

ORIGINAL RESEARCH

Determinants of Physical and Mental Health-related Quality of Life among Patients with Breast Cancer During COVID-19 Pandemic



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Abstract

Background: The concern surrounding the physical and mental health-related quality of life (HRQoL) among patients with breast cancer emerged during COVID-19. However, there is a lack of sufficient studies that have specifically addressed this issue. It is crucial to emphasize the evaluation of this aspect as it significantly impacts the enhancement of future physical and mental HRQoL for these patients.

Purpose: This study investigated the determinants of physical and mental HRQoL among patients with breast cancer during COVID-19.

Methods: In a cross-sectional study conducted between September and October 2022, participation involved 260 patients diagnosed with breast cancer, selected through convenience sampling. Our observation focused on assessing the outcomes of physical and mental HRQoL using the Short Form (SF-12) questionnaire for data collection. Additionally, the data underwent analysis via binary logistic regression.

Results: Respondents aged <50 years ($p=0.010$; $aOR=2.08$; $95\% CI=1.18-3.67$), unemployed ($p=0.022$; $aOR=2.29$; $95\% CI=1.16-4.53$), and had high depression ($p=0.026$; $aOR=2.41$; $95\% CI=1.13-5.12$) have a more likelihood to have low physical HRQoL. In addition, unemployed respondents ($p<0.001$; $aOR=4.15$; $95\% CI=2.14-8.04$) and had high anxiety ($p=0.004$; $aOR=2.71$; $95\% CI=1.38-5.33$) have more likelihood to have low mental HRQoL.

Conclusion: In this study, it was found that anxiety, depression, and unemployed respondents were associated with a higher likelihood of experiencing lower physical and mental HRQoL. Nurses and healthcare workers should prioritize addressing psychological issues such as anxiety and depression among breast cancer patients, emphasizing the necessity for interventions aimed at alleviating these concerns.

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1. Introduction

Acute respiratory distress syndrome is an outbreak of Coronavirus disease (COVID-19). The outbreak of the COVID-19 epidemic that began in December 2019 had a moderately severe impact and became the most critical and widespread pandemic of this century (Huang et al., 2020). COVID-19 spreads rapidly in the larger community, including patients with a clinical presentation of acute respiratory distress syndrome, and causes high morbidity and mortality (Hasan et al., 2020). The condition of COVID-19 leads to fear and anxiety that impact physical and mental health-related quality of life (HRQoL) (Shafran et al., 2021). Physical and mental health are integral components of an individual's overall quality of life. Physical health encompasses the state of the body, including aspects such as fitness, freedom from illness, mobility, and the ability to perform daily tasks without hindrance. On the other hand, mental health encompasses emotional, psychological, and cognitive well-being, influencing factors like emotional stability, coping mechanisms, interpersonal relationships, and adaptability to life's challenges. Both physical and mental health play pivotal roles in determining an individual's well-being and ability to lead a fulfilling and satisfying life (Folsom et al., 2009).

Breast cancer patients experience immunosuppression caused by cancer treatments, such as chemotherapy and other therapies. Decreased immunity puts them in a group that is more at risk of contracting the virus and suffering from complications of COVID-19 compared to the general population (Al-Quteimat & Amer, 2020; Al-Shamsi et al., 2020). During the COVID-19 pandemic, patients with breast cancer experienced severe mental disorders such as fear of being infected with COVID-19 during the chemotherapy process and even death (Erdoğan et al., 2022; Hikmat et al., 2022; Stanizzo et al., 2022). This condition also has an impact on physical condition and causes weakness (Yang et al., 2021). With conditions that continue to decline, this can have an impact on the quality of life of patients with breast cancer.

Patients with malignancy experience high levels of psychological distress. Fear of COVID-19 combined with interference with some treatment programs can affect the psychological health of cancer patients (Momenimovahed & Salehiniya, 2021). The COVID-19 pandemic has had an emotional impact, and previous research has shown that breast cancer survivors also feel emotional distress, such as exaggerated anxiety and depression related to a higher level of ruminative response and chronic worry (Choobin et al., 2021). The most commonly reported stressor was a higher level of concern regarding the experienced anxiety and depressive symptoms and a higher fear of cancer recurrence (Massicotte et al., 2021). The previous review studies have only evaluated the quality of life in general, not specific to physical and mental HRQoL, and not during the COVID-19 pandemic (Heidary et al., 2023; Mokhtari-Hessari & Montazeri, 2020; Yan et al., 2016). Thus, this original study aimed to investigate the determinants and analyze their correlation to physical and mental HRQoL among patients with breast cancer during the COVID-19 pandemic.

