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Prevalence of comorbidities and quality of life assessment among breast cancer patients at the Komfo Anokye Teaching Hospital: A descriptive cross-sectional study

Linda Ahenkorah Fondjo, Osei Owusu-Afriyie, Ernest Osei-Bonsu, Emmanuel Amankwaah-Frimpong, Emmanuel Acheampong, Emmanuella Nsenbah Batu, Bright Amankwaah, Esther Ofosu Mintah, Naa Okailey Dromo Ammah

ABSTRACT

Aims: The presence of comorbidities among breast cancer patients affects their proper management and quality of life. This study determined the prevalence of comorbidities and quality of life among breast cancer patients at Komfo Anokye Teaching Hospital, Ghana. Methods: This was a descriptive cross-sectional study among breast cancer patients visiting the Oncology Department of KATH between February 2016 and April 2016. For this study, 370 patients were recruited. Well-structured questionnaires were used to collect information on socio-demographics and comorbidities. For quality of life assessment, the EORTC QLQ-C30 and EORTC QLQ-BR23 questionnaires were used. Results: Most (81.1%) of the respondents had breast cancer for < 5 years. 34% of the respondents had comorbidities. Respondents with comorbidities had increased BMI (29.3±5.34), weight (72.4±14.9), mean systolic (146±27.6), diastolic (90.6±17.5) blood pressure than those without comorbidities. The average perception of quality of life by participants was 65.87±27.28. Total 241 (65.1%) perceived themselves to have a good quality of life with 13% having a poor quality of life perception. Conclusion: Comorbidities were present in 34% of patients. Obesity, overweight, diabetes and hypertension were the most prevalent comorbidities. Overall, patients QoL was moderate but symptom scales, score, financial constraints were high.

Keywords: Breast cancer, Comorbidities, Quality of life, Prevalence

Linda Ahenkorah Fondjo[1], Osei Owusu-Afriyie[2], Ernest Osei-Bonsu[2], Emmanuel Amankwaah-Frimpong[2], Emmanuel Acheampong[1], Emmanuella Batu[1], Bright Amankwaah[1], Esther Ofosu Mintah[3], Naa Okailey Dromo Ammah[3]

Affiliations: [1]Department of Molecular Medicine, School of Medical Sciences, College of Health Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana; [2]Komfo Anokye Teaching Hospital, Kumasi, Ghana; [3]Department of Medical Laboratory Technology, Faculty of Allied Health Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

Corresponding Author: Linda Ahenkorah Fondjo, Department of Molecular Medicine, School of Medical Sciences, College of Health Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana; Email: linda.ahenkorahfondjo@yahoo.com

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INTRODUCTION

Breast cancer is the most common invasive cancer in women globally. In Ghana, it is the commonest cancer type among women [1]. Breast cancer is also the primary cause of cancer death among women globally [2]. Comorbidity is prevalent among cancer patients. Breast cancer development, staging, treatment and prognosis are affected by comorbidity [3]. Over a century ago, hyperglycemia and diabetes were first linked to breast cancer. Incidence reports since the 1950s, have also described women with breast cancer as having higher rates of diabetes than do healthy women [4, 5]. Also, it has been observed that Tamoxifen may increase diabetes incidence through its oestrogen-inhibiting effects. Regardless of the cancer type, hypertension has been found to be the most prevalent chronic condition among cancer survivors [6] and can influence prognosis and survival [7, 8]. This frequency keeps increasing with an aging population. Breast cancer development, staging, treatment and prognosis are affected by comorbidity [3].

In Ghana, breast cancer is the leading malignancy [9]. In 2007, breast cancer accounted for 15.4% of all malignancies, with this number increasing annually [10]. Roughly 70% of women diagnosed with breast cancer in Ghana are in the advanced stages of the disease resulting in lower chances of survival [11]. The incidence and prevalence of comorbidities among such female patients becomes alarming as it affects the survival rate, proper management and Quality of Life (QoL). Indeed, the diagnosis and treatment of breast cancer although demanding, can further trigger overwhelming challenges to basic principles, beliefs, goals of women, and alter their sense of identity and psychological functioning [12, 13]. While early detection and treatment, along with advances in treatment are expected to result in better rates of survival, problems related to the treatment can cause negative effects on health related QoL. Today, QoL of patients is considered an important issue in the treatment of women with breast cancer [14–16]. This study therefore sought to assess the prevalence of comorbidities among breast cancer patients and also determine the overall QoL in breast cancer patients in Kumasi, Ghana.

