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Healthcare Workers Facing COVID-19: The More Exposed, the Less Stressed

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Abstract: Background: Since the outbreak of the 2019 coronavirus, healthcare workers found themselves on the front lines, exposed to a high risk of contamination and to an enormous psychological impact. Objective: The current study aimed to assess the perceived stress among healthcare professionals during the COVID-19 pandemic and to determine the associated factors. Methods: A cross-sectional study was conducted involving 254 healthcare professionals in the health region of Sousse from March to September 2020. Socio-demographic and professional characteristics were collected using a self-administrated questionnaire. The perceived stress level, work belongingness, resilience, and coping strategies were assessed using the PSS10 scale, the Workplace Belongingness Scale, the Connor-Davidson Resilience Scale (CD-RISC) and the Brief Cope questionnaire, respectively. Results: The overall mean [±standard deviation (SD)] age of the participants was 32.9 ± 8.76 years with a sex ratio (M / F) of 0.51. The assessment of perceived stress level among participants revealed a mean score of 30.69 ± 7.67 with an estimated high stress level prevalence of 22.4%. The majority of participants evinced a moderate stress level (59.5%) followed by a high stress level (22.4%). Women and health professionals with a parent in charge have higher level of perceived stress. On the other hand, perceived stress was significantly lower among healthcare professionals working in COVID units than those not working in COVID units, with $p < 10^{-3}$. The multivariate analysis revealed that working in a COVID circuit, resilience, work belongingness, problem-focused coping strategies and avoidance strategies were factors associated with perceived stress among healthcare professionals. Conclusion: Based on these results, the psychological impact of the COVID-19 pandemic on healthcare professionals is undeniable. However, working by personal choice in COVID units, work belongingness, resilience and problem-focused coping strategies appeared to be protective factors.

Keywords: Perceived Stress, Resilience, Coping, Healthcare Professionals, Work Belongingness

1. Introduction

The coronavirus disease (COVID-19) pandemic spread rapidly across the planet in a short periode of time, confining entire populations, closing borders, overflowing hospitals and straining an already suffering care's systems.

It has been well established that this pandemic could have a significant psychological impact on healthcare professionals [1]. Indeed, they have been facing unprecedented challenges, armed with little in equipment and information. They have been exposed to harmful dangers; an increased risk of contamination, an increasing number of confirmed and suspected cases, an overwhelming workload, a shortage of personal protective equipment, a legitimate but

burdensome fear, an unparalleled "infodemia", a lack of specific drugs and "moral injuries" that may increase their mental burden and daily stress [2].

Stress classically refers to "the bodily processes that result from circumstances that place physical or psychologic demands on an individual" [3]; and it becomes problematic and even pathological when the demands outweigh the perceived resources to cope with [4]. At work, this stress would lead to exhaustion, demotivation, reduced commitment and conflicting relationships. Delays [5], absenteeism or even resignation [2] would follow.

In addition to hindering the work of healthcare professionals and the continuity of care [6], stress may affect their physical health and decrease their immunity [7]. Combined with the social isolation imposed by preventive measures and poor perceived control, stress has been shown to be a risk factor for cardiovascular morbidity and mortality [8].

However, in critical situations stress affects many people, but individual responses vary. This strongly suggests the involvement of associated factors modulating the perceived stress of these health professionals during this kind of situation. In this context, previous research puts resilience at the top of the list [9, 10].

Resilience refers to an individual's ability to maintain good adaptability facing life stressors, threats or other major stressful events [11]. Numerous worldwide studies were conducted to assess the relationship between stress and coping strategies, highlighting the contribution of adapted strategies in stress management [12, 13]. Coping strategies refer to behavioral and cognitive efforts that help reduce the pressure of a stressful situation and are used when demands exceed individual resources [14].

Despite the undeniable importance of this phenomenon, unfortunately, it receives less attention and often takes a back seat [15]. Actually, to the best of our knowledge, no previous study has analyzed perceived stress and resilience, work belongingness, coping strategies as associated factors in Tunisian healthcare workers during the COVID-19 pandemic. Specifically, the main aim was to investigate the psychological impact of the COVID-19 pandemic in Tunisian healthcare, in terms of perceived stress. At first, the associations of socio-demographic variables (gender, marital status, having or not children and being or note in charge of parents) with levels of perceived stress were explored. The next step was to analyze whether working or not in a COVID unit, the resilience score, the work belongingness score and coping strategies were predictive of healthcare workers' stress levels.

2. Materials and Methods

2.1. Study Design and Settings

A cross-sectional analytical study was conducted among working health professionals, in the health region of Sousse from March to September 2020.

