

Sleep Disorders, Perceived Stress and Family Support Among Nursing Staff During the Pandemic Crisis

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Abstract

Background: The covid-19 pandemic is likely to cause mental health issues, especially for healthcare professionals. The aim of this study is to investigate levels of perceived stress, sleep disturbances and sense of family support among nurses in pandemic conditions.

Methods: Athens Insomnia Scale (AIS), Perceived Stress Scale (PSS) and Family Support Scale (FSS) were administered in a sample of 150 nurses from different hospital departments during the COVID-19 pandemic. Individual and demographic data were recorded.

Results: 120 women and 30 men completed the study questionnaires. Almost half of participants (49.7%) reported the presence of sleep difficulties and more than half (50.3%) experienced increased stress levels. Scores on AIS scale correlated positively with PSS scores ($P < 0.01$), and negatively with FSS scores ($P < 0.01$). A significantly negative correlation was observed between the PSS scores and the FSS scores ($p < 0.01$). Regression model showed 'scores on PSS scale' and 'years of work experience' were significant predictors of 'scores on AIS scale', each explaining 43.6% and 2.3% of the variance. Scores on AIS scale' and 'scores on FSS scale' were significant predictors of PSS explaining 43.7% and 9,2% of the variance .

Conclusion: The study confirmed that working with COVID-19 patients has a negative effect on the sleep of nurses, possibly mediated by increased levels of stress. Family support, as a protective factor, appears to moderate the deleterious consequences of stress.

Background

Since December 2019, the whole world is experiencing an unprecedented situation due to the emergence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causing the pandemic of novel coronavirus disease (COVID-19). Presently, frontline professionals working in designated hospitals for COVID-19 treatment, experience a sense of intense psychological pressure. High risk of infection, inadequate protection from contamination, increased workload, discrimination, isolation, uncertainty about the outcomes of the pandemic, are all expected to impose stress upon healthcare workers, seriously affecting mental health, including sleep hygiene [1].

Scientific studies suggest that sufficient sleep quality is a biological requirement for human life, alongside food, water, and air and is vital for maintaining life and health as well as safe working conditions. Seven to eight hours sleep a night is associated with a lower risk of obesity, diabetes, hypertension, myocardial infarction and stroke, and a reduced risk of injuries and fatigue-related errors. Medical and nursing staff is usually exposed to shifts and long working hours. These demanding occupational programs contribute to employee sleep disorders [2].

According to previous studies on SARS and Ebola epidemics, the onset of a sudden life-threatening disease could lead to extraordinary amounts of pressure on healthcare professionals. High-intensity work, physical and emotional exhaustion, inadequate personal protection equipment, risk of nosocomial

infection during hospitalization, helplessness, fear, anxiety and concern for patients and family members and the need to make sense of the morally challenging decisions being made, can have dramatic effects on their physical and mental well-being. Their resilience can be further compromised by isolation and loss of social support, risk of contagion and infection of friends and relatives, as well as drastic, often annoying changes in working conditions. Previous studies have reported that healthcare staff especially those who work in the frontline during viral epidemic outbreaks are at high risk for developing mental health issues, including stress, anxiety, depressive symptoms, anger, insomnia, fear, and sleep disorders [3, 4, 5, 6].

As the COVID-19 pandemic took hold, nurses were on the front line of health and social care in the most extreme of circumstances. In similar outbreaks, nurses have had the highest levels of occupational stress and resulting distress compared with other groups [7,8,9,]. Having to enter the negative pressure ward to care for the patients after only undergoing a brief training, working in the Intensive Care Units and the Infection Departments, spending hours each day putting on and removing airtight protective equipment, being transferred to other non-anti-epidemic positions and in the meanwhile worrying about becoming infected or infecting family members, at times may compromise safety and wellbeing and can lead to adverse mental health outcomes [10].

Family support refers to the sense of perceived support from the family environment. It is an important element of social support. Evidence on the influence of family support on chronic illness self-management behaviors shows that perceived family support is positively associated with improved outcomes among individuals with diabetes mellitus [11,12], chronic obstructive pulmonary disease [13], even in lung cancer patients [14]. Also, research highlights the negative correlation between family support and depression [15], while another study reported a negative correlation between family support and burnout [16]. The role of family support is likely to become more influential in situations where entire societies are placed under tightened quarantine restrictions.