MATERIALS AND METHODS

Study design/ setting

This was a descriptive cross-sectional study among female breast cancer patients visiting the oncology department of the KATH between February 2016 and April 2016. The study site was the Oncology Department of the Komfo Anokye Teaching Hospital (KATH) Kumasi. KATH is the second largest Hospital in Ghana, located in Kumasi, the Regional Capital of the Ashanti Region. The geographical location, country road network and commercial nature of Kumasi make the Hospital accessible to people far and near. The Hospital being a referral center, receives referrals from the Northern Region, Brong Ahafo, Central, Western, Eastern and parts of the Volta Region.

Study population/Sample size

Three hundred and seventy (370) female breast cancer patients were conveniently recruited onto the study. In order to determine the required sample size, the formula: $n = Z^2PQ/d^2$ was used, where, $Z = 1.96$, P = prevalence of breast cancer from a previous study (and d = margin of error i.e. 0.05. Thus, the calculated sample size was $n = 329$. With the minimum number to be enrolled being 329, we recruited 370 individuals in this study.

Inclusion criteria

- Having being diagnosed with breast cancer
- Women more than 25 years with various stages of breast cancer
- Being indicated for breast cancer surgery and any other treatment regimens

Exclusion criteria

- Difficulty in understanding the questionnaire.
- Unwillingness to participate

Instrument for data collection

Well-structured questionnaires were administered to the respondents. Using the questionnaires, socio-demographical and clinical information were obtained from the participants. The information provided was verified from the patient's hospital records. For the QoL assessment, the questionnaires used included the EORTC QLQ-C30 and the EORTC QLQ-BR23.

Data collection procedures

A convenient sampling method was used to recruit subjects for the study. The case records of all women with a diagnosis of breast cancer were screened for eligibility on the day they turned up for their appointments with their primary physicians. The researchers approached the eligible participants to explain the study aim and obtain their written consent. The recruitment was in the form of a face-to face interview with the participants.

Ethical consideration

Ethical approval for the study was obtained from the committee on Human Research, Publication and Ethics (CHRPE) (CHRPE/AP/252/16 and CHRPE/AP/270/16) of the School of Medical Sciences (SMS), Kwame Nkrumah University of Science and Technology (KNUST) as well as Research and Development board of the Komfo Anokye Teaching Hospital.

Data analysis

The data collected was entered into Microsoft Excel and analyzed using GraphPad Version 6. Independent t-test and ANOVA tests were used to assess the relationship between normally distributed variables. Mann-Whitney and Kruskal-Wallis tests were used to analyze non-parametric distributed variables. Descriptive statistics were used to present demographic characteristics and QOL. Normally distributed categorical variables were expressed as mean ±SD and non-parametric categorical variables expressed as median (IQR). A statistical significant level was set at $p< 0.05$ for all tests.

RESULTS

The socio-demographical characteristics of the respondent are given in Table 1. Most of the respondents (33.0%) were between ages 41–50 years while 18.1% were < 40 years of age. More than half (81.1%) of the respondents had been living with breast cancer for less than five years. With respect to marital status, high proportions (60.0%) of the women were married while 18.1% were divorced. Majority (40.0%) had primary education, half (50.0%) were unemployed, 41.1% were employed, 1.9% were on retirement while 7% were on pension. A high proportion of the respondents (71.1%) were in their post-menopausal stage. A greater percentage (85.9%) had no family history of breast cancer. Also majority of the respondents were neither alcoholic (98.1%) nor smokers (98.9%). More than half (51.9%) did not indulge in regular exercise. Only 48.1% actively engaged in exercise.

The distribution of obesity and blood pressure indices among the respondents is given in Table 2. With respect to BMI, majority of the respondents (44.1%) were normal, whereas 28.9% and 25.9% were overweight and obese respectively. Forty percent of the respondents had normal blood pressure levels, 25.9% were pre-hypertensive while 34.1% had high blood pressure. The mean systolic and diastolic values both were in the pre-hypertensive range.