2.2. Sample Size and Sampling Technique

The sample size (n=254) was calculated with consideration of a 5% margin of error, 95% confidence interval, and a 21% prevalence of severe perceived stress associated with the COVID-19 outbreak.

This sample was formed by snowball sampling from the source population represented by health professionals working in the public health sector in the region of Sousse, during the study period and meeting the following inclusion criteria: Health professionals; paramedics and medical personnel of all ranks, being on duty during the pandemic in public health establishments with a COVID unit.

2.3. Data Collection Instrument and Process

A questionnaire was developed for the purpose of the study. The surveillance questionnaire had seven sections; Socio-demographic and clinical characteristics, General professional characteristics, health professionals' preoccupations, perceived stress evaluation (PSS-10), work belongingness evaluation, resilience evaluation (CD-RISC) and coping strategies evaluation (brief Cope).

2.3.1. Health Professionals' Preoccupations

4 most common preoccupations were evaluated on a 4-point scale, ranging from never = 0 to often = 4; the apprehension of being infected, infecting a loved one, being away from the family and changing lifestyle.

2.3.2. Perceived Stress Scale (PSS) 10

It is the most widely used scale in psychology to assess the extent to which a person generally perceives situations in his life as being stressful. It has good sensitivity and good construct validity. Studies reveal a two-factor structure with satisfactory psychometric proprieties.

The 10-item Perceived Stress Scale invites the participant to rate each item on its frequency of occurrence during a period (in this case, the previous month) using a 5-point scale ranging from 1 = never to 5 = often. Total scores were obtained by summing all the scale items. Responses to the four positively stated items (4, 5, 7, and 8) must be reversed.

2.3.3. Workplace Belongingness Scale

The Work Belongingness Scale is a 12-item self-reported instrument published by Lalatendu Kesari Jena and Sajeet Pradhan in 2017. It explores the sense of belonging, identification and involvement in work setting [16].

A 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) is used for the rating.

The team work carried out the linguistic validation from the original language (English) to French.

This instrument has a confirmed convergent and discriminant validity (0.86, 0.86) [16].

2.3.4. The Connor-Davidson Resilience Scale (CD RISC)

The CD-RISC is a questionnaire developed by Connor and Davidson in 2003 [17]. It has been validated with several populations. This is a self-administered 25-item

questionnaire that assesses several aspects of resilience. This instrument uses a 5-point Likert-type response scale varying from 0 "Not true at all" to 4 "True most of the time".

2.3.5. The Brief Cope

The brief COPE is a 28-item-self-administered questionnaire designed to assess the coping and adjustment strategies used by a person to cope with a stressful event.

It is an abridged version of the COPE inventory [18], translated into French and validated by Muller, L and Spitz, E in 2003 [14].

For the purposes of the study, the coping approaches of this scale were categorized as:

a. Problem-focused coping strategies (active coping, planning, instrumental support and acceptance) also called active adaptation.
b. Emotion-focused strategies (emotional support, positive reinterpretation, expression of feelings, blame and humor).
c. Avoidance strategies (denial, distraction, religion, substance use and behavioral disengagement).

This multidimensional coping measuring instrument has good psychometric qualities [14].

First, the departments' heads were contacted to justify the purpose of the study. Following this, the questionnaires were delivered to the representative of each department who thereafter, distributed them to the rest of the healthcare staff. An electronic version of the questionnaire was sent by email to the health professionals working in COVID units, isolated or confined, and impossible to reach directly. Finally, they shared the link further to their colleagues, using the snowball sampling technique. The data collection was stopped as soon as the required sample was obtained.

The present study was conducted in accordance with ethical considerations. The evaluation was explicitly presented as a research work. Participants were informed of the voluntary and anonymous nature of the study.

2.4. Data Analysis

The SPSS version 22.0 was used for analysis.

Qualitative variables were reported with percentage. whereas quantitative variables were reported with mean and standard deviations and with median and interquartile range.

The study of the associations and correlations between the different variables and the perceived stress was carried out using Pearson's correlations after checking for normality, the student's t-test and ANOVA. a level of significance of 0.05 was used.

Then, a linear regression model was performed including all explanatory variables with a $p < 0.05$ to evaluate factors independently influencing the perceived stress level.

3. Results

3.1. Sample Description

The overall mean (±SD) age of the participants was 32.9 ± 8.76 years, Of the 254 participants (165) 66.5% were female, (114) 44.9% were married, (90) 39% had children, and (87) 34.3% were in charge of their parents. 183 (72.04%) of the sample were medical staff and 71 (27.96%) paramedical staff. 172 (68%) worked in COVID units. The assignment to the units was by choice for only 41 (23.8%) of them.

