

# THE RELATIONSHIP BETWEEN PSYCHOLOGICAL STRESS WITH BREASTFEEDING FREQUENCY AND BREASTMILK VOLUME DURING THE COVID-19 PANDEMIC

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## ABSTRACT

Breastfeeding mothers have limited access to healthcare facilities during the pandemic, thus raising their risk of psychological stress. This study aimed to analyze the correlation between psychological stress with breastfeeding frequency and breastmilk volume. A cross-sectional survey was conducted with 120 exclusively breastfeeding mothers. The Perceived Stress Scale (PSS) was employed as a stress assessment indicator measuring tool. The measurement of breastmilk volume was performed using a manual breast pump two hours before or after the baby suckles to restore milk production. The frequency of breastfeeding was calculated by adding up the number of times the baby is breastfed in a day. The chi-square test was used in this study. It was found that 68 respondents (56.7%) reported experiencing mild to moderate stress. Stress levels were found to have a significant connection with breastfeeding frequency and breastmilk volume ( $p < 0.05$ ). The respondents who experienced severe stress have a 2.63-times higher risk for breastfeeding  $< 8$  times/day and 33.2 times higher risk of producing breast milk  $< 100$ cc than respondents who experienced mild-moderate stress. Concerns about the psychological stress of breastfeeding mothers highlight the critical need for good mental health and broader help from families during the pandemic.

Keywords: Breastfeeding; COVID-19; psychological stress



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## INTRODUCTION

Breastfeeding support for mothers is the current public health priority during the COVID-19 epidemic. Many investigations have found no evidence of SARS-CoV-2 transmission through breastmilk in SARS-CoV-2 patients (Chambers C et al., 2020; Dumitriu et al., 2021; Groß R et al., 2020). Furthermore, the SARS-CoV-2 antibodies found in breastmilk have a strong immunological response to the virus. This clinical research supports global recommendations for women to continue breastfeeding during the pandemic to boost infant health and immunity (Fox et al., 2020; Pace et al., 2021; UNICEF, 2020; van Keulen et al., 2021; WHO, 2020).

From March to August 2020, the COVID-19 outbreak in Indonesia resulted in severe social restrictions and stay-at-

home regulations. Since then, the incidence of SARS-Cov-2 cases has been relatively low, but then grew in the same year and the second wave of COVID-19 occurred, prompting the implementation of a policy of Enforcement of Community Activity Restrictions in May-August 2021 (John Hopkins University, 2020). For breastfeeding mothers, policies related to the pandemic in Indonesia (such as the lockdown) have resulted in a reduction in direct assistance from spouses, extended family, and professional services. These factors, in addition to financial uncertainty, can lead to psychological stress.

Furthermore, the mental health and well-being of breastfeeding mothers are a public health concern, particularly during the current pandemic conditions (Ceulemans M et al., 2020; Spatz et al., 2021; Taylor et al.,

2021). In this situation, support for new mothers' breastfeeding is severely limited, especially in terms of acquiring access and adapting to the environment during the epidemic. These conditions have caused mothers to have an excess of parental obligations, including their role in the family. Thereby contributing to why mothers are disproportionately affected by the pandemic and lockdown (Snyder & Worlton, 2021; Wenham et al., 2020).

Numerous studies have proven that the psychological state of breastfeeding mothers will decrease their breastfeeding quality (Krol & Grossmann, 2018; Shiraishi et al., 2020; Witten et al., 2020). Previous research has shown that a lack of support was noticed from the home environment's health community network. However, these studies did not explore psychological stress and its impact on breastfeeding mothers (Gonçalves-Ferri et al., 2021). Another study investigated the content of breastmilk in mothers who experienced stress during the pandemic (Juncker et al., 2022; Ziolkiewicz et al., 2021). Nevertheless, there are limited studies that have measured the effect of psychological stress on breastfeeding frequency and breastmilk volume during the pandemic. This study aimed to investigate the possible correlation between breastfeeding mothers' psychological stress to breastfeeding frequency and breastmilk volume.