One hundred and twenty-six (34.1%) of the respondents had comorbidities while 65.9% did not. Out of the 34% who presented with comorbidities, 82% had only one comorbidity, 15% had two comorbidities with one respondent (3%) presenting with three comorbidities.

Table 1: Socio-demographic characteristics of study respondents

Variable	Frequency (n = 370)	Percentage
Age (years)		
<40	67	18.1%
40–50	122	33.0%
51–60	70	18.9%
>60	111	30%
Duration of Diagnosis		
<5	300	81.1%
5–10	52	14.5%
>10	18	4.9%
Residential Area		
Urban	370	100.0%
Rural	0	0%
Marital Status		
Single	22	5.9%
Married	222	60%
Divorced	67	18.1%
Widowed	59	16%
Number of Children		
None	26	7.0%
1–3	163	44.1%
4–6	152	41.1%
7–8	22	5.9%
>8	7	1.9%
Educational Status		
None	44	11.9%
<High School	148	40.0%
High School	122	33.0%
>Tertiary	56	15.1%
Employment Status		
Employed	152	41.1%
Unemployed	185	50.0%
Retired	7	1.9%
Pensioner	26	7%
Religious Affiliation		
Christianity	311	84.0%
Islam	55	14.9%
Other	4	1.1%
Menopausal Status		
Pre-menopausal	107	28.9%
Post-menopausal	263	71.1%
Family History of Breast Cancer		
Yes	52	14.1%
No	318	85.9%
Alcohol consumption		
Yes	7	1.9%
No	363	98.1%
Smoking		
Yes	4	1.1%
No	366	98.9%
Exercise		
Yes	178	48.1%
No	192	51.9%

Data is presented as numbers and percentages (%)

A summary of the comparison of anthropometric measures and blood pressure between breast cancer patients with and without comorbidities is given in Table 3. For the anthropometric measures, there was a statistically significant variation in the BMI and mean weight of the respondent with comorbidities compared to those without ($p< 0.05$). In all, respondents with comorbidities had increased BMI (29.3±5.34) and weight (72.4±14.9) than those without comorbidities although they were both overweight. The mean systolic (146±27.6) and diastolic (90.6± 17.5) blood pressures were significantly higher in the respondents with comorbidities than those without ($p < 0.05$).

A comparison of the socio-demographic and lifestyle characteristics between patients with and those without comorbidities is given in Table 4. Statistical significant difference was observed when age ($p=0.003$), employment status ($p=0.026$) and menopausal status ($p=0.003$) were compared between patients with comorbidities and those without comorbidities. Majority of respondents without comorbidities (34.8%) were between 40–50 years whereas most of those with comorbidities (53.2%) were above 60 years. With respect to employment status, a higher proportion of the respondents without comorbidities were employed (48.0%) while most of their counterparts with comorbidities (56.5%) were unemployed.

The EORTC-QLQ Scale Scores and level of quality of life perceived by breast cancer patients is presented in Table 5. The average perception of quality of life by participants was 65.87±27.28. Two hundred and forty-one (65.1%) of the women perceived themselves to have a good quality of life with 13% having a poor quality of life perception. The participants recorded a healthier function in the order; social functioning (88.9%), 76% for both cognitive functioning and emotional functioning, physical function (74%) and role function (72.9%) with means of 80.73, 82.94, 75.93, 75.87 and 70.35 respectively. Participants were found to have considerable symptomatic problems in terms of finance with a median of 100 (67.0). Fatigue and pain symptoms were also relatively high with medians of 22 (0.0–33) and 17 (0.0–62.8) respectively.

The EORTC-QLQ-BR23 scale scores and level of quality of life perceived by breast cancer patients is presented in Table 6. On the QLQ-BR23, the study participants had the best function in body image (90%) and sexual function (83%) with means of 87.12±25.65 and 81.68±27.49 respectively. Participants recorded poor sexual enjoyment and future perspective function (mean of 61.83±28.25 for both). Systemic therapy side effects were the most challenging symptom recorded by participants and followed by Arm symptoms with a median of 11.0 (0.0–56).

