ORIGINAL ARTICLE

Quality of life among Filipino breast cancer patients undergoing radiotherapy during the COVID-19 pandemic

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ABSTRACT

Background: The effect of treatment delays on the quality of life of breast cancer patients undergoing radiotherapy remains to be seen, especially from quarantine measures implemented during the COVID-19 pandemic.

Objective: The objective of this study is to assess the Health-Related Quality Of Life (HR-QOL) of breast cancer patients referred for radiotherapy during the COVID-19 pandemic.

Methodology: This cross-sectional analysis included histopathologically proven breast cancer patients referred for radiotherapy at the Philippine General Hospital from June to October 2020. The University of the Philippines-Department of Health Quality of Life Scale for Cancer Patients was used to assess the HR-QOL of the respondents across five domains.

Results: A total of 60 respondents (median age of 52, range 33-71) were surveyed and eligible for analysis. College degree holders and good performers were associated with higher HR-QOL scores (p=0.008). The median interval from diagnosis to survey was 10.7 (SD±6.18) months and a longer illness duration was detrimental to HR-QOL. Overall, the global HR-QOL score was high (80.0% of respondents, HR-QOL score of 5.38±0.46). This was observed in all, except for the cognitive domain where HR-QOL was moderate among respondents (4.24±0.76).

Conclusion: This assessment was conducted within seven months into the pandemic, when an overall high HR-QOL score was observed among breast cancer patients. With further restrictions in treatment census encountered during the pandemic, strategies are recommended to address these indicators of health related QOL in this patient population through equitable and prompt access to needed care, such as radiotherapy.

Introduction

According to the latest Global Cancer (GLOBOCAN) Statistics published in 2018, breast cancer has an incidence of 2,088,849 cases representing 11.4% of all cancers worldwide, leading to as much as 626,679 or 6.6% of mortalities [1]. Locally advanced breast cancer, defined as stage III including any T3 disease (more than five centimeters in size), comprises the majority of presentations in our setting. Therapeutic management largely includes mastectomy, neoadjuvant or adjuvant chemotherapy, radiotherapy or a sequential combination of these treatments, in accordance with the latest NCCN guidelines [2,3]. As a matter of fact, around twenty-five percent (25%) of the caseload in radiation oncology practice involves the treatment of breast cancer patients [2].

On March 17, 2020, the whole island of Luzon was placed under Enhanced Community Quarantine as the Philippine government's precaution against the disease caused by the novel SARS-CoV-2 virus or COVID-19. This effectively halted all operations of the radiotherapy facilities in our state-run institution, resulting in the stoppage and postponement of our high-volume treatment census. International experience and opinion varies in terms of the balance between preserving oncological care and conducting measures to minimize patient contact, such as hypofractionation, deferral of follow-up or treatment, telemedicine and infection control [4,5,6]. Prominent radiation oncology societies such as the American Society for Radiation Oncology (ASTRO) subsequently published initial guidelines focused largely on screening, triaging and scheduling of patients for treatment in order to similarly prevent the probability of infection in this vulnerable population [7,8]. The effects of such measures, such as of treatment delays experienced by the population described, remains to be seen and is an evolving area of study in the time of this pandemic.

Review of Related Literature

Over the last three decades, Quality Of Life (QOL) studies in oncologic literature have seen exponential growth in terms of quality, quantity, and relevance, with its importance increasing with better survivorship data.

Various studies have attempted to improve the quality of QOL data, in terms of timing and statistical issues, to be translatable into clinically significant interventions. For example, for studies with two arms where clinically significant tumor control will be achieved at the expense of toxicities, QOL is pertinent for clinicians and patients alike [9].

In a survey of advanced cancer patients, strong determinants of overall health-related QOL are age, performance status, and projected survival time, although significant aggravating factors were noted, including worse emotional well-being and treatment delays for whatever reason [10]. Another survey of around 350 patients with different tumor histologies found worse emotional functioning, pain, and appetite as predictors of worse QOL, with a sub-analysis of breast cancer patients finding fatigue and nausea/vomiting as pertinent factors [11]. Among patients undergoing radiation therapy, increased impact of symptoms and higher anxiety were seen after treatment, compromising QOL but with no reduction in treatment tolerance or daily activities [12].