2. Methods

2.1 Research design

A cross-sectional study was designed to investigate the correlation between independent and dependent variables (Arifin et al., 2022). The study's reporting followed the guidelines outlined in the Strengthening the Reporting of Observational Studies (STROBE) framework for cross-sectional studies (Von Elm et al., 2007).

2.2 Setting and samples

The study was conducted from September to October 2022 at a government hospital and a university hospital in Padang, Indonesia. Both study locations were elected as a referral hospitals for cancer treatment in Padang. A total of 260 respondents were recruited using convenience sampling. The sample size is measured by G*Power analysis statistical app with $\alpha=0.05$, $\beta=0.20$, and effect size of 0.26 (medium effect size). Finally, the minimum sample size was 190-260 participants obtained based on the analysis (Cohen, 2013; Hohls et al., 2021). During the study process, no dropout respondents were found. All of the respondents met the criteria of 1) being female aged 18-60 years, 2) being diagnosed with breast cancer for at least six months, 3) having been during or undergoing chemotherapy and radiology, 4) communicating in the local language (Padang) and Indonesia language, 5) and having the commitment to participate in this study. In addition, respondents with cognitive impairment or psychiatric disorders (e.g., schizophrenia, psychosis, and depression) before the breast cancer diagnosis, were excluded from this study.

2.3 Measurement and data collection

The independent variables in this study included demographical data (age, marital status, educational level, and employment status), disease characteristics (cancer stages, cancer treatment, and disease duration), anxiety, and depression. Moreover, the dependent variables were physical and mental HRQoL. The general information sheet was designed to gather data on demographic and disease characteristics, encompassing details such as age, marital status, education level, number of children, employment status, cancer stages, cancer treatment, and disease duration.

Anxiety and depression were measured using the Hospital Anxiety and Depression Scale (HADS), consisting of seven items for depression and seven for anxiety (Zigmond & Snaith, 1983). Each item is rated on a four-point Likert scale (0 = not at all, to 3 = most of the time). The total score ranged from 0 to 21, indicating low anxiety and depression (0-7) and high anxiety and depression (8-21) (Zigmond & Snaith, 1983). The HADS-Indonesian version scale showed

acceptable internal reliability with a Cronbach's alpha of 0.85 for anxiety and 0.80 for depression, with the Kaiser-Meyer-Olkin statistics of 0.89 and Bartlett's test of sphericity (χ^2 (91, N=200) of 1052.38, $p < 0.001$ (Tiksnadi et al., 2023).

Physical and mental HRQoL was measured using the short form (SF-12) with 12-items and calculated following the scoring algorithm developed by Ware et al. (1996). SF-12 measures consist of two concepts, including Physical Component Summary (PCS-12) and Mental Component Summary (MCS-12). SF-12 consists of two components; first, the PCS-12 score is represented by six items: 1) general health with response categories excellent/very good/good/fair, 2) moderate activities, 3) climb several flights of stairs with response category limited a lot/limited/not limited at all, 4) accomplish less (physical), 5) limited in kind of work with response category all of the time/most of the time/a little of the time/none of the time, and 6) pain interference with response category not at all/a little bit/moderate/quite a bit/extremely. Second, MCS-12 is represented by six items: accomplish less (emotional), did work less carefully, calm and peaceful, energy or vitality, downhearted and blue, and social limitations. All items MCS-12 with response: all of the time/most of the time/a little of the time/none of the time. The PCS-12 and MCS-12 scores were computed and normalized for SF-12v2 according to published algorithms (Ware et al., 1996). Scores range from 0 to 100, with a higher score indicating better physical and mental health functioning. A score of 50 or less on the PCS-12 could be considered low physical functioning, while a score of 42 or less on the MCS-12 may be indicative of low mental health functioning (Soh et al., 2021; Ware et al., 1995). The SF-12 version 2 showed good internal reliability for PCS-12 with Cronbach's alpha of 0.83 for anxiety and 0.81 for MCS-12 (Soh et al., 2021).