Table 2: Distribution of obesity and blood pressure indices among breast cancer patients

Variable	Frequency (n=370)	Percentage (%)
Obesity Indices		
Weight (kg) **(Mean ± SD)**	67.9±15.27	
Height (m) **Mean ± SD)**	1.59±6.48	
Body Mass Index (BMI) **(Mean ± SD)**	27.0±5.48	
Underweight	4	1.1%
Normal	163	44.1%
Overweight	107	28.9%
Obese	96	25.9%
Blood pressure		
Systolic Blood Pressure (mm/Hg) **(Mean ± SD)**	128.7±25.08	
Diastolic Blood Pressure (mm/Hg) **(Mean ± SD)**	83.71±19.51	
Hypotensive	0	-
Normotensives	148	40.0%
Pre-hypertensive	96	25.9%
Hypertensives	126	34.1%

Table 3: Comparison of anthropometric measures and blood pressure between breast cancer patients with and without comorbidities

Variable	With Comorbidities (n=126)	No Comorbidities (n=244)	
	Mean ± SD	Mean ± SD	p-value
Body Mass Index	29.3 ± 5.34	25.9 ± 5.21	**0.0026**
Weight (kg)	72.4 ± 14.9	65.6 ± 15.1	**0.0334**
Height (m)	159 ± 6.00	159 ± 6.75	0.7403
Systolic Blood Pressure (mmHg)	146 ± 27.6	120 ± 18.5	**<0.0001**
Diastolic Blood Pressure (mmHg)	90.6 ± 17.5	80.2 ± 19.7	**0.0107**

DISCUSSION

Presence of comorbidities among breast cancer patients is a matter of great worry, as it affects proper management and QoL. This study determined the prevalence of comorbidities and overall QoL among breast cancer patients at Komfo Anokye Teaching Hospital, in Kumasi Ghana. There is a general consensus that comorbidity is common in patients presenting with cancer, but no study has come from Ghana reporting the magnitude. In this current study, 34.1% of the study

Table 4: Comparison of socio-demographic and lifestyle characteristics between breast cancer patients with and without comorbidities

Variable	With Comorbidities	Without Comorbidities	p-value
	n=124	n=244	
Age (years)			
<40	0 (0%)	66 (27.1%)	**0.003**
40-50	36 (29.0%)	85 (34.8%)	
51-60	22 (17.7%)	49 (20.1%)	
>60	66 (53.2%)	44 (18.0%)	
Educational Status			
<High School	43 (34.7%)	102 (41.8%)	0.136
High School	30 (24.2%)	93 (38.1%)	
>High School	30 (24.2%)	27 (11.1%)	
None	21 (16.9%)	22 (8.0%)	
Marital Status			
Single	0 (0%)	22 (9.0%)	0.284
Married	77 (62.1%)	144 (59.0%)	
Divorced	22 (17.7%)	44 (18.0%)	
Widowed	25 (20.2%	34 (14.0%)	
Employment Status			
Employed	32 (25.8%)	117 (48.0%)	**0.026**
Unemployed	70 (56.5%)	115 (47.1%)	
Retired	22 (17.7%)	12 (4.9%)	
Menopausal Status			
Post-menopausal	117 (94.4%)	144 (59.0%)	**0.003**
Pre-menopausal	7 (5.6%)	100 (41.0%)	
Lifestyle Alcohol			
Yes	0 (0%)	7 (2.9%)	0.305
No	124 (100.0%)	237 (97.1%)	
Smoking			
Yes	0 (0%)	5 (2.0%)	0.470
No	124 (100.0%)	239 (98.0%)	
Exercise			
Yes	69 (55.6%)	107 (43.8%)	0.295
No	55 (44.3%)	137 (56.2%)	

respondents presented with comorbidities (Figure 1). Edwards et al., reported that, in the United States, patients with breast cancer had prevalence of comorbidity of 32.2% [17]. More than half, 53% of the respondents who presented with comorbidities were above 60 years (Table 4). It has been established that breast cancer incidence cum the risk of comorbidities increases with age [18, 19]. Thus having a comorbidity at an older age could serve as a risk factor, predisposing a patient to breast cancer especially in the case of diabetes and hypertension [20]. Comorbidities is most prevalent in older adults and the aged, majority of our study participants were older than 40 years this might in part explain the observed higher prevalence of comorbidity in this category of patients. Additionally, it is common knowledge that cancer and chronic comorbid conditions share similar predisposing factors. Comorbidities tend to be increased in individuals living with increased levels of financial difficulty or poverty [21, 22] as observed from our study only 41. 1% of our respondents were gainfully employed.

