Sleep quality and associated factors in the context of COVID-19, among pre-hospital emergency personnel, in North-Eastern Greece

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Abstract

Background: The stressful conditions that emerged during the Coronavirus disease 2019 (COVID-19) pandemic have had a negative impact on sleep quality in large part of the healthcare worker population. This study aimed to assess the self-reported quality of sleep among members of the Emergency Ambulance Service personnel of the National Emergency Center in the region of Thrace, Northeastern Greece, and to investigate its associations with perceived stress, feelings, and perceptions of well-being during the COVID-19 pandemic.

Methods: The study was conducted from March to May 2021 using an online structured questionnaire, and the collected data included: socio-demographic characteristics, occupational and medical history, distress and mental health issues due to COVID-19 and the following self-administrated instruments: Pittsburgh Sleep Quality Index (PSQI), WHO-5 Well-Being Index (WHO-5), and Perceived Stress Scale-14 items (PSS-14).

Results: Among the 74 participants, 71 % were poor sleepers (i.e., PSQI >5). The majority (83 % of the sample) reported feelings of stigma due to their occupation, with the proportion being higher among women (100 % vs 78 % in men, p =0.05) and poor sleepers (95 % vs 65 % in good sleepers, p =0.03). Poor sleepers had significantly lower WHO-5 scores than good sleepers (13.8 ± 4.9 vs 16.9 ± 5.8, p =0.04) and were experiencing significantly more anxiety and/or sadness at the time they answered the questionnaire (69.1 % vs 35.3 %, p =0.02). Perceived stress was significantly positively correlated with the "Latency" dimension of the PSQI (p =0.03).

Conclusions: Poor sleep quality and feelings of stigmatization were prevalent for most of the sample. Poor sleep quality was associated more frequently with reported feelings of stigmatization, anxiety and/or sadness, and impaired well-being. HIPPOKRATIA 2021, 25 (3):126-133.

Keywords: Front-line health workers, sleep quality, mental health, COVID-19, pandemic

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Introduction

The stressful conditions during the Coronavirus disease 2019 (COVID-19) pandemic have exacerbated pre-existing sleep difficulties in a large part of the healthcare worker population[1]. Sleep can affect the thinking process, emotion regulation, and memory; thus, it is a crucial parameter of mental well-being[2]. Sleep disturbances can negatively affect the life-work balance. In addition, they might increase the risk of accidents or injuries[3]. Different factors can lead to sleep impairment, including several physical diseases, psychiatric disorders, as well as acute and chronic psychosocial stress[4]. According to Jahrami et al[5], 40 % of medical and non-medical populations have manifested sleep difficulties due to the COVID-19 pandemic.

Previous research during the SARS or Ebola epidemics and recent studies during the COVID-19 pandemic have highlighted the remarkable and unusual psychological pressure on healthcare workers, especially after the sudden onset and spread of a life-threatening illness[6,7]. Moreover, front-line healthcare workers seem to experience stress, anxiety, and sleep difficulties at a greater degree than the personnel not working on the front-line[8-10]. While research has been focused, almost exclusively, on hospital employees and the pressure on them due to COVID-19[11-14], there is not much research on the impact of COVID-19 on the emergency ambulance personnel and paramedics, even though they were identified as a "high-risk" occupational group[15]. In many countries, ambulance service personnel was the first to come in contact with suspected cases and had to pick them up from their homes and transfer them to the hospital or COVID-19

centers. Thus, according to the recent research findings on front-line healthcare workers, we hypothesize that their sleep quality would be negatively affected.

The present study aimed to assess the self-reported quality of sleep and to investigate associations among quality of sleep, perceived stress, feelings, and perceptions of well-being, during the COVID-19 pandemic, in a sample drawn from the National Emergency Center (Ambulance Service) personnel in the area of Thrace, Northeastern (NE) Greece.

Methods
Sample
The initial sample included all the employees of the Emergency Ambulance Personnel (Greek National Emergency Center) in Thrace, NE Greece. All employees (n =157) were contacted twice in an interval of 15 days through their professional email addresses, as provided by their employer. Informed consent was required from every participant. No exclusion criteria were applied.

