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Depression in women with a diagnosis of breast cancer. Prevalence of symptoms of depression in Peruvian women with early breast cancer and related sociodemographic factors

Sandro Casavilca-Zambrano, Mg, MD[a,b,*], Nilton Custodio, Mg, MD[c], Ruddy Liendo-Picoaga, MSc[b], Karina Cancino-Maldonado, BSc[b], Loida Esenarro, BSc.(Psych)[d], Rosa Montesinos, MD[c], Stéphane Bertani, PhD[e], Laura Fejerman, PhD[f], Maëlenn Guerchet, PhD[g], Tatiana Vidaurre, Mg, MD[h]

[a] *Facultad de Psicología, University of Huanuco, Huanuco, Peru*
[b] *Banco de Tejidos Tumorales, Instituto Nacional de Enfermedades Neoplásicas, Lima, Peru*
[c] *Instituto Peruano de Neurociencias, Lima, Peru*
[d] *Departamento de Especialidades Medicas, Instituto Nacional de Enfermedades Neoplásicas, Lima, Peru*
[e] *Université de Toulouse, IRD, UPS, Toulouse, France*
[f] *University of California San Francisco, San Francisco, CA*
[g] *Université de Limoges, INSERM, IRD, Limoges, France*
[h] *Departamento de Oncología Medica, Instituto Nacional de Enfermedades Neoplásicas, Lima, Peru*

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ABSTRACT

We sought to review literature on the prevalence of symptoms of depression in women with a diagnosis of breast cancer (BC) and in the Peruvian population determine the prevalence of symptoms of depression and to describe the association with sociodemographic characteristics. Descriptive cross-sectional analytical study of 254 patients from the National Cancer Institute of Peru (Instituto Nacional de Enfermedades Neoplásicas) with a diagnosis of clinical stage I or II BC. The patients included women aged between 26 and 67 years old. Symptoms of depression were monitored by the Beck Depression Inventory-II. Moreover, clinical features and patient sociodemographic characteristics were analyzed and their association with depression was assessed by logistic regression. The average age of the patients was 47.8 ± 9.2 years; 5.4% of the patients were postmenopausal at the time of the questionnaire. About 55% of women were from Lima, 58.3% had completed secondary education (11 ± 3.2 years), 45.7% were not working, and 46.5% were single. The prevalence of depression was 25.6% at the time of BC diagnosis. Of those patients with symptoms of depression, 16.9% showed symptoms of mild depression, 6.3% moderate, and 2.4% severe. A multivariable logistic regression model showed that in Peruvian women with a diagnosis of BC being married or employed significantly decreased the odds of presenting depressive symptoms ($P = 0.029$ and 0.017, respectively). Our main limitation was the lack of evaluation of depressive symptoms before the diagnosis, during or at the end of treatment. Another limitation was that the Beck Depression Inventory-II test could only identify depressive symptoms, but not depression as a disease. We have reviewed relevant literature on depression in women with a diagnosis of BC. The data presented suggests an association between both employment and marital status with depressive symptoms among Peruvian women with a diagnosis of BC. Pre-emptive support for women at risk could influence resilience and/or motivation for compliance with antineoplastic treatments.

* Corresponding author. Banco de Tejidos Tumorales, Instituto Nacional de Enfermedades Neoplásicas, 105 Las Lilas Street, Apt. 302, Valle Hermoso urbanization, Monterrico-Surco, Lima, Peru.
E-mail address: scasavilca@inen.sld.pe (S. Casavilca-Zambrano).

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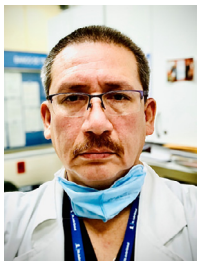

Casavilca-Zambrano, Sandro, Mg, MD, Magister in Medicine with mention in Oncological Pathology and PhD candidate in Neurosciences from the Universidad Nacional Mayor de San Marcos, Lima Peru. Chief Physician of the Biological Research Center (BRC) of the National Institute of Neoplastic Diseases of Peru, and Consultant for Central Nervous System Tumors in the Surgical Pathology Department. Research Professor at the University of Huanuco and Professor of Neuroanatomy and Neurophysiology at the school of Psycology at the Universidad de Huanuco, Junin, Peru.