This study further observed that majority of the respondents were either pre-hypertensive or hypertensive. The mean blood pressure readings for respondents with comorbidities were also significantly higher than those without comorbidities. Mash (2010) also made similar observation from their study in which they attributed the increase in hypertension to lifestyle factors, including physical inactivity, a salt-rich diet through processed and fatty foods and alcohol and tobacco use [23]. In Ghana, The Ministry of Health (MOH) in 2005 reported a high prevalence of hypertension in adults above 45 years in Ghana (MOH, 2005). All the respondents were urban dwellers, and Addo et al., reported that the prevalence of hypertension in the urban societies of many developing countries like Ghana, is presently as high as that in the developed countries [24]. Souza et al., in a systematic review found that a high prevalence of hypertension in cancer patients is due to similar risk factors between hypertension and cancer [25]. The high prevalence of hypertension may be ascribed lifestyle factors as well as to the worry and fear associated with breast cancer diagnosis and treatment which can predispose a non-hypertensive breast cancer patient to hypertension especially if the patient is not counseled adequately.

A previous study has reported obesity to be related to prognosis in patients with breast cancer [26]. In this study, majority of the participants were overweight as well as obese (Table 2). This is in line with a cross-sectional study by Amoah in Ghana which revealed the overall crude prevalence of overweight and obesity to be 23.4% and 14.1% respectively among adults aged 25 years and above [27]. Moreover, in an epidemiological study conducted among Ghanaians by Biritwum et al., [28]. The prevalence of overweight and obesity among these women could be attributed to the general lack of physical activity, sedentary occupations, unbalanced diets, higher educational level and urban dwelling.

Table 5: EORTC-QLQ scale scores and level of quality of life perceived by breast cancer patients

EORTC-QLQ-C30 Variables	No. of Items	Good (≥66.7)	Average (33.3-66.6)	Poor (<33.3)	Central tendency
					Mean ± SD
Global Health Status/QoL	2	241	81	48	65.87±27.28
C30 Functional Scales					**Mean ± SD**
Physical functioning	5	270	37	63	75.87±31.97
Role functioning	2	266	19	85	70.35±37.49
Emotional functioning	4	281	26	63	75.93±32.05
Cognitive functioning	2	281	30	59	82.94±26.73
Social functioning	2	329	11	30	80.73±24.98
C30 Symptom Scales					**Median (IQR*)**
Fatigue	3	70	19	281	22 (0.0–33)
Nausea/Vomiting	2	33	15	322	0.0 (0.0–17)
Pain	2	93	11	266	17 (0.0–62.8)
Dyspnea	1	30	0	340	0.0 (0.0–0.0)
Insomnia	1	70	0	300	0.0 (0.0–33)
Appetite loss	1	52	0	318	0.0 (0.0–33)
Constipation	1	11	0	359	0.0 (0.0–0.0)
Diarrhea	1	26	0	344	0.0 (0.0–0.0)
Financial difficulties	1	252	0	118	100 (33–67.0)

*IQR: interquartile range

Table 6: EORTC-QLQ-BR23 scale scores and level of quality of life perceived by breast cancer patients

EORTC QLQ_BR23 Variables	No. of Items	Good (>66.7)	Average (33.3-66.6)	Poor (<33.3)	Central tendency
BR23 Functional Scales					**Mean ± SD**
Body image	4	333	15	22	87.12±25.65
Sexual functioning	2	307	19	44	81.68±27.49
Sexual enjoyment	1	289	0	81	61.83±28.25
Future perspective	1	289	0	81	61.83±28.25
BR-23 Symptom Scales					**Median (IQR*)**
Systemic therapy Side effects	7	26	78	266	10 (0.0–38)
Breast symptoms	4	59	26	285	8.0 (0.0–33)
Arm symptoms	3	81	15	274	11.0 (0.0–56)
Upset by hair loss	1	38	0	322	0.0 (0.0–0.0)

