Perceived Stress and Coping Strategies among Nursing Students during the COVID-19 Pandemic: A Systematic Review

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Keywords
Perceived stress · Coping strategies · Resilience · Nursing students · COVID-19

Abstract
Background and Objective: Stress is common among nursing students, especially during COVID-19, because of direct contact with patients, so they need to cope with the stressors. The aim of this systematic review was to assess the level of perceived stress and coping strategies by nursing students during the COVID-19 pandemic. Material and Methods: Databases such as MEDLINE, PubMed, ScienceDirect, Cochrane Library, and Web of Science were searched using keywords. The authors used keywords (perceived stress, coping strategies or resilience, and nursing students). The language was restricted to English. The studies, conducted between December 2019 and December 2021, were included. The full articles were checked for eligibility. The reference manager software EndNote X4 was used for sorting and managing studies. This systematic review was registered on PROSPERO with a number: CRD42021267791. Results: Five studies were included in this review: the first study, from the Philippines, showed that levels of stress and coping strategies by nursing students during the COVID-19 pandemic were estimated to be 79% and 76.8%, respectively; the second study, from Saudi Arabia, found that the rate of stress is 30.9% with several strategies for coping, while the other study from Saudi Arabia showed that the stress level is 1.32 (low stress) and 1.95 (moderate stress) with different coping strategies (avoidance 1.47, problem solving 2.09, stay optimistic 2.06, and transference 1.87); the fourth study from the USA showed that the rate of stress is high 24.7%, with high levels of resilience among nursing students; and the fifth study showed that the rate of stress is 20.94 in the UK and 21.54 in China, with a resilience of 26.70 in the UK and 25.18 in China. Conclusion: The current systematic review showed that nursing students have a high level of stress in all included countries (the Philippines, Saudi Arabia, the USA, the UK, and China), and they developed appropriate coping strategies to face the situation.

Introduction
The World Health Organization (WHO) has officially described the COVID-19 coronavirus outbreak that began in March 2020 as a pandemic [1]. The short-term mental health consequences of COVID-19 are equally high across affected countries [2]. For instance, in Saudi Arabia, university students have been exposed to high...
levels of stress, anxiety, and depression during the pandemic, which is considered a challenge for students and teachers [3].

The psychological well-being of nursing students during the pandemic is an important part of their academic success and requires appropriate coping mechanisms to deal with the situation. Many studies have investigated the perceived stress and coping strategies among university students, but fewer studies have correlated the situation to the pandemic [3–21]. The perceived stress among nursing students is high and affects their psychological well-being, so they need a high level of resilience and coping mechanisms [17]. This situation has been made worse during lockdowns due to COVID-19, which has led to remarkable level stress and poor mental health [16].

There are contradicting findings in studies concerning the perceived stress among nursing students and related resilience during the pandemic. It was questionable whether the nursing students’ stress level is well known and are they able to cope with stressors during the pandemic? Hence, we conducted this systematic review to analyze the perceived stress and coping strategies among nursing students during COVID-19 pandemic.

### Material and Methods

**Keywords and Search Strategy**

The search strategy for this systematic review was based on specific keywords on the topic of perceived stress and coping strategies among nursing students during the pandemic which is shown in Table 1. The process of search was restricted to English and during the period December 2019 to January 2022 when the final search was processed. The summary of search is presented in Table 1, and the flowchart which showed the step-by-step process of including and excluding studies to this systematic review is shown in Figure 1.
Eligibility Criteria
The articles published in peer-reviewed journals after December 2019 until the date of search January 2022 were included for this systematic review. The authors applied specific criteria for selection of studies (summarized in Table 1). It was passed through stages in first stage by title and then by reading the abstract, and in the last stage, articles were decided after reading all parts in the studies.

Data Sources
The websites of MEDLINE, PubMed, ScienceDirect, Google Scholar, and Cochrane Library were searched using predetermined keywords. The WHO and CDC in addition to the gray literature search were also searched. A primarily search elicited 11,564 papers from all databases. After applying the criteria for inclusion, only 5 studies were included.

Type of Studies
This systematic review included studies with the design of descriptive, cross-sectional, comparative, and surveys.

Data Extraction
Four researchers were divided into two groups; then, each group independently screened the found articles and applied the inclusion criteria. They first read the titles and then abstract; then, they retrieved the full-text articles. The articles were read and evaluated for eligibility. The reference manager software EndNote X4 was used to help in sorting, removing duplicates, and dividing the articles into subfolders.