The EORTC QLQ-C30 instrument was developed for use in international clinical trials and measures functional scales such as physical, role, cognitive, emotional, and social, in order to formulate a Global Quality of Life among cancer patients [13]. Some investigators have observed the importance of understanding disease status and quality of life while accounting for different ethnic origins and languages [14]. The need thus arises for a culture-specific assessment tool for Health-Related QOL that is validated to a native culture and language [14].

To wit, there exists a validated Filipino translation EORTC QLQ-C30 instrument, the University of the Philippines-Department of Health Quality

of Life Scale for Cancer Patients developed by the same [15]. This scale was drafted from more than 1,000 patients across the Philippines in 1995, in order to provide a culture-appropriate quality of life scale [16]. It is composed of 33 queries classified under five domains, namely physical wellness, emotional well-being, social status, cognitive status, and self-care/related functions. This validated HR-QOL tool has been utilized and determined an overall moderate quality of life for Filipino head and neck patients, with lower scores for those who have undergone chemotherapy [17]. Assessing the HR-QOL of patients being treated in the midst of the COVID-19 pandemic may be beneficial, given the challenges of treatment prioritization and other factors brought about by quarantine measures [18]. The objective of this study is thus to assess the Health-Related Quality of Life (HR-QOL) of breast cancer patients referred for radiation therapy during the COVID-19 pandemic, using this validated, culture-specific tool and identify any clinical/socio-demographic predictors of HR-QOL in these patients.

Methodology

Study Participants

Patients with clinically and histopathologically-proven locally advanced invasive carcinoma of the breast referred for radiation therapy at the out-patient clinic of the Division of Radiation Oncology of the Philippine General Hospital from June 2020 to October 2020 were included in the study. In particular, study participants included such patients aged 19-65 years old planned to be treated with post-operative radiation therapy in either conventional fractionation or a hypofractionated regimen. Excluded from recruitment were those with metastatic disease, pregnant patients, and those with severe incapacitating conditions that may preclude accomplishment of the survey questionnaire.

Respondents must have read and been able to understand the informed consent as described in forms provided. Those who declined to consent were also excluded from the study.

Data Collection

After obtaining institutional review board approval, recruitment of study participants was initiated. Participants must have met all of the inclusion criteria and none of the exclusion criteria to be eligible for this study. There were no exceptions made to these eligibility requirements at the time of registration. Patients were invited personally by the primary investigator/co-investigators, and the study and its objectives were explained. The self-administered survey questionnaire contained the study objectives and procedures. Ample time had been given for the respondent to read through the introduction part of the study and any concerns/issues were addressed; as well as to answer the survey privately afterwards. The survey was conducted within a four-month period from June 2020 to October 2020 or until the target number of participants have been recruited.

Data were gathered using standard case record forms. After completion of a CRF, a hard copy was kept in the investigator's own patient study file securely under lock and key. The identities of the individual were not revealed, and codes were used to mask their identities. The data collection forms do not contain any personal patient details such as name, address, or hospital number in accordance with the guidelines for privacy and confidentiality as specified in the Data Privacy Act of 2012 and the 2017 National Ethical Guidelines for Privacy and Health Related Research (NEGHHR). The research protocol was approved by the University of the Philippines Manila Research Ethics Board (UPM REB) with registration number 2020-316-01.

Study Materials and Procedure

The HR-QOL questionnaire used is the University of the Philippines - Department of Health Quality of Life Scale for Cancer Patients, a validated questionnaire comprising 33 questions exploring different aspects of life quality [15]. Items are grouped into the following domains: Physical Wellness (13 items), Emotional Well-being (8 items), Social Status (3 items), Cognitive Status (5 items) and Self-care/related Functions (4 items). Each domain subscale can act as a unique measure of each specific domain of QOL and if combined, they provide the overall QOL of an individual. Two types of QOL can be derived, including specific domains and the global QOL, both of

which were scored and assessed. The responses to each item ranged from 1 to 7, corresponding to the lowest and highest QOL for each item. Item scores per domain are summed and divided by the number of items in the domain. The resulting mean score for each domain represents the domain-specific QOL. To obtain the global QOL, QOL scores of each domain are summed and divided by the number of domains (5 domains). The resulting mean score for the entire scale represents the global QOL, with high scores demonstrating better quality of life.

