

Prevalence and Determinants of Depression and Generalized Anxiety Disorder among Female Patients Diagnosed with Breast Cancer Attending Two Referral Health Care Centres in Kano State, Nigeria

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Abstract

Background: Breast cancer is a major public health concern worldwide, with significant psychological implications. Depression and generalized anxiety disorder (GAD) are common comorbidities among cancer patients, potentially affecting treatment adherence, prognosis, and quality of life. Despite the increasing burden of breast cancer in Nigeria, limited research exists on the prevalence and determinants of these mental health disorders, particularly in Kano State, therefore, understanding the prevalence and determinants of these psychiatric disorders in this population is crucial for integrating mental health care into oncology services. **Aim:** This study aimed to determine the prevalence and determinants of depression and generalized anxiety disorder among female breast cancer patients attending two referral healthcare centers in Kano State, Nigeria. **Materials and Methods:** This cross-sectional study was conducted among 240 female breast cancer patients attending SOPD clinics at Aminu Kano Teaching Hospital and Murtala Muhammad Specialist Hospital, Kano. Participants were assessed using the Mini International Neuropsychiatric Interview (MINI Version 7.0) for depression and GAD. Socio-demographic (e.g., age, marital status, education) and clinical data (e.g., cancer



stage, treatment type) were collected. Descriptive statistics were used to determine prevalence rates, while chi-square and Fisher's exact test were used to analyze associations between depression and GAD. Factors that were significant in the bivariate analysis were subjected to binary logistic regression to determine independent determinants of depression and GAD. Statistical significance was set at $p < 0.05$. **Results:** The prevalence of depression among the participants was 63.7% (95% CI: 57.4 - 69.7%), and GAD was 23.1% (95% CI: 16.4 - 27%). Age at diagnosis (≥ 45 years) was the only independent determinant of depression (AOR: 1.994, 95% CI: 1.076 - 3.679, $p = 0.028$). **Conclusion:** This study revealed a high prevalence of depression and GAD among female patients with breast cancer with age at diagnosis as the only independent determinant of depression among the participants.

Keywords

Depression, GAD, Breast Cancer

1. Introduction

Breast cancer is the most common malignancy among women worldwide [1], with significant physical and psychological burdens [2]. In low- and middle-income countries, including Nigeria, the psychological impact of breast cancer is often overlooked despite its significant effect on treatment adherence, quality of life, and overall prognosis [3]. Depression and Generalized Anxiety Disorder (GAD) are highly prevalent in cancer patients due to disease-related stressors, including uncertainty about prognosis, treatment side effects, and financial difficulties [4]. Biologically, breast cancer triggers inflammation, for example elevated IL-6 and TNF-alpha and hypothalamic-pituitary-adrenal (HPA) axis dys-regulation, contributing to depression [5]. Psychologically, fear of body image concerns, treatment side effects and mortality heightens anxiety [6]. Socially, stigma and financial burden in Nigeria may exacerbate mental health issues [7]. Globally, the prevalence of depression among breast cancer patients ranges from 0% to 58% [8], while Nigerian studies reported much lower rates (11.4% and 15.5%) [2] [9]. The prevalence of anxiety disorders among breast cancer patients is higher in western studies (e.g., Germany [10], the United States of America [11]) than in Nigeria [12]. These variations may reflect differences in healthcare access, cultural stigma and screening tools [13]. Socio-demographic associations with depression and GAD vary: a Nigerian study found no links [14], while others reported marital status, educational and income associations [15] [16]. Furthermore, a study in Greece linked age, place of domicile, religion, educational level and marital status to depression [8]. In Nigeria, cultural and religious beliefs shape mental health experiences, particularly in Kano State, where help-seeking is limited [17]. Clinical factors including cancer stage, duration of breast cancer before diagnosis, treatment modality [18], and recurrence [19], are strongly associated with depression and GAD. Few studies have explored these in Kano, where cultural and reli-

gious influences may shape mental health experiences and help-seeking behaviors.