*IQR: interquartile range

In this current study, there was a higher proportion of the cancer patient between the ages 40–50 years (33.0%), followed by those above 60 years (30%) with most of the women (71.1%) being postmenopausal. This finding is similar to reports from a retrospective study among Ghanaians by Edmund et al., and in a survey study by Ghartey et al., [29, 30]. Most of the women from this current study did not have a family history of breast cancer prior to their diagnosis (Table 1). Only 14.1% of women diagnosed with breast cancer have a first-degree female relative (daughter, mother or sister) with the disease. Research by Collaborative Group on Hormonal Factors in Breast Cancer [31] reported that majority of women with breast cancer do not have a family history of the disease which conforms to the findings of our current study. This suggests that the aetiology and risk of breast cancer among Ghanaians is beyond merely hereditary patterns.

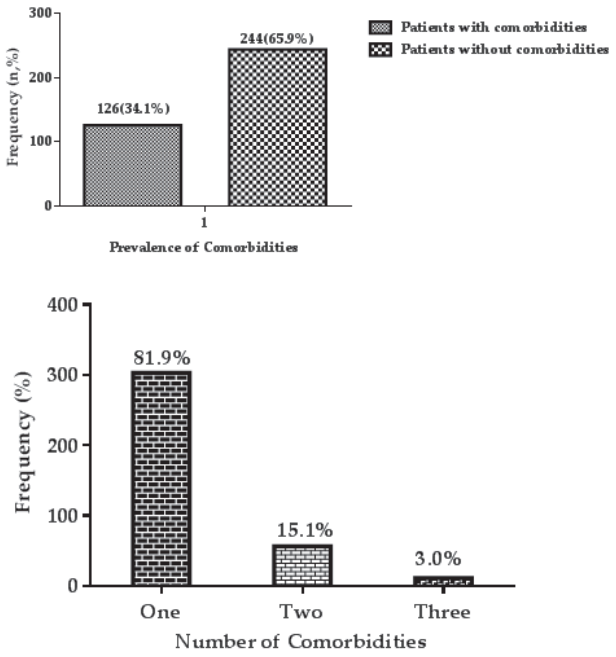

Figure 1: The prevalence of comorbidities among the various respondents.

The EORTC QOL-C30 scores were high for physical functioning (74%), role functioning (74%), emotional functioning (76%), cognitive functioning (76%) and social functioning (89%) indicating a satisfactory level of these functions. These findings match up with reports from a cross-sectional study by Lobo et al., in Portugal on breast cancer patients who showed satisfactory functional scores [32]. Participants, however, had low symptoms scores for pain (25%), fatigue (19%), insomnia (19%), nausea/vomiting (9%), dyspnea (8%), constipation (3%), diarrhea (7%) and appetite loss (14%), (Table 5). Financial problems were a common problem amongst participants. Moreover, less than half of our study participants were actively employed. Lobo et al., in their study also reported that patients faced similar financial issues [32]. Breast cancer treatment regimens were very expensive and most participants complained greatest about treatment cost during the recruitment. To mitigate the cost of breast cancer treatment, we advocate for an increment in the cost allocated to breast cancer treatment in order to reduce the out-of-pocket payment made by the breast cancer patients.

Evaluation of participants with EORTC-QLQ BR23 showed patients with healthier functional scales but low symptom scale. Scores were high for body image (90%), sexual functioning (83%), sexual enjoyment (78%) and future perspective (78%). Lower scores were recorded for the symptom scale; systemic therapy side effects (7%), breast symptoms (16%), arm symptoms (22%) and upset by hair loss (14%), (Table 6). Systemic therapy side effects were the worst challenging symptom recorded by participants which could be due to the adverse effects implicated by adjuvant therapies. Earlier studies conducted on breast cancer patients, a global quality of life nearer to 100 (thus >70) was considered reasonable or satisfactory by women [32, 33]. The global quality of life (65.87) though fairly good was unsatisfactory as considered by the women. In most cancer treatment, the presence of other comorbidities is seldom taken into consideration and this can have a possible adverse effect on the prognosis, QoL and overall survival, it is therefore suggested that treatment strategies must take into account the interaction and co-existence of cancer with other comorbidities for improved prognosis and overall QoL. Although the aforementioned findings in this study concur with several other authors, the limitations of the results of this study are related to the cross-sectional design that does not allow establishing relations of cause and effect.

