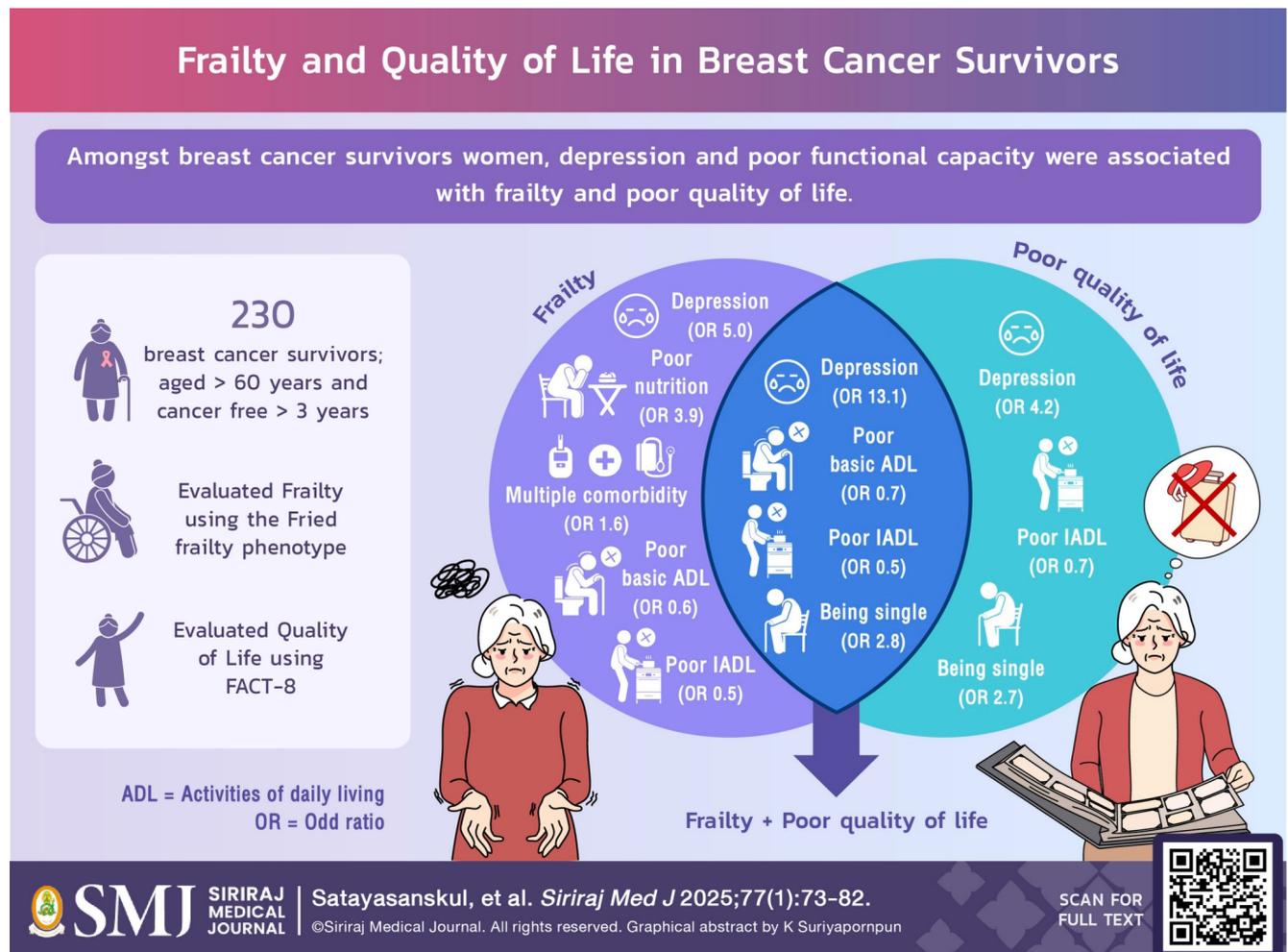# Depressive Symptoms and Poor Functional Status are Factors Associated with Frailty and Decreased Quality of Life in Thai Older Breast Cancer Survivors

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Frailty and Quality of Life in Breast Cancer Survivors

Amongst breast cancer survivors women, depression and poor functional capacity were associated with frailty and poor quality of life.