The aim of the study is to investigate the prevalence of sleep disorders and perceived stress and evaluate the effects of the sense of family support in a specialized COVID-19 hospital nursing staff during the pandemic crisis.

Methods

Research Design

This cross-sectional study was conducted in one of the largest hospitals in Greece after approval from the Clinical Research Ethics Committee. The hospital received the first suspected Covid-19 case in February 2020 and remained a specialized hospital treating exclusively COVID-19 patients until May 2020. The study took place in the second half of May.

Study participants

One hundred and fifty nurses (out of 679) were randomly selected, and agreed to participate anonymously by completing self-reported questionnaires. Participants worked in departments of respiratory medicine, fever clinics, intensive care units or in other non-anti-epidemic positions, during past month.

Measurement Tools

Demographic and social data from the study participants included age, gender, education, and marital status. Professional and work information included their title, role, department that they worked during last month, and work experience.

Athens Insomnia Scale (AIS)

The severity of sleep disturbances was measured by the Athens Insomnia Scale (AIS) [17]. The scale is a self-assessment psychometric instrument designed for quantifying sleep difficulty based on the ICD-10 criteria. It consists of eight items: the first five pertain to sleep induction, awakenings during the night, final awakening, total sleep duration, and sleep quality; while the last three refer to well-being, functioning capacity, and sleepiness during the day. In this scale, the sleep difficulty severity is measured based on a 4-point Likert scale, since last month. The scores ranged from 0 (meaning not being a problem) to 3 (meaning more acute sleep difficulties). A cut-off score of 6 has been determined to distinguish between insomniacs and healthy subjects [18].

Perceived Stress Scale (PSS)

PSS was used to evaluate the perception of stressful experiences. The 10-item PSS [19] measures global perceived stress experienced, by asking the respondent to rate the frequency of his/her feelings and thoughts related to events and situations that occurred across the past 30 days, on a 5-point scale (0 – never, 1 = almost never, 2 = once in a while, 3 = often, 4 = very often). Total scores range from 0 to 40, with higher scores indicating higher perceived stress. Scores ranging from 0–13 would be considered low stress, from 14–26 moderate stress and from 27–40 high perceived stress. As the PSS is not a diagnostic instrument, there are no cut-off scores.

Family Support Scale (FSS)

To evaluate perception of family support we used the family support scale [20] which aims to record the sense of support that a subject receives from the members of his/her family (with whom he/she lives). The scale consists of 13 items, which are answered on a Likert scale, ranging from 1 ("I disagree a lot") to 5 ("I agree a lot"). The scale is self-administered and all of the items focus on the interrelations of individuals that live together. High scores correspond to an increased sense of family support. Individuals that live alone did not complete the scale.

Statistical Analysis

SPSS software, version 20, was used for the statistical analysis. All variables were assessed with the use of descriptive statistics and values were expressed as the mean \pm standard deviation for continuous

variables. The prevalence of insomnia and perceived stress levels were determined in percentages. All distributions of the continuous variables were normal (One - Sample Kolmogorov-Smirnov Test, $p > 0.05$). Independent t-test, one sample t test, ANOVA, Pearson's correlation and stepwise linear regression analysis were used for the evaluation of data. Statistical significance was set at $P < 0.05$ (two-tailed).

Results

A total of 150 nurses (120 women and 30 men) completed the study questionnaires. The demographic and working data of the study participants are shown in Table 1. No statistically significant difference was noted between men and women regarding age and years of work experience (Independent t-test, $p > 0.05$). Also, no statistically significant gender differences were observed in mean scores on AIS, PSS and FSS scales (Table 2, $p > 0.05$).

Table 1
General characteristics of nurses

		Age	Work experience (in years)
	Mean	44,27	16,77
MALE N = 30	Std. Deviation	11,01	12,088
	Minimum	25,00	1
	Maximum	64,00	35
FEMALE N = 120	Mean	41,79	17,36
	Std. Deviation	10,65	11,167
	Minimum	23,00	0
	Maximum	64,00	40
TOTAL N = 150	Mean	42,29	17,24
	Std. Deviation	10,73	11,32
	Minimum	23,00	0
	Maximum	64,00	40

Table 2
Scores on Athens Insomnia Scale (AIS), Perceived Stress Scale (PSS) and Family Support Scale (FSS) as to gender