For the interpretation of scores for each domain, the following scoring system can be used: a high QOL will have a mean score of 5.01-7.00, moderate QOL signifies a score of 3.01-5.00 and the QOL will be considered low when the score is 1.00-3.00.

In addition, sociodemographic and medical information likewise was collected. Age was recorded as a continuous variable. The places where they live were categorized into binary categories: inside and outside Metro Manila. Marital status was divided into single, married, widowed, separated, and live-in. Employment status was divided into employed, unemployed, and retired. Highest level of educational attainment was divided into did not graduate, elementary school, high school, college, and post-graduate level. Cohabitation status was divided into spouse, spouse and children, children, alone and others. Clinical stage was divided into stage I, II, III and IV. Self-perceived pain score was assessed using a 10-point numerical rating scale (NRS), with a higher rating denoting increasing pain severity. Performance status was scored using a 4-point rating scale according to the Eastern Cooperative Oncology Group (ECOG), with increasing scores indicating poorer patient performance. Chemotherapy given (neoadjuvant, adjuvant, hormonal or a combination) was also recorded. The duration of illness at time of survey was recorded in days. Time at which the survey was conducted in reference to radiotherapy treatment (initial consult, pre-simulation, pre-treatment, during treatment and follow-up/post-treatment) was also recorded and to be analyzed in association with likelihood of attaining higher QOL score.

Statistical Methods and Data Analysis

Given the cross-sectional nature of the study, the primary objective is met through convenience sampling across four months of data collection. Homogeneity and representativeness among the sample were ensured by recruiting participants from the population of interest, accounting for the seasonality of patient referrals in the institution. For unadjusted univariate analysis across specific QOL scores, a minimum of 60 patients was required for this study based on the 0.79 standard deviation of Global QOL score of patients, 5% level of significance and 0.4 desired total width of confidence interval [19].

Descriptive statistics was used to summarize the demographic and clinical characteristics of the patients. Frequency and proportion were used for categorical variables, median and inter quartile range for non-normally distributed continuous variables and mean with standard deviation for normally distributed continuous variables. Binary logistic regression analysis was used to determine the significant socio-demographic and clinical profile of the patients that may affect the HR-QOL domains and its total Global QOL. Shapiro-Wilk was used to test the normality of the continuous variables. Missing values were neither replaced nor estimated. Null hypothesis was set to be rejected at 0.05 α-level of significance. STATA 13.1 was used for data analysis.

Results

A total of 60 patients were included in the study with a median age of 52 years old (range: 33-71). Most of the respondents were married (68.3%), cohabiting with their spouse and children (60.0%) and unemployed (68.3%). Majority had stage III disease (56.7%) and were still for scheduling of radiotherapy planning at the time of survey (66.7%).

The median interval from the time of diagnosis to data collection was 10.7 months (SD±6.18 months). Of the 60 participants, 55 (91.7%) were good performers (ECOG 0) and 50 (83.3%) had a low general pain score. Socio-demographic characteristics of the respondents are outlined in Table 1, Appendix C.

Of note, being a degree holder (college/postgrad) was associated with a higher QOL (OR 8.62, p=0.018). All other variables were not statistically