The data collection process commenced after obtaining permission from the concerned hospitals, adhering to ethical guidelines. The primary method employed for data acquisition involved the administration of a structured questionnaire. To facilitate this process, the researcher, with the aid of a research assistant, conducted the data collection. The researcher and the assistant worked collaboratively, accompanying respondents throughout the questionnaire completion. This approach ensured a supportive environment, enabling respondents to address any queries or concerns they encountered while filling out the questionnaire. By maintaining a supportive presence, the researcher aimed to enhance respondent comfort and accuracy in providing necessary information for the study.

2.4 Data analysis

The data analysis was performed using IBM SPSS 22.0 software. Descriptive statistics comprised frequencies and percentages for categorical variables and mean and standard deviation (SD) for continuous variables. A Chi-squared test was used to examine the correlations between demographic characteristics and disease characteristics, anxiety, depression, and physical and mental HRQoL. The variables with a p -value of ≤ 0.20 in the Chi-squared test were further entered into the univariate logistic regression analysis to examine the association of these influential factors with physical and mental HRQoL (Mickey & Greenland, 1989). A multivariate logistic regression model was used to identify the significant predictors of the quality of life of breast cancer survivors after adjusting for confounding variables in the univariate logistic regression model ($p < 0.05$). All tests were two-tailed, with p -values less than 0.05 were considered statistically significant.

2.5 Ethical considerations

This study has been deemed ethically appropriate by the Health Research Ethics Committee of Dr. M. Djamil Hospital Padang, Indonesia (No. L.B.02.02/5.7/410/2022), in accordance with seven WHO 2011 standards. All study participants received a consent form describing the study's aim and providing adequate information for them to make an informed decision about their participation. Those participants willing to participate had to sign the form before completing the questionnaire, and participation was voluntary without any coercion.

3. Results

3.1 Demographics and disease characteristics of the respondents

In total, 260 eligible breast cancer survivors participated in this study. More than half of respondents (62.7%) were younger, with a mean age of 47.14 years (range, 18-60 years). Most

respondents were married (81.2%) and had a high education level (80.8%). Regarding the number of children, more than half (67.3%) of participants had ≤ 3 children and were unemployed (54.0%). According to the cancer characteristics, more than half of the participants were diagnosed in III or IV stages, and the majority received 2-3 treatments. Overall, the mean of the disease duration is 34.26 months. Furthermore, more than 50% had high anxiety, and less than 70% had low depression. From this study, more than half of respondents had low physical and mental health functioning related to quality of life (Table 1).

Table 1. Characteristics of respondents (n=260)

Variables	M(SD)	n	%
Age (years)	47.14(7.37)		
Younger (≤ 50 years old)		163	62.7
Older (> 50 years old)		97	37.3
Marital status			
Married		211	81.2
Widowed/Others		49	18.8
Education level			
Low		50	19.2
High		210	80.8
Number of children			
≤ 3		175	67.3
> 3		85	32.7
Employment status			
Employed		105	40.4
Unemployed		155	59.6
Cancer stages			
I and II		118	45.4
III and IV		142	54.6
Cancer treatment			
1 treatment [†]		37	14.3
2-3 treatment [*]		222	85.7
Disease duration (months)	34.26(26.91)		
≤ 24 months		145	55.8
> 24 months		115	44.2
Anxiety	7.48(4.22)		
Low anxiety		123	47.3
High anxiety		137	52.7
Depression	5.67(3.80)		
Low depression		192	73.8
High depression		68	26.2
Physical health functioning	42.88(7.34)		
Low		139	53.5
High		121	46.5
Mental health functioning	42.53(10.93)		
Low		134	51.5
High		126	48.5

Notes:

[†] Surgery, chemotherapy, radiotherapy; ^{*}Surgery and, or chemotherapy and radiotherapy and others
M: Mean; SD: standard deviation

3.2 The correlation of demographic and disease characteristics, anxiety, and depression with physical and mental HRQoL

Table 2 shows the bivariate analysis of physical and mental HRQoL. In the physical HRQoL, age, number of children, employment status, cancer stages, anxiety, and depression showed a significant relationship with physical HRQoL ($p < 0.05$). Moreover, number of children, employment status, anxiety and depression had a significant correlation with mental HRQoL ($p < 0.05$). Furthermore, the variables with $p < 0.20$ were included in the multivariate analysis.

