

Stress Among Nurses in COVID-19 Pandemic

Yasaman Hosseini^{1*}, Amir Modarresi Chahardehi¹

¹ Cognitive Neuroscience Research Center, Aja University of Medical Science, Tehran, Iran

Summary

As the pandemic of coronavirus infection (COVID-19) spreads, worldwide healthcare organizations have become overburdened, placing significant psychological strain on nurses caring for seriously ill COVID-19 patients [1]. One study found that about one-third of nurses suffered from depression, anxiety, or stress during the COVID-19 pandemic [2].

Lovibond created the DASS-21 in 1995 to measure stress, anxiety, and depression [3]. Cortisol levels are also regarded as a significant indicator of physiological stress [4], which is released from the hypothalamus-pituitary-adrenal axis[5]. The Pittsburg Sleep Quality Index (PSQI) is a widely used self-reported sleep questionnaire that has been verified in healthy individuals and people with mental health conditions [6]. Mizaj (temperament) is a critical component of Iranian Traditional Medicine's preventative, therapeutic, and lifestyle advice [7]. We hypothesize a connection between the kind of Mizaj and stress levels. However, no study was performed in this field. Cognitive-behavioral therapy (CBT) effectively reduces depression and anxiety in employees [8]. Our study aimed to assess the level of stress in the frontline nurses coping with COVID-19 and provide a solution to reduce their stress and improve their physiological health and function, also finding a relationship between the kind of Mizaj and stress levels among these people.

Methods- Results

Study design and Participants

A four-week cross-sectional study was performed among frontline nurses at one of the army hospitals in Tehran, Iran, during COVID-19 (Wave V). The inclusion criteria were voluntary; only women aged 25 to 50 who did not attend the other training sessions were tested, and also, they were not in their menstrual cycle's late luteal phase (days 21–25). The exclusion criteria were: compulsory attendance at all training sessions (no absence was allowed), night shift, dual shift, pregnancy, having surgery in the last six months, COVID-19 infection during the last three months, family or social problems, and neurological and psychological disease. This study included two groups of nurses (120), including a control group and an educational intervention group. The volunteers completed the DASS-21, PSQI, and MMQ questionnaires on the first day. On the last day, the DASS-21 questionnaire was

completed again. Also, salivary cortisol levels were assessed on the first and last day of the study. During these four weeks, resilience training was performed three times a day (after breakfast, lunch, and before bed) for one minute. Also, comics programs were made available online every night for one hour. The study protocol was approved by the ethics committee of the Aja Medical University with the ethic code: IR.AJAUMS.REC.1400.103.

Salivary sampling

On the first and last day (1st and 28th day) of the study, salivary samples were taken from 8 to 10 A.M. Then centrifuged at 2000 rpm for 10 min at 4°C [9]. The clear supernatant was separated and evaluated for cortisol levels using the Elisa immunoassay with a commercial kit, Salivette (ZellBio GmbH, Germany).

Statistical analysis

The data were quantified using means, frequencies, and standard deviations (SDs). The collected data were analyzed by GraphPad Prism version 8.3. The MMQ cutoff points were used to calculate the sensitivity and specificity of the questionnaire to assess its validity among our participants. Poor sleep quality was the dependent variable. The *t*-test was utilized to check if there was a difference in PSQI and cortisol levels between the groups. The DASS-21 score was provided as mean \pm SD, and numbers and proportions. Also, the total DASS-21 score was compared with cortisol levels in both groups using linear regression. The level of significance was set at $p < 0.05$. The non-parametric chi-square coefficient (χ^2) was used to compare the two single Mizaj statuses found in the intervention and control groups using the questionnaire.

The research participants' demographic and employment characteristics

The mean age of frontline nurses was 41.59 ± 9.19 years old. The average duty career as a frontline nurse was 19.32 ± 2.45 years. Also, the mean years of experience was 18.59 ± 9.19 years. The majority of participants (92.00% and 90.00% for the control and intervention groups, respectively) were married. All participants had a university degree in the related field in terms of educational level. Based on years of experience, most participants had 16 years of experience or above, with 74.00% and 71.43 for the control and intervention groups, respectively.

