Critical Analysis of Quality-of-Life Domains from Primary to Adjuvant Treatment Stages in Breast Cancer Patients

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Abstract

Background: To study the changes in quality of life (QoL) domains in breast cancer patients during the treatment and follow-up.

Methods: A cross-sectional study was conducted at King George's Medical University, Lucknow, UP. Data were collected using a two-part questionnaire. In the first part, demography, disease and treatment details and related information were collected. In the second part, a validated scale developed by Ferrel for evaluating QoL of breast cancer patients was used. Over 150 patients diagnosed with breast cancer at King George Medical University, Lucknow, India (KGMU) were sampled. Baseline along with two follow-ups were done for the same patient to see the changes in QoL's domains during treatment. Analysis of variance technique (ANOVA) was used to see the association between QoL domains and effect of treatment.

Results: A total of 150 patients were interviewed and their average QoL index was built by using index number approach. Average QoL was found to be 0.3433 during baseline which mildly improved in the first follow-up to 0.3744 and more in the second follow-up to 0.419. The major reason is that 74% belonged to low economic status and occurrence of cancer further deteriorated the situation for them. During the adjuvant treatment, though it deteriorated their physical condition, hope of getting better improved psychological conditions and after nine months of treatment their both conditions improved. Major factors which affected quality of life of patients during the treatment were fatigue, pain, and fear of recurrence and spread of cancer.

Conclusion: Geographical area, socioeconomic status, education, and type of treatment, especially non-adjuvant and adjuvant therapy, significantly affect QoL among breast cancer patients. To develop a customized intervention, psychological counselling centres are the need of the hour.

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Introduction

Cancer of breast is very common in all cancers (WHO, 2012), 2.4 million women suffered breast malignancy, and 685,000 deaths were reported globally; it is regarded as the most widespread cancer in the world (WHO). It is also reported that among all cancers, 20% of cases account for breast cancer; hence, the situation is highly alarming. In 2020, 1,78,361 new cases and 90,408 deaths due to breast cancer were reported in India (WHO). Most common cancer across the World as well as in India is breast cancer. Although rapid advancement in diagnosis, treatment, mammography, and screening has increased the rate of survival, women's survival continues to face physical, psychological, social and financial challenges; thus, a great need to evaluate their quality-of-life and issues has arisen thereafter. Diagnosis and its long-term treatment have shown both positive as well as negative effects in recovery and, thus, QoL in these patients because different interventions have different effects.

General sagacity of well-being, happiness, and level of satisfaction among patients is invariably influenced and expressed by QoL. Thus, QoL may be considered as a vital health indicator and consequence that is linked with care extended to such patients. QoL is a general term encompassing several domains of life viz. physical life, psychological life, social and spiritual life. Disturbance in any one domain of life will automatically affect other domains which further affects overall quality of life,[1] and a balance with all the domains means good QoL. The QoL becomes poor when the patient's expectation does not match their experiences. The assessment of breast cancer broadly includes two sets of endpoints, i.e. outcome of the treatment (response of a patient to treatment, duration of response etc.); the patients' outcome assesses the survival benefit after treatment for increase in their length of life and change in QoL after treatment. Unfortunately, the outcome of the breast cancer is measured, while QoL assessment has remained a neglected area till now. The study aims to evaluate post-diagnosis quality-of-life among breast cancer patients and identify various factors effecting QoL from primary to adjuvant treatment stage.

Quality of Life and Breast Cancer

Breast malignancy is very common among women. In oncological research, measuring QoL through surveys has become an important issue for health care and well-being of patients. On one hand, the effect on all tangible and intangible aspects of QoL due to malignancy is well established, but scientists and medical practitioners find it difficult to precisely and accurately measure the QoL and introduce it in their treatment. Patient's point of view at the time of diagnosis, initial stages of treatment, and completion of the treatment they have difficult time both physically and emotionally. Mostly, it is seen that the QoL indicator deteriorates rapidly in stage three patients. QoL starts declining immediately when cancer is diagnosed; hence, it is essential for the cancer care providers to become familiar with the patient problems like anxiety, pain depression, fatigue, etc. for coping with them during diagnosis and treatment.

With the above background, we were prompted to do the present study. The main objective was to assess the change in QoL during diagnosis and throughout the treatment. Further, we made an attempt to determine the major domains that affect the QoL.

