Original Article

Prevalence and Predictors of Fatigue among Thai Women after COVID-19 Infection

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Abstract

Background: Several people suffered from fatigue after recovering from coronavirus disease 2019 (COVID-19). However, limited studies focused on fatigue in women who recovered from COVID-19 infection. This study aimed to investigate the prevalence of fatigue among Thai women after COVID-19 infection and to identify predictive factors, including depression, anxiety, fear, and insomnia. **Materials and Methods:** A cross-sectional research design using convenience sampling was conducted from October 2022 to January 2023. A total of 142 Thai women after COVID-19 infection were recruited from two urban communities located in the Bangkok Metropolitan area, Thailand. The participants completed self-reported questionnaires, including the demographic and illness-related data questionnaire, the Depress Anxiety Stress Scales, the Insomnia Severity Index, the Fear of Progression Questionnaire, and the Fatigue Severity Scale. Data were analyzed using mean, standard deviation, range, Pearson's product-moment correlations, and stepwise multiple regression. **Results:** All (100%) participants returned the questionnaires. After recovering from COVID-19 infection for at least 1 month or longer, 39.40% of the participants reported fatigue. The multiple regression analysis revealed that fear, anxiety, and insomnia collectively contributed to 47% of the variance in the participants' fatigue ($R^2 = 0.47$; $p < 0.001$). **Conclusions:** Nearly two-quarters of Thai women after recovering from COVID-19 infection experienced fatigue. To prevent fatigue among Thai women after COVID-19 infection, it is necessary to help them overcome feelings of fear and anxiety. Furthermore, nursing interventions aiming to alleviate insomnia should be implemented.

Keywords: *Anxiety, fatigue, insomnia, long COVID, women and health*

Introduction

Globally, coronavirus disease 2019 (COVID-19) has rapidly spread. Since the first case of COVID-19 was reported in China, the number of cases increased exponentially. At the time of revising this manuscript [April 29, 2024], there have been 704,753,890 cases and 7,010,681 deaths globally and 4,770,149 cases and 34,586 deaths in Thailand.[1] During recovery from COVID-19, patients might experience fatigue. Existing literature reports a prevalence of fatigue ranging from 22% to 63% after COVID-19 infection.[2-4] Patients, both hospitalized and non-hospitalized, experienced fatigue for at least 1–12 months.[2-4] Previous studies have noted that fatigue is more prevalent among women than men.[5,6] Fatigue affects many health domains, including physical, psychological, spiritual, and social health such as declining levels of activities of daily living, increasing levels of stress, and avoiding participation with friends and family members.[7,8] Gender, physical, psychological, situational, and functional performance factors are related to fatigue.[9] Depression, anxiety, fear, and insomnia are associated with fatigue in patients who have recovered from COVID-19 infection.[3,4]

Although existing studies indicated that the majority of people after COVID-19 infection experienced fatigue, research on fatigue among women after COVID-19 infection is limited. Most studies assessed fatigue using only one item. Researchers have rarely used a standardized instrument for measuring fatigue in this population. Studies have not examined fatigue after COVID-19 infection in Thailand, especially in Bangkok. Not only has Bangkok reported the highest number of COVID-19 cases in Thailand, but also the majority of these cases have occurred in adults. In addition, more than a quarter of the resident

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Access this article online

Website: https://journals.lww.com/jnmr

DOI: 10.4103/ijnmr.ijnmr_285_23

Quick Response Code:

How to cite this article: Jitpanya C, Maninet S, Saengkham P. Prevalence and predictors of fatigue among Thai women after COVID-19 infection. Iran J Nurs Midwifery Res 2024;29:563-7.

Submitted: 24-Sep-2023. **Revised:** 01-Jun-2024. **Accepted:** 06-Jun-2024. **Published:** 04-Sep-2024.

population of Bangkok is made up of migrant Thais from all parts of the country. Therefore, the study findings could be generalized to people across Thailand. Hence, our study aimed to explore: 1) the prevalence of fatigue, 2) the factors related to fatigue, and 3) the predictive factors of fatigue among Thai women after COVID-19 infection. The results of our study offer valuable insights into the contextual information and associated factors of fatigue. This contribution is vital in developing effective intervention strategies to reduce fatigue among women after COVID-19 infection. Furthermore, the findings of this study could help nurses to screen women suffering from fatigue and prevent factors that could increase the severity of fatigue.