Setting
Thrace is a region in NE Greece, near the borders with Turkey and Bulgaria. The study was conducted over two months, between March and May 2021 (3rd pandemic wave in Greece). During the study period, the region was characterized as "red" due to the high incidence rate of COVID-19 cases, resulting in the intensification of working conditions for all healthcare personnel. When the study was conducted, all confirmed or suspected cases of COVID-19 had to be transported from their homes to the hospital or from smaller COVID centers to referral centers by the Emergency Ambulance Personnel. This policy significantly increased the work burden, as this was added to the usual demands (unrelated to COVID-19 cases). The study protocol was in accordance with the Helsinki declaration. Participants provided their consent after being informed about the goals of the study. Ethical approval was obtained by the Scientific Committee of the Greek National Emergency Centre (Protocol No: 898, date: 15/02/2021).

Questionnaires
The LimeSurvey© platform (LimeSurvey GmbH, Survey Services & Consulting, Hamburg, Germany) was used to develop an anonymous survey. This online survey consisted of two separate parts. The first part included questions about: i) Demographic characteristics: sex, age, education, family status, being a parent, place of residence, years of working experience, ii) Medical history: known disorders associated with coronavirus vulnerability, infection, hospitalization and its outcome and vaccination status of themselves, their families and colleagues, iii) Working conditions due to the pandemic: work intensification, change of work schedule, use of technological means, and iv) Distress and mental health issues concerning COVID-19: being stigmatized/rewarded, maladaptive coping with pandemic stress, feelings

of safety and feelings of fear, experiencing anxiety and/or sadness, change in everyday habits, known history of sleep disorder, anxiety, and depression.

In the second part, we included the following self-rated instruments: the Pittsburgh Sleep Quality Index (PSQI), the Perceived Stress Scale (PSS-14), and the WHO-5 Well-Being Index (WHO-5).

The PSQI is a scale that measures one's subjective assessment of sleep quality and sleep disturbances during the last month[16]. PSQI consists of 19 questions evaluating seven dimensions: sleep duration, subjective sleep quality, sleep latency, sleep disturbances, sleep efficiency, use of sleep medication, and daytime dysfunction. Scores range from 0-21, with scores ≤5 indicating good sleep quality. PSQI is an established international instrument and has been used and validated for both assessment and prognosis of sleep disturbances in many different groups of patients in Greece[17,18].

The PSS-14 is a scale that measures stress in chronic conditions and reflects the level to which respondents' life has become unpredictable, overloaded, or uncontrollable. It consists of 14 items, and the score ranges from 0-56[19]. The higher the score, the worse the perceived stress. The standardization of the Greek version of PSQI was done by Katsarou et al[20].

The WHO-5 is a questionnaire that measures the current quality of life. It consists of five items, and the score ranges from 0 to 25 (raw score) or from 0-100 if multiplied by four. The lower the score, the worse the quality of life. WHO-5 has been adequately studied regarding its psychometric properties and translated into more than 30 languages[21]. Its Greek translation is available online[22].

Statistical Analysis
Descriptive statistics were applied. Results are presented as percentages for categorical variables while for continuous variables as means with standard deviation or median (with minimum and maximum values) for data with normal or non-normal distribution, respectively. We used the student's t-test for continuous variables and the chi-squared test/Fisher's exact test for comparisons between categorical variables. To assess the association between continuous variables, we used Pearson or Spearman correlation coefficient for normally or non-normally distributed data, respectively. We considered statistical significance at a p-value <0.05. Statistical analysis was conducted using the IBM SPSS Statistics for Windows, Version 24.0 (IBM Corp., Armonk, NY, USA).

Results
General characteristics
One hundred fifty-seven employees were working for Emergency Ambulance Personnel (sample frame), and questionnaires were initially sent to all of them. Out of those, 83 questionnaires were returned (response rate: 53 %), but nine had all questions blank (completion rate: 89 %). Most of the sample were males working as Ambulance Crew (Table 1). The mean age of the sample was 47 ± 5 years, with a working experience of 15 ± 7 years

Table 1: General characteristics of the 74 employees working for Emergency Ambulance Personnel who completed the questionnaires and were included in the study.