Quality of Life Among Newly Diagnosed Patients

After diagnosis and experience of physical symptoms like body pain, appearance, physical functioning, sexual functioning and psychological symptoms like stress, anxiety, and depression, the patient is faced with a change in her quality of life adversely. Many domains constitute quality of life and when these are not in balance, the patient suffers poor quality of life. Many studies have looked into and explored the physical symptoms of breast cancer care, such as pain, arm lymphedema, decreased mobility, diminished upper body function, weakness, and loss of strength.[2-4] These physical complaints seem to have an effect on the Quality-of-Life of the patients suffering from breast cancer. Following a diagnosis of breast cancer, patients' physical health and functioning often deteriorate dramatically.[5, 6] From diagnosis to care and prognosis, and even after the treatment, recovery and survival, stress is considered a significant precipitating psychological problem in cancer patients.[7] In reality, it was discovered that the initial stress induced during diagnosis persisted for a longer time and it has been established that psychological and physical health is affected even in the future.[8]

Quality-of-Life During the Treatment
Primary Treatment

Anxiety and fear shoot up as soon as the patient with breast cancer come to know about the disease. Patients feel some relief in anxiety and distress once the treatment is planned, but they are develop new fear about the treatment plan comprising chemotherapy, radiation, or surgery depending upon the stage. The patient needs family support in such situation and someone who can assist at every moment to minimize anxiety and fear. Patients reported both positive and negative effects of their diagnosis and treatment in many studies. Clinical interventions to address common symptoms during treatment should always be considered to improve physical and emotional well-being at the end of primary treatment. This was observed in a study by.[9,10]

Adjuvant Therapy

Nowadays, extensive range of adjuvant therapies,

ranging from tamoxifen as a single agent to complex chemotherapy regimens with or without tamoxifen to newer hormonal therapies are available. Patients must explore and enquire every bit of information about all the available therapeutic regimens from the experts before going for the treatment. Gathering information is tough and stressful, but this will give confidence and leads to a better understanding and acceptance for treatment plan. Most adjuvant therapies are well tolerated. This has been proved that adjuvant therapy significantly decreases the quality-of-life during the treatment.[11] Type of surgery, chemotherapy choices (if more choice are available), and type of radiation therapy are important aspects as they affect the level of anxiety mood and stamina.[12, 13] During this phase, we measured QoL after 6 months of treatment and found that average QoL index had slightly increased to 0.56. This was due to deterioration of physical as well as phycological conditions.

Symptom's Pain and Fatigue

It was noticed that the most commonly assessed post-breast cancer impairment symptom was pain which was found to be linked to QoL.[14, 15] Investigated post-surgery chronic pain in the case of breast cancer and reported that pain had a detrimental impact on QOL regardless of treatment type. Several studies have looked at arm morbidity, and patients with lymphedema and other problems were found to have substantially lower QOL than those without it.[16]

After the adjuvant treatment, some symptoms occurred. Fatigue and hot flashes which cause disturbed sleep are a few effects resulting in poor quality-of-life which was observed in a study by Stein et al. In a study carried out by,[17] it was observed that symptoms like fatigue with pain and others after the treatment may increase anxiety and depression. Physical problems and symptoms of psychological distress lead to adverse quality of life among breast cancer patients.[18, 19]

Many studies have been done to evaluate the QoL of patients during the treatment. A study by,[20] revealed that patient's QoL was adversely affected by factors like age, menopausal status and earlier treatment that influenced the QoL domains. Fatigue had a strong association with patients' QoL, and the moderate association with functional capacity and social well-being had the least association with patients' QoL.[21] In a study by,[22] poor quality of life was found in patients who were treated with chemotherapy; patients reported this was stressful and affected their psychological and physical well-being. This was also due to poor infrastructure, patients' illiteracy and poverty, and lack of adequate treatment facilities.[23] Studied the impact of radiotherapy on QoL of cancer patients and reported that radiotherapy (RT) negatively affected the patients' QoL, but it led to significant improvements

in QoL after 1 month post RT ; the author advocated measuring QoL in cancer patients as a must and recommended that it should be done on a regular basis for routine patient management. Ali[24] studied on patients' QoL before and after the diagnosis and concluded that patients benefitted from the long-term treatment; however, most of the functional scores did not improve. On the contrary, a study on pre- and post-operative QoL of patients by[25] concluded that QoL was worst after breast surgery.[26] measured QoL of patients who were undergoing chemotherapy and reported a potential improvement in QoL after chemotherapy. Also,[27] measured QoL in long term breast cancer survivors and found that improvement in many domains of QoL after the long-term treatment.

Many women diagnosed with breast cancer may feel sad, anxious, shocked, and scared. They need psychological treatment to improve their mental illness as well as depression, panic disorders, and anxiety disorders. Planning a psychological intervention is a must and will support the patient's ability to cope with the stress of treatment and help the patient to bear the short-term loss and manage the symptoms.[28-30] Some sort of mechanism should be developed to cater for psychological problems. Future research should be focused to develop and evaluate interventions which may reduce the adverse effect of breast cancer diagnosis and treatment.