Materials and Methods

We conducted a cross-sectional design from November 2022 to January 2023. The sample size was calculated using the power analysis approach. Regarding a previous study that investigated post-COVID-19 fatigue in women,[10] G*Power software version 3.1.9.7 was utilized, considering a statistically significant level of 0.05, a power of test of 0.90, and an effect size of 0.24. Therefore, the minimum required sample size was 142. Using a convenience sampling technique, we recruited individuals who met the inclusion criteria, including those aged 18 years or older from two urban communities located in the Bangkok Metropolitan area, Thailand, having tested positive for COVID-19, a history of being as either outpatients or inpatients of tertiary hospitals or being quarantined at community centers/homes, with more than 1 month since the onset of COVID-19 infection, and living in two urban communities of Bangkok Metropolitan areas. We excluded people who could not communicate accurately.

This study employed five research instruments. First, a demographic and illness-related data questionnaire was developed by the researchers to collect information, including age, marital status, education, weight, height, body mass index, comorbidity, and the number of COVID-19 vaccine doses administered. Second, the Thai version of Depress Anxiety Stress Scales (DASS-21) was used in this study.[11] The DASS-21 was widely validated and applied in numerous studies worldwide, including convergent and construct validity.[10,12] This self-report instrument has three subscales for measuring negative emotional states: depression (7 items), anxiety (7 items), and tension/stress (7 items). Participants read the item and chose a number 0, 1, 2, or 3, indicating how much they related the item to themselves during the past week. Each subscale's score was calculated by adding up the scores of the seven items and then multiplying by 2 to obtain the total score. Researchers utilized only two subscales of the DASS 21: depression and anxiety. The reliability as tested by Cronbach's α of depression and anxiety subscales was 0.79 each. Third, the original English version of the Insomnia Severity Index (ISI)[13] was translated into the Thai language by researchers to measure the severity of nighttime and daytime components of insomnia. It had seven items. Participants responded to items by choosing the number 0, 1, 2, 3, or 4, indicating their sleep problems. The total score was calculated by adding up to seven items. Total scores were interpreted into four categories: no clinically significant insomnia (0–7); subthreshold insomnia (8–14); clinical insomnia, moderate severity (15–21), and clinical insomnia, severe (22–28). In the present study, the Content Validity Index (CVI) of the ISI was checked by a panel of five experts (the calculated CVI was 0.90). The reliability tested by Cronbach's α of the ISI was 0.95. Fourth, the Thai version of the Fear of Progression Questionnaire (FoP-Q-12)[14] was used. It had 12 items with a 5-point Likert scale for each item, ranging from 1 (never) to 5 (very often). The total score ranged from 12 to 60. A score of 34 or above indicated a dysfunctional level of fear. Five health experts evaluated FoP-Q's validity; its CVI was 0.80. The internal consistency method was used to assess the scale's reliability, confirmed to be 0.92 by using Cronbach's alpha. Fifth, the Thai version of the Fatigue Severity Scale (FSS) was used to collect the data.[15] This 9-item required the participants to rate their level of fatigue by choosing a number from 1 to 7. The total score was calculated by adding up nine items and then dividing by 9. The cutoff score of 4 or more was indicative of fatigue. A study in Thailand reported great content validity (CVI = 1.0) and reliability for the questionnaire with Cronbach's α of 0.92.[15] The reliability of the FSS in the present study tested by Cronbach's α was 0.95.

A team of three researchers and 16 nurses collected the data. The team performed data collection at two community centers located in the Bangkok Metropolitan areas, Thailand. Nurses and health volunteers directly distributed study flyers to the participants. If potential participants were interested in the study, the researchers made an appointment with them at the community centers. If the inclusion criteria were met and they were willing to participate, then community health volunteers introduced the researchers to the participants. The researchers clarified the purposes, benefits, risks, and rights of the patients. Later, the researchers asked them to sign the consent forms and explained how to answer the questionnaires. The researchers collected the questionnaires personally. For data analysis, we used descriptive statistics to delineate characteristics of demographic and illness-related data. Frequency and percentages were used for categorical variables. Mean and Standard Deviation (SD) were used for continuous data. If some data points were outliers, we also used the median. The relationships among the studied variables were tested using Pearson's product-moment correlations. We conducted stepwise multiple regression analysis and entered the data into Statistical Package for the Social Sciences (SPSS) version 29.0.1 (SPSS Inc.,

Chicago, IL, USA; concurrent use license provided by Chulalongkorn University).