Custodio, Nilton, Mg, MD, Neurologist, Master in Medicine, Master in Neuroscience, and PhD candidate in Neuroscience, Dr. Custodio is Director of the Instituto Peruano de Neurociencias, Lima, Peru. He conducts research in dementia, Alzheimer's disease and fronto-temporal dementia. He has a particular interest in the field of brief cognitive tests for the detection of impairment and dementia in the context of low educational level.

Liendo-Picoaga, Ruddy, MSc, Biologist, Master in Biochemistry and Molecular Biology. Research Assistant and co-researcher of several projects at the Universidad Nacional de San Agustín (UNSA), Universidad Peruana Cayetano Heredia (UPCH) and the Banco de Tejidos Tumorales del INEN. Cancer researcher at the Tumoral Tissue Bank of the Department of Pathology in the National Institute of Neoplastic Diseases (INEN).

Cancino-Maldonado, Karina, BSc, Biologist, Bachelor of Biological Sciences from the Universidad Nacional Jorge Basadre Grohmann in Tacna. Master candidate in Biochemistry and Molecular Biology from the Universidad Peruana Cayetano Heredia (UPCH); as well as, contributing in the molecular area of research in infectious diseases, from the same university. Cancer researcher at the Tumor Tissue Bank of the Department of Pathology. National Institute of Neoplastic Diseases (INEN).

Esenarro, Loida, BSc. (Psych), Psychologist, Master candidate in Clinical Psychology with mention in Neuropsychology, Diploma in Music Therapy. She is currently a Psychologist at the National Institute of Neoplastic Diseases of Peru (INEN) and at the Institute of Neuropsychology and Dementia in Lima. She is also Professor at the Universidad Peruana Unión.

Montesinos, Rosa, MD, Head of Rehabilitation of the Instituto Peruano de Neurociencias (IPN). Member of the Physical Medicine and Rehabilitation Unit of the International Clinic and Member of the Research Unit of neurodegenerative diseases of the International Clinic. Member of the American Academy of Physical Medicine and Rehabilitation, Member of the International Society to an Advance Alzheimer's Research and Treatment Member of the International Society of Physical Medicine and Rehabilitation.

Bertani, Stéphane, PhD, is obtained his Ph.D in biochemistry and molecular biology from the University Paris 6 in 2006. He then trained as postdoctoral fellow in the research field of epigenetics at the University of California, Riverside (UCR) between 2007 and 2010. In 2011, he was hired by the French National Research Institute for Sustainable Development (IRD) to initiate a strategic focus on cancer in low- and middle-income countries. Dr. has been working since on the field of cancer in Peru.

Fejerman, Laura, PhD, Associate Professor in Residence, Department of Medicine, Division of General Internal Medicine, Institute of Human Genetics Helen Diller Family Comprehensive Cancer Center, University of California San Francisco. Dr. Fejerman is the 2019-2020 Chairperson of the AACR Minorities in Cancer Research (MICR) Council and Leader of the UCSF San Francisco Cancer Initiative Breast Cancer Task Force. She earned her PhD in Biological Anthropology and MSc in Human Biology at the University of Oxford, England. She completed her undergraduate degree in Social Anthropology at the University of Buenos Aires, Argentina.

Guerchet, Maëlenn, PhD, is obtained her PhD at the University of Limoges (France) with a focus on ageing and dementia in sub-Saharan Africa. She has a background in Epidemiology and Biostatistics. She then joined the 10/66 Dementia Research Group (London, UK), which carries out population-based research into dementia, non-communicable diseases and ageing in low- and middle-income countries. She contributed to several reports commissioned by Alzheimer's Disease International (including World Alzheimer Reports) and to the estimation of the burden of dementia with the World Health Organization (Global Dementia Observatory). She is currently researcher of the French National Research Institute for Sustainable Development (IRD)

Vidaurre, Tatiana, Mg, MD, Oncologist from the National Institute of Neoplastic Diseases (INEN), Specialties in General and Oncological Medicine, Health Services Management and Health Administration. Master's Degree in Molecular Oncology from the National Center for Oncological Research-CENIO in Spain and in Public Health with a mention in Health Services Management - Universidad Peruana Cayetano Heredia (UPCH). PhD candidate in Public Health-UPCH, with experience in Clinical Research having carried out postgraduate studies in Clinical Molecular Oncology at the NCI in the United States. She has developed the National Plan for Comprehensive Cancer Care and Improvement of Access to Oncology Services in Peru "Plan Esperanza".