3.2. Perceived Stress

The overall mean (±SD) PSS score was 30.69 ± 7.67. Sever perceived stress levels were reported by (57) 22.4% of the participants, while moderate perceived stress was reported by (151) 59.5% of them and low perceived stress was reported by (46) 18.1%.

3.3. Factors Associated with the Perceived Stress Level

The results illustrate that Perceived stress was associated with gender since higher levels among females (31.67± 7.24) compared to males (28.74± 8.16) were observed. No differences emerged on perceived stress level according to age or marital status. However, being in charge of a parent was associated with higher level of stress ($p = 0.007$). At the same time, the results illustrate that Perceived stress was not associated with having or not children.

No significant difference appeared between medical and paramedical staff. Furthermore, perceived stress was significantly lower among healthcare professionals working in COVID units than those not working in COVID units, with $p<10^{-3}$. But healthcare workers assigned by random draw in these units had a significantly higher level of perceived stress ($M = 34.06 \pm 6.87$) than those assigned by personal choice ($M = 25.24 \pm 8.29$) with $p <10^{-3}$.

The results of the linear regression analysis indicated that working in a COVID unit, the apprehension of being infected, the apprehension of infecting a loved one, resilience, work belongingness, problem-focused coping strategies and avoidance strategies were independent factors influencing perceived stress level among healthcare professionals (Table 1).

Table 1. *Factors associated with perceived stress level identified by the linear regression.*

	βeta	P	CI 95%
Working in a COVID unit	-0.080	0.042	-0.838 to -0.215
The apprehension of being infected	0.129	$<10^{-3}$	0.174 to 1.789
The apprehension of infecting a loved one	0.182	0.001	0.442 to 1.705
Work belongingness	-0.209	0.02	-0.253 to -0.089
Resilience	-0.192	0.002	-0.164 to -0.036
Problem-focused coping strategies	-0.191	0.001	-0.554 to -0.144
Avoidance strategies	0.179	$<10^{-3}$	0.160 to 0.544

CI: confidence interval; Beta: standardized coefficient.

Finally, a comparative linear regression according to the workplace (working or not in a COVID unit) was performed including the independent variables found previously (Table 2).

Table 2. *Factors associated with perceived stress level identified in a comparative linear regression according to the workplace.*

	COVID unit		NON COVID unit	
	βeta	P	βeta	P
The apprehension of being infected	0.112	0.113	0.257	0.01
The apprehension of infecting a loved one	0.208	0.002	0.170	0.06
Work belongingness	-0.295	$<10^{-3}$	-0.121	0.175
Resilience	-0.143	0.05	-0.199	0.097
Problem-focused coping strategies	-0.241	0.004	-0.172	0.199
Avoidance strategies	0.096	0.16	0.206	0.023

Beta: standardized coefficient.

This regression model revealed that the apprehension of infecting a loved one, work belongingness, resilience and problem-focused coping strategies were independent factors influencing the perceived stress of healthcare professionals working in COVID units. While the apprehension of being infected and avoidance strategies were independent factors influencing the perceived stress of healthcare professionals who were not working in COVID units.

4. Discussion

In this study, healthcare professionals had an average perceived stress score of 30.69 ± 7.67.

Studies conducted in India [19], Italy [20], and China [21] during the COVID-19 pandemic, found an average score of perceived stress among health professionals ranging from 26.5 ± 7.3 at 36.29 ± 7.61.

Due to the lack of published data, it was not possible to compare the average score of perceived stress among healthcare professionals with a reference value before the COVID-19 pandemic nor with the average score of perceived stress among the general Tunisian population.

However, it has been well documented that, pandemic aside, caregivers were at greater risk compared to the general population of having mental disorders and of being underdiagnosed and undertreated [2].

Furthermore, the prevalence of severe and prolonged stress (perceived stress score >36) in the study population was 22.4%. In the literature, this prevalence varies from 7.6% in India [22] to 36.1% in China [23].

None of the socio-demographic characteristics were found to be an independent factor of perceived stress.

Nevertheless, according to the results, women were significantly more stressed than men (p = 0.004). A result widely found in the literature [21, 24–26]. Indeed, previous studies have highlighted gender determinants and mechanisms that protect or undermine mental health and resilience to stress and adversity [24]. The psychological vulnerability of women might be explained by the many constraints and difficulties of their daily lives and the multiple demands imposed by parenthood and the well-being of the household, especially when it comes to protecting their children.

No significant correlation was found between perceived stress and age. However, Lai J et al. [27] in a study conducted in 34 Chinese hospitals suggested that younger people suffered significantly higher levels of perceived stress.