CONCLUSION

Comorbidities were present in 34% of the breast cancer patients. Obesity, overweight, diabetes and hypertension were the most prevalent comorbidities. Overall, the quality of life (QoL) of the breast cancer patients was moderate but with high symptom scales and score as well as financial constraints. The presence of comorbidities affects breast cancer treatment, QoL, prognosis, as such, screening for occurrence of comorbidity in breast cancer patients should be made a priority and a part of routine medical care with extra attention given to patients that present with comorbidities with the aim of improving their prognosis and QoL.

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Author Contributions
Linda Ahenkorah Fondjo – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published
Osei Owusu-Afriyie – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published
Ernest Osei-Bonsu – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published
Emmanuel Amankwaah-Frimpong – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Emmanuel Acheampong – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published
Emmanuella Batu – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published
Bright Amankwaah – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published
Esther Ofosu Mintah – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published
Naa Okailey Dromo Ammah – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor
The corresponding author is the guarantor of submission.

Conflict of Interest
Authors declare no conflict of interest.

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REFERENCES

1. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM. Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. Int J Cancer 2010 Dec 15;127(12):2893–917.
2. Forouzanfar MH, Foreman KJ, Delossantos AM, et al. Breast and cervical cancer in 187 countries between 1980 and 2010: A systematic analysis. Lancet 2011 Oct 22;378(9801):1461–84.
3. Sarfati D, Koczwara B, Jackson C. The impact of comorbidity on cancer and its treatment. CA Cancer J Clin 2016 Jul;66(4):337–50.
4. Glicksman AS, Rawson RW. Diabetes and altered carbohydrate metabolism in patients with cancer. Cancer 1956 Nov–Dec;9(6):1127–34.
5. Muck BR, Trotnow S, Hommel G. Cancer of the breast, diabetes and pathological glucose tolerance. Arch Gynakol 1975 Dec 16;220(1):73–81.
6. Jeong JR, Kim S, Jo SR, Joh JY, Kim YP. Health Behaviors of Breast Cancer Survivors with Hypertension: A Propensity Analysis of KNHANES III-V (2005-2012). PLoS One 2015 May 15;10(5):e0127346.
7. Yancik R, Wesley MN, Ries LA, Havlik RJ, Edwards BK, Yates JW. Effect of age and comorbidity in postmenopausal breast cancer patients aged 55 years and older. JAMA 2001 Feb 21;285(7):885–92.
8. Ogle KS, Swanson GM, Woods N, Azzouz F. Cancer and comorbidity: Redefining chronic diseases. Cancer 2000 Feb 1;88(3):653–63.
9. Wiredu EK, Armah HB. Cancer mortality patterns in Ghana: A 10-year review of autopsies and hospital mortality. BMC Public Health 2006 Jun 20;6:159.
10. Clegg-Lamptey J, Hodasi W. A study of breast cancer in korle bu teaching hospital: Assessing the impact of health education. Ghana Med J 2007 Jun;41(2):72–7.
11. Kirby A. 16 Early detection oF breast cancer in Ghana, West Africa. Journal of Investigative Medicine 2005;53(1):S80.
12. Cordova MJ, Giese-Davis J, Golant M, Kronenwetter C, Chang V, Spiegel D. Breast cancer as trauma: Posttraumatic stress and posttraumatic growth. Journal of Clinical Psychology in Medical Settings 2007;14(4):308–19.
13. Montazeri A, Jarvandi S, Haghighat S, et al. Anxiety and depression in breast cancer patients before and after participation in a cancer support group. Patient Educ Couns 2001 Dec 1;45(3):195–8.
14. Jayasekara H, Rajapaksa LC, Brandberg Y. Measuring breast cancer-specific health-related quality of life in South Asia: psychometric properties of the Sinhala version of the EORTC QLQ-BR23. Qual Life Res 2008 Aug;17(6):927–32.
15. Kontodimopoulos N, Ntinoulis K, Niakas D. Validity of the Greek EORTC QLQ-C30 and QLQ-BR23 for measuring health-related quality of life in breast cancer patients. Eur J Cancer Care (Engl) 2011 May;20(3):354–61.
16. Montazeri A. Health-related quality of life in breast cancer patients: A bibliographic review of the literature from 1974 to 2007. J Exp Clin Cancer Res 2008 Aug 29;27:32.
17. Edwards BK, Noone AM, Mariotto AB, Annual Report to the Nation on the status of cancer, 1975-2010, featuring prevalence of comorbidity and impact on survival among persons with lung, colorectal, breast, or prostate cancer. Cancer 2014 May 1;120(9):1290–314.
18. Andersen BL, Kiecolt-Glaser JK, Glaser R. A biobehavioral model of cancer stress and disease course. Am Psychol 1994 May;49(5):389–404.
19. American Cancer Society. Breast Cancer Facts & Figures 2015–2016. Atlanta: American Cancer Society, Inc 2015.
20. Ording AG. Breast Cancer and Comorbidity: Risk and Prognosis. PhD Dissertation: Health, Aarhus University; 2014. [Available at: http://www.kea.au.dk/file/Ph.d.-afhandlinger/Anne%20Ording.pdf]
21. Louwman WJ, Aarts MJ, Houterman S, van Lenthe FJ, Coebergh JW, Janssen-Heijnen ML. A 50% higher prevalence of life-shortening chronic conditions among cancer patients with low socioeconomic status. Br J Cancer 2010 Nov 23;103(11):1742–8.
22. Schrijvers CT, Coebergh JW, van der Heijden LH, Mackenbach JP. Socioeconomic variation in cancer survival in the southeastern Netherlands, 1980–1989. Cancer 1995 Jun 15;75(12):2946–53.
23. Mash R. Chronic diseases, climate change and complexity: The hidden connections. South African Family Practice 2010;52(5):438–45.