## METHOD

### Study design

A cross-sectional study was conducted in Yogyakarta's Special Region from January to March 2021. A municipality and four district cities were selected for this investigation. Eligible participants were approached at their residences by using a list of names provided by the Public Health Care (PHCs), and convenience sampling was utilized to recruit them.

### Sample

The sample size was not calculated, and a consecutive sampling method of sample selection was used. This study was comprised of a total of 120 mother-infant dyads with babies under the age of six months. Mothers who gave birth after more than a 37-week gestation period, had a baby weighing >2500 grams, had never formula fed their babies, and were impacted by the pandemic (experienced financial problems, e.g., layoffs, lower monthly wages, and lower daily earnings) were eligible for this study. The exclusion criteria included mothers who had undergone breast surgery, experienced postpartum problems, such as hemorrhagic postpartum or postpartum infection, or if the infant had neonatal abnormalities, such as labioschisis or labiopalatoschisis, or a history of admission to a neonatal critical care unit.

### Instrument

Mother's age, parity type, employment status, and education level were the demographic variables assessed in this study. The Perceived Stress Scale (PSS) was employed as a stress assessment indicator measuring tool. The respondents' level of unpredictability, uncontrollability, and overburden in their lives was measured using a 10-item scale. The results obtained then measured the respondents' level of stress, from mild-moderate stress (total score 1-26) and severe stress (total score >26) (Andreou et al., 2011; Cohen & Williamson, 1988; Cohen et al., 1983; Okinarum et al., 2020). The respondents were asked how often they felt specific emotions during the COVID-19 pandemic over the previous

month, with four positive words and six negative words on the list. A higher score would indicate a stressed person.

The measurement of breast milk volume was conducted by using a manual breast pump two hours before or after the baby suckles to restore the mother's milk production. Before feeding the baby, both breasts were pumped for 30 minutes or until there were no release of milk after pumping for two minutes. This pumping process were repeated three times per day, and the average was calculated. Breast milk volume was measured by using a measuring tube in cc units. The frequency of breastfeeding was calculated by adding up the number of times the baby was breastfed in a day, which could be 8 times per day or more than 8 times per day (Morton et al., 2009; Parker et al., 2015).

### Data collection

All PHCs were visited in Yogyakarta to obtain data on the number of breastfeeding mothers. The mothers were then contacted to determine whether they were eligible to be respondents based on the inclusion and exclusion criteria. After confirming that they were eligible and agreed to be respondents, each respondent's house was visited to collect data.

A form was used to collect and record data on the frequency of breastfeeding for 24 hours. Due to the pandemic conditions at the time of the study, the researchers were not permitted to repeatedly contact respondents in person. Thus, the respondents were asked to complete a form for each breastfeeding session. Then, the researchers provided a standardized electric breast pump to be used by the respondents. After pumping their breasts, the respondents were instructed to take a photo of their expressed breast milk results and placed them in a measuring cup provided by the researcher. The findings were then recorded on the form.

### Data analysis

Both univariate and bivariate methods were used in the data analysis project. The frequency distribution of the variables from the univariate analysis was obtained. The Chi-square test was also employed in the bivariate analysis to investigate the correlations between variables.

### Ethical considerations

This study has been approved by The Research Ethics Committee, Faculty of Health Sciences, Universitas Respati Yogyakarta, Indonesia, with the number: 219.3/FIKES/PLX/2020.

## RESULTS

The majority of respondents in this study were primiparas, aged 20-35 years, unemployed, and have a good level of education. Based on the stress measurement conducted using PSS, it was found that a higher number of respondents experienced moderate-severe stress than mild stress. In addition, the majority of respondents breastfeed their children 8 times/day. However, regarding the volume of breastmilk, most respondents had a breastmilk volume of <100cc (Table 1). The stress experienced by the respondents has a significant relationship to the frequency of breastfeeding and their breastmilk volume ( $p$ -value < 0.05) (Table 2 and Table 3). Based on the results of the Odds Ratio (OR), the respondents who experience severe stress have a 2.613-times greater risk for breastfeeding <8 times/day (Table 2) and are 33.213 times at greater risk of producing breastmilk <100cc than respondents who have mild stress (Table 3).