Variable	n or mean ± SD	%
Sex		
Male	55	74.3
Female	19	25.7
Age (years)	47 ± 5	
Family status		
Married/living together in relationship	63	85.1
Divorced	7	9.5
In relationship/not living together	1	1.4
Single	2	2.7
Children		
Yes	70	94.6
No	4	5.4
No of children	2 (1-3)*	
Type of residence		
Apartment	42	56.8
House	29	39.2
People living at the same apartment		
1	4	5.5
2	6	8.1
3	18	24.3
4+	46	62.3
Type of education		
Technical and Vocational school	57	77.0
University	17	33.0
Occupation		
Rescuers/Ambulance Crew	69	93.2
Doctor/Nurse	3	4.1
Other	2	2.7
Years of working experience	15 ± 7	

n: number, SD: standard deviation, *: median with minimum and maximum values in brackets.

(range: 1 to 32 years).

Medical characteristics - Attitudes towards COVID-19
Regarding vulnerability to COVID-19, 13 % considered themselves vulnerable due to their medical history, and 38 % had a vulnerable member in the family (Table 2). Additionally, 29 % of the sample had to move away from their house during the study period to protect their families from possible coronavirus transmission. When the study was contacted, 58 % of the sample was vaccinated, and 14 % had already been infected, but no one had been admitted to the hospital. Most of the sample reported having a colleague who had been infected already (Table 2).

Working conditions due to the pandemic
Almost all participants reported that their work was intensified due to COVID-19, but most did not have to change their work schedule or use novel technological means.

Sleep quality and well-being
According to the total PSQI scores, 71 % of the participants had poor quality of sleep (PSQI >5), although only

Table 2: COVID-19-related medical characteristics and attitudes of the 74 participants regarding themselves, their families, and their colleagues.

Variable	n or mean	%
Belonging to a vulnerability group, based on medical history		
Yes	9	13.0
No	20	87.0
Vulnerable member of the family		
Yes	26	38.2
No	42	61.8
Vaccinated for COVID-19 (as of May 2021)		
Yes	39	58.2
No	28	41.8
Moved to another residence during the pandemic to reduce exposure to COVID-19 of family members		
Yes	20	29.4
No	48	70.6
Mandatory quarantine due to symptoms or close contact		
Yes	10	15.4
No	55	84.6
COVID-19 infection		
Yes	9	13.8
No	56	86.2
COVID-19 infection of a family member		
Yes	11	17.9
No	54	83.1
COVID-19 infection of a colleague		
Yes	52	80
No	13	20
Hospitalization		
Yes	0	0
No	64	100
Hospitalization of a family member		
Yes	3	4.6
No	62	95.4
Hospitalization of a colleague		
Yes	25	39
No	39	61
Death of a family member		
Yes	4	6.3
No	60	93.7
Death of a colleague		
Yes	18	28.1
No	46	71.9

n: number of participants.

24.6 % had reported sleep disturbances before the pandemic. The mean PSQI value was 7.5 ± 3.7 (Table 3).
Well-being (based on WHO-5 score) was significantly correlated with sleep quality. Poor sleepers (PSQI >5) had significantly lower WHO-5 scores than good sleepers (t-test =2.07, p =0.04). The negative correlation between WHO and PSQI total scores was also significant but moderate in magnitude (r =-0.34, p =0.01). No statistically significant difference between poor and good sleepers was observed in the PSS scores (Table 4).
PSS total score was negatively correlated with the WHO-5 score (r =-0.63, p <0.001). Regarding the association between perceived stress and sleep quality, only a positive correlation between total PSS with the "Latency" dimension of the PSQI was observed (r =0.30, p =0.03), indicating that the higher PSS is accompanied by higher sleep latency time.

Table 3: Scoring of the studied sample in the Pittsburgh Sleep Quality Index (total and subscales), the WHO-5 Well-Being Index, and the Perceived Stress Scale.