230 breast cancer survivors; aged > 60 years and cancer free > 3 years

Evaluated Frailty using the Fried frailty phenotype

Evaluated Quality of Life using FACT-8

ADL = Activities of daily living
OR = Odd ratio

Frailty
Depression (OR 5.0)
Poor nutrition (OR 3.9)
Multiple comorbidity (OR 1.6)
Poor basic ADL (OR 0.6)
Poor IADL (OR 0.5)

Depression (OR 13.1)
Poor basic ADL (OR 0.7)
Poor IADL (OR 0.5)
Being single (OR 2.8)

Poor quality of life
Depression (OR 4.2)
Poor IADL (OR 0.7)
Being single (OR 2.7)

Frailty + Poor quality of life

Satayasanskul, et al. *Siriraj Med J* 2025;77(1):73-82.
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ABSTRACT

Objective: This study examines the prevalence and clinical factors associated with frailty, poor health-related quality of life (HR-QoL), and the combined presence of both in older breast cancer survivors.

Materials and Methods: In this cross-sectional study, 230 BSC patients aged > 60 years and > 3 years cancer free were recruited. Frailty and HR-QoL were evaluated using the Fried Frailty Phenotype and the Functional Assessment of Cancer Therapy-Breast (FACT-B), respectively. As well, overall health status was assessed through a comprehensive geriatric assessment (CGA). Logistic regression was used to identify factors independently associated with frailty and reduced HR-QoL.

Results: Of all 230 BCS, 16.5% were frail, 47.4% were pre-frail, and 36.1% were robust. Depressive symptoms were strongly associated with frailty (OR: 13.1, 95% CI: 4.04–42.74), indicating that individuals with these symptoms were 13 times more likely to be frail. Low physical activity (OR: 5.7, 95% CI: 2.1–15.08) and unmarried status (OR: 2.75, 95% CI: 1.47–19.57) were also significant predictors of frailty. Frail participants had notably lower HR-QoL scores than those who were non-frail.

Conclusion: This study highlights the significant impact of depressive symptoms, reduced physical function, and social factors on frailty and HR-QoL in old-age BCS. Comprehensive geriatric assessment, including mental health and social support evaluations, are essential for early identification and intervention. Further research should focus on additional interventions aimed at reducing frailty and enhancing HR-QoL.

Keywords: Breast cancer survivors; frailty; health-related quality of life; depression; older adults (Siriraj Med J 2025; 77: 73-82)

INTRODUCTION

Frailty, characterized by increased vulnerability to endogenous and exogenous stressors, presents significant public health challenges, especially among aging populations. The prevalence of frailty, ranges from 4% to 59% in older adults living in the community, increasing with age and being significantly higher in women than in men.[1] This condition imposes substantial risks, including falls, hospitalizations, and increased mortality, amplifying the urgency to effectively address this problem.[2,3] The impact of frailty is not only societal, but also personal, worsening quality of life, inducing feelings of loneliness, and imposing significant financial burdens due to escalating care costs.[4-6]

In the context of breast cancer survivors (BCS), frailty assumes a unique dimension. Previous studies have shown that a substantial proportion of older BCS, particularly those aged 70-79, experience frailty or pre-frailty, highlighting the need for tailored healthcare interventions.[7] Additionally, the combination of breast cancer and its treatments further complicates the health aspects of these survivors, affecting not only their physical well-being, but also their mental health and quality of life (QoL).[8] Previous research have demonstrated that predictors of psychological well-being among BCS were resilience, stress, and social support.[9] However, recent advances in breast cancer therapies have led to treatments that are less aggressive but more effective, potentially altering the landscape of frailty prevalence and health-related quality of life (HR-QoL) among older BCS.[10-13]

With the complexities of recent advances in adjuvant endocrine therapy and chemotherapy through intensive therapeutic escalation[14], it is challenging in daily clinical practice to deliver comprehensive care to older breast cancer survivors (BCS) who are already suffering from declining cognitive abilities and physical frailty without a comprehensive geriatric assessment.[15] However, recent evidence has shown that various types knowledge sharing for geriatric patients are important and can serve as effective tools for increasing patient satisfaction.[16] Therefore, a specific study is needed to investigate all associated factors of frailty and HR-QoL, within the context of physical, mental, social, and functional aspects of a comprehensive geriatric assessment.[17] Through this exploration, we aim to facilitate targeted interventions and improved healthcare strategies tailored to the unique needs of this population.