Sleep quality measurement

The PSQI total score for the control and intervention groups was 9.63 ± 0.8 and 9.09 ± 1.04 , respectively ($p = 0.2973$). A total of 120 frontline nurses were included in this study, of which 100 (83.33%) reported poor sleep quality (PSQI total scorer of ≥ 7). The hours of real sleep for the control and intervention groups were 6.31 and 6.41 h, respectively (Table 1).

Mojahedi's Mizaj Questionnaire (MMQ)

In this study, the control group was colder (12%) than the intervention group (22.9%). Among 120 nurses, the majority were categorized in warm Mizaj (47.10% and 62.90% for general and brain, respectively).

Stress, anxiety and depression measurement

According to DASS-21, we observed depression in 18 (15%), anxiety in 30 (25%), and stress in 2 (1.7%) of the research participants during the COVID-19 pandemic. There was a significant difference between control and intervention groups in terms of the severity of depression ($p = 0.0196$), while no significant difference was found in anxiety and stress among control and intervention groups ($p > 0.05$).

Correlation between cortisol levels and total DASS-21 score

Surprisingly, all the participants presented low cortisol levels when compared to the reference ranges provided by the hospital's clinical analysis laboratories. When the relationship between the control group on day one and day 28 was further investigated, no significant difference was found ($p > 0.05$). However, a significant difference was found between the control and intervention groups on day 28 ($p < 0.0001$) using Student's *t*-test (Fig. 1A).

A Pearson's correlation showed a positive correlation between salivary cortisol levels and total DASS-21 score in the control group, with $r = 0.7959$ (95% CI: 0.5781-0.9078), $R^2 = 0.6335$ and a significant regression $p < 0.0001$ (Fig. 1B). A significant positive correlation for linear regression between salivary cortisol levels and total DASS-21 score was also observed in the intervention group, with $r = 0.7562$ (95% CI: 0.5279-0.8826), $R^2 = 0.5718$, and $p < 0.0001$ (Fig. 1C). According to the figure, it can be concluded that the intervention group was able to reduce the amount of total DASS-21 compared to the control group.

Conclusion

Most frontline nurses showed poor sleep quality in this study. Anxiety, stress, and other mental factors were reduced in frontline nurses with a higher degree of personal resilience and CBT techniques. However, there was no significant found between groups. Also, probably there is a relationship between low stress and a warm and dry brain Mizaj. Hence, hospital administrators must consider interventions (such as

COVID-19's mental health protective measures) for all nurses, regardless of where they currently work.

References

1. Shen, X., et al., *Psychological stress of ICU nurses in the time of COVID-19*. 2020, Springer. p. 1-3.
2. Al Maqbali, M., M. Al Sinani, and B. Al-Lenjawi, *Prevalence of stress, depression, anxiety and sleep disturbance among nurses during the COVID-19 pandemic: A systematic review and meta-analysis*. *J Psychosom Res*, 2021. **141**: p. 110343.
3. Lovibond, P.F. and S.H. Lovibond, *The structure of negative emotional states: comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories*. *Behav Res Ther*, 1995. **33**(3): p. 335-43.
4. Pires da Rocha, M.C., et al., *[Stress among nurses: an examination of salivary cortisol levels on work and day off]*. *Rev Esc Enferm USP*, 2013. **47**(5): p. 1194-201.
5. Husseini, Y., et al., *The controlling role of nitric oxide within the shell of nucleus accumbens in the stress-induced metabolic disturbance*. *Archives of physiology and biochemistry*, 2021. **127**(1): p. 73-81.
6. Robert, S., et al., *Quetiapine improves sleep disturbances in combat veterans with PTSD: sleep data from a prospective, open-label study*. *J Clin Psychopharmacol*, 2005. **25**(4): p. 387-8.
7. Mojahedi, M., et al., *Reliability and Validity Assessment of Mizaj Questionnaire: A Novel Self-report Scale in Iranian Traditional Medicine*. *Iran Red Crescent Med J*, 2014. **16**(3): p. e15924.
8. Wan Mohd Yunus, W.M.A., P. Musiat, and J.S.L. Brown, *Systematic review of universal and targeted workplace interventions for depression*. *Occup Environ Med*, 2018. **75**(1): p. 66-75.
9. Al-Ansari, A., et al., *Salivary cortisol determination: adaptation of a commercial serum cortisol kit*. *Annals of Clinical Biochemistry*, 1982. **19**(3): p. 163-166.