Scale	mean ± SD or n (%)
PSQI total score	7.5 ± 3.7
PSQI subscales	
Quality	1.7 ± 0.9
Latency	1.3 ± 0.9
Duration	1.3 ± 0.8
Efficiency	0.9 ± 1.1
Disorder	1.4 ± 0.6
Medicine	0.3 ± 0.7
Dysfunctional	0.7 ± 0.8
PSQI categorical	
Good sleepers (PSQI ≤5)	17 (23 %)
Poor sleepers (PSQI >5)	42 (71 %)
WHO-5 (0-25)	14.7 ± 5.3
PSS	23.7 ± 2.7

n: number, SD: standard deviation, PSQI: Pittsburgh Sleep Quality Index, WHO-5: WHO-5 Well-Being Index, PSS: Perceived Stress Scale.

Mental health during the pandemic
Most participants reported that their daily life had worsened due to the COVID-19 restrictions. At the same time, feelings of anxiety and/or sadness, for most of the period, during the pandemic, were intensified for 72 % of the sample, while more than half were also experiencing those feelings while answering the questionnaire. Feelings of anxiety and/or sadness were not present before the pandemic for the vast majority of participants (88 %). However, almost none sought mental health specialists' help to deal with the aforementioned feelings (Table 5).
About 63 % of the sample was not feeling safe in the work environment during the pandemic period. Approximately 85 % of the participants reported feeling stigma-
tized due to their work during the pandemic, and this was more prevalent among all women (100 % vs 78 % in men, p =0.048) (Table 4). Experiencing stigma was more frequently reported among those living in apartment buildings who had to interact with neighbors, but this difference was not statistically significant. The majority of those experiencing stigma (64.8 %) noted that they experienced feelings of anxiety and/or sadness at the time of the study, compared to only 20 % among those not experiencing stigma (χ^2 =7.25, p =0.008), and 78 % of them had the same feelings, more than usual, during most of the pandemic, compared to 40 % of those that did not feel stigmatized (χ^2 =6.40, p =0.04). Eighty-five percent (85 %) of those having experienced stigma had a colleague infected by COVID-19, compared to 60 % of those who did not experience it; however, the difference was at the borderline of statistical significance (χ^2 =3.51, p =0.06) (Table 4).
It should be noted that poor sleepers reported more frequently feeling stigmatized due to their job compared to good sleepers, and the difference was statistically significant (95 % vs 65 %, χ^2 =8.8, p =0.03). They also reported that they experienced significantly more negative feelings, such as anxiety and/or sadness, when they answered (χ^2 =5.72, p =0.02) (Table 4). No other factors were found to play a statistically significant role in terms of sleep quality or stigma.

Discussion
Our study suggests that poor sleep quality during the third wave of the COVID-19 pandemic was present in the majority of the National Emergency Center employees in Thrace, NE Greece. Poor sleep quality was associated with more frequent negative feelings of sadness and/or

Table 4: Stigmatization and sleep quality in relation to demographics, feelings of sadness/anxiety, and COVID-19 in the workplace.

	Feeling stigma (n =55)	Not feeling stigma (n =10)		Good sleepers (n =17)	Bad sleepers (n =42)	
	Mean ± SD	Mean ± SD	p *	Mean ± SD	Mean ± SD	p *
Age	47 ± 5	48 ± 6	0.44	46 ± 5	47 ± 6	0.52
Years at work	15 ± 8	14 ± 6	0.78	16 ± 4	14 ± 8	0.33
WHO-5 total score	14.4 ± 5.3	16.9 ± 5.4	0.22	16.9 ± 5.8	13.8 ± 4.9	**0.04**
PSS total score	24.2 ± 8.2	20.9 ± 6.1	0.26	14.4 ± 5.3	16.9 ± 5.4	0.22
	n (%)	**n (%)**		**n (%)**	**n (%)**	
Sex						
Males	38 (69.1)	10 (100)	**0.04^**	14 (82.4)	28 (66.7)	0.23
Females	17 (30.9)	0		3 (17.7)	14 (33.3)	
Feeling of anxiety and / or sadness for most of the pandemic?						
More than usual	43 (78.2)	4 (40.0)	**0.04**	11 (64.7)	32 (76.2)	0.55
Same as usual	9 (16.4)	4 (40.0)		5 (29.4)	7 (16.7)	
Not at all	3 (5.5)	2 (20.0)		1 (5.9)	3 (7.1)	
Feeling of anxiety and / or sadness now						
Yes	35 (64.8)	2 (20.0)	**0.008**	6 (35.3)	29 (69.1)	**0.02**
No	19 (35.2)	8 (80.0)		11 (64.7)	13 (30.9)	
Colleague with COVID						
Yes	46 (85.2)	6 (60.0)	**0.06**	12 (70.6)	37 (88.1)	0.11
No	8 (14.8)	4 (40.0)		5 (29.4)	5 (11.9)	