Methods

Data Collection

This cross-sectional study was conducted at King George's Medical University, Lucknow, UP. Data was collected using a two-part questionnaire. In the first part, demography, disease and treatment details and related information were collected. The second part was a validated scale for measurement of quality-of-life of breast cancer patients.

Sample Size

A total of 150 patients with breast cancer who attended the Departments of Endocrine Surgery and Radiotherapy, King Georges Medical University, Lucknow comprised the study sample.

Sampling Technique

A non-probability purposive with a mix of convenience sampling was done as the Institute is a tertiary care center and facilitates treatment for all types of cancer patients.

Inclusion and Exclusion Criteria

All the freshly diagnosed breast cancer patients aged <60 years receiving treatment at Outdoor and Indoor Departments of Endocrine Surgery and Radiotherapy were requested to be part of the

study and those providing consent to participate were finally included in the study. Approval for conducting the study was obtained from the Ethics Committee of King Georges Medical University, Lucknow. A total of 190 patients were enrolled, but only 150 could fulfil the inclusion criteria; hence, they were selected.

Quality of Life (QoL) Instrument

The quality-of-life of patients was measured using a validated QoL questionnaire developed by Ferrel meant to gauze Quality of Life among Breast Cancer patients. The quality-of-life instrument (Breast Cancer Patient Version) has forty-six items on ordinal scale (0-10). This questionnaire covers QoL domains like general well-being, psychological well-being, distress, fearfulness, social concerns, and spiritual well-being. As different domains had variable number of items, to understand the burden of disease on different domains of QoL, we converted absolute scores of a domain into weighted scores when dividing it by the number of items; hence, for each domain the maximum possible score was 10.

Statistical Analysis

IBM SPSS 25 software was used for data analysis. Descriptive statistical techniques were used to represent the data as frequencies and percentages along with their mean and standard deviation values. Chi-square test, independent samples t-test, and ANOVA were used to compare the data.

Results

Quality-of-Life (QoL) Index

In this study, there was an attempt to assess the average QoL index for the surveyed respondents at each stage, so that corrective actions could be suggested. In general, the quality-of-life of people in India compared to developed nation is very poor and since the respondents visiting the KGMU care centre are mostly from lower or lower middle-class family, their quality-of-life is not very good. At the primary treatment stage, the mean QoL was 0.51, and it was observed for 58% of the patients. The reason could be attributed to poor socioeconomic background, low literacy, and rural background apart from suffering from breast cancer. However, once the treatment advances, this even starts declining; hence, this is a cause of concern to health professionals and even patient themselves (Tables 1 and 2).

At this stage, care, and counselling were needed. Again, after nine months of treatment, QoL was measured, and the average index was worsened. To further find out the reason for this deterioration in QoL, we analyzed various factors (Table 3).

Fatigue
H_0: No change in the fatigue level during treatment
H_1: Significant change in the fatigue level during treatment

ANOVA	Difference in fatigue level in three assessments					
Source of Variation	SS	df	MS	F	P value	F crit
Fatigue	49.69333	2	24.84667	12.3613	5.95E-06	3.015899
Error	898.4867	447	2.010037			
Total	948.18	449				

Based on the results, the null hypothesis was rejected, and it could be seen that the level of fatigue changed during treatment. On further analysis, it was found to be increasing with time, and treatment in most of the cases as chemotherapy, radiation, or surgery had side

Table 1: The quality of life of breast cancer patients

	Category of Quality of life	Count	Percentage
1	Less than 0.4	2	1.3
2	Less than 0.5	61	40.67
3	Less than 0.6	82	54.67
4	Greater than 0.6	5	3.33

Table 2: The quality of life of breast cancer patients after three months of treatment

	Category of Quality of life	Count	Percentage
1	Less than 0.4	1	0.67
2	Less than 0.5	37	24.67
3	Less than 0.6	72	48.00
4	Greater than 0.6	40	26.67

Table 3: The quality of life of breast cancer patients

	Category of Quality of life	Count	Percentage
1	Less than 0.4	1	0.67
2	Less than 0.5	27	18
3	Less than 0.6	46	30.67
4	Less than 0.7	40	26.67
5	Greater than 0.7	36	24.00

effects as well. At initial stage, the average score was 4.50; after six months of assessment, it increased to 4.70, and with prolonged treatment it increased further to 5.32 at the time of the third assessment which could be attributed to the side effects of the treatment. This happens after the chemotherapy and radiotherapy because chemotherapy decreases the red blood cells causing anemia and radiation therapy destroys healthy cells as well as the cancer cells. Fatigue is a persistent problem in women diagnosed with breast cancer and even after many years during and after the treatment. This is very high during the first 6 months after diagnosis.