**Table 1. Participants' characteristics (n=120)**

Variables	n	%
Age		
<20	22	18.3
20-35	70	58.3
>35	28	23.3
Parity		
Primiparous	78	65
Multiparous	42	35
Employment status		
Unemployed	76	63.3
Working	44	36.7
Educational level		
Junior high school	8	6.7
Senior high school	78	65
Diploma or above	34	28.3
Stress level		
Mild-moderate	68	56.7
Severe	52	43.3
Breastfeeding frequency		
<8 times/day	35	29.2
≥8 times/day	85	51.8
Milk Volume		
<100 cc	62	51.7
≥100 cc	58	48.3

**Table 2. The relationship between stress level and breastfeeding frequency (n=120)**

Variables	Breastfeeding frequency		p-value	OR	CI 95%
	<8 times/day n (%)	≥8 times/day n (%)			
Stress level					
Mild-moderate	14 (40.0)	54 (63.5)	0.031	2.613	1.165-5.860
Severe	21 (60.0)	31 (36.5)			

**Table 3. The relationship between stress level and milk volume (n=120)**

Variables	Milk Volume		p-value	OR	CI 95%
	<100 cc n (%)	≥100 cc n (%)			
Stress level					
Mild-moderate	15 (24.2)	53 (91.4)	0.000	33.213	11.216-98.355
Severe	47 (75.8)	5 (8.6)			

## DISCUSSION

Previous studies have shown that breastfeeding mothers are more susceptible to mental illnesses (Jiang et al., 2022; Krol & Grossmann, 2018). The COVID-19 outbreak in Indonesia has exacerbated this vulnerability. While breastfeeding, mothers frequently feel a strong feeling of obligation to provide the best possible care for their infants. However, they may experience stress due to their dread of meeting new people and becoming infected with the virus and spreading it to their infants (Ceulemans et al., 2020; Vassilopoulou et al., 2021). Due to social restrictions, the COVID-19 pandemic may have had an impact on these mothers, such as their spouses losing their jobs, reduced income, and lack of aid from family members for breastfeeding. Therefore, breastfeeding women may experience stress as a result of this indirect impact (Brown & Shenker, 2021; Spatz et al., 2021).

Furthermore, previous research has shown that parity and education level have a consistent impact on stress in breastfeeding mothers (Hendaus et al., 2018; Shiraishi et al., 2020). In contrast, age has been found in multiple studies to have no meaningful link with a mother's breastfeeding behavior (Khasawneh & Khasawneh, 2017; Witten et al., 2020). Some respondents are between the ages of 20 and 35, which is the best age for giving birth and breastfeeding to

lower the risk of stress. Scientific literature has indicated that a lower risk of bearing babies is seen in a maternal age of 20-30 years (Bellieni, 2016; Gossett et al., 2013).

The majority of the respondents in this research had a high school education or higher. Mothers with a higher level of education have more opportunities to learn about the benefits of breastfeeding, which increases their enthusiasm to nurse their newborns (Khasawneh & Khasawneh, 2017; Shiraishi et al., 2020).

Next, the majority of the respondents are primiparous. Compared to primiparous mothers, multipara mothers were also more likely to exclusively breastfeed since they had experience with the benefits of breastfeeding on their babies' growth and development. Furthermore, our findings support the contention that among multiparous mothers, it is the breastfeeding experience rather than the childrearing experience that influences later breastfeeding practices (Bai et al., 2015). In primiparous mothers, pressure from family and societal conventions or culture might damage the mental health of primiparous moms, leading them to opt not to breastfeed their babies (Hendaus et al., 2018; Shiraishi et al., 2020).