Table 1. Baseline Clinico-Demographic Characteristics of the Respondents

Variable	Frequency (%), Mean (+/-SD); Median (IQR)
Age (years)	51.5 (33-71)
Marital Status	
Single	11 (18.33%)
Married	41 (68.33%)
Widowed	6 (10.00%)
Separated	1 (1.67%)
Live-in	1 (1.67%)
Place of living	
Within Metro Manila	31 (51.67%)
Outside Metro Manila	29 (48.33%)
Employment status	
Employed	11 (18.33%)
Unemployed	41 (68.33%)
Retired	8 (13.33%)
Highest Level of Educational Attainment	
Undergraduate	4 (6.67%)
Elementary	10 (16.67%)
High School	21 (35.00%)
College	24 (40.00%)
Post-graduate	1 (1.67%)
Cohabitation status	
Spouse	3 (5.00%)
Spouse and Children	36 (60.00%)
Children	10 (16.67%)
Alone	-
Others	11 (18.33%)
Stage	
I	1 (1.67%)
II	21 (35.00%)
III	34 (56.67%)
IV	4 (6.67%)
Chemotherapy	
Neoadjuvant	17 (28.33%)
Adjuvant Chemotherapy only	31 (51.67%)
Adjuvant Chemotherapy and Hormonal Therapy	15 (25.00%)
Pain score (Numerical Rating Scale)	
0-4	50 (83.33%)
5-7	7 (11.67%)
8-10	3 (5.00%)
ECOG Performance Status	
0	55 (91.67%)
1	2 (3.33%)
2	1 (1.67%)
3	1 (1.67%)
4	1 (1.67%)
Duration of illness (in days)	320.5 (185.5)
Radiotherapy status	
Pre-simulation	40 (66.67%)
Pre-treatment	4 (6.67%)
Ongoing Treatment	15 (25.00%)
Post-treatment	1 (1.67%)

significant in the adjusted binary logistic regression model (Table 2). On univariate analysis, adjuvant chemotherapy and hormonal therapy were also significant predictors of low QOL (OR 0.14, p=0.006). Good performance status or an ECOG score of 0 also predicted for a better QOL scores (OR 0.04 for ECOG 1-4, p=0.008). Moreover, a longer duration of illness was associated with a lower QOL, with the odds of having a high QOL decreasing by 0.004% for every additional day from initial diagnosis.

Overall, the global QOL score of most participants was high (80.0%, 5.38±0.46). This was also observed in most of the other domains including physical (5.51±0.54), emotional (5.42±0.67), social (6.14±0.59) and self-care (5.56±0.61) The exception is in the cognitive domain where QOL was moderate among respondents (4.24±0.76). The distribution of perceived quality of life across participants is displayed in Table 3.

A summary of the factors affecting each health-related quality of life domain is outlined in Table 4. For physical wellness, having a high ECOG performance status score of greater than zero decreases the odds of high physical wellness score by 90%. For emotional well-being, being a college or post-graduate degree holder was associated with a higher score, while having a pain score greater than four decreases the odds of high emotional well-being score by 89%. For self-care, being a degree holder increased the odds of self-care score five-fold. There were no statistically significant predictor of high social status and high cognitive scores.

Discussion

Among Filipinos, breast cancer ranks highest in incidence and mortality rates, accounting for 33% of cancer cases and 23% of cancer death [20]. This study pioneers the assessment of quality of life in this particular subset of breast cancer patients in this institution, which accounts for a high proportion of the overall radiotherapy treatment census. Given their number and the adjuvant nature of their planned treatment, they are typically relegated to a lower priority status, especially during the current pandemic situation.

Delays in radiation treatment initiation have been shown to increase local recurrence rates in this disease entity, such that such gaps should be made brief as not to compromise survival and quality of life [21]. A large, international QOL study of breast cancer patients undergoing surgery and adjuvant treatment has shown the feasibility of determining similar QOL assessment and factors in patient coping, well-being, appetite and mood, giving relevance in this patient subset [22].

Of utmost relevance to the present situation is a cross-sectional QOL study done in a Chinese province in the midst of the COVID-19 pandemic showed mild stressful impact and a majority not feeling helpless in this crisis among their general public. QOL determinants included in this study were reactions to the COVID-19 situation, social support and coping strategies [23]. Furthermore, pre-proof Taiwanese and Indian articles evaluating patients receiving radiation therapy have also evaluated apprehension of patients in acquiring the infection, hence postponing clinic visits, affecting important decision-making processes and even deferring recommended therapy [5,24].

As demonstrated in this study demographic, most patients enrolled were of a low socioeconomic status or were unemployed, typically cohabiting as part of a nuclear Filipino family. In terms of disease status, most had locally advanced or stage III disease which is the prevalent initial presentation, with good performance status and low pain scores characteristic of most breast cancer patients. Given the low priority in this population with the triaging of radiotherapy resources resulting from the quarantine period, majority (66.7%) of patients are observed to be still in the process of radiotherapy scheduling at the time of survey. Moreover, the average interval from initial histopathologic diagnosis to the time of survey was 10.7 months, beyond the ideal overall treatment time for breast cancer of 6-8 months to include surgery, chemotherapy and radiation therapy, depending on regimen used [2,3].