		AIS	PSS	FSS
MALE	Mean	5,20	13,57	54,50
	Std. Deviation	3,79	7,82	8,02
	Minimum	0	0	28,00
	Maximum	15,00	33,00	65,00
	N	30	30	26
FEMALE	Mean	6,18	14,91	52,16
	Std. Deviation	4,34	6,89	7,95
	Minimum	0	2,00	25,00
	Maximum	17,00	34,00	65,00
	N	120	120	93
TOTAL	Mean	5,98	14,64	52,67
	Std. Deviation	4,24	7,09	7,99
	Minimum	0	0	25,00
	Maximum	17,00	34,00	65,00
	N	150	150	119

In addition, the study did not find significant differences in scores on AIS, PSS and FSS scales among participants who worked in fever clinics or wards for patients with COVID-19 and nurses who worked in non- frontline departments, possibly owing to the effect of the periodical rotation of personnel (ANOVA post hoc, $p > 0.05$).

49.7% of participants scored above cutoff on AIS scale, indicating the presence of sleep disorders. On PSS scale, 49.7% of responders expressed low levels of stress, 45.5% moderate stress and 4.8% high perceived stress.

Males stated increased sense of family support with a mean value of 54.5 on FSS scale, a result that differs significantly from the reference value of 50.8 [20] in the standardized version of the scale in a sample of Greek healthcare professionals (one sample t test $p < 0.05$) and similarly mean FSS value in female participants was significantly different from the corresponding reference value of 47 [20] in the standardized version of the scale (52.16 versus 47, one sample t test $p < 0.01$).

Scores on AIS scale correlated positively with increasing age and years of work experience ($p < 0.05$, Table 3). There was a significant positive correlation between the AIS scores and the PSS scores ($P < 0.01$), and a negative correlation between the AIS scores and the FSS scores ($P < 0.01$). Also, a significantly negative correlation was observed between the PSS scores and the FSS scores ($p < 0.01$, Table 3).

Table 3

Correlations among continues variables: age, work experience (in years), Athens Insomnia Scale (AIS) Perceived Stress Scale (PSS), Family Support Scale (FSS)

		Age	Work experience (in years)	AIS	PSS
Work experience (in years)	Pearson Correlation	,925**			
	Sig. (2-tailed)	,000			
	N	146			
Athens Insomnia Scale (AIS)	Pearson Correlation	,186*	,204*		
	Sig. (2-tailed)	,024	,013		
	N	147	146		
Perceived Stress Scale (PSS)	Pearson Correlation	,106	,115	,650**	
	Sig. (2-tailed)	,203	,170	,000	
	N	146	145	147	
Family Support Scale (FSS)	Pearson Correlation	-,029	-,109	-,388**	-,536**
	Sig. (2-tailed)	,756	,242	,000	,000
	N	118	118	119	119
Reported correlations are statistically significant at the * $p < 0.05$; or ** $p < 0.01$ level					

Stepwise multiple regression analysis was conducted to identify the best predictors of the dependent variable 'scores on AIS scale' among the independent variables that showed significant associations in the correlation analyses (scores on PSS scale, scores on FSS scale, age and years of work experience) and to examine their contribution to the variation (expressed as R^2) in the dependent variable. The final regression model showed that from all variables entered into the equation, 'scores on PSS scale' and 'years of work experience' were significant predictors of 'scores on AIS scale', each explaining 43.6% and 2.3% of the variance ($F_{2,115}=48.897$, $p = 0.000$, Table 4).

Table 4
Stepwise multiple regression analysis of factors predicting insomnia

	Beta	t	p								
PSS	.647	9.394	.000**								
Work experience (in years)	.153	2.221	.028*								
Age	-.010	.056	.956								
FS	-.038	-.461	.645								
<table border="1"> <tbody> <tr> <td>R Square</td> <td>.460</td> </tr> <tr> <td>Durbin-Watson</td> <td>1.976</td> </tr> <tr> <td>F</td> <td>48.897</td> </tr> <tr> <td>Sig.</td> <td>.000**</td> </tr> </tbody> </table>				R Square	.460	Durbin-Watson	1.976	F	48.897	Sig.	.000**
R Square	.460										
Durbin-Watson	1.976										
F	48.897										
Sig.	.000**										
FS: Family Support Scale, PSS: Perceived Stress Scale											

On the basis of the results of the bivariate analyses, a stepwise multiple regression test was performed to identify the best predictors of the dependent variable 'scores on PSS scale' among the independent variables that showed significant associations (scores on FSS scale, scores on AIS scale) and to examine their contribution to the variation (expressed as R^2) in the dependent variable. The final regression model showed that 'scores on AIS scale' and 'scores on FSS scale' were significant predictors of the dependent variable explaining 43.7% and 9,2% of the variance ($F_{1,116}=65.040$, $p = 0.000$, Table 5).

