deal with patients' illness; second, they are concerned with their own health; third, they are under the impact of high-intensity work pressure. The self-transcendence theory can effectively allow nurses to relax their body and mind, take off their guard, stimulate their potential, amplify positive emotions, and reduce their fear of the unknown.

This study also has some limitations. The research sample was not highly representative, with only clinical nurses from tertiary hospitals in Zhejiang Province as the participants. The lack of data collected from multiple cities and hospitals at different levels makes it difficult for the sample to represent all nursing workers. The results yielded from the questionnaire survey in this study may be subjective. For the evaluation of sleep, multi-channel sleep monitoring can be used to provide more objective and effective evidence.

Conclusion

In this study, which focused on nurses' sleep quality during the COVID-19 epidemic, the incidence of sleep disorder among clinical nurses in tertiary hospitals was 45.46%. Nursing administrators should pay attention to clinical nurses' sleep quality, reduce the occurrence of sleep disorder, and maintain their physical and mental health. Gender, educational background, occupational title, working years, night shift frequency, anxiety, and stress are all important factors affecting the sleep quality of clinical nurses. Night shift frequency, anxiety, and stress are positively correlated with sleep disorder. The self-transcendence theory, as a branch of positive psychology, can effectively enhance positive emotions in nurses and improve their sleep quality. The results of this study provide important reference and inspiration for promoting nurses' physical and mental health and improving their nursing efficiency when facing sudden infectious diseases again in the future as well as facilitate the formulation of early response measures.

Journalism Ethics considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of Interest

The authors declare that there is no conflict of interest.