Introduction

Breast cancer (BC) is the second leading cause of cancer-related death in Peruvian women with an incidence of 34 cases per 100,000 [1,2]. Over 21,000 cases were treated in 2017 at the National Cancer Institute of Peru (INEN), and projections indicate that the incidence will continue to increase during upcoming years [3].

Depression among patients with a diagnosis of has been a concern since the 1960s [4]. The types of cancer associated with depression include head and neck, pancreas, breast, and lung [4,5,6]. Major depression negatively impacts the motivation of the patients and reduces compliance with antineoplastic treatments, such as chemotherapy. Depression can also be an important predictor of late-stage BC [7]. Studies on depression have reported a wide range of incidence and/or prevalence of depression amongst women with a diagnosis of BC [8,9] (Table 1). However, the different methodologies used for the evaluation of depression drastically limit the interpretation of the data available in literature [10]. Bukberg et al, studied 62 oncology patients. Forty-two percent met criteria for nonbipolar major depression: 24% for severe and 18% for moderately severe symptoms [11]. While a study of 222 women diagnosed with early BC in London found symptoms of depression in 33% at the time of diagnosis. They also reported that the prevalence of depression, anxiety or both in the year after a cancer diagnosis was around twice that of the general female population [12]. A study of 1,400 Chinese women with BC reported that 26% had mild to severe depression [10]. This same study, as well as another one, reported that patients who were single had a greater risk of developing depression compared to women who were married, and that marital status was one of the independent predictors for depression amongst patients with a diagnosis of BC [10]. Other sociodemographic factors such as ethnic origin have not been associated with depression amongst patients with a diagnosis of BC [13,14].

A variety of factors from different dimensions and levels are likely to interact and contribute to depression and anxiety in women with a diagnosis of BC, including individual (eg, biology, personal history), demographic (eg, age, sex), social and economic (eg, employment status, level of formal education and availability of social support), and structural factors (eg, universal health coverage), and studies that are designed as to allow for evaluation of these different factors and their interaction are lacking [10,13].

The prevalence of depression in the general population of Peru varies by region: 18.2% in Metropolitan Lima, 16.2% in the Peruvian highlands and 21.4% in the rainforest areas [15]. The prevalence of depression in Peruvian women with a diagnosis of clinical stage I or II BC has not been previously studied. In addition, there is lack of knowledge regarding how depression among Peruvian women with a diagnosis of BC influences their resilience, coping strategies and outcomes (treatment, mortality, and recovery).

In this study, we recruited BC patients at INEN to assess prevalence of depression symptoms and associated factors.

Material and methods

The sample consisted of 254 women with a diagnosis of BC attending INEN between 2019 and 2020. All study participants were women with a confirmed diagnosis of BC. No women had yet received hormonal treatment or chemotherapy when the questionnaire was applied. The period of recruitment was 12 months and included patients from ambulatory consultation. The inclusion criteria were: (1) female, 18 years of age or older, (2) histologically documented diagnosis of early BC (BC that has not spread beyond the breast or the axillary lymph nodes, Clinical Stage I or II), (3) with no history of mental disorders nor dementia, (4) with no history of alcohol abuse or drugs, (5) with adequate knowledge of Spanish and satisfactory level of communication and (6) providing a written consent to participate in the study. Before the interview, all participants received an explanation on the purpose of the study. The investigation was done following the principles of confidentiality and anonymity, according to the Declaration of Helsinki and its subsequent reviews. The study protocol was approved by the Ethics Committee and the Scientific Council of INEN (protocol number: INEN 17-79).

Assessment instruments

Data were collected during in-person interviews using a structured and pretested questionnaire including basic sociodemographic information (age, place of residence, marital status, number of children, educational level). The Beck Depression Inventory-II (BDI-II) questionnaire was used to assess depression symptoms amongst the BC patients [11,16,17]. Individual items of the BDI-II assessed mood, pessimism, sense of failure, self-dissatisfaction, guilt, punishment, self-dislike, self-accusation, suicidal ideas, crying, irritability, social withdrawal, body image, work difficulties, insomnia, fatigue, appetite, weight loss, bodily preoccupation, and loss of libido. Personnel trained in BDI-II test application and certified by the Peruvian Institute of Neurosciences (IPN) performed the questionnaire at INEN.