Table 2. The correlations of demography, disease characteristics, anxiety, depression, physical, with mental health-related quality of life (n=260)

Variables	Physical		X ²	p	Mental		X ²	p
	High f (%)	Low f (%)			High f (%)	Low f (%)		
Age (years)								
Younger (≤50)	69 (39.3)	99 (60.7)	9.29	0.002	76 (46.6)	87 (41.9)	0.59	0.443
Older (>50)	57 (58.8)	40 (41.2)			50 (51.5)	47 (48.5)		
Marital status								
Married	98 (46.3)	113 (53.6)	0.00	0.950	99 (46.9)	112 (53.1)	1.06	0.302
Widowed/Others	23 (46.9)	26 (53.1)			27 (55.1)	22 (44.9)		
Education level								
High	103 (49.0)	107 (51.0)	2.76	0.096	105 (50.0)	105 (50.0)	1.035	0.309
Low	18 (36.0)	32 (64.0)			21 (42.0)	29 (58.0)		
Number of children								
≤3	70 (40.0)	105 (60.0)	9.19	0.002	67 (38.3)	108 (61.7)	22.19	<0.001
>3	51 (60.0)	34 (40.0)			59 (69.4)	26 (30.6)		
Employment status								
Employed	70 (66.7)	35 (33.3)	28.68	<0.001	80 (76.2)	25 (23.8)	54.22	<0.001
Unemployed	51 (32.9)	104 (67.1)			46 (29.7)	109 (70.3)		
Cancer stages								
I and II	65 (55.1)	53 (44.9)	6.43	0.012	62 (52.5)	56 (47.5)	1.44	0.230
III and IV	56 (39.4)	86 (60.6)			64 (45.1)	78 (54.9)		
Cancer treatment								
1 treatment [†]	18 (48.6)	19 (51.4)	0.93	0.760	16 (43.2)	21 (56.8)	0.43	0.509
2-3 treatment [‡]	102 (45.9)	120 (54.1)			109 (49.1)	113 (50.9)		
Disease duration (months)								
≤24 months	66 (45.5)	79 (54.5)	0.13	0.711	67 (46.2)	78 (53.8)	0.66	0.414
>24months	55 (47.8)	60 (52.2)			59 (51.3)	56 (48.7)		
Anxiety								
Low anxiety	78 (63.4)	45 (36.6)	26.72	<0.001	84 (68.3)	39 (31.7)	36.75	<0.001
High anxiety	43 (31.4)	94 (68.6)			42 (30.7)	95 (69.3)		
Depression								
Low depression	107 (55.7)	85 (44.3)	24.92	<0.001	104 (54.2)	88 (45.8)	9.56	0.002
High depression	14 (20.6)	54 (79.4)			22 (32.4)	46 (67.6)		

3.3 Determinants of physical and mental HRQoL

Based on the multivariate analysis using binary logistic regression, respondents with younger age had 2.08 times more likely to have low physical health compared to older age (p -value: 0.010; aOR:2.08; 95% CI:1.18-3.67). Based on work status, respondents who did not work (unemployed) had 2.29 times greater to have low physical health rather than employed (p -value: 0.022; aOR: 2.29; 95% CI: 1.16-4.53). In addition, respondents with high depression had 2.41 times greater to have low physical health compared to low depression (p -value: 0.026; aOR: 2.41; 95% CI: 1.13-5.12). According to mental HRQoL, unemployed respondents had 4.15 times more likely to have low mental health compared to employed respondents (p -value: <0.001; aOR: 4.15; 95% CI: 2.14-8.04). Furthermore, respondents with high anxiety had 2.71 times greater to have low mental health compared to respondents with low anxiety (p -value: 0.004; aOR: 2.71; 95% CI: 1.38-5.33) (Table 3).