References

1. Jahrami H, BaHammam AS, Bragazzi NL, et al (2021). Sleep problems during the COVID-19 pandemic by population: a systematic review and meta-analysis. *J Clin Sleep Med*, 17(2): 299-313.
2. Otu A, Charles CH, Yaya S (2020). Mental health and psychosocial well-being during the COVID-19 pandemic: The invisible elephant in the room. *Int J Ment Health Syst*, 14: 38.
3. Bani-Issa WA, Al Nusair H, Altamimi A, et al (2021). Self-Report Assessment of Nurses' Risk for Infection After Exposure to Patients With Coronavirus Disease (COVID-19) in the United Arab Emirates. *J Nurs Scholarsh*, 53(2): 171-79.
4. Han LN, Liu J (2021). Investigation and analysis of the sleep and health status of nurses during the COVID-19 epidemic. *J Changchun Univ Chin Med*, 37(3): 662-65.
5. Kitson A, Chirico A, Gaggioli A, et al (2020). A review on research and evaluation methods for investigating self-transcendence. *Front Psychol*, 11: 547687.
6. Jiang T, Sedikides C (2022). Awe motivates authentic-self pursuit via self-transcendence: Implications for prosociality. *J Pers Soc Psychol*, 123(3): 576-96.
7. Abdollahi A, Panahipour H, Allen KA, et al (2021). Effects of death anxiety on perceived stress in individuals with multiple sclerosis and the role of self-transcendence. *Omega (Westport)*, 84(1): 91-102.
8. Er S, Şahin-Bayındır G, Kayış A, Buzlu S (2022). The effect of psychosocial distress and self-transcendence on resilience in patients with cancer. *Perspect Psychiatr Care*, 58(4): 2631-638.
9. Liu P, Zhang R, Li D (2022). The effect and mechanisms of self-transcendence values on durable happiness. *Adv Psychol Sci*, 30(3): 660-69.
10. Niu GF, Sun JP, Zhang H, et al (2017). The correlation between self transcendence and quality of life in elderly chronic disease patients in the community. *Chin J Gerontol*, 37(13): 3332-333
11. Indrayana IKS, Arisudhana GAB, Putra PWK (2023). Hubungan Tingkat Spiritualitas dengan Self-Efficacy pada Pasien HIV/AIDS di Puskesmas Kuta II: Correlation between Spirituality with Self-Efficacy on HIV/AIDS Patient in Puskesmas Kuta II. *J Nurs Res Publ Media (NURSEPEDIA)*, 2(2): 63-79.
12. Soriano GP, Calong KAC (2021). Spiritual well-being, self-transcendence, and spiritual practices among Filipino women with breast cancer. *Palliat Support Care*, 19(6): 723-26.
13. Garland EL, Hanley AW, Hudak J, et al (2022). Mindfulness-induced endogenous theta stimulation occasions self-transcendence and inhibits addictive behavior. *Sci Adv*, 8(41): eabo4455.
14. Haugan G, Kuven BM, Eide WM, et al (2020). Nurse-patient interaction and self-transcendence: assets for a meaningful life in nursing home residents? *BMC Geriatr*, 20(1):168.
15. Li YJ, Li XZ, Li JB, et al (2021). Application of the Chinese version of the Stress Perception Scale in representative community adult population. *Chin Ment Health J*, 35(1): 67-72.
16. Cohen S, Kamarck T, Mermelstein R (1983). A global measure of perceived stress. *J Health Soc Behav*, 24(4): 385-96.
17. Buysse DJ, Reynolds IIICF, Monk TH, et al (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res*, 28(2): 193-213.
18. Liu XC, Tang MQ, Hu L, et al (1996). Reliability and validity of the Pittsburgh Sleep Quality Index. *Chin J Psychiat*, 29(2):103-07.
19. Zung WW (1971). A rating instrument for anxieties orders. *Psychosomatics*, 12(6): 371-79.
20. Al Maqbali M, Al Sinani M, Al-Lenjawi B (2021) Prevalence of stress, depression, anxiety and sleep disturbance among nurses during the COVID-19 pandemic: A systematic review and meta-analysis. *J Psychosom Res*, 141: 110343.
21. Sheng JW, Wang J (2021). The relationships among sleep quality,anxiety and depression of clinical nurses in tertiary hospitals. *J Nurs Sci*, 36(22):16-8.
22. Wang S, Xie L, Xu Y, et al (2020). Sleep disturbances among medical workers during the outbreak of COVID-2019. *Occup Med (Lond)*, 70(5): 364-69.
23. Tu HY, Hou Y, Wang K, et al (2020). Study on sleep quality, anxiety of frontline nurses

against COVID-19 and its correlation with work environment. *Chin Nurs Manage*, 20(6): 857-60.
24. Fatima Y, Doi SAR, Najman JM, et al (2016). Exploring Gender Difference in Sleep Quality of Young Adults: Findings from a Large Population Study. *Clin Med Res,* 14: 138-44.
25. Yin TT, Han QY, Zheng Y, et al (2021). Study on the influencing factors of nurses' sleep quality and mindfulness level during the COVID-19 epidemic. *J Nurs Admin*, 21(1): 15-20.
26. Kim-Godwin YS, Lee MH, Logan JG, et al (2021). Factors Influencing Sleep Quality among Female Staff Nurses during the Early COVID-19 Pandemic in the United States. *Int J Environ Res Public Health*, 18(9): 4827.
27. Lou MX, Wang T, Li JF (2022). Investigation on sleep and psychological status of nurses in different periods of COVID-19 epdemic. *Chongqing Med*, 51(22): 3884-889.
28. Xu M., Xing J, Li TT (2023). Investigation and analysis on sleep quality of staff in a Grade A hospital during the COVID-19. *Anhui Med J*, 44(2): 224-28.
29. Martin JA, Ericson M, Berwaldt A, et al (2023). Effects of two online positive psychology and meditation programs on persistent self-transcendence. *Psychol Conscious*, 10(3): 225-53.
30. Liu P, Wang X, Li D, et al (2021). The benefits of self-transcendence: Examining the role of values on mental health among adolescents across regions in China. *Front Psychol*, 12: 630420.