Ethical considerations

This study was approved by the Institutional Review Board of Chulalongkorn University Group 1 (Approval No.: COA 650119/2022 on October 14, 2022) and Police General Hospital (Approval No.: COA 60/2022 on October 2, 2022). All participants signed consent forms before enrolling in the study.

Results

In this study, the response rate was 100%. The majority of them got married (50%), believed in Buddhism (95.80%), completed primary school (44.80%), were employed (72.50%), and were adults (69.70%). The mean (SD) age of the participants was 51.75 (14.23) years (range: 19–82 years). The mean of their body mass index was 25.34 (SD = 5.13) kg/m^2 (range: 13.97–43.75 kg/m^2). The mean number of COVID-19 vaccine doses administered was 2.89 (SD = 0.96) (range: 0–≥5 doses). Most of them experienced COVID-19 infection for the first time (88.70%). Furthermore, the majority of participants had no comorbidities (77.46%). Some participants (22.54%) reported existing comorbidities such as dyslipidemia, hypertension, and diabetes mellitus. Table 1 shows that the prevalence of fatigue in Thai women after COVID-19 infection was 39.40%. In Table 2, the current study found a large positive association between fear and fatigue (r = 0.52, $p < 0.001$). Anxiety and depression showed a medium positive association with fatigue (r = 0.37 and 0.36, respectively; $p < 0.001$). In addition, insomnia had a small positive correlation with fatigue (r = 0.28, $p < 0.001$). The multiple regression analysis showed that only three independent variables (fear, anxiety, and insomnia) together explained for 47% of the variance in fatigue among the participants ($R^2 = 0.47$; $p < 0.001$) and could potentially predict fatigue [Table 3].

Table 1: Percentage and numbers of participants experienced fatigue

	Frequency	Percentage
No fatigue (FSS* score <4)	86	60.60
Fatigue (FSS score ≥4)	56	39.40

*Fatigue Severity Scale

Table 2: Factors related to fatigue among Thai women after COVID-19 infection

Variables	Fear	Anxiety	Depression	Insomnia	Fatigue
Fear	1				
Anxiety	0.37**	1			
Depression	0.39**	0.67**	1		
Insomnia	0.38**	0.34**	0.31**	1	
Fatigue	0.52**	0.37**	0.36**	0.28**	1

**p<0.001

Discussion

The current study findings showed that 39.40% of women experienced fatigue after COVID-19 infection. This finding aligns with a previous study that reported the pooled prevalence of fatigue among people post-COVID-19 recovery of approximately 35%, particularly at 60 and over 90 days of follow-up.[2] One study conducted in Italy indicated that from 1 month to 12 months post COVID-19 infection, 34% of women reported fatigue.[16] However, researchers in Spain revealed that 42.80% of women who recovered from COVID-19 experienced fatigue.[17] Another study in India found that 61.20% of the participants experienced fatigue.[18] The lower incidence of post-COVID-19 fatigue in the current study resulted from the fact that 66.90% of the participants received at least three doses of COVID-19 vaccine. A systematic review supported the association between reduced risks of long COVID-19 and the number of vaccine doses, especially for those who received more than two doses.[16] Some Thai women who experienced fatigue post COVID-19 avoided providing information to health authorities because of "stigma." In Thailand, being infected with COVID-19 might lead to stigma. Thai women felt that COVID-19 infection forced them into "social isolation."[19] They were isolated due to being perceived as infectious or dangerous to those around them. They felt that they were rejected from their own environment, including family, friends, home, workplace, and school. Reporting any symptoms might imply that they were not considered cured.[20]

As this study's findings showed, fear, anxiety, and insomnia predicted fatigue among Thai women after COVID-19 infection. These three psychological factors jointly affected fatigue. People infected with COVID-19 experienced fear as one of the negative emotions.[9,10,20] Most women perceived COVID-19 as a threat. Fear later stemmed from the COVID-19 threat. In the current study, participants perceived fear in various forms, including fear