Statistical analyses

The following sociodemographic characteristics were analysed: age at interview, place of residence (coming from Lima or residing in other regions of Peru), degree of education (incomplete or complete secondary school education), average number of years of formal education, marital status (cohabiting, married or single), employment status (employed, unemployed, inactive or not currently working because of the disease, or independent contractor). The responses of the BDI-II questionnaire, which consists of 21 Likert-type items with a score range from 0 to 63, were analysed as well. BDI-II scores were divided into 4 groups: no depression (scores 0–13), mild depression (scores 14–19), moderate depression (scores 20–28), and severe depression (scores 29–63) [18,19].

A descriptive analysis of the information was carried out through frequencies, percentages, and summary measures (mean with standard deviation, median and interquartile range). Differences in sociodemographic characteristics between the groups of depressed and non-depressed patients based on the BDI-II scores were evaluated with *t* tests or its respective non-parametric test (continuous variables) and chi-square and/or Fisher exact tests (categorical variables). The association between the presence of depression and sociodemographic characteristics was evaluated with a multivariable logistic regression model. All statistic tests with *P*values $\leq$0.05 were considered statistically significant. We used the R program to conduct all analyses [20].

Results

The mean age of the 254 women with a diagnosis of BC included in the study was 47.8 $\pm$ 9.2 years. There were 140 (55.1%) women residing in the Lima region and 114 (44.9%) residing in other regions of Peru. Seventy-seven patients (30.3%) had completed secondary school education and the average number of

Table 1
Depression amongst women with a diagnosis of breast cancer (BC).

Reference	Study design and participants	Results	Conclusions	Observations
Burgess et al [12] (2005) Observational Cohort Study	• 222 women with early BC: 170 (77%) provided complete interview data up to either 5 years after diagnosis or recurrence. Assessed: • Prevalence of clinically important depression and anxiety (structured psychiatric interview with standardized diagnostic criteria) • Clinical and patient risk factors, including stressful life experiences	• In women with early BC, depression, anxiety, or both found in: - ~50% in the year after diagnosis - ~25% in the second, third, and fourth years - ~15% in the fifth year • Point prevalence was 33% at diagnosis, falling to 15% after 1 year • 45% of those with recurrence experienced depression, anxiety, or both within 3 months of the diagnosis • Previous psychological treatment predicted depression, anxiety, or both in the period around diagnosis (1 month before diagnosis to 4 months after diagnosis) • Longer term depression and anxiety, were associated with - Previous psychological treatment - Lack of an intimate confiding relationship - Younger age - Severely stressful non-cancer life experiences • Clinical factors were not associated with depression and anxiety, at any time • Lack of intimate confiding support predicted more protracted episodes of depression and anxiety	• Increased levels of depression, anxiety, or both occur in the first year after a diagnosis of early BC underscoring the need for the provision of dedicated services during this time • Psychological interventions for women with BC who remain disease free should take account of the broader social context in which the cancer occurs, with a focus on improving social support	• In women with early breast cancer, the prevalence of depression, anxiety, or both in the year after diagnosis is around twice that of the general female population
Chen et al [10] (2009) Interview and Inclusion of Clinical Data	• 1400 participants of a population-based cohort study of women with stage 0-IV BC in Shanghai, China In-person interviews conducted at 6 months and 18 months post-diagnosis • Medical charts reviewed • Collected information on sociodemographic and clinical factors and quality of life (QOL) Depression measured by the 20-item Center for Epidemiologic Studies Depression Scale at 18 months postdiagnosis	• ~26% of participants had mild to severe depression • 13% fulfilled criteria of clinical depression at 18 months post-diagnosis • Women with lower income more likely to have depression than women with higher income (prevalence: 16.6% *v* 6.9% for mild depression and 17.1% *v* 5.5% for clinical depression, respectively) • Depression more common among women who were widowed (18.9%) or divorced/separated/single (16.4%) than among women who were married (11.8%) • Clinical depression more likely amongst women with comorbidities (17.3% *v* 11.2%) • Multivariate analysis found the following independent predictors for depression: - Low income - Marital status - Comorbidity - Low QOL scores • Factors without impact on prevalence of depression: - Menopausal status - Estrogen or progesterone receptor status - Disease stage - Cancer-related treatments	• Depression common among Asian women with BC • Routine screening and prevention of depression warranted among women with BC	• Low socioeconomic status, being single, presence of comorbidity, and low QOL scores shortly after cancer diagnosis may identify groups or populations of women with breast cancer that are particularly vulnerable to depression.