Various QOL tools and questionnaires that are sensitive and responsive to such changes have been developed [25]. The changes observed in QOL from baseline and after the use of cytotoxic chemotherapy is an example of clinically meaningful dilemma from measurable adverse QOL effect [22]. Aside from previous determinants mentioned, other QOL indicators also include social support, household income, and healthcare coverage, with chemotherapy consistently observed as a negative predictor [26].

The University of the Philippines-Department of Health Quality of Life Scale for Cancer Patients (UP-DOH QOL CA Questionnaire), a validated, culture-specific survey instrument, was utilized in this study. In its initial validation, the overall QOL of Filipino cancer patients was moderate to high, with majority of patients exhibiting high scores in the domains of emotional and social well-being and better QOL scores among patients with early-stage disease, and patients who received 3-6 months of chemotherapy alone [16].

In this study, most of the pre-determined socio-demographic factors identified did not show any association of statistical significance with quality of life scores. Albeit with mild relevance, having a college or vocational degree was found to have statistical correlation with better QOL scores. As can be surmised, good ECOG performance status scores were significantly associated with better quality of life, while the opposite was noted for patients having prolonged postponements in treatment, with a progressive decreasing score (0.004% decrease in odds of high QOL score) with each additional day of delay.

A similarly high overall QOL score was noted in the patient subset included in this study, with 80% of respondents reporting individual high scores of between 5.01-7.00. This was also observed across all domains (physical, social, emotional and self-care) except for the cognitive domain where average scores were moderate, which may be attributable to the general semantic of the queries in the survey tool. These trends reflect the overall good quality of life in Filipino breast cancer patients given their adjuvant status at the time of referral for radiotherapy.

Furthermore, in the initial QOL studies among all cancer types, factors noted to affect QOL include age, gender, civil status, education, site of cancer, stage of disease and type of treatment, where single young women

Table 2. Association of Perceived Health-related Quality of Life to related variables

Variable	Unadjusted measures		Adjusted measures	
	Odds ratio (95% CI)	p-value	Odds ratio (95% CI)	p-value
Age (years)	0.98 (0.91-1.05)	0.561	-	
Marital Status				
Single/ Widowed/ Separated	Reference (1.00)		Reference (1.00)	
Married/ Live-in	3.00 (0.81-11.08)	0.099	4.86 (0.46-51.77)	0.19
Place of living			-	
Within Metro Manila	Reference (1.00)			
Outside Metro Manila	0.92 (0.26-3.26)	0.897		
Employment status			-	
Employed	Reference (1.00)			
Unemployed	0.31 (0.04-2.73)	0.291		
Retired	0.70 (0.04-13.18)	0.812		
Highest Level of Educational Attainment				
Elementary graduate/ undergraduate	Reference (1.00)		Reference (1.00)	
High School	3.19 (0.70-14.56)	0.135	0.54 (0.04-7.92)	0.655
College/ Post-graduate	8.62 (1.44-51.72)	0.018	102.07 (1.81-57.45)	0.024
Cohabitation status			-	
Spouse and/or Children	Reference (1.00)			
Others	2.89 (0.33-25.16)	0.335		
Stage			-	
I/ II	Reference (1.00)			
III/ IV	0.83 (0.22-3.17)	0.789		
Chemotherapy				
Neoadjuvant	2.27 (0.44-11.67)	0.325	-	
Adjuvant	4.20 (1.01-17.50)	0.049	3.01 (0.14-64.18)	0.48
Combination of Chemotherapy and Hormonal	0.14 (0.04-0.57)	0.006	0.04 (0.001-1.12)	0.058
Pain score (Numerical Rating Scale)				
0-4	Reference (1.00)		Reference (1.00)	
5-10	0.09 (0.02-0.42)	0.002	0.12 (0.007, 2.11)	0.147
ECOG Performance Status				
0	Reference (1.00)		Reference (1.00)	
1-4	0.04 (0.004, 0.43)	0.008	0.03 (0.001-1.05)	0.053
Duration of illness (in days)	0.996 (0.993-0.9998)	0.039	0.999 (0.992-1.006)	0.808
Radiotherapy status			-	
Pre-simulation/ Pre-treatment	Reference (1.00)			
Ongoing/ Post-treatment	1.11 (0.26-4.77)	0.884		