MATERIALS AND METHODS
Ethical issues

The research protocol was approved by the Human Research Ethics Committee of the Faculty of Medicine Siriraj Hospital, Mahidol University (Si 213/2022). The research was also registered through the Thai Clinical Trials Registry (TCTR20230811012).

Participants and sample size

Breast cancer survivors were recruited from the Breast Clinic, Department of Surgery, Faculty of Medicine Siriraj Hospital, Mahidol University, Thailand. The eligibility criteria included individuals who were 60 years or older, and cancer-free for more than 3 years. Exclusion criteria included communication problems, moderate to severe dementia, end-stage renal disease, or receiving renal replacement therapy, as well as women with cancers other than breast cancer (except non-melanoma skin cancer).

The prevalence of frailty in cancer patients has previously been reported to be 48% (p = 0.48) at a confidence level of 95%, with a margin of error of 6.5% (d = 0.065).[18] Using the sample size formula to estimate the proportion of a population, the calculated number of samples was 227. Consequently, 230 subjects were ultimately recruited for the study.

Data collection and assessment

Relevant demographic data, clinical and pathological data, and breast cancer treatment were retrieved from medical records. The variables related to comprehensive geriatric assessment (CGA) were directly evaluated by well-trained research assistants using structured questionnaires. Physical Performance and muscle strength were also measured on site.

Frailty status was diagnosed using the Fried frailty phenotype.[19] The cutoff points for each were as follows.
- The grip strength less than 28 kg for men and 18 kg for women
- Unintentional loss of body weight of more than 4.5 kg in the past year.
- 6-meter walk with gait speed less than 1 m/s.
- Feeling exhausted by 1 or 2 positive questions established by Center for Epidemiology Studies Depression Scale (CES-D)
- Global Physical Activity Questionnaire (GPAQ) less than 20th percentile.

Those who met 1-2 of 5 abnormalities were categorized as pre-frailty, and those with 3 or more abnormalities were categorized as frailty. The Functional Assessment of Cancer Therapy-Breast (FACT-B) was used to assess HR-QoL.[20] Individuals with FACT-B scores lower than the 50th percentile were categorized as having a poor HR-QoL. Other important variables included body weight, height, BMI, calf circumferences, Charlson's comorbidity index[21], Mini-Cog test[22], Six-item version of the Thai Geriatric Depression Scale (TGDS-6)[23], Short-form Mini Nutritional Assessment-Short Form (MNA-SF)[24], Barthel's index of activities of daily living (iADL)[25] and Lawton's iADL.[26]

Statistical analysis

The mean with standard deviation (SD) or median (interquartile range) were used for quantitative variables. Qualitative data were presented as numbers and percentage. To compare quantitative variables, Student's t tests and Mann-Whitney U tests were used for normal and non-normal distribution data, respectively. Chi-square tests or Fisher's exact tests were used to compare qualitative variables. Stepwise forward logistic regression analysis was used to identify independent factors associated with frailty, poor HR-QoL, and the combination of frailty and poor HR-QoL.

Statistical significance was set at a p-value <0.05. PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc; 2009, was used for all statistical analysis.

RESULTS

The prevalence of frailty, pre-frailty, and robust groups diagnosed by the Fried frailty phenotype was 16.5%, 47.4%, and 36.1%, respectively. The baseline characteristics of the three groups shown in Table 1.

Almost half of the participants were married (44.3%) and had received education for 12 years or more (70.4%). 17.4% had a history of breast cancer among their first-degree relatives. Invasive ductal carcinoma was the most common pathology (91.2%), followed by intralobular carcinoma, mucinous carcinoma, and malignant phyllodes breast cancer. The staging distribution was as follows: stage 0 (15%), stage 1 (33%), stage 2 (33%), stage 3 (15%), and stage 4 (1.3%). Triple-negative breast cancer (poor prognosis) breast cancer was present in 11.2% of the cases.

Regarding cancer treatment, all of them had undergone surgery, specifically mastectomy in 71.7% and breast-conserving therapy (BCT) in 28.3%. More than half of them received chemotherapy (CMT) (55.1%), while 91.1% had completed CMT. The commonly used chemotherapies were as follows: 60.2% had doxorubicin and cyclophosphamide (AC), 22.8% had their combination with taxane (AC+T), 5.7% had CMT with targeted therapy, and 14% had other regimens such as methotrexate. Among them, 72.2% had received endocrine therapy and 52.6% had received radiotherapy.