Pain

H_0: No change in the pain level during treatment
H_1: Significant change in the pain level during treatment

ANOVA	Difference in pain level in three assessments					
Source of Variation	SS	df	MS	F	P value	F crit
Pain	127.8178	2	63.90889	23.56142	1.87E-10	3.015899
Error	1212.46	447	2.712438			
Total	1340.278	449				

The null hypothesis was rejected, and the change in the level of pain could be seen during treatment. On further analysis, it was found to be increasing with time and treatment in most of the cases as chemotherapy, radiation, or surgery had side effects as well. Initially, the average score was 4.70; after the six-month assessment, it increased to 5.25, and when treatment was extended, it rose to 6.0 at the third assessment. Tenderness, pain, and discomfort are very common in breast cancer patients, feeling pain in the neck area, arms, legs and joints. After the surgical procedure, pain increased. The most frequently assessed impairment after breast cancer was pain. Chronic pain was reported after surgery regardless of the treatment type.

Mental Health and Overall Health

The patient care methods including choice of treatment by patient are the most important predictors of health outcomes. The choice of patient was found to be independently associated with better mental health status; this was found in a cohort study.[31] extended these results and indicated that the agreement between the desired and actual decision making was more important than the actual process itself. A negative impact has been revealed about the weight gain associated with chemotherapy.[32] A study by[33] revealed that breast cancer survivors reported more problems with cognition, sexual functions, fatigue, and anxiety, where their cancer was in an advanced stage and chemotherapy was used as treatment, compared with women with no history of cancer.

QoL

H_0: No change in the Quality-of-life level during treatment
H_1: Significant change in the Quality-of-life level during treatment

ANOVA	Difference in QoL level in three assessments					
Source of Variation	SS	df	MS	F	P value	F crit
QoL	39.85333	2	19.92667	6.975842	0.001039	3.015899
Error	1276.867	447	2.856525			
Total	1316.72	449				

The small P value shows that the null hypothesis is rejected; the level of QoL changed during treatment. On further analysis, it was found to be increasing with time and various treatments in most of the cases chemotherapy, radiation, or surgery had side effects as well. At the initial stage, the mean score was 4.93; after the six-month assessment, it increased to 5.24 and when the treatment was given for a year, at the time of the third assessment, the value increased to 5.66. Patients suffering from breast cancer may experience physical as well as psychological changes, and after the treatment their quality-of-life is adversely affected as Quality of life generally consist of physical, psychological, social, and spiritual domains. These domains were disturbed after the diagnosis and treatment and patient's quality of life turned to poor.

Happiness

H_0: No change in the happiness level during treatment
H_1: Significant change in the happiness level during treatment

ANOVA	Difference in Happiness level in three assessments					
Source of Variation	SS	df	MS	F	P value	F crit
Happiness	35.37333	2	17.68667	5.915199	0.002914	3.015899
Within Groups	1336.547	447	2.990037			
Total	1371.92	449				

The null hypothesis is rejected, and we see that the level of happiness changed during treatment. On further analysis, it was found to be increasing with time and treatment in most of the cases (chemotherapy, radiation, or surgery) had side effects as well. At the initial stage, the mean score was 5.00; after the six-month assessment, it increased to 5.35, and when the treatment was prolonged to the third assessment, it reached 5.68. During the treatment, patients feel annoyed, fearful, doubtful and shocked. Many patients feel they have lost their identity that affects their life and happiness. Moderate level of happiness was found in breast cancer patients during the treatment.[34]

Anxiety

H_0: No change in the anxiety level during treatment
H_1: Significant change in the anxiety level during treatment

ANOVA	Difference in anxiety level in three assessments

Source of Variation	SS	df	MS	F	P value	F crit
Anxiety	179.8178	2	89.90889	30.29997	4.57E-13	3.015899
Error	1326.38	447	2.967293			
Total	1506.198	449				

The null hypothesis is rejected, and we see that the level of anxiety changed during treatment. On further analysis, we found that with increase intime and treatment in most of the cases after chemotherapy, radiation or surgery had side effects. At first, the mean score was 3.89; after six months of assessment, it increased to 5.42 and when the treatment was prolonged to the third assessment, it was 6.74. The main reason was the treatment and uncertainty for future life. Patients with breast cancer experience anxiety during the treatment due to changes in their body image and in sexual life. In early stages, , the study revealed that 42% patients reported anxiety or depression or both,[35] and in advanced breast cancer patients similar findings were reported.[36]