(*continued on next page*)

Table 1 (*continued*)

Reference	Study design and participants	Results	Conclusions	Observations
Christie et al [14] (2010) Descriptive, prospective longitudinal study (Interview)	• 677 low-income women (425 Hispanic, 252 non-Hispanic White) enrolled in the Medi-Cal Breast and Cervical Cancer Treatment Program • Data gathered through phone interviews conducted in English or Spanish 6 and 18 months following a diagnosis of BC • Focused on 3 variables literature indicated are salient for BC survivors: sexual function, body image and depression.	• Results indicated worse sexual function for Hispanic women, even after controlling for significant covariates. Hispanic women reported: - Significantly less sexual desire - Greater difficulty relaxing and enjoying - Greater difficulty becoming sexually aroused and having orgasms than non-Hispanic White women • Both Hispanic and non-Hispanic White women endorsed lack of sexual desire more frequently than problems with sexual function • Body image did not differ between Hispanic and non-Hispanic White women • 38% of Hispanic and 48% of non-Hispanic White women scored above cut-off scores for depressive symptoms • No ethnic difference in depressive symptoms • Single women reported more depressive symptoms than partnered women	• Data suggest low-income survivors of BC may experience symptoms of depression more than a year following diagnosis • Sexual dysfunction may be particularly salient for low-income Hispanic women	• Ethnic origin was not associated with depression
Begovig et al (2012)	• 70 female survivors of breast cancer, ages 23–79 • Completed Center for Epidemiological Studies Depression Scale [depression], Functional Assessment of Cancer Therapy [body image], and EORTC QOL questionnaire - Breast Cancer [quality of life]	• On the depression scale, 56% had scores $\geq$16 on depression scale - a score that identifies participants with potential depression • Majority of women felt less attractive and less feminine • Low body image, attractiveness, and femininity positively correlated with depression and negatively with overall QOL	• Multidisciplinary health care services relevant to physical attractiveness and femininity of survivors of BC may foster positive body image perceptions, reduced depression, and increase QOL	• Younger women more affected by physical changes in their bodies, as well as by the loss of reproductive capacity of treatment-induced menopause
Zainal et al [8] (2013)	• Systematic review of prevalence of depression in patients with a diagnosis of BC and associated factors in BC survivors • Articles published up to November 2012, using Depression OR Dysthymia AND Cancer OR Tumor OR Neoplasms as the keywords	• 32 eligible studies that recruited 10,826 BC survivors • Most studies were cross-sectional or prospective designed • Most frequent instrument used to screen depression were - Center for Epidemiological Studies for Depression (CES-D, $n = 11$ studies) - Beck Depression Inventory (BDI, $n = 6$ studies) - Hospital Anxiety and Depression Scale (HADS, $n = 6$ studies) • CES-D returned similar prevalence of depression (median = 22%, range=13%–56%) with BDI (median = 22%, range=17%–48%) but higher than HADS (median = 10%, range = 1%–22%) • Depression associated with: - Several socio-demographic variables - Cancer-related factors - Treatment-related factors - Subject psychological factors - Lifestyle factors - Social support • Quality of life	• BC survivors are at risk for depression and its detection and treatment are important	

(*continued on next page*)

Table 1 (*continued*)