The two groups separately extracted data after applying the eligibility criteria. Then, the extraction forms were compared and refined for both groups. The researchers then confirmed included and excluded articles.

Statistics
The findings of this study are shown after narrative analysis and grouping of similar findings in Table 2. The perceived stress and used coping strategies by nursing students were summarized and discussed.
Types of Outcome Measures
1. Primary outcome(s): The primary outcome is the level of perceived stress and coping strategies.
2. Secondary outcome(s): There are no secondary outcomes included.

Results

Study Selection
The details of selected studies are presented in Table 1, and the flowchart which showed the step-by-step process of including and excluding studies to this systematic review is shown in Figure 1. The primary search on all database showed the studies which are needed for screening (11,564 articles); then, 183 were primarily included based on the title. Then after reading abstract and main findings and removing the duplicates, review and irrelevant articles were excluded based on titles and abstracts (155 articles are considered). Then, the full texts were read to ensure the eligibility (12 articles) which need in-depth investigation. Then, the irrelevant, review, duplicates, and not investigating both stress and coping strategies were excluded; only five articles were found to be included in this systematic review. The justification for including only 5 articles in this systematic review is the short period since the emergence of the COVID-19 pandemic and the systematic and independent application of inclusion criteria on the found studies.

Studies Characterized
Five studies were included in this systematic review. The studies were from the Philippines, Saudi Arabia, the USA, the UK, and China. All studies investigated the stress levels and resilience or coping strategies among nursing students in response to COVID-19. The characteristics of included studies are summarized in Table 3.
Risk of Bias (Quality) Assessment

The included articles were appraised according to the criteria of STROBE Statement – Checklist for observational studies, and the quality of included articles was measured using the specific criteria which is summarized in Table 4 for risk of bias assessment of observational studies using STROBE checklist of observational studies.

- **Design**,  
- **Data collection**,  
- **Data collection tools**,  
- **Sample size**,  
- **Selection methods**,  
- **Methods of measurements**,  
- **Design-specific source of bias**,  
- **Statistical methods**,  
- **Quality**  

| No. | Study | Design | Data collection | Data collection tools | Sample size | Selection methods | Methods of measurements | Design-specific source of bias | Statistical methods | Quality |
|-----|-------|--------|----------------|----------------------|-------------|------------------|------------------------|--------------------------|-----------------|---------|
| 1   | (Labrague, 2021) [22] | Low    | High           | Moderate             | Low         | High             | High                    | Moderate                 | High            | Moderate |
| 2   | (Alsolais et al., 2021) [6] | Low    | High           | Moderate             | Low         | High             | Low                     | Moderate                 | Moderate         | Moderate |
| 3   | (Hamadi et al., 2021) [15] | Moderate | High           | Moderate             | Low         | High             | Moderate                | High                     | Moderate         | High    |
| 4   | (Kim et al., 2021) [17] | Low    | High           | Moderate             | Low         | High             | Moderate                | Moderate                 | High            | Moderate |
| 5   | (Hasson et al., 2021) [16] | Low    | High           | Moderate             | Low         | Moderate         | Moderate                | Moderate                 | High            | Moderate |

The two groups independently assessed the level of quality for each article (high quality, moderate quality, or low quality) as shown in Table 4. This systematic review was prepared based on the PRISMA checklist which is attached as supplementary material with this review (see www.karger.com/doi/10.1159/000526061 for all online suppl. material).

**Level of Stress and Level of Coping**

The studies showed that nursing students were exposed to high stress due to this pandemic, but their flexibility was sometimes enough to overcome the stress as well as build an appropriate coping strategy that made them more able to face the pandemic. The first study was from the Philippines and estimated that the levels of stress and coping strategies were 79% and 76.8%, respectively [22]. It also showed that the stress level at the beginning of the pandemic among the 301 nursing students participating in the study was 60% as high. But with the continuation of the pandemic, the stress level dropped because of resilience and coping strategies.
Another study was conducted in the Kingdom of Saudi Arabia with 492 nursing students. The study found that students’ perception of risk was initially poor with a strong fear of coming into contact with someone who had COVID-19 [6]. Religion played an important role in the coping strategy to face the pandemic. The rate of stress among respondents was 30.9% at the beginning of the pandemic with different coping strategies (self-distraction as 4.30, active coping as 4.90, denial as 3.68, substance as 3.02, emotional support as 4.15, instrumental support as 4.20, behavioral disengagement as 3.54, venting as 4.29, positive reframing as 4.81, and acceptance as 5.4).