Comparisons between the frailty and non-frailty groups are presented in Table 1. Sequentially, the independent factors associated with frailty among BCS were identified by a stepwise forward binary logistic

TABLE 1. Baseline characteristics, and relevant clinical data of the three frailty status groups (n = 230).

		Total Mean ±SD or N (%)	Robust (n = 83) Mean ±SD or N (%)	Prefrail (n=109) Mean ±SD or N (%)	Frail (n=38) Mean ±SD or N (%)	Non-Frailty* (n=192) Mean ±SD or N (%)	p-value (Frailty VS Non-Frailty)
Age (years)		68.6 ±7.0	66.08 ±5.1	68.52 ±6.3	74.16 ±9.0	67.47 ±5.9	<0.01*
Age at diagnosis		59.1 ±8.5	56.70 ±7.1	59.33 ±7.3	63.76 ±11.9	59.2 ±7.3	<0.01*
Years after diagnosis		9.5 ±5.7	9.39 ±5.6	9.19 ±4.9	10.39 ±7.6	9.28 ±5.2	<0.01*
BMI (kg/m²)		24.5 ±4.3	24.25 ±3.8	24.38 ±4.7	25.20 ±4.6	24.32 ±4.29	0.52
Grip strength (kg)		18.2 ±4.6	21.53 ±2.4	17.24 ±4.1	13.36 ±4.2	19.1 ±4.04	<0.01*
Gait speed (m/s)		1.15 ±0.32	1.32 ±0.21	1.12 ±0.31	0.83 ±0.31	1.2 ±0.29	<0.01*
Charlson's Comorbidity Index		2.5 ±0.65	2.37 ±0.8	2.51 ±0.83	3.24 ±1.4	2.45 ±0.8	<0.01*
Calf circumference (cm)		34.8 ±3.6	35.10 ±3.1	34.58 ±3.9	34.57 ±3.7	34.8 ±3.56	0.56
Barthel iADL		19.5 ±1.2	19.66 ±0.5	19.62 ±0.6	18.5 ±2.6	19.64 ±0.56	<0.01*
Lawton iADL		7.4 ±1.4	7.88 ±0.4	7.61 ±1.0	5.87 ±2.5	7.73 ±0.79	<0.01*
Status	Married	102 (44.3)	44 (53.0)	48 (53.0)	10 (26.3)	92 (47.9)	0.206
	Divorced/widow	83 (36.1)	21 (25.3)	42 (38.5)	20 (52.6)	63 (32.8)	
	Single	45 (19.6)	18 (21.7)	19 (17.4)	8 (21.1)	37 (19.3)	
Education (year)	0-12	68 (29.6)	20 (24.1)	29 (26.6)	19 (50)	22 (11.5)	0.09
	>12	162 (70.4)	63 (75.9)	80 (73.4)	19 (50)	19 (9.9)	
Caregiver	No	75 (32.6)	36 (43.4)	30 (27.5)	9 (23.7)	30 (15.6)	0.04*
	Informal caregiver	148 (64.3)	45 (54.2)	75 (68.8)	28 (73.7)	28 (14.6)	
	Formal caregiver	7 (3.0)	2 (2.4)	4 (3.7)	1 (2.6)	14 (7.3)	
Smoking		10 (4.3)	4 (4.8)	5 (4.6)	1 (2.6)	49 (25.5)	0.85
History of alcohol drinking		28 (12.2)	13 (15.7)	14 (12.8)	1 (2.6)	66 (34.4)	0.12
Polypharmacy (≥5 medication use/day)		74 (32.2)	19 (22.9)	76 (69.7)	22 (57.9)	52 (27.1)	<0.01*
Physical activity (GPAQ)	High	42 (18.3)	22 (26.5)	14 (12.8)	6 (15.8)	36 (18.8)	<0.01*
	Moderate	122 (53)	47 (56.6)	69 (63.3)	6 (15.8)	116 (60.4)	
	Low	66 (28.7)	14 (16.9)	26 (23.9)	26 (68.4)	40 (20.8)	
Depressive symptoms (TGDS -6 score ≥2)		19 (8.3)	2 (2.4)	8 (7.3)	9 (23.7)	10 (5.2)	<0.01*
Exhaustion (CES-D positive)		31 (13.5)	0 (0.0)	92 (84.4)	14 (36.8)	17 (8.9)	<0.01*
MNA-SF (<12 = at risk or malnutrition)		29 (12.6)	4 (4.8)	11 (10.1)	14 (36.8)	15 (7.8)	<0.01*
Cognitive impairment (Minicog score ≥ 2)		54 (23.5)	13 (15.7)	30 (27.5)	11 (28.9)	43 (22.4)	0.11

Note: The Nonfrailty group comprises individuals from both the pre-frail and frail groups.