2. Methodology

This cross-sectional study was conducted among female breast cancer patients at the surgical outpatient department (SOPD) clinics of Aminu Kano Teaching Hospital (AKTH) and Murtala Muhammad Specialist Hospital (MMSH), Kano State, Nigeria, over six months (September 2023 - February 2024). A systematic sampling method recruited 240 participants, with proportional allocation based on patient volume at each hospital. The first participant was selected using a random number table, followed by every second patient until the sample size was reached. Ethical approval was obtained from AKTH's Research Ethics Committee (AKTH/MAC/SUB/12A/P-3/VI/3748). Informed consent was obtained from all the participants.

Inclusion criteria: Women aged ≥ 18 years with a histopathologically confirmed breast cancer diagnosis.

Exclusion criteria: Participants with severe mental illness impairing response capability, severe medical conditions preventing participation, or pre-existing psychiatric disorders before breast cancer diagnosis were excluded from the study.

2.1. Procedure

Participants completed the Mini International Neuropsychiatric Interview (MINI 7.0) to diagnose depression and GAD, administered by trained interviewers in approximately 15 minutes. A socio-demographic and clinical questionnaire collected data on age, marital status, employment, religion, income, cancer stage, treatment type (e.g., chemotherapy, mastectomy), duration of illness (time since diagnosis: ≤ 1 year vs. ≥ 1 year), recurrence, and support source (relatives vs. others, e.g., friends, NGOs). The MINI 7.0, aligned with DSM-5, has high reliability and validity [20], and prior use in Nigeria [21].

2.2. Statistical Analysis

Data were analyzed using SPSS version 21. Descriptive statistics (frequencies, means and standard deviations) summarized characteristics. Prevalence was reported as proportions with 95% confidence intervals (CI). Chi-square or Fisher's exact tests assessed associations at $p < 0.05$. Age at diagnosis was categorized (<45 vs. ≥ 45 years, based on menopausal and depression risk [22]). Whilst less common, breast cancer which occurs at the age less than 45 yrs is considered early onset, majority of breast cancers occurs at the age above 45 – 50 yrs. Significant bivariate factors were analyzed via binary logistic regression to identify independent determinants.

3. Results

Using the MINI-7, depression prevalence was 63.7% (95% CI: 57.4 - 69.7%) and GAD prevalence was 21.3% (95% CI: 16.4 - 27.0%) among 240 participants. **Fig-**

Figure 1 (pie chart) illustrates depression prevalence, and **Figure 2** shows GAD prevalence. Socio-demographic factors: Age ($p = 0.001$) and religion ($p = 0.004$) were associated with depression (**Table 1**). No socio-demographic factors were significantly associated with GAD (all $p > 0.05$). **Table 1** details associations, with Christianity linked to higher depression (90.9% vs. 61.1% for Islam). Clinical Factors: Age at diagnosis (<45 vs. ≥ 45 years) was the only clinical factor associated with depression ($p = 0.014$), with no clinical factors linked to GAD (**Table 2**). **Table 2** summarizes clinical associations.

Regression Analysis: Binary logistic regression of significant bivariate factors (age, religion, age at diagnosis) identified age at diagnosis (≥ 45 years) as the sole independent determinant of depression (AOR: 1.069, CI: 1.076 - 3.679, $p = 0.028$) (**Table 3**). The wide CI for the 20 - 29 age group (AOR: 1.069, CI: 0.105 - 10.891) reflects the small sample size ($n = 33$), reducing estimate precision.