Table 5
Stepwise multiple regression analysis of factors predicting stress

	Beta	t	p
AIS	.533	7.708	.000**
FS	-.329	-4.753	.000**

R Square	.529
Durbin-Watson	2.022
F	65.040
Sig.	.000**

FS: Family Support Scale, **AIS:** Athens Insomnia Scale

Discussion

This cross-sectional study revealed a high prevalence of sleep disorders among nurses working in a specialized COVID-19 hospital, in the past month, during the pandemic. A recent study in the Greek population, using the AIS scale to explore sleep difficulties during the COVID-19 pandemic, reported sleep problems in 36.7% of the general population [21]. A survey of insomnia among medical staff members in China found that more than one-third of the medical staff suffered insomnia symptoms during the COVID-19 outbreak [22]. In another study [23] scores on AIS scale to evaluate sleep disturbances of Chinese frontline medical workers were not statistically different from the findings of our study (6.3 ± 4.2 versus 5.95 ± 4.238 , $p > 0.05$).

More than half of nursing staff who responded to questionnaires expressed moderate to high levels of stress. Literature suggests that nursing staff are psychologically more vulnerable to the pressure caused by the pandemic. These results may be partly biased because of the gender effect [24], taking into account that the majority of nurses are females, but could also be attributed to the fact that they may face extreme challenges. A higher risk of exposure to patients with COVID-19 as they spend more time in wards providing nursing care to patients and being responsible for the collection of sputum for the detection of viruses or working continuously and intensively in the isolation wards justify the highest levels of occupational stress and resulting distress compared with other groups. In addition, due to their intimate contact with patients, they may be more exposed to moral injuries associated with suffering, death and ethic dilemmas [25].

Results from linear regression analysis in this study suggested that the effect of the coronavirus outbreak on sleep difficulty has partly been mediated by stress. Research indicates that stress is closely related to sleep quality. The HPA axis, central catecholamine systems and sympathetic system play an important

role in the regulation of the sleep–wake cycle and there is good evidence that dysregulation of the neural and neuroendocrine mediators of the stress response can lead to sleep disturbances [26]. In turn, sleep disorders may appear to lead to further HPA axis dysregulation, thereby promoting a vicious cycle of stress and insomnia [27]. From another point of view, there is evidence of a bidirectional association between insomnia and loneliness [28], providing an explanation for the positive effects of family support.

The role of perceived family support seems to be important in moderating stress levels possibly by reducing the perception of the threat of stressful events and the physiological response and inappropriate behavior that can result from stress, leading to improved self-efficacy and a sense of professional achievement and acting protectively against the development of burnout [29]. Also, increased sense of family support, reported by our study, in the midst of a pandemic, may be related to the recognition of the absolute need and the significant contribution of the nursing profession.

The message from the World Health Organization for healthcare workers forewarned that managing mental health and psychosocial wellbeing during this pandemic is as important as managing physical health. In other words, even before the crisis begins to recede mental health issues need to be addressed in order to avoid long-lasting impacts on healthcare workers.

Conclusion

High rates of sleep disturbances were observed among nurse participants during the pandemic period. Reported stress levels correlate significantly with sleep disorders. Sense of family support is negatively associated with perceived stress and insomnia.

Abbreviations

AIS

Athens Insomnia Scale

PSS

Perceived Stress Scale

FSS

Family Support Scale

Declarations

Ethics approval and consent to participate

All the materials and procedures checked and approved by the Sotiria Generar Hospitale ethics committee (Number 12253/7-5-20). Participants gave their written consent by responding to the questionnaire.

Consent for publication

This manuscript does not contain any individual person's data.

Availability of data and materials

Data of this study will be obtained by contacting the corresponding author via this email: atselebis@yahoo.gr

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

AT and AP conceived the paper, carried out the mathematical analysis and drafted the paper; DL, CS and ET performed the clinical measurements, collected data and helped draft the manuscript; II carried out the mathematical analysis; DB conceived the paper, and helped draft the paper. All authors read and approved the final manuscript.

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