In line with a previous study conducted by Babore et al [25], the results did not show a significant difference in perceived stress according to marital status. However, several studies have suggested that marital status is an important predictor of perceived stress [21]. Specifically, Tan W et al. [28] showed that being married was associated with the severity of psychiatric symptoms in the general population. Doshi D et al. [29] explained that married people had a higher risk of having a greater fear of COVID-19 in the general Indian population. However, previous studies during SARS epidemic have pointed out that it is rather being single that would expose hospital staff to greater psychological distress [30].

In addition, the results showed a significant association between perceived stress and having parents in charge. This may be part of the family responsibilities that were associated with poor mental health outcomes among healthcare workers [31]. Moreover, the fact that parents are a very vulnerable population, likely to develop severe forms of COVID-19 would feed the apprehensions of health professionals and expose them to higher levels of stress. Cai H et al. [12] found the same result among health professionals in Hunan. Indeed, their study suggests that the presence of an elderly family member with chronic diseases was one of the most common causes of stress among healthcare workers.

Paradoxically, no significant association was found between perceived stress and having children, unlike Babore A et al. [25] and Evanoff BA et al. [31] who suggested that having children could be a protective factor against perceived stress. Walton M et al. [32] suggested that having children remind healthcare workers of the positive aspects of their lives.

No significant difference of perceived stress level was found between medical and paramedical staff. Adeb-Saeedi J identifies the nursing staff as the most at risk of psychological distress, being directly and intensively involved in care [33].

However, a Spanish study found that doctors had presented a higher percentage of Burn-out during the COVID-19 pandemic [34]. They were responsible for major ethical and moral decisions [35], the announcement of bad news [36] and all the suffering that ensued.

Numerous studies have shown that healthcare professionals working in high-risk infection units have the most severe mental health outcomes during all the epidemic and pandemic outbreaks that humanity had seen. In a review of literature listing 44 articles relating to the epidemics of SARS, MERS-CoV, A / H1N1, A / H7N9, Ebola virus disease and COVID-19, a majority of the articles associated the psychological results to the level of exposure [37].

In a study conducted in China including 1257 healthcare professionals, working on the front line directly treating patients with COVID-19 was found to be an independent risk factor for all psychiatric symptoms (depression, insomnia, distress) [27].

It may seem counterintuitive, but in the present study, working in a COVID unit was an independent factor negatively influencing the perceived stress level. Health care workers in COVID units had a significantly lower perceived stress level than the rest of the workforce. This result is in agreement with the study of Wu et al. [38] that reported lower levels of Burn Out among front-line caregivers compared to other healthcare givers during the COVID-19 outbreak in Wuhan.

These results can be explained by many observations. According to Ruiz Fernández MD et al. [34], a possible explanation could be that these front-line professionals had a greater sense of control and more information about the evolution of the pandemic process. Several of them had stated that this pandemic had some benefits for them: they felt proud of themselves, of their courage and tenacity and their ability to overcome ordeals and a sense of accomplishment [39].

This result is also consistent with studies pointing out that some people can feel good when they work hard and see how others benefit from their efforts [40]. During the COVID-19 crisis, the suffering of the population was real and palpable. The great effort made by health care professionals to treat patients unconditionally would have given them profound satisfaction. In this kind of situation, great compassion, intrinsic motivation and real commitment can arise [41].

In addition, a social movement of support and recognition developed during the pandemic. Thus, this gratitude that was not often expressed before the pandemic could strengthen the compassion among professionals who put their lives on the line to help those suffering from COVID-19 [42]. Motivation to relieve suffering, as well as social recognition, could also revive the perceived self-efficacy of health professionals.

Pavlovian theory, offers another explanation for this result. Working on the front line in COVID units may expose healthcare professionals to their greatest fears. A habituation phenomenon could take place, reducing fear and stressful anticipation. Habituation is said to occur when a fear response to a stimulus diminishes following repeated presentations of the stimulus [43]. On the other hand, healthcare professionals working outside of COVID units would be increasingly sensitized to their fears, whether through anticipation or through what goes on around them without being part of it.

This explanation could be consolidated by another result. Indeed, the linear regression done separately according to the working or not in COVID unit, showed that the fear of being infected was not an independent factor influencing the perceived stress level among workers in COVID units, unlike other health workers. By exposing themselves, frontline healthcare workers appeared to have overcome their fear of being infected, one less burden for their mental health.

Interestingly, in the present study a significant difference in stress level was noted between healthcare professionals assigned to COVID units by personal choice and those assigned by random draw. Two similar studies have found that being enrolled from a unit at low risk of infection to a unit at high risk of infection during an epidemic is a specific risk factor for worsening mental health [44, 45]. Conversely, altruistically accepting the risk of infection is a protective factor [30, 46].