* = statistically significant; iADL = index of activities of daily living; GPAQ = Global Physical Activity Questionnaire; TGDS = Thai Geriatric Depression Scale; CES-D = Center for Epidemiology Studies Depression Scale; MNA-SF = Mini Nutritional Assessment-Short Form

regression analysis, as shown in Table 4. Comorbidities assessed by Charlson's comorbidity index, activities of daily living (Barthel's index for basic ADL and Lawton's index for instrumental ADL), depressive symptoms and poor nutritional status were found to be associated with frailty.

Likewise, the comparisons of clinical characteristics between the good and poor HR-QoL groups and the independent factors associated with the poor HR-QoL groups were demonstrated in Table 2 and 4, respectively. The only independent factors associated with poor HR-QoL were depressive symptoms, poor instrumental ADL, and being single. Interestingly, the total FACT-B score for the frailty group (115.95±17.14) was significantly lower than that of the non-frailty group (128.91±11.87), p <0.01. All other subdomains of the FACT-B score of the frailty group were also lower than those of the non-frailty group, as shown in Table 5.

Finally, comparisons of clinical characteristics between those with and without the combination of frailty and poor HR-QoL and the factors independently associated with the combination are shown in Tables 3 and 4, respectively. Again, depressive symptoms and poor Lawton iADL, Barthel index ADL scores, and being single were found to be statistically significant associated factors.

DISCUSSION

Depression increased the risk of frailty through physical inactivity and decreased motivation, which are commonly observed in depression, leading to a loss of energy and overall functioning.[27,28] Depression and frailty are also important risk factors for malnutrition in older adults with cancer.[29] Our results revealed an independent association between malnutrition and frailty (Table 4). Some common risk factors for depression and frailty have previously been highlighted, for example, oxidative stress, hypothalamic-pituitary-adrenal axis, and mitochondrial dysregulation.[30-32] Our subjects with depressive symptoms had a higher probability of frailty (OR=13.1, 95%CI:4.0-42.7), whereas a meta-analysis in older adults conducted by Soysal et al reported an OR of 4.07 (95%CI 1.93-8.55).[33] These findings highlight significantly higher risk of frailty in older adult with breast cancer compared to healthy older adults.(Fig 1)

Due to the atypical presentation of depression in older adults, overcoming these barriers and recognizing the impact of depression on cancer outcomes are crucial for improving overall well-being and prognosis in older cancer patients.[27,34] Given that depression is a treatable disease and associated with a poor HR-QoL among older BCS, healthcare personnel involved in their care should be aware of these relationships. Integrating depression screening into routine clinical services is essential, as it can reduce risk of frailty, and improve HR-QoL.[35] Treatment options for depression include psychotherapy, medication, lifestyle modifications, increased physical activity, and enhanced social support and connection.

BCS who reported a higher HR-QoL were able to maintain higher levels of physical activity and the ability
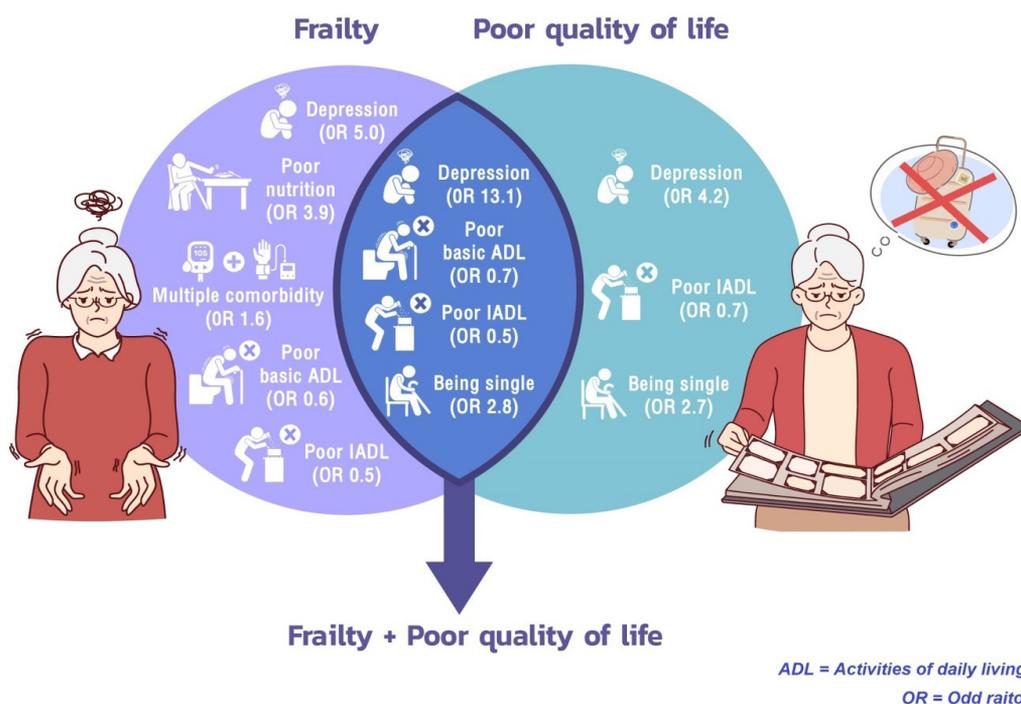