24. Addo J, Smeeth L, Leon DA. Hypertension in Sub-Saharan Africa a systematic review. Hypertension 2007;50(6):1012–8.
25. Souza VB, Silva EN, Ribeiro ML, Martins Wde A. Hypertension in patients with cancer. [Article in English, Portuguese]. Arq Bras Cardiol 2015 Mar;104(3):246–52.
26. Schapira DV, Kumar NB, Lyman GH, Cox CE. Obesity and body fat distribution and breast cancer prognosis. Cancer. 1991 Jan 15;67(2):523–8.
27. Amoah AG. Obesity in adult residents of Accra, Ghana. Ethn Dis 2003;13(2 Suppl 2):S97–101.
28. Biritwum R, Gyapong J, Mensah G. The epidemiology of obesity in ghana. Ghana Med J 2005 Sep;39(3):82–5.
29. Naku Ghartey Jnr F, Anyanful A, Eliason S, Mohammed Adamu S, Debrah S. Pattern of breast cancer distribution in Ghana: A survey to enhance early detection, diagnosis, and treatment. Int J Breast Cancer 2016;2016:3645308.
30. Edmund DM, Naaeder SB, Tettey Y, Gyasi RK. Breast cancer in Ghanaian women: What has changed? Am J Clin Pathol 2013 Jul;140(1):97–102.
31. Collaborative Group on Hormonal Factors in Breast Cancer. Familial breast cancer: Collaborative reanalysis of individual data from 52 epidemiological studies including 58,209 women with breast cancer and 101,986 women without the disease. Lancet 2001 Oct 27;358(9291):1389–99.
32. Lôbo SA, Fernandes AFC, Almeida PCd, Carvalho CMdL, Sawada NO. Qualidade de vida em mulheres com neoplasias de mama em quimioterapia. Acta Paulista de Enfermagem 2014;27(6):554–9.
33. Browall M, Ahlberg K, Karlsson P, Danielson E, Persson LO, Gaston-Johansson F. Health-related quality of life during adjuvant treatment for breast cancer among postmenopausal women. Eur J Oncol Nurs 2008 Jul;12(3):180–9.