In another study from the Kingdom of Saudi Arabia [15], stress and tension were compared, as were endurance and coping strategies among nursing students before and during the pandemic. Before COVID-19, the stress level was 1.32 (low stress), and during the pandemic, it was 1.95 (moderate stress) due to lack of professional knowledge, skills, and a resilience strategy before and during the pandemic. However, a change was found in the coping strategy category of “staying optimistic” from an average coping strategy level of 2.06 (low) before COVID-19 to 2.15 (average) during the pandemic.

The fourth study was conducted in both the UK and China among nursing students in two different universities [16]. It showed that the stress as a result of the pandemic was 20.94 ± 3.87 in the UK and 21.54 ± 3.64 in China. The rate of resilience was much better and reached 26.70 ± 5.11 in the UK and 25.18 ± 5.61 in China. Despite the high stress rate, the resilience in dealing with the pandemic gave the students a protective factor against exposure to long-term psychological stress. The fifth study was conducted in Southern California, USA, and showed that there is a significant relationship between stress among nursing students and the spread of the corona pandemic. The rate of stress and tension was high at 24.7%, and the resilience was also high [17].

Comparison between Tools That Measure the Stress and Coping in Terms of Psychometric Properties

Four included studies (Labrague [22], Hamadi et al. [15], Kim et al. [17], and Hasson et al. [16]) used Perceived Stress Scale (PSS; Cohen et al. [23]), to measure the stress. The PSS has been widely used in student populations in both nursing and non-nursing disciplines and was found to have good psychometric properties (Aslan and Pekince [9]), where Labrague [22] used addition scale: the Psychological Well-Being Scale (PWBS). Only the Alsolais et al. [6] used different scales in his study where he adapted the scale from Depression, Anxiety, and Stress Scale short-form version (DASS-21; Lovibond and Lovibond [24]). The DASS-21 is a well-established scale with good validity and reliability (Lovibond and Lovibond [24]), Table 3.

Regarding the coping strategy scale measurement used, Kim et al. [17] and Hasson et al. [16] used the same scale by the Connor-Davidson Resilience Scale (CD-RISC) in their study, and this 10-item scale reported to be both credible and reliable (Ni et al. [25]), whereas Labrague [22] used the BRCS to measure the resilience. This 4-item scale was found to be highly valid and reliable (Savitsky et al. [26]), whereas the remaining studies used separate other methods to measure the coping (Table 3).

Discussion

The systematic review showed that there was high level of stress among nursing students in response to the pandemic of COVID-19 in all included countries (the Philippines, Saudi Arabia, the USA, the UK, and China). Our findings showed that nursing students were exposed to high stress level due to the COVID-19 pandemic, but their flexibility and adaptation techniques were partially adequate to overcome the stress and to build an appropriate coping strategy that enabled them to deal with the situation. They might be afraid of the spread of the virus while working at hospitals or meeting together in the classrooms, which may be related to broader or earlier knowledge of the virus, a high level of resilience and healthy coping systems, a reduction in the academic load, increased availability of support within the family, and the protective effect of knowledge about COVID-19 [18]. Compared to another systematic review, this review’s findings suggest that healthcare workers manage their stress during the spread of the COVID-19 pandemic by utilizing both problem-focused and emotion-focused coping strategies [27]. These findings are similar to results of a study done by Huang et al. [28], who concluded that nurses have stronger emotional responses and are more willing to use problem-focused coping.

Saudi Arabian nursing students’ perception of risk was initially poor, with a strong fear of becoming infected with COVID-19 and a high level of stress [6]. Religion played an important role as a coping strategy to face the pandemic. This study is similar to a study done by Abdulghani et al. [4], who reported that medical students who practice religious meditation have lower levels of stress. Our findings are not similar to another study done...
by Babore et al. [29], who found that religion was associated with the stress level. The rate of stress among nursing students was slightly high at the beginning of the pandemic, and then they developed different coping strategies, such as self-distraction, active coping, denial, substance use, emotional support, instrumental support, behavioral disengagement, venting, positive reframing, and acceptance, which they used to adapt to the situation.