Table 3. Distribution of Perceived Health-Related Quality of Life Domains

QUALITY OF LIFE DOMAIN	Summary measures (Frequency %, mean +/- SD)
Physical Wellness	5.51±0.54
Low	-
Moderate	10 (16.67%)
High	50 (83.33%)
Emotional Well-being	5.43±0.68
Low	-
Moderate	17 (28.33%)
High	43 (71.67%)
Social Status	6.13±0.59
Low	-
Moderate	4 (6.67%)
High	56 (93.33%)
Cognitive Status	4.24±0.76
Low	2 (3.33%)
Moderate	51 (85.00%)
High	7 (11.67%)
Self-care/Related Functions	5.56±0.61
Low	-
Moderate	15 (25.00%)
High	45 (75.00%)
Global Quality of Life	5.38±0.46
Low	-
Moderate	12 (20.00%)
High	48 (80.00%)

with higher education diagnosed with earlier stage breast cancer treated with minimal modality treatment had the best measured QOL [15].

Notably, this study revealed that being a college or vocational degree holder was also associated with better QOL specifically in the emotional and self-care aspects, observed as well in previous studies [15-18]. Other associations were intuitive, including decreasing emotional scores with higher pain scores and decreasing physical scores with poorer functional status.

All in all, the findings displayed in this study demonstrate the current state of this patient subset affected by delays brought about by quarantines and lockdowns due to the current pandemic. Focus must be given to mitigate the collateral effects of the judicious use of resources amidst the limitations in patient load required to prevent the spread of infection. As the interest for quality-of-life studies continue to proliferate, subjective insight from such studies may objectively influence treatment decisions through contributions to small-scale hospital institutional policies or even to widely-applicable national health regulations.

Conclusion

A cross-sectional survey was conducted to assess the overall health-related quality of life and its associated socio-demographic predictors among breast cancer patients referred for radiotherapy during the COVID-19 pandemic, to determine adverse effects of resulting treatment delays. This assessment was conducted between three and seven months into the pandemic and at this time, an overall high global health-related quality of life score was observed among respondents. Good ECOG performance status and degree holders were identified as determinants of high HR-QOL scores while longer illness duration was associated inversely.

With further backlogs being encountered from limited treatment census and restrictive logistics during the pandemic, such strategies as patient feedback surveys and review of institutional protocols on treatment prioritization are recommended to be employed to address these quality-of-life determinants in this sizeable breast cancer patient population through equitable and prompt access to needed care, such as radiotherapy.