4. Discussion

Physical and mental health-related quality of life (HRQoL) becomes a critical concern for patients with breast cancer. This study explored the determinants affecting physical and mental HRQoL from the perspectives of demographics and physiological symptoms such as anxiety and depression. The correlation between age, employment status, and depression is discussed concerning physical HRQoL. Additionally, work status and anxiety are examined in relation to mental HRQoL.

Table 3. Multivariate analysis of physical and mental health–related quality of life

Variables	Physical health			Mental health		
	aOR	(95% CI)	p-value	aOR	(95% CI)	p-value
Age						
Older (>50 years old)	Ref.			NA		
Younger (≤50 years old)	2.08**	(1.18 – 3.67)	0.010	NA	NA	NA
Level of education						
High	Ref.			NA		
Low	1.03	(0.26 – 4.00)	0.966	NA	NA	NA
Number of children						
>3	Ref.			Ref.		
≤3	1.16	(0.61 – 1.18)	0.750	1.87*	(0.98 – 3.57)	0.057
Work status						
Employed	Ref.			Ref.		
Unemployed	2.29**	(1.16 – 4.53)	0.022	4.15***	(2.14 – 8.04)	<0.001
Cancer stages						
I and II	Ref.			NA		
III and IV	1.65	(0.94 – 2.89)	0.083	NA	NA	NA
Anxiety						
Low	Ref.			Ref.		
High	1.73	(0.89 – 3.33)	0.096	2.71***	(1.38 – 5.33)	0.004
Depression						
Low	Ref.			Ref.		
High	2.41**	(1.13 – 5.12)	0.026	0.79	(0.37 – 1.65)	0.533

Notes:

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

4.1 Physical HRQoL

In this study, respondents aged < 50 years were more likely to have low physical HRQoL. Physical activity is a crucial for better quality of life and ageing in the long-term care. This finding is contradicted with a previous study which stated that people aged < 50 years had better physical HRQoL (Jang et al., 2019). Studies stated that engaging in regular physical exercise significantly enhances individuals' physical HRQoL (Gill et al., 2013; Marquez et al., 2020; Wei et al., 2022). Low physical HRQoL at aged < 50 years can be influenced by disease and other risk behaviors, such as smoking and drinking that make it unable to carry out physical activities properly (Megari, 2013; Nari et al., 2021; Tran et al., 2022). However, this study is still limited to several variables, such as lifestyle, which might be associated with the low physical HRQoL in population aged < 50 years. Therefore, the addition of variables to the future studies is highly recommended.

In addition, respondents who were unemployed had more likely to have low physical HRQoL. Unemployment in cancer patients is correlated with increased financial burden, increased costs of living, and ongoing treatment (Mols et al., 2020). In addition, people who are working will have more physical activity, so they can increase their physical strength, and vice versa for people who are unemployed (Schutgens et al., 2009). However, a significant aspect during the COVID-19 pandemic is the situation where parents must manage both childcare and homeschooling (Vogelbacher); this situation can potentially impact physical HRQoL (Galanti et al., 2021; Tavares, 2017). In addition, with these conditions, it is widely reported that people experience increased stress, malnutrition characterized by increased body weight, and decreased physical HRQoL (Alshahrani et al., 2022; Majumdar et al., 2020; Muñoz-Corona et al., 2022).

Furthermore, this study also showed that respondents with high depression had more likely to have low physical HRQoL. This finding is similar with the previous studies (Cho et al., 2019; Fernandes et al., 2021; Hohls et al., 2021). The condition of the COVID-19 pandemic is an added burden that can induce depression among breast cancer patients. Moreover, this circumstance is compounded by uncertainties regarding recovery and the necessity for regular treatments like chemotherapy and/or radiation therapy (de Souza et al., 2014). Also, depressive conditions can exacerbate the severity of symptoms for people dealing with breast cancer (Wondimagegnehu et al., 2019). This has an impact on the immune system and physical conditions that can get weaker

(Wang et al., 2020). For this reason, it is very important to treat depression in patients with breast cancer, especially during the COVID-19 pandemic.