Fig 1. Schematic figure summarizing risk factors related for frailty and poor HR-QoL.

TABLE 2. Comparisons of baseline characteristics, staging, and treatments, as well as relevant clinical data between the good and poor HR-QoL groups.

Characteristics		Poor QoL (n=115) Mean ±SD or N (%)	Good QoL (n=115) Mean ±SD or N (%)	p -value or N (%)
Age (years)		70.03 ±8.17	67.12 ±5.12	<0.01*
Age at diagnosis (years)		60.67 ±9.70	57.56 ±6.6	<0.01*
Years after diagnosis (years)		14.37 ±1.85	14.12 ±2.0	0.78
BMI (kg/m²)		24.8 ±4.3	24.13 ±4.4	0.25
Grip strength (kg)		17.04 ±4.75	19.31±4.1	<0.01*
Gait speed (m/s)		1.05 ±0.34	1.26 ±0.27	<0.01*
Charlson Comorbidity Index		2.77 ±1.05	2.4 ±0.86	<0.01*
Calf-circumference (cm)		34.56 ±3.8	34.96 ±3.4	0.4
Barthel iADL		19.3 ±1.4	19.6 ±1.04	0.07
Lawton iADL		7.08 ±1.82	7.77 ±0.67	<0.01*
Smoking		4 (3.5)	6 (5.2)	0.52
History of alcohol consumption		9 (7.8)	19 (16.5)	<0.01*
Marital status	married	39 (33.9)	63 (54.8)	
	divorced/widow	54 (47.0)	29 (25.2)	0.03*
	single	22 (19.1)	23 (20.0)	
Education (years)	0-12	42 (36.5)	26 (22.6)	0.022*
	>12	73 (63.5)	89 (77.4)	
Caregiver	No	32 (27.8)	43 (37.4)	
	Formal caregiver	6 (5.2)	7 (6.1)	0.034*
	Paid caregiver	7 (6.1)	0 (0.0)	
Polypharmacy (≥5 medications use/day)		45 (39.1)	29 (25.2)	0.02
Physical activity (GPAQ)	High	23 (20.0)	19 (16.5)	
	Moderate	54 (47.0)	68 (59.1)	0.17
	Low	38 (33.0)	28 (24.3)	
Exhaustion (CES-D positive)		21 (18.3)	10 (8.7)	0.03*
Depressive symptoms (TGDS-6 score ≥2)		15 (13.0)	4 (3.5)	<0.01*
Poor nutritional status (MNA-SF <12)		18 (15.7)	11 (9.6)	0.16
Cognitive impairment (Minicog score ≥2)		27 (23.5)	27 (23.5)	1.00

= statistically significant; QoL = quality of life; iADL = index of activities of daily living; GPAQ = Global Physical Activity Questionnaire; TGDS = Thai Geriatric Depression Scale; CES-D = Center for Epidemiology Studies Depression Scale; MNA-SF = Mini Nutritional Assessment-Short Form

TABLE 3. Comparisons of baseline characteristics, staging, and treatments, as well as relevant clinical data between those with and without the combination of frailty and poor HR-QoL.