With regard to the apprehensions of healthcare professionals, a positive correlation was found between perceived stress and the degree of different fears / worries. In particular, the multivariate analysis revealed that the fear of being infected and the fear of infecting a loved one were independent factors of perceived stress.

Huang L et al. [21] concluded in their study that the fear of being infected was an important predictor of high perceived stress level. And one of the most important sources of psychological distress for healthcare professionals, identified by Lai et al. [27] as well as by Goulia P et al. [47] was the health workers' concerns about their family.

In the present study, the work belongingness was found to be an independent factor influencing perceived stress level. A better work belongingness was correlated to a lower level of perceived stress.

The need to belong is a fundamental human requirement and one of the most powerful sources of individual motivation.

The association between sense of belongingness to work and depressive symptoms has already been well established in a study by Cockshaw WD et al. in 2013 [48].

Although this current research is the first to study the impact of this factor on the mental health of healthcare professionals during a pandemic, several studies have highlighted workplace specific factors that predict good mental health. namely; respect, recognition, appreciation, reward, teamwork, communication, trusting relationships between colleagues and good supervision [49].

The results indicate a negative correlation between perceived stress and resilience which has been shown to be an independent factor influencing perceived stress level.

This result is consistent with numerous studies that have evaluated the existing interactions between resilience and health professionals [50, 51]. They concluded that there is an indisputable correlation between the resilience capacities of clinicians and the improvement of certain parameters of health system, in particular; the quality of care, the reduction of health costs and the improvement of doctors' well-being. This last point allows the improvement of many others [52].

Previous research has shown that different coping strategies do not have the same impact on perceived stress. For example, Koeske GF et al. [53] found in a study

conducted among professionals working with clients with mental illness that active coping strategies served as work stress shields. while the use of avoidance strategies resulted in higher overall levels of distress three months later.

These previous results strongly suggest that coping strategies that reflect direct "action", dealing with the stressor and/or associated emotions, are more effective at preventing the negative consequences of stress, than avoidance strategies, which involve turning away from the stress factor and/or related emotions.

Indeed, when "a person takes charge" [54], he or she would feel in control of the stressful situation. This perceived control could be the magic ingredient that explains why engagement coping strategies have more positive effects on psychological well-being than avoidance strategies [55–58].

This study has a number of limitations, which need to be taken into account. First, the correlational nature and the cross-sectional design of the study that excluded the evolution over time of the results. Therefore, longitudinal studies are recommended. Second, selection bias due to the sampling techniques employed and the use of two different forms of data collection instrument dictates cautious interpretation of the findings. Third, the use of self-reported questionnaires exposes this study to subjectivity bias. Despite these limits, the results offer multiple lines of action for a better management of distress in healthcare workers during the COVID-19 pandemic.

5. Recommendations

Based on this study results, several measures can be taken to manage the current pandemic and to be prepared to any future adversity. In term of organization, staff fears and apprehensions must be alleviated by providing the necessary logistical assistance (transport, accommodation, etc.) to caregivers, to protect themselves, their families and to maintain a healthy lifestyle. Resilience and coping skills training must be a preventive strategy rather than a response. Organizations should focus explicitly on improving the healthcare professionals' workplace belongingness; by maintaining fairness and gratification, encouraging, supporting and mainly avoiding forced or random assignments to workplaces. Any psychological distress due to stress at work must be detected and managed early in order to avoid serious repercussions. Peer support groups, counselling centers, mental health helplines, and stress management training can be effective.

In term of research, this psychological impact described in the present study should be followed over time, with continuous or repeated survey.

6. Conclusion

Up to the present day, healthcare professionals are still on the front lines facing an unprecedented pandemic. Overwhelmed with work and worries, they have been challenged every day. The current study aimed to assess the perceived stress among healthcare professionals during the COVID-19 pandemic and to determine the associated factors. The objectives set have been reached. And the results offered several axes of intervention among health professionals targeting better perceived personal efficiency and an adapted stress management. Good care is essential to guarantee the continuity of care and to alleviate the suffering of health workers Lessons must be learned to be better armed against any future adversity.

However, the present study has certain limitations which should be taken into consideration. The use of two types of data collection means (paper questionnaires and online questionnaires) could present a limitation to this study. Though, the use of the online questionnaire was imposed by work conditions during the COVID-19 pandemic. Indeed, it was very difficult to hand deliver questionnaires to caregivers in COVID units, who were often in uniform, isolated in closed units or in quarantine.

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