Participants were divided in Good and Bad sleepers according to the total Pittsburgh Sleep Quality Index scores (cut off ≤5), WHO-5: WHO-5 Well-Being Index, PSS: Perceived Stress Scale, *: p value as a result of t-test or χ^2 test for continuous and categorical variables, respectively, ^: Fisher exact test was also performed and the p-value was 0.05.

Table 5: Distress and mental health issues related to COVID-19

Variable	n or mean	%
Feeling of being avoided and stigmatized due to profession		
Yes	55	84.6
No	10	15.4
Feeling of being rewarded for your profession		
Yes	37	57.8
No	27	42.2
Need to resort more often to (during the pandemic):		
Alcohol	6	8.8
Sedatives	1	1.5
Online gaming/gaming	7	10.3
Sports	24	35.3
None of the above	25	36.8
Many of the above	5	7.4
Experiencing anxiety and / or sadness during the study period		
Yes	38	58.5
No	27	41.5
Feeling of anxiety and / or sadness for most of the pandemic?		
More than usual	49	72.1
Same as usual	15	20.6
Not at all	5	7.4
Feeling safe at work environment during COVID-19		
Yes	24	37.5
No	40	62.5
In general, how has daily life been affected during the restriction measures		
Better than before	5	7.2
The same as before	10	14.5
Worse than before	54	78.3
Reported history of sleep disorders (e.g. insomnia) before the pandemic		
Yes	16	24.6
No	49	75.4
History of anxiety and / or depression before the pandemic		
Yes	8	12.3
No	57	87.7
Needed help from a mental health professional for mental health issues related to the pandemic		
Yes	2	3.0
No	63	97.0

anxiety. In addition, experiencing stigma due to their occupation was more overt between poor sleepers and those having negative feelings such as sadness and/or anxiety during the pandemic period and at the time the questionnaire was answered. Perceived stress was correlated only with sleep latency time.

To our knowledge, our study was the first to evaluate the sleep disturbances of emergency ambulance personnel during the COVID-19 pandemic. A high prevalence of sleep disorders among the ambulance staff has been reported previously, mainly due to the difficulty in coping with the demands of shiftwork[23]. However, in our sample, only a quarter had any already known sleep dysfunction, and the increased prevalence can be attributed to the adverse conditions faced during the pandemic. This is in accordance with other studies exploring sleep disorders in front-line healthcare workers after the COVID-19 outbreak[4,5,10,24-30].

The negative correlations between WHO-5 and PSQI total scores, as well as between WHO-5 and PSS total scores, were statistically significant. These results agree with existing evidence which supports the association between poor sleep quality and poor quality of life and between perceived stress and poor well-being in front-line health workers during the pandemic[31,32].

Unexpectedly, perceived stress was significantly correlated only with the "Latency" dimension of the PSQI, showing that higher stress levels are associated with increased sleep onset latency. In a study conducted by Jahrami et al[33] using the same tools as in the current study, no statistically significant linear association between PSQI and PSS scores was found for front- and non-front-line health workers. These results should be considered, given that the ambulance staff workers are trained to work under stress and maintain a stable emotional state, so their sleep difficulties are not caused by perceived stress. During the pandemic, Zhao et al[34] used PSS and PSQI to assess perceived stress and sleep quality in the gen-

eral population in China and found that higher perceived stress was significantly associated with higher anxiety levels, which, in turn, were associated with lower sleep quality. In our study, no specific diagnostic tool was used to measure anxiety. Moreover, there was no statistically significant difference in the PSS scores between poor and good sleepers.