Characteristics		Frail + Poor QoL (n=30) Mean ±SD or N (%)	Other (n=200) Mean ±SD or N (%)	p-value
Age (years)		75.07 ±9.5	67.6 ±5.9	<0.01*
Age at diagnosis (years)		64.7 ±13.0	58.28 ±7.26	0.01*
Years after diagnosis (years)		10.37 ±8.29	9.33 ±5.18	<0.01*
BMI (kg/m^2)		25.88 ±4.2	24.3 ±4.3	0.06
Grip strength (kg)		13.2 ±4.5	18.9 ±4.1	<0.01*
Gait speed (m/s)		0.8 ±0.34	1.20 ±0.29	<0.01*
Charlson Comorbidity Index		2.43 ±0.62	2.9 ±0.67	<0.01*
Calf-circumference (cm)		35.13 ±3.7	34.71 ±3.57	0.56
Barthel iADL		18.43 ±2.4	19.61 ±0.87	<0.01*
Lawton iADL		5.53 ±2.6	7.71 ±0.83	<0.01*
Smoking		1 (3.3)	9 (4.5)	0.08
History of alcohol consumption		1 (3.3)	27 (13.5)	0.11
Marital status	married	6 (20.0)	96 (48.0)	
	divorced/widow	19 (63.3)	64 (32.0)	<0.01*
	single	5 (16.7)	40 (20.0)	
Education (years)	0-12	15 (50)	53 (26.5)	<0.01*
	≥12	15 (50)	147 (73.5)	
Caregiver	No	8 (26.7)	67 (33.5)	
	Informal caregiver	21 (70)	127 (63.5)	0.14
	Formal caregiver	1 (3.3)	6 (3.0)	
Polypharmacy (≥5 medication use /day)		17 (56.7)	57 (28.5)	<0.01*
Physical activity (GPAQ)	High	3 (10.0)	39 (19.5)	
	Moderate	6 (20.0)	116 (58.0)	<0.01*
	Low	21 (70.0)	45 (22.5)	
Exhaustion (CES-D positive)		11 (36.7)	20 (10.0)	<0.01*
Depressive symptoms (TGDS-6 score ≥2)		9 (30.0)	10 (5.0)	<0.01*
Poor nutritional status (MNA-SF <12)		10 (33.3)	19 (9.5)	<0.01*
Cognitive impairment Mini-cog (score ≤2)		8 (26.7)	46 (23.0)	0.66

*= statistically significant; QoL = quality of life; iADL = index of activities of daily living; GPAQ = Global Physical Activity Questionnaire; TGDS = Thai Geriatric Depression Scale; CES-D = Center for Epidemiology Studies Depression Scale; MNA-SF = Mini Nutritional Assessment-Short Form

TABLE 4. Crude and adjusted odds ratios of the independent factors associated with BCS with frailty, poor HR-QoL, and those who had the combination of frailty and poor HR-QoL.

	Crude odds ratio	Adjusted odds ratio
Independent factors associated with frailty and poor HR-QoL		
Lawton iADL score	0.48 (0.36-0.62)	0.47 (0.35-0.62)
Barthel iADL score	0.53 (0.36-0.80)	0.68 (0.52-0.91)
Depressive symptoms	8.14 (2.98-22.30)	13.13 (4.04-42.74)
Marital status (single)	4.75 (1.80-12.54)	2.75 (1.47-19.57)
Independent factors associated with frailty		
Charlson comorbidity index	1.14 (1.08-1.20)	1.58 (1.09-2.30)
Barthel iADL	0.43 (0.27-0.68)	0.64 (0.45-0.91)
Lawton iADL	0.48 (0.37-0.63)	0.54 (0.41-0.72)
MNA-SF (poor nutritional status)	6.89 (2.96-16.01)	3.85 (1.28-11.56)
Depressive symptoms	5.65 (2.12-15.08)	5.04 (1.42-17.95)
Independent factors associated with poor HR-QoL		
Depressive symptoms	4.16 (1.34-12.96)	4.17 (1.29-13.48)
Lawton iADL	0.63 (0.47-0.83)	0.67 (0.51-0.93)
Marital Status (single)	3.01 (1.65-5.50)	2.65 (1.391-5.05)

QoL = quality of life; iADL = index of activities of daily living; MNA-SF = Mini Nutritional Assessment-Short Form

TABLE 5. Comparisons of the FACT-B score between the frailty and non-frailty groups.