Table 4. Factors associated with each HR-QOL domain and Global Quality of Life

Variable	Physical Wellness	Emotional Well-being	Social Status	Cognitive Status	Self-care/ Related Functions	Global Quality of Life
	Odds ratio (95% CI)**					
Age (years)	0.97 (0.90-1.04)	1.02 (0.96-1.09)	1.04 (0.93-1.17)	0.97 (0.88-1.06)	0.99 (0.92-1.05)	0.98 (0.91-1.05)
Marital Status						
Single/ Widowed/ Separated	Reference (1.00)	Reference (1.00)	Reference (1.00)	Reference (1.00)	Reference (1.00)	Reference (1.00)
Married/ Live-in	2.85 (0.71-11.44)	2.93 (0.90-9.61)	2.50 (0.32-19.30)	2.83 (0.32-25.42)	2.70 (0.80-9.17)	3.00 (0.81-11.08)
Place of living			-			
Within Metro Manila	Reference (1.00)	Reference (1.00)		Reference (1.00)	Reference (1.00)	Reference (1.00)
Outside Metro Manila	1.5 (0.38-5.97)	2.11 (0.66-6.73)		0.78 (0.16-3.82)	0.77 (0.24-2.47)	0.92 (0.26-3.26)
Employment status						
Employed	Reference (1.00)	Reference (1.00)	Reference (1.00)	Reference (1.00)	Reference (1.00)	Reference (1.00)
Unemployed	1.30 (0.22-7.53)	0.91 (0.20-4.01)	1.27 (0.12-13.52)	1.39 (0.15-13.29)	0.61 (0.11-3.25)	0.31 (0.04-2.73)
Retired	0.67 (0.07-6.11)	1.13 (0.14-8.99)	-	1.43 (0.08-26.90)	0.67 (0.07-6.11)	0.70 (0.04-13.18)
Highest Level of Educational Attainment						
Elementary graduate/ undergraduate	Reference (1.00)	Reference (1.00)	Reference (1.00)	Reference (1.00)	Reference (1.00)	Reference (1.00)
High School	0.19 (0.02-1.82)	2.50 (0.61-10.26)	0.73 (0.06-8.92)	0.63 (0.08-5.10)	1.88 (0.45-7.76)	3.19 (0.70-14.56)
College/ Post-graduate	0.56 (0.05-6.00)	5.25 (1.18-23.46)*	1.85 (0.11-32.01)	0.82 (0.12-5.59)	5.50 (1.11-27.37)*	8.62 (1.44-51.72)*
Cohabitation status				-		
Spouse and/or Children	Reference (1.00)	Reference (1.00)	Reference (1.00)		Reference (1.00)	Reference (1.00)
Others	0.88 (0.16-4.85)	1.99 (0.38-10.32)	0.65 (0.06-6.94)		1.63 (0.31-8.53)	2.89 (0.33-25.16)
Stage						
I/ II	Reference (1.00)	Reference (1.00)	Reference (1.00)	Reference (1.00)	Reference (1.00)	Reference (1.00)
III/ IV	0.70 (0.16-3.04)	0.92 (0.29-2.97)	0.56 (0.05-5.69)	1.52 (0.27-8.56)	0.82 (0.24-2.82)	0.83 (0.22-3.17)
Chemotherapy						
Neoadjuvant	0.91 (0.21-4.01)	1.40 (0.39-5.15)	0.11 (0.01-1.16)	2.09 (0.41-10.52)	0.73 (0.21-2.57)	2.27 (0.44-11.67)
Adjuvant	1.08 (0.28-4.21)	2.55 (0.79-8.16)	3.46 (0.34-35.34)	0.67 (0.14-3.29)	2.74 (0.80-9.32)	4.20 (1.01-17.50)*
Combination of Chemotherapy and Hormonal	1.41 (0.26-7.49)	0.33 (0.10-1.12)	1.00 (0.10-10.41)	1.23 (0.21-7.12)	0.57 (0.16-2.06)	0.14 (0.04-0.57)*
Pain score						
0-4	Reference (1.00)	Reference (1.00)	Reference (1.00)	Reference (1.00)	Reference (1.00)	Reference (1.00)
5-10	0.38 (0.08-1.83)	0.11 (0.0-0.49)*	0.17 (0.02-1.36)	0.81 (0.09-7.62)	0.25 (0.06-1.03)	0.09 (0.02-0.42)*
ECOG Performance Status				-		
0	Reference (1.00)	Reference (1.00)	Reference (1.00)		Reference (1.00)	Reference (1.00)
1-4	0.10 (0.01-0.69)*	0.23 (0.03-1.51)	0.23 (0.02-2.76)		0.19 (0.03-1.24)	0.04 (0.004-0.43)*
Duration of illness (in days)	0.999 (0.996-1.003)		0.998 (0.993-1.003)	1.00 (0.998-1.01)	0.999 (0.996-1.003)	0.996 (0.993-0.9998)*
Radiotherapy status						
Pre-simulation/ Pre-treatment	Reference	Reference	Reference	Reference	Reference	Reference
Ongoing/ Post-treatment	0.47 (0.11-1.96)	1.00 (0.99-1.00)	0.33 (0.04-2.59)	2.31 (0.46-11.69)	1.00 (0.27-3.75)	1.11 (0.26-4.77)

*significant at 5% level of significance; **Odds ratio – odds of attaining a higher domain/global score

Recommendations

The cross-sectional nature of the study and its limited population restricts formulating conclusions on causality for the variables correlated with health-related quality of life. Given that the sample (n=60) was computed to fulfill the primary objective, further inclusion of all breast cancer patients seen in the institution may rectify this limitation and allow for in-depth multivariate analysis.

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Conflicts Of Interest

The investigators have no conflicts of interest to declare.

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