Reference	Study design and participants	Results	Conclusions	Observations
Bener et al (2017) Observational cohort hospital-based study [9]	• 678 patients with breast cancer (34.7% were Qataris and 65.3% Arab) • Beck Hopelessness Scale (BHS), Back Depression Scale (BDS) and Multidimensional Scale of Perceived Social Support (MSPSS)		• Hopelessness of the patients with breast cancer decreased with the increase in their social support. Therefore, activating patient social support systems is of importance in increasing their levels of hope.	• The study revealed that married • participants were happier than single participants.
Tsaras et al (2018) A descriptive, cross-sectional study	• 170 randomly selected breast cancer patients • The Patient Health • Questionnaire-2 (PHQ-2) and the Generalized Anxiety Disorder-2 (GAD-2)		• Breast cancer patients are in high risk for developing psychiatric disorders such as depression and anxiety. Being rural resident, non-Orthodox Christian and experiencing extend symptom burden can be predicting factors associated with depression and anxiety in breast cancer patients.	• Rural residents had 2.6 times (95%CI: 1.02, 6.40) higher possibility of developing depression disorder than urban residents • Non-Orthodox Christians were 6.8 times (95% I: 1.72, 26.90) more likely to have elevated depression symptoms compared with Orthodox Christians.
İzci et al (2018) Case and control study	• Beck Hopelessness Scale (BHS), Beck Anxiety Scale (BAS), Beck Depression Scale (BDS), Eysenck Personality Inventory (EPI) and Quality of Life Scale–Short Form (SF-36)		• Patients with BC and extraversion personality traits had lower levels of anxiety and depression, with better QOL	• Patients with neurotic personality traits may show symptoms of anxiety and depression, with poorer QOL
Bener et al [9] (2019) Used A self-assessment of depression (Zung scale)	• 194 patients diagnosed with the disease between 2009 and 2015 in the Clinical Center Kragujevac, Serbia • Aimed to determine prevalence of depressive disorder in women suffering from BC as and examine its relationship with clinical-pathological and immunophenotypic characteristics of BC	• Level of depression confirmed statistically significant differences in level of depression: - Molecular tumor subtype/Luminal A ($P< 0.0005$) - PR expression ($P= 0.050$) - Lymphatic invasion ($P = 0.025$) • Multivariate binary logistic regression found association of depression with the present molecular subtype of the tumor of a worse prognostic character ($P= 0.019$)	• Level of depression shown to correlate with some of the clinicomorphological and immunophenotypic characteristics of their cancer	• According to macro and micromorphological characteristics, the pathological stage of the disease was defined according to the WHO recommendations
Trinca et al [7] (2019)	• 45 female patients	• 16/45 (35.6%) had positive HADS-D questionnaire and depressive symptoms confirmed by psychiatrist • 7/16 (15.6%) had a confirmed major depressive episode • Significant association of depressive symptoms with: - Future perspectives scale ($P= 0.022$) - Breast symptoms scale ($P= 0.011$) - Arm symptom scale ($P = 0.005$) • Differences in subscales were significantly worse in those with depressive symptoms: - Fatigue ($P = 0.024$) - Pain ($P = 0.037$) - Dyspnea ($P = 0.009$) • Association between depressive symptoms or not significant or marginally significant for: - Variables stage of the tumor ($P= 0.057$) - Presence of distant metastasis ($P= 0.072$) - Previous diagnosis of depression ($P= 0.011$) • Compared to patients treated with chemotherapy regimens without monoclonal antibodies those treated with regimens containing monoclonal antibodies presented better outcomes in various subscales of the EORTC QLQ-C30 and QLQ-B23	• Although a small sample the study provides evidence that depressive symptoms in patients with BC undergoing treatment detrimentally reduced various aspects of QoL	

BC = breast cancer; EORTC = European Organization for the Research and Treatment of Cancer; HADS-D =Hospital Anxiety and Depression Scale; QOL =quality of life.

Table 2
Characteristics of women with a diagnosis of stage I or II BC, according to the status of symptoms of depression.

Characteristic	Overall	Depression score		*P* value[b]
	(*N* = 254)	>14(*N* = 65)	<14(*N* = 189)	
Age, years [mean, (SD)]	47.8 (9.2)	46.2 (9.8)	48.4 (8.9)	0.097
Age of menarche, years [mean, (SD)]	12.9 (1.7)	12.9 (1.5)	12.9 (1.8)	0.660
Age of menopause, years [mean, (SD)]	46.3 (5.4)	47.2 (4.5)	46.2 (5.5)	0.648
Place of residence				
Lima	140 (55.1)	36 (55.4)	104 (55.0)	0.960
Other regions	114 (44.9)	29 (44.6)	85 (45.0)	
High school completed				
Complete	148 (58.3)	22 (68.8)	126 (66.7)	0.817
Incomplete	73 (28.7)	10 (31.3)	63 (33.3)	
Not registered	33 (13.0)	33	0	
Years of education (*N* = 221) [mean, (SD)]	11.1 (3.2)	10.9 (3.0)	11.1 (3.3)	0.783
Marital status				
Cohabiting	59 (23.2)	12 (18.5)	47 (24.9)	**0.001**
Married	77 (30.3)	9 (13.8)	68 (36.0)	
Single[a]	118 (46.5)	44 (67.7)	74 (39.2)	
Employment status				
Employed	14 (5.5)	5 (8.8)	9 (4.8)	**0.005**
Inactive[c]	116 (45.7)	20 (35.1)	96 (50.8)	
Independent contractor	36 (14.2)	4 (7.0)	32 (16.9)	
Unemployed	80 (31.5)	28 (49.1)	52 (27.5)	
Not registered	8 (3.1)	8	0	