FACT-B score	Total (n=230)	Frailty (n=38)	Non-frailty (Prefrail + Robust) (n=192)	p value
FACT-B GP	25.93 ± 2.72	24.42 ± 3.89	26.22 ± 2.32	<0.01*
FACT-B GS	22.29 ± 5.07	20.23 ± 5.97	22.69 ± 4.78	<0.01*
FACT-B GE	21.89 ± 3.05	20.71 ± 3.51	22.13 ± 2.9	0.02*
FACT-B GF	23.48 ± 4.36	19.78 ± 5.60	24.22 ± 3.67	<0.01*
FACT-B breast	33.18 ± 5.30	30.81 ± 7.18	33.64 ± 4.73	0.02*
FACT-G	94.77 ± 10.87	85.79 ± 12.99	96.54 ± 9.48	<0.01*
FACT-B total	126.76 ± 13.72	115.95 ± 17.14	128.91 ± 11.87	<0.01*

* = statistically significant; FACT-B = Functional Assessment of Cancer Therapy-Breast; FACT-G =Functional Assessment of Cancer Therapy - General; GP = general physical well-being score; GS = general social/family well-being score; GE = general emotional well-being score; GF = general functional well-being score; FACT-B breast = FACT-B Breast cancer subscale

to live independently over time.[18] This underscores the crucial role of a comprehensive geriatric assessment of functional decline by multidisciplinary approaches during cancer treatment, integrated with therapy itself, to prevent frailty and preserve HR-QoL among survivors in their later years.[35]

Our results also highlighted the significant impact of social factors on single breast cancer survivors, linking them to reduced HR-QoL (p=0.03) and compounded frailty and poor HR-QoL (adj. OR 2.8, 95%CI 1.5-19.6). A study in Korea revealed that single cancer patients exhibited a more significant decline in HR-QoL compared to individuals with other marital statuses.[36] These findings are consistent with previous research on Thai breast cancer survivors, emphasized the importance of family ties in the spirituality of Thai women. Enhanced spiritual well-being was influenced by positive family connections, strong social support, and a deep connection with nature or a higher being, regardless of religious beliefs.[37] Despite this influence, healthcare providers often overlook spirituality due to cultural disparities and the absence of guidelines in many low- and middle-income countries. Regarding single marital status, a previous study demonstrated associations between depression and single BCS.[38] Another systematic review showed that single cancer survivors are more likely to experience physical frailty.[39] However, to the best of our knowledge, no publication has shown an association between both depression and frailty in single BCS. Our study is the first to report that single marital status was significantly related to both depression and frailty in BCS.

Due to similar living cultures among other Asian countries, we anticipate that the result from this study could apply to other Asian populations. Women who are BCS should receive a comprehensive geriatric approach and appropriate intervention to prevent frailty and enhance HR-QoL. These interventions include diet monitoring, regular exercise programs, mental health intervention and social support.

Although previous studies have examined frailty and HR-QoL in older BCS[40], the strengths of our study lie in the use of specific clinical tools in this particular setting, i.e., comprehensive geriatric assessment used in routine clinical practice, the Fried frailty phenotype for frailty diagnosis, and FACT-B to assess HR-QoL in BCS. To our knowledge, this study is the first clinical study on frailty and HR-QoL among Thai BCS. However, due to the cross-sectional study design, we were unable to establish causal relationships between independent risk factors and frailty or HR-QoL.

CONCLUSION

Depressive symptoms and physical inactivity in older BCS are associated with frailty and poor HR-QoL. Single marital status and BCS in Thailand is associated with a poor HR-QoL, with or without frailty. Poor nutritional status is also an independently associated factor of frailty. Therefore, the comprehensive geriatric approach, including diet counseling, exercise programs, mental health assessment and intervention, as well as social support, should be discussed with older BCS to prevent and manage frailty in order to promote good HR-QoL.

Conflict of Interest

All authors declare that they have no personal or professional conflicts of interest related to any aspect of this study.

Author Contributions

Conceptualization and methodology: A.S., P.A., S.C.; Data collection and data acquisition: A.S., M.T., T.C.; Data analysis and interpretation: A.S., P.S., S.C., M.T., T.C., S.U.; Drafting the manuscript: A.S., P.S.; Critical revision of the manuscript: A.S., P.S., S.C. All authors have read and agreed to the final version of the manuscript.

Use of Artificial Intelligence

No artificial intelligence tools or technologies were used in the writing analysis, or development of this research and manuscript.

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