Our findings are supported by a study done in Egypt on university students by El-Monshed et al. [30], who showed that students suffer from different levels of psychological effects, including depression, anxiety, and stress. Another study on Saudi Arabian nursing students [15] showed that a high level of stress was observed among the students, and they used different coping strategies before and during the pandemic. Before COVID-19, the stress level was low, and during the pandemic, it was a moderate level due to a lack of professional knowledge and skills. These results are similar to findings of one study done by Sheroun et al. [31]. They used different coping strategies, such as staying optimistic, avoidance, problem solving, and transference during the pandemic.

Nursing students from both the UK and China [16] expressed high levels of stress as a result of the pandemic, and the rate of resilience was much better as it reached acceptable levels. Despite the high stress rate, the resilience in dealing with the pandemic gave the students a protective factor against their exposure to long-term psychological stress. This finding agrees with results reported in a study done by Awoke et al. [10], who concluded that the majority of participants are appropriately coping with stress. In addition, a study conducted in Egypt showed that problem-focused coping strategies resulted in the highest score on Brief COPE, while dysfunctional coping strategies (venting, denial, and substance use) resulted in the lowest score [30].

American nursing students [17] appeared to have a high level of stress due to the pandemic and a significant relationship between their level of stress and the pandemic [4]. This was similar to the study findings reported by Thai et al. and a study by Savitsky et al. in Israel. These studies showed that students have moderate to severe anxiety [26, 32].

Assessing the perceived stress among nursing students as healthcare providers and the impact of resilience and coping mechanism is highlighting the readiness to cope with clinical situation. In our systematic review, it was shown that nursing students were able to cope with clinical environment as they use different coping strategies. It was also shown in one previous study that coping and social support control the stress level among healthcare providers during the COVID-19 pandemic [33].

In addition to what has been shown, this systematic review is studying academic stress among nursing students globally. Nursing program is in most of the international and national universities, where nursing students are practicing in a highly competitive complicated environment with life-threatening conditions [34]. The impact of such stressful environment in addition to the social pressure on nursing profession led to situation where health system should adapt an appropriate mechanism to minimize the problem [35]. In Saudi Arabia, the shortage in Saudi nurses is one of the top priority issues for ministry of health to solve, and the identification of factors affecting the profession is the first step to manage the situation [36]. Stress is negatively impacted in all health systems including Saudi health system, and this assumption is in line with the study done by Aburuz (2014) [37], which concluded that nurses face a global problem with stress, which has a negative impact on job satisfaction. Nurse managers should take steps to reduce stress in order to enable their nurses operate more efficiently and effectively. It is critical to document the causes and amount of stress in any healthcare setting in order to provide effective therapies.

However, this systematic review has used scientific search strategy and all available studies were included in the review; it has several limitations such as not all studies have used the same scale for measuring stress or coping strategies which make it difficult to compare and judge, so the appropriate current situation on the stress and resilience in the included countries are not appropriately compared. Another limitation is that only five studies which satisfied that inclusion criteria were included in this review. So, the authors recommend that a comprehensive analysis of the stressors facing nursing students and meta-analysis of the current situation should be studied, and more studies should be considered. Furthermore, studies on all healthcare providers should be addressed in upcoming systematic review and ensure all parts of the situation are covered.

**Conclusion**

The current systematic review showed that nursing students exposed to high level of stress in all included countries (the Philippines, Saudi Arabia, the USA, the UK, and China) during the pandemic of COVID-19, and they developed appropriate coping strategies to face the situation.
Statement of Ethics

This is not applicable because this systematic review is based on published articles, and there is no involvement of human bodies.

Conflict of Interest Statement

We would like to confirm that there are no financial and personal relationships with other people or organizations that could inappropriately affect our work. We also would like to assure that we have no conflicts of interest related to publication of this systematic review.

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Author Contributions

All the authors participated in this study. Waled A.M. Ahmed is the principal investigator and the main author and has worked with co-authors (Yahya Hussein Ahmed Abdulla, Mugahed Ali Alkhadher, and Faroq Abdulghani Alshameri) in preparing the protocol and searching for articles. They also worked in drafting and revising the manuscript and finally approved the review before submission. They also consent for their agreement on all aspect of work and accuracy of the work.

Data Availability Statement

All data generated or analyzed during this study are included in this article and its online supplementary material. Further inquiries can be directed to the corresponding author.
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