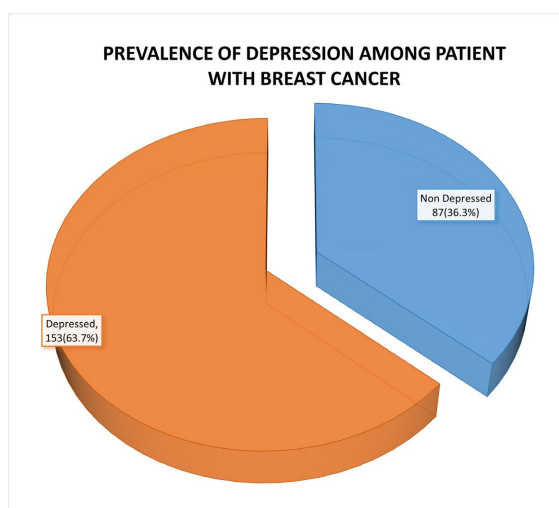


Figure 1. Pie Chart showing the prevalence of depression among the participants.

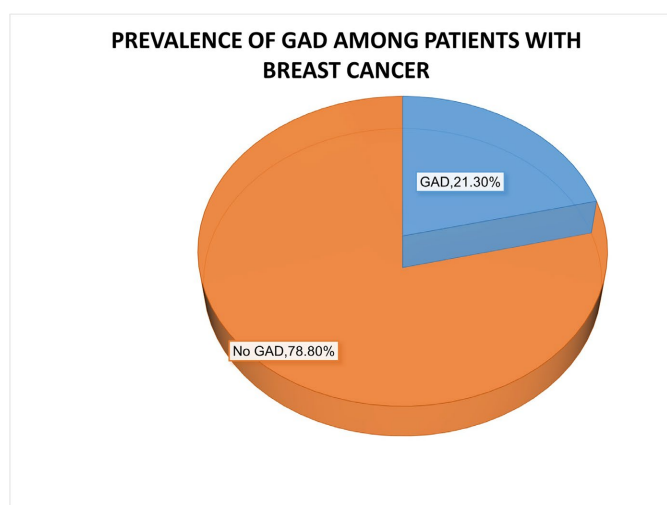


Figure 2. Pie chart showing the prevalence of generalized anxiety disorder among the participants.

3.1. Socio-Demographic Factors Associated with Depression and GAD among the Participants

The socio-demographic factors associated with depression were the age of the participants $p = 0.001$ and religion $p = 0.004$ interestingly, no socio-demographic factor achieved statistical significance with GAD (**Table 1**). The two socio-demographic variables that had statistical significance with depression were subjected to binary logistic regression.

3.2. Clinical Factors Associated with Depression and GAD among the Participants

Age at diagnosis of breast cancer was the sole factor associated with depression among the participants $p = 0.014$, while no clinical factors were associated with depression among the participants (**Table 2**).

Table 1. Association between socio-demographic factors with depression and GAD among the participants.

Variables	Depressed (Frequency (%))	Non-depressed (Frequency (%))	χ^2	p value	GAD	No-GAD	χ^2	p value
Age(years)			14.987	0.001**			7.315	0.198
<20	10 (41.7%)	14 (58.3%)			4 (16.7%)	20 (83.3%)		
20 - 29	25 (75.8%)	8 (24.2%)			9 (27.3%)	24 (72.7%)		
30 - 39	30 (50.8%)	29 (49.2%)			6 (10.2%)	53 (89.8%)		
40 - 49	48 (67.6%)	23 (32.4%)			19 (26.8%)	52 (73.2%)		
50 - 59	21 (75.0%)	7 (25.0%)			6 (21.4%)	22 (78.6%)		
≥60	19 (76.0%)	6 (24.0%)			7 (28.0%)	18 (72.0%)		
Marital status			2.590	0.61			2.654	0.103
Married	97 (62.6%)	58 (37.4%)			28 (18.1%)	127 (81.9%)		
Unmarried	56 (65.9%)	29 (34.1%)			23 (27.1%)	62 (72.9%)		
Family type			2.660	0.27			0.411	0.944
Monogamy	100 (63.7%)	57 (36.3%)			34 (21.7%)	122 (78.3%)		
Polygamy	53 (64.9%)	30 (36.1%)			16 (20.3%)	64 (79.7%)		
Number of children			0.167	0.68			0.145	0.704
0 - 4	98 (62.8%)	58 (37.2%)			32 (20.5%)	124 (79.5%)		
≥5	55 (65.5%)	29 (34.5%)			19 (22.6%)	65 (77.4%)		
Religion			3.970	0.004**			0.477	0.490
Islam	140 (61.1%)	89 (38.9%)			48 (20.9%)	182 (79.1%)		
Christianity	10 (90.9%)	1 (9.1%)			3 (30.0%)	7 (70.0%)		
Educational status			0.856	0.355			0.221	0.638
High (≥12 years)	91 (61.5%)	57 (38.5%)			30 (20.3%)	118 (79.7%)		
Low (<12 years)	62 (67.4%)	30 (32.6%)			21 (22.8%)	71 (77.2%)		
Tribe			0.260	0.610			0.645	0.422
Hausa-Fulani	130 (63.1%)	76 (36.9%)			42 (20.4%)	164 (79.6%)		
Others	23 (67.6%)	11 (32.4%)			9 (26.5%)	25 (73.5%)		