Table1. Pittsburgh Sleep Quality Index (PSQI) total and component scores in all participants

| | Control group (n = 50) Mean ± SD | Intervention group (n = 70) Mean ± SD | p value |
|--------------------------|--|---|---------|
| PSQI total score | 9.63 (0.8) | 9.09 (1.04) | 0.2973 |
| Subjective sleep quality | 0.82 (0.77) | 1.27 (0) | 0.0856 |
| Sleep latency | 1.21 (0.89) | 0.91 (1.14) | 0.3680 |
| Sleep duration | 1.40 (1.12) | 1 (0.77) | 0.2852 |
| Sleep efficiency | 3 (0) | 3 (0) | - |
| Sleep disturbance | 1.24 (0.66) | 1.33 (0) | 0.2355 |

| | | | |
|-------------------------|-------------|-------------|--------|
| Daytime dysfunction | 1.12 (1.41) | 0.64 (0.81) | 0.2938 |
| Use of sleep medication | 0.85 (0.75) | 1.27 (0.65) | 0.1028 |

Values are presented as mean (SD). The p-value based on t-test.

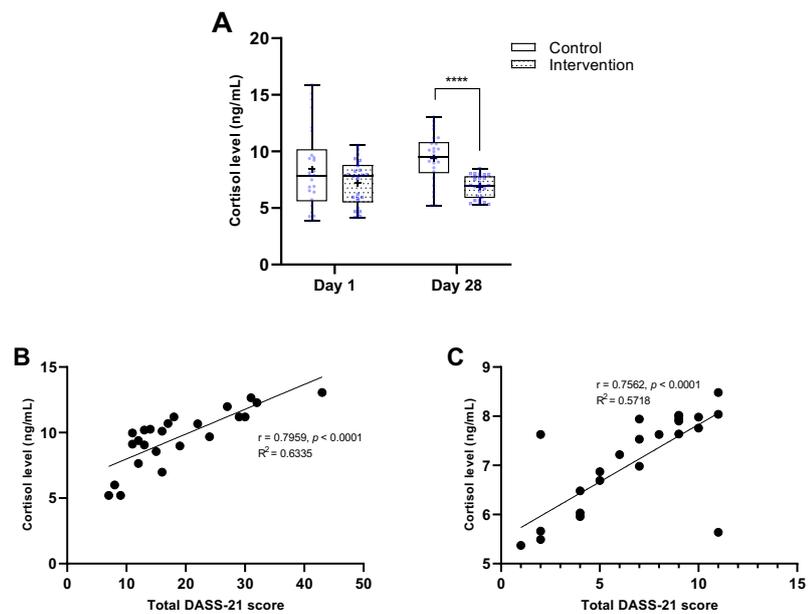


Fig. 1. A) Box diagram of the pattern followed by salivary cortisol. The white box corresponds to the control group and the white-black dot pattern boxes to the intervention group. The "+" corresponds to the mean value. Purple dots represent the data distribution; p-value: ****A significant difference was found between control and intervention group at day 28 ($p < 0.0001$); B) Correlation in total DASS-21 score and salivary cortisol levels for control group ($R^2 = 0.6335$); and C) Correlation in total DASS-21 score and salivary cortisol levels for intervention group ($R^2 = 0.5718$). r = Pearson's correlation, p = significant value.