BC = breast cancer.
[a] Includes cases of separated, divorced and widows.
[b] *t*-tests were used for continuous normally distributed variables, Mann-Whitney tests for non-normally distributed variables and chi-square test for categorical variables.
[c] Inactive: have job but not currently work and because of disease, 43.1% of women declaring being inactive self-identified as housemakers.

Table 3
Beck's Depression Inventory item response proportions among women with a diagnosis of breast cancer.

Characteristic	Scoring scale for symptoms (N, %)			
	None	Mild	Moderate	Severe
Sadness	195 (76.8)	42 (16.5)	10 (3.9)	7 (2.8)
Expectation about the future	199 (78.3)	42 (16.5)	3 (1.2)	10 (3.9)
Sense of failure	209 (82.3)	22 (8.7)	21 (8.3)	2 (0.8)
Dissatisfaction	128 (50.4)	111 (43.7)	12 (4.7)	3 (1.2)
Feelings of guilt	131 (51.6)	114 (44.9)	6 (2.4)	3 (1.2)
Feelings of punishment	193 (76.0)	56 (22.0)	0 (0.0)	5(2.0)
Self-compliance	212 (83.5)	26 (10.2)	13 (5.1)	3 (1.2)
Self-criticism	141 (55.5)	79 (31.1)	25 (9.8)	9 (3.5)
Suicidal thoughts	226 (89.0)	25 (9.8)	2 (0.8)	1 (0.4)
Crying	115 (45.3)	66 (26.0)	44 (17.3)	29 (11.4)
Irritability	160 (63.0)	81 (31.9)	10 (3.9)	3 (1.2)
Social abandonment	185 (72.8)	59 (23.2)	5 (2.0)	5 (2.0)
Indecision	195 (77.1)	44 (17.4)	5 (2.0)	9 (3.6)
Body image	217 (85.4)	28 (11.0)	5 (2.0)	4 (1.6)
Work inhibition	112 (44.1)	127 (50.0)	13 (5.1)	2 (0.8)
Insomnia	89 (35.0)	118 (46.5)	23 (9.1)	24 (9.4)
Fatigue	113 (44.5)	127 (50.0)	13 (5.1)	1 (0.4)
Appetite	129 (50.8)	100 (39.4)	16 (6.3)	9 (3.5)
Difficulty concentrating	130 (51.2)	111 (43.7)	11 (4.3)	2 (0.8)
Agitation	97 (38.2)	132 (52.0)	6 (2.4)	19 (7.5)
Loss of sexual interest	141 (55.5)	77 (30.3)	9 (3.5)	27 (10.6)

years of instruction was 11.1 ± 3.23 years. A large proportion of patients were unemployed and reported being a homemaker when asked about their job (Table 2).

Overall, 65 (25.6%) patients had symptoms of depression (Table 2). Based on BDI-II score categories, 43 (16.9%) had mild depression symptoms, 16 (6.3%) had moderate depression symptoms and 6 (2.4%) patients had severe symptoms of depression. Patients more frequently reported some specific items in the BDI-II assessment tool. These included crying, work inhibition, insomnia, tiredness, and agitation (Table 3).

No significant differences were observed between the group of patients with symptoms of depression symptoms and those without symptoms according to age, years of education and place of residence. However, statistically significant differences were observed with respect to marital status and employment status (Table 4). The proportion of women who reported being single was higher among patients with some depressive symptoms, compared to those without them (67.7% *v* 39.2%, respectively). The proportion of women who reported being unemployed was higher among those with depressive symptoms (49.1% *v* 27.5%, respectively).

Table 4
Association between depression symptoms and sociodemographic features in women with a diagnosis of breast cancer.