Continued

Employment status			0.377	0.539			0.123	0.726
Employed	101 (65.2%)	54 (34.8%)			34 (21.9%)	121 (78.1%)		
Unemployed	52 (61.2%)	33 (38.3%)			17 (20.0%)	68 (60.0%)		
Monthly-income (Naira)			0.017	0.895			1.833	0.176
≤30,000	112 (64.0%)	63 (36.0%)			41 (23.4%)	134 (76.6%)		
>30,000	41 (63.1%)	24 (36.9%)			10 (15.4%)	55 (84.6%)		
Support source			3.744	0.053			0.205	0.651
Relatives	127 (61.4%)	80 (38.6%)			43 (20.8%)	164 (79.2%)		
Others	26 (78.8%)	7 (21.2%)			8 (24.2%)	25 (75.8%)		

**Statistically significant.

3.3. Clinical Factors Associated with Depression and GAD among the Participants

Age at diagnosis was the only clinical factor associated with depression p value = 0.014, while none of the clinical factors showed statistical significance with GAD among the participants (Table 2).

Table 2. Association between clinical factors with depression and GAD among the participants.

Variables	Depressed (Frequency (%))	Non-depressed (Frequency (%))	χ^2	p-value	GAD (Frequency (%))	No-GAD (Frequency (%))	χ^2	p-value
Age at diagnosis (years)			6.101	0.014**			3.543	0.060
≤44	98 (58.7%)	69 (41.3%)			30 (18.0%)	137 (82.0%)		
≥45	55 (75.3%)	18 (24.7%)			21 (28.8%)	52 (71.2%)		
Duration of illness			0.342	0.558			0.053	0.819
≤1year	54 (61.4%)	34 (38.6%)			18 (20.5%)	70 (79.5%)		
≥1year	99 (65.1%)	53 (34.9%)			33 (21.7%)	119 (78.3%)		
Cancer stage			7.617	0.055			3.661	0.300
Stage 1	10 (62.5%)	6 (37.5%)			2 (12.5%)	14 (87.5%)		
Stage 2	29 (49.2%)	30 (50.8%)			10 (16.9%)	49 (83.1%)		
Stage 3	59 (67.8%)	28 (32.2%)			24 (27.6%)	63 (72.4%)		
Stage 4	55 (70.5%)	23 (29.5%)			15 (19.2%)	63 (80.8%)		
Treatment modality			4.067	0.254			6.904	0.075
Combination	81 (60.4%)	53 (39.6%)			28 (20.9%)	106 (79.1%)		
Chemotherapy	40 (62.5%)	24 (37.5%)			14 (21.9%)	50 (78.1%)		
Mastectomy	21 (72.4%)	8 (27.6%)			3 (10.3%)	26 (89.7%)		
Not yet on treatment	11 (84.6%)	2 (15.4%)			6 (46.2%)	7 (53.8%)		
Illness recurrence			0.921	0.337			0.141	0.707
Yes	42 (59.2%)	29 (40.8%)			14 (19.7%)	57 (80.3%)		
No	111 (65.7%)	58 (34.3%)			37 (21.9%)	132 (78.1%)		