4.2 Mental HRQoL

Regarding the mental HRQoL, unemployed respondents were more likely to have low mental HRQoL. Patients with breast cancer who have no activity or low social relationships can cause a decrease in low mental health (Yang et al., 2022). Previous studies indicated that breast cancer patients experiencing stable physical health and engaged in work tend to exhibit higher mental HRQoL (Carreira et al., 2018; Jin, 2022). This correlation might be attributed to the supportive environment fostered by colleagues and the potential diversion of the patient's focus away from their illness (Finck et al., 2018). Consequently, it is suggested that breast cancer patients in favorable physical health conditions can actively engage in physical activities, maintain productivity, and cultivate strong social relationships, which can contribute positively to both their physical and mental quality of life. This recommendation emphasizes the potential benefits derived from staying physically active and socially engaged despite the challenges posed by the illness.

Patients with breast cancer experienced anxiety related to cancer treatments, fear of cancer recurrence and fear about uncertainties surrounding life and death (Baqtayan, 2012; Tiedtke et al., 2012). In addition, cancer patients also have anxiety regarding postponed appointments, delayed treatments, and limited access to medical facilities due to COVID-19 pandemic (Rucinska & Nawrocki, 2022). Furthermore, cancer patients are vulnerable to COVID-19 infection and had 60% increased risk of positive COVID-19 test compared with individual without cancer (Lee et al., 2021). These collective stressors may contribute to anxiety among patients with breast cancer, impacting their mental HRQoL. Therefore, it can make the healing process of the disease take longer (Carreira et al., 2018). Prior investigations have demonstrated a notable increase in anxiety levels among breast cancer patients amid the COVID-19 pandemic (Bartmann et al., 2021; Shah et al.; Stanizzo et al., 2022; Yasin et al., 2021). This surge in anxiety can be attributed to the fear associated with potential COVID-19 infection, intensifying concerns about the worsening of their existing medical condition and the heightened risk of mortality. Consequently, this finding places an augmented responsibility on nurses. Beyond addressing the complexities of cancer treatment, nurses are now compelled to provide interventions aimed at alleviating anxiety among breast cancer patients. Effective mental health management becomes crucial, encompassing strategies to regulate stress, depression, and anxiety levels. These interventions are essential to mitigate the amplified psychological distress experienced by breast cancer patients, thereby enhancing their overall well-being and coping mechanisms during this challenging period characterized by the pandemic.

5. Implications and limitations

In the context of the COVID-19 pandemic, understanding the nuances HRQoL among breast cancer patients has never been more critical. Our research underscores the profound role healthcare professionals play in shaping the QoL of these patients. During global crises, such as pandemics, external factors might exacerbate the mental and physical health challenges faced by breast cancer patients. Nurses should recognize the heightened challenges faced by breast cancer patients during crises like the COVID-19 pandemic and offer personalized care and interventions that address both physical and mental health concerns. This brings to the fore the crucial importance of tailored clinical interventions. Furthermore, our findings illuminate the necessity for systemic changes. Policymakers, armed with this knowledge, can champion reforms that embrace specialized care models during such crises.

This study offers empirical evidence to identify the determinants of physical and mental HRQoL among patients with breast cancer during the COVID-19 pandemic. However, several limitations should be considered. Firstly, the confirmation of causal relationships between risk factors and physical and mental health-related quality of life was hindered by the cross-sectional study design. Secondly, the limited generalizability of their findings arose from recruiting all participants solely from two hospitals within one province of Indonesia. Thirdly, the exclusion of other risk factors such as chronic diseases, health behaviors, and lifestyle factors from the study should be noted.

6. Conclusion

Physical and mental HRQoL aspects among breast cancer patients shows a substantial correlation with various demographic and psychological factors, including age and employment status, as well as anxiety and depression levels. This study revealed a clear association indicating that higher levels of anxiety and depression significantly increase the likelihood of experiencing lower physical and mental HRQoL. This underscores the critical need for targeted interventions aimed at reducing anxiety and depression specifically tailored for breast cancer patients. Initiating such interventions becomes pivotal in addressing the challenges posed by these psychological factors, thereby potentially enhancing the overall quality of life experienced by individuals grappling with breast cancer. Recognizing the impact of anxiety and depression on the QoL of breast cancer patients and implementing targeted strategies such as psychological intervention to mitigate these psychological challenges stands as a vital step in improving the well-being and coping mechanisms of these individuals.

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Author contribution

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Conflict of interest

None

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