Table 3: Predicting factors of fatigue among Thai women after COVID-19 infection

	Unstandardized Coefficients *B*	Std. Error	Standardized Coefficient Beta	*t*	*P*
(Constant)	8.89	2.50		3.56	0.001
Fear	0.62	0.12	0.39	0.39	0.000
Anxiety	1.33	0.37	0.27	0.27	0.001
Insomnia	0.40	0.16	0.18	0.18	0.012

R=0.69; R^2=0.47; Adjusted R^2=0.46; Standard Error=12.29

of social isolation, fear of being less productive at work, fear of economic uncertainty, and fear that their loved ones might get infected. In addition, fear of death was reported among the participants. They received information concerning COVID-19 through social media and health personnel, which portrayed COVID-19 as a serious and life-threatening disease. When the patients experienced fear, they were more likely to experience fatigue.

Another negative emotion, anxiety was a predictor of post-COVID-19 fatigue in the current study. Existing studies in the United States of America and India revealed that anxiety potentially contributed to fatigue in women who faced COVID-19.[10,13] Previous studies reported a positive association between fear of COVID-19 infection and anxiety.[16,18] Patients often felt worried when they were infected with COVID-19. They might think that bad things would happen, such as long COVID or dying. When they felt anxious, their hypothalamus, pituitary, and adrenal glands released hormones. This led to experiencing physical symptoms such as increased heart rate, dry mouth, and muscle tension. They experienced fast and shallow breathing. These physiological responses caused fatigue.[13] The third predictor was insomnia. The current study found that the prevalence of insomnia among Thai women following COVID-19 infection was 56.30%. Existing studies in several countries reported that people experienced a prevalence of insomnia ranging from 19.70% to 36.70% after recovering from COVID-19 infection.[21-24] Experiences of insomnia among patients post COVID-19 varied. They might have trouble getting to sleep at night, waking up frequently during the night, waking up early in the morning, or have a combination of these problems. Insomnia or poor sleep could lead to negative physiological consequences, ultimately causing fatigue.

The results of this study have several implications. Nurses should assess fatigue among women who have recovered from COVID-19 infection by using a valid and reliable scale to understand its nature. They should ask the women to fill out questionnaires related to their feelings of fear, anxiety, and sleep habits. Developing standardized clinical practice guidelines to alleviate post-COVID-19 fatigue would help nurses in making decisions and providing proper care. For further research studies, researchers need to explore the longitudinal, and causal relationships among these variables. Healthcare providers should develop multicomponent interventions aimed at reducing fatigue among women after COVID-19 infection. These interventions should include strategies to reduce post-COVID-19 fatigue, such as implementing an online chatting application, utilizing psychological therapy techniques to decrease fear and anxiety, and providing tips for enhancing better sleep. The current study had several strengths. First, the research paper investigated fatigue after COVID-19 infection and its predictors by using standardized instruments. All instruments in the current study were multi-item measures. All measures presented evidence supporting their validity and reliability. In contrast, some previous studies assessed each variable with a single direct question. For example, "Did you think you have fatigue?" The limitation was that providing evidence for the reliability of a one-item measure was very difficult. Second, the participants of the current study responded to the questionnaire themselves. If they did not understand any items, they were able to ask the researchers directly for clarifications.

However, our study has some limitations. First, a cross-sectional design only allowed us to refer to associations among variables, not to make causal inferences. Second, the current study might have a selection bias. Patients with uncontrolled comorbidities were more likely to die or to stay in hospitals for longer periods. They had a low chance of being the participants. Thus, participants with pre-existing comorbidities, such as dyslipidemia, diabetes, and hypertension, who were recruited in the current study had their diabetes, hypertension, and dyslipidemia controlled. This issue might mitigate the effect of pre-existing comorbidities on fatigue. Therefore, caution is needed when generalization of the study results.

Conclusion

The prevalence rate of fatigue (39.40%) in women recovering from COVID-19 highlights some concerns to health personnel. We recommend that healthcare providers should develop standardized clinical practice guidelines to alleviate post-COVID-19 fatigue. Interventions should be tailored according to symptoms. For example, the guidelines should emphasize the strategies for decreasing fear of COVID-19 and anxiety. Finally, healthcare providers should encourage the adoption of appropriate sleep enhancement guidelines.

Acknowledgments

The authors would like to thank all participants who took part in this study.

Financial support and sponsorship

Nil.

Conflicts of interest

Nothing to declare.

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