A significant finding was the fact that most of the sample felt stigmatized because of their work, especially women during the pandemic. According to literature, stigmatizing attitudes towards first-line health professionals emerged during the pandemic as a social phenomenon[35]. The impact of stigma on first-line health professionals was significant in several aspects of their lives: being rejected in their neighborhood, being refused service in restaurants or taxis, and having thoughts of quitting their job[36]. Banerjee et al[37], in a systematic review regarding the impact of the COVID-19 pandemic on psychosocial health and well-being in South Asia, concluded that front-line healthcare workers experience sleep problems, stigmatization, chronic stress, and raised psychological burden. In our study, the feeling of being stigmatized was more prevalent in women than in men, indicating the increased emotional burden among females and a vulnerability that can be attributed to increased anxiety and fear of infecting others. This finding is possibly linked to their role as family caregivers[38,39].

Feeling stigmatized was more frequently reported among those living in apartment buildings. The proximity of the flats, the frequent interaction among the residents, and the common use of specific spaces (e.g., the elevator) may provoke fear, especially if it is known that a person in the building is working with the risk of getting infected.

Another factor linked to the feeling of being avoided and stigmatized is having a colleague who got infected during the pandemic. This can enhance any pre-existing self-stigma, which stems from guilt, negative self-perception, and the current public perception of front-line healthcare workers[40]. An issue that needs special attention is the fact that coronavirus spreading in the workplace can increase the perceived lack of safety in the occupational setting. In our study, more than three-fifths of the sample felt unsafe while working during the pandemic.

Feelings of anxiety or sadness were intensified during the pandemic for the majority of the sample. Poor sleepers reported that they experienced significantly more negative feelings, such as anxiety and/or sadness, at the time they answered. These are in line with previous studies, such as da Silva et al[41], who also reported higher levels of anxiety, depression, and insomnia among healthcare professionals. Additionally, Della Monica et al[42] concluded that anxiety, depression, and stress were observed (as well as other mental disorders) in a similar kind of sample. Depression, anxiety, and insomnia, among others, were also frequent in healthcare worker populations, according to the review of Hao et al[43]. Almost none of our study participants sought help from a mental health

specialist for anxiety and/or sadness feelings or for sleep difficulties. Experiencing stigma could explain the lack of motivation to seek help or treatment when unwell[44].

Most of the workers experiencing stigma noted that they experienced feelings of anxiety and/or sadness at the time of the study and during the pandemic, compared to those not experiencing stigma. Stigma experience has a strong negative impact on health professionals. According to published literature, it has been significantly associated with a higher risk of manifesting symptoms of depression, anxiety, and insomnia[45,46].

In our study, stigma appears to be a more potent factor related to poor sleep quality than perceived stress during the COVID-19 pandemic. High-risk Ambulance Service personnel should have easy and immediate access to adequate psychological support. Strategies that take into account the negative impact of stigma on front-line staff well-being should be used in health care systems[47].

Our study is subjected to some limitations, including small sample size, the use of self-rated questionnaires, and a low participation rate. It is unclear how responders differ from non-responders in terms of sleeping patterns or other characteristics, so that a possible bias might exist. In addition, anxiety levels that are also related to sleep disturbances were not assessed. Nevertheless, this is the first study in this occupational group that has used a line of validated questionnaires to investigate factors relating to sleep quality and feelings of well-being.

Conclusion

While first-line healthcare workers have been facing an already challenging job, COVID-19 created an even more demanding environment. Throughout the pandemic, Ambulance Service Personnel seems to have suffered from poor sleep quality. Poor sleepers experience significantly more negative feelings due to their jobs, such as anxiety and/or sadness and stigmatization. Adequate psychological support must be easily accessed and urgently provided, targeting vulnerable populations so that they can overcome the mental burden of these difficult times.

Conflict of interest
The authors declare no conflict of interest.

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