	OR (95%CI)	*P* value
Marital status		
Single[a]	1.00	
Cohabiting	0.56 (0.26–1.21)	0.139
Married	0.27 (0.11–0.63)	**0.002**
Employment status		
Unemployed	1.00	
Employed	0.98 (0.29–3.31)	0.970
Inactive[b]	0.46 (0.23–0.92)	**0.029**
Independent	0.25 (0.08–0.78)	**0.017**

[a] Includes separated, divorced and widow.
[b] includes women who not currently work and because of disease self-identified as housemakers.

In a multivariable logistic regression model, marital status and employment situation were shown as characteristics that significantly influence the possibility of depression. A lower chance of depression was observed in patients who were married (odds ratio [OR] = 0.27, 95% confidence interval [CI] 0.11–0.63, $P = 0.002$) compared to patients who were single. A lower possibility of depression was observed in patients who were inactive (because of disease) at the time of applying the BDI-II (OR = 0.46, 95%CI: 0.23–0.92, $P = 0.029$) and in patients who worked independently (OR = 0.25, 95%CI: 0.08–0.78, $P = 0.017$) compared to patients who were unemployed (Table 4). We did not find statistically significant associations with the occurrence of symptoms of depression and place of residence or degree of education.

Discussion

Assessing depression in cancer patients and understanding its impact on cancer outcomes and quality of life for survivors is a challenge. Several studies have explored the association between socio-demographic factors and the prevalence of depression in patients with cancer [10]. There is a lack of high-quality studies investigating mental health in people with cancer. Common mental disorders may adversely affect cancer treatment and recovery, as well as quality of life and survival [21]. Studies that focus on prevention are minimal and research covering low- and middle-income populations is limited.

In our patient population, employment and marital status correlated with having symptoms of depression. Unemployed and single patients showed more symptoms of depression, possibly due to low levels of emotional, family and economic support. These factors were also reported as relevant in previous studies [6,10,14,16,22]. For example, a study of 1,400 Chinese women with BC found that women with lower income were more likely to have symptoms of depression than women with higher income [10]. Being employed might be associated with stronger social support and a lower probability of feeling hopeless.

In addition, our results suggest an association between marital status and symptoms of depression. These results are consistent with previous reports, where depression was more commonly reported among women who were widowed (18.9%) or divorced and/or separated and/or single (16.4%) compared to those who were married (11.8%) [6].

In patients with a diagnosis of cancer, depression may include feelings of misery, harshness, lowered self-esteem, bleakness and suicidal mania [23]. In Peruvian patients with severe depressive symptoms, crying and loss of sexual interest are the most prevalent characteristics previous to treatment; other authors have reported anxiety as higher among patients with cancer [9]. In addition, the severity of depression may depend on the cancer type and treatment response and magnitude of side-effects [23].

The study of depression is challenging because its diagnosis is often overlooked, inconsistent, or subject to differences observed between doctors and institutions. The prevalence of depression as a disease ranges from 1.5% to over 53% depending on the method used and whether study participants are inpatient or outpatients [24,25]. Our results showed that 25.6% of Peruvian women with a diagnosis of BC had depressive symptoms before treatment. Previous studies reported that the perception of body image, attractiveness, and femininity increased depression and reduced quality of life, especially during the first year of treatment [22]. We therefore expect that the percentage of depressive symptoms in Peruvian women with BC will increase during the course of their disease.

Given the high prevalence of symptoms of depression among women with a diagnosis of BC in Peru, we would agree with the recommendations of others [8,11] and encourage health care institutions to closely monitor women with a diagnosis of BC for symptoms of depression, taking into account the patient's socio-demographic characteristics, so as to provide the necessary support, improve treatment compliance and increase quality of life for Peruvian women with a diagnosis of BC.

Conclusions

We have reviewed relevant literature regarding depression amongst women with a diagnosis of BC. We also report the prevalence of depression symptoms among Peruvian women with a diagnosis of early BC and explore the association between symptoms of depression and sociodemographic factors. We believe this assessment is important because symptoms of depression can influence resilience and motivation for compliance with antineoplastic treatments. Future research should focus on evaluating previous history of depression and anxiety among women with a diagnosis of BC in order to assess the role of antineoplastic agents in depression, and potentially identify biological markers for antineoplasic agent-driven depression.

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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The Contributors designed and supervised the study and were involved in data collection, statistical analysis and in the writing of the paper. All authors approved the final version of this manuscript.

Ethics Committee Approval was received for this study.

Informed consent was obtained for this study.

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