Continued

Presence of lingering side effect		0.000 0.992		0.907 0.341	
Yes	81 (63.8%)	46 (36.2%)	30 (23.6%)	97 (76.4%)	
No	72 (63.7%)	41 (36.3%)	21 (18.6%)	92 (81.4%)	

**Statistically significant.

3.4. Regression of Factors Associated with Depression and GAD among the Participants

Factors that were significant at the bivariate analysis such as age of the participants, religion and age at diagnosis were subjected to binary logistic regression, only age at diagnosis was an independent determinant of depression among the participants. Participants who were diagnosed with breast cancer above the age of 45 years were 2 times more likely to be depressed than those who were diagnosed 44 years and below (AOR: 1.994, CI: 1.076 - 3.679, p-value 0.028) (Table 3).

Table 3. Analysis of factors associated with depression and GAD among the participants at logistic regression.

Variables	B	AOR	Confidence interval		p value
			Upper	Lower	
Age at diagnosis of cancer	0.690	1.994	1.076	3.697	0.028**
Age of participants (years)					
<20	-20.999	0.000	0.000		0.999
20 - 29	0.067	1.069	0.105	10.891	0.955
30 - 39	-2.057	0.128	0.014	1.206	0.072
40 - 49	-0.378	0.685	0.084	5.609	0.724
50 - 59	1.105	3.021	0.519	17.567	0.128
Religion (Islam)	-1.827	0.161	0.020	1.303	0.087

Reference categories: Age at diagnosis of cancer: 44 years and below, Age of participants: 60 years and above, Religion: Christianity, ** statistically significant.

4. Discussion

The 63.7% prevalence of depression in this study is high, exceeding prior Nigerian studies (11.4 - 15.5%) [2] [9], and a South African study (36.6%) [23]. GAD prevalence (21.3%) is significantly higher than the general Nigerian population rate of 1.8% [24], and aligns with Southwest Nigerian cancer study (18.5%) [25] [26]. These differences may be due to confounders like limited healthcare access, higher stigma in Kano, and use of MINI 7.0 which is more sensitive than self-report tools used elsewhere [20]. Socio-cultural factors, including stigma and low mental health awareness, amplify psychological distress, with breast cancer often perceived as a "death sentence". Age was associated with depression, particularly among the participants aged ≥ 60 and 20 - 29 years. Older women may face spousal loss, reduced independence, and physical decline, while younger women experience career disruptions and body image issues, lowering self-esteem [27]-[29], Religion influenced depression, with Christians showing higher prevalence (90.9%

vs. 61.1% for Muslims). This variation may reflect differences in religious coping styles. Certain Islamic beliefs emphasizing acceptance of life challenges might offer some psychological buffering. Age at diagnosis (≥ 45 years) was the sole independent determinant of depression (AOR: 1.994), consistent with Vahdaninia *et al.* (2015) [30]. Older women perceive cancer as terminal, compounded by menopausal hormonal changes (e.g., low estrogen) [31]. No clinical factors, including recurrence, were associated with GAD, possibly due to the cross-sectional design's inability to capture temporal anxiety triggers.

5. Limitations

The cross-sectional design precludes causal inferences, as depression and GAD may precede or follow cancer diagnosis. The hospital-based sample may limit generalizability to community settings. The wide CI for the 20 - 29 age group's GAD estimate ($n = 33$) indicates low precision due to small subgroup size.

6. Clinical Implications

Routine screening should be integrated into oncology clinics, prioritizing women diagnosed at ≥ 45 years. Counselling services, for older and younger patients, can address stigma and body image concerns. Training health care workers in oncology unit in empathetic communication can improve mental health support.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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