According to the majority of breastfeeding mothers who participated in this study, occupation can also impair the

efficiency of exclusive breastfeeding. Past studies have suggested that working mothers who breastfeed have trouble maintaining exclusive breastfeeding due to their hectic schedules and inability to bring their babies to work. Moreover, if the household does not have a maid, the duty of being a housewife exacerbates this problem as mothers would become too exhausted to breastfeed their children after doing chores (Ejie et al., 2021; Hendaus et al., 2018).

In this study, 52 people reported experiencing severe stress. Previous research has shown that COVID-19 harms the mental health of breastfeeding mothers. Breastfeeding women can face sadness and anxiety symptoms in addition to stress (Ceulemans et al., 2020). Stress on breastfeeding mothers will affect the quality of breastfeeding if it is not recognized and managed (Gila-Díaz et al., 2020).

Furthermore, the findings of this study show that there is a correlation between breastfeeding mothers' stress with the frequency of breastfeeding and the volume of breastmilk they produce. In comparison to sociocultural influences, employment, and family, breastfeeding women's psychological aspects have the greatest influence on breastfeeding patterns. Psychological factors (stress) have been shown in various nations to shorten the duration of breastfeeding (Gila-Díaz et al., 2020; Shiraishi et al., 2020). According to this study, mothers who are under a lot of stress have a greater risk of breastfeeding <8 times/day and producing breastmilk of <100 cc (average per day; three times expressing breastmilk). Breastfeeding frequency has been proven to be negatively affected by stress (Foligno et al., 2020). Although prior research has demonstrated that stress has no direct effect on decreasing breastmilk volume (Shiraishi et al., 2020), the hormone cortisol rises in response to stress in the mother. Cortisol levels under mild stress will aid the mother to adapt to and even resolve the stressor. The excessive rise of cortisol levels during moderate-to-severe stress interferes with the normal functioning of the hypothalamic-pituitary-adrenal (HPA) axis. This dysfunction will make the mother more vulnerable to physical disease and increase her risk of developing more serious mental illnesses. This will consequently jeopardize the mother's dedication to breastfeeding. Moreover, high cortisol levels in stressed nursing mothers will cause the cortisol levels in their infants to also rise (Spratt et al., 2016).

Previous research has shown that mothers who are committed to breastfeeding might lessen their stress levels (Krol & Grossmann, 2018; Mizuhata et al., 2020). The level of oxytocin in the mother's blood rises after she breastfeeds. Oxytocin is responsible for limiting the release of cortisol, which means that when a mother is breastfeeding, cortisol, as well as the mother's stress, is managed, and the amount of cortisol in the baby is reduced (Shiraishi et al., 2020). As a result, stress management in breastfeeding mothers is a critical action that needs to be conducted by mothers, families, and healthcare providers. This is because breastfeeding support increases the confidence of breastfeeding mothers and has a positive impact on achieving exclusive breastfeeding (Kartikasari et al., 2020).

The limitation of this research is this study used the same model of standardized manual breast pump, but various pumping methods were used; some only used the manual breast pump, while others also combined technique by hand. This could have an effect on the overall volume, resulting in a relatively large value in its OR.

## CONCLUSION AND RECOMMENDATION

This study presents the most recent information on the influence of the COVID-19 pandemic on breastfeeding mothers' stress levels, as well as the impact on breastfeeding frequency, and breastmilk volume. During the pandemic, our data revealed a relationship between stress levels and breastfeeding frequency and breastmilk volume. Breastfeeding mothers' elevated levels of stress, which continue throughout the pandemic, can limit breastfeeding frequency and milk supply. This cross-sectional study of breastfeeding mothers during the COVID-19 pandemic found that family and community support should still be provided to reduce psychological stress to achieve exclusive breastfeeding and improve the well-being of breastfeeding mothers.

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