Depression
H_0: No change in the depression level during treatment
H_1: Significant change in the depression level during treatment

ANOVA	Difference in depression level in three assessments					
Source of Variation	SS	df	MS	F	P value	F crit
Depression	109.6711	2	54.83556	34.81219	8.89E-15	3.015899
Error	704.1067	447	1.575183			
Total	813.7778	449				

The null hypothesis is rejected; the level of depression changed during treatment. Furthermore, it was found to be increasing with time and treatment in most of the cases as chemotherapy, radiation, or surgery had side effects as well. At the initial stage, the mean score was 4.47; after the six-month assessment, it increased to 5.68 and when the treatment was prolonged to the third assessment, it reached 6.70. These are complex conditions for breast cancer patients. This is due to diagnosis of breast cancer and side effects of treatment like radiotherapy.[37] evaluated the relationship between anxiety, depression, and QoL, revealing the need for initial assessment and early screening of anxiety and depression, so that necessary interventions could be applied to reduce them ad enhance QoL.

Recurrence
H_0: No change in the recurrence level during treatment
H_1: Significant change in the recurrence level during treatment

ANOVA	Difference in recurrence level in three assessments					
Source of Variation	SS	df	MS	F	P value	F crit
Recurrence	87.61333	2	43.80667	3.471723	0.031904	3.015899
Error	5640.307	447	12.61814			
Total	5727.92	449				

The null hypothesis is rejected, and the level of recurrence changed during treatment. On further analysis, it was found to be increasing with time and treatment in most of the cases as chemo, radiation or surgery had side effects as well. At the initial stage, the mean score was 5.44; after the six-month assessment, it increased to 6.51, and when the treatment was prolonged to the third assessment, it was 7.93. There are minimum chances of tumor recurrence after radiation therapy, but 7% to 11% of women with early breast cancer experienced a local recurrence. Patients with high grade ER and low nuclear grade have high risk of recurrence after 5 years.[38]

Spread of cancer
H_0: No change in the spread of cancer during treatment
H_1: Significant change in the spread of cancer during treatment

ANOVA	Difference in spread of cancer level in three assessments					
Source of Variation	SS	df	MS	F	P value	F crit
Spread of cancer	190.92	2	95.46	55.73633	2.45E-22	3.015899
Error	765.58	447	1.712707			
Total	956.5	449				

The null hypothesis is rejected, and the level of spread of cancer changed during treatment. On further analysis, it was found to be increasing with time and treatment in most of the cases as chemotherapy, radiation, or surgery also had side effects. At the initial stage, the mean score was 6.08; after the six-month assessment, it increased to 6.52, and when the treatment was prolonged to the third assessment, it reached 7.85. Spread of cancer is because of radiation therapy and chemotherapy; radiation therapy makes cancer worst.

Discussion

The results of the present study showed that after the diagnosis of breast cancer, patients experienced physical and psychological symptoms that affected their QoL adversely; during the primary therapy, the symptoms are well tolerated and it has been proved that during this treatment stage the patient's QoL of was found to be poor. Symptoms like pain, fatigue, anxiety, depression, reoccurrence, and spread of cancer were discussed and found significant during the treatment.

Limitations

Only breast cancer patients were included in the study

and sample size was limited. This case study was from one government hospital and could be extended to more tertiary care hospitals across nation. Various economic status could be explored in future studies as this was limited to low socio-economic background. In future studies, it is recommended that different cancer types should be included into the research to generalize the findings across the disease.

Conclusion

Breast cancer patients suffered many common symptoms like pain, fatigue, anxiety, depression, reoccurrence, and spread of cancer which grossly affected their quality of life (QoL). In breast cancer care, management of pain and depression is a serious issue. Psychological interventions amongst these patients are very important, apart from medical interventions, as patients suffer from different social, financial, and psychological factors during and after the treatment. Psychological assistance will definitely help them to handle the stress during the treatment, tolerate short term side effects and mange the adverse effects of the treatment. Due to increased patient burden, in-depth and customized psychological intervention are required as each patient has different problems. The main issues are management of symptoms, and strategies are required to empower breast cancer patients to have a better sense of control over the disease and treatment, thereby improving their QoL. Cancer patients' care (clinical and psychological) is a critical phenomenon and, thus, to generalise any finding, a diverse data set is required. Due to legal constraints and ethical issues, access to patients' record is restricted. Further, advanced cancer care units are very few and located far from each other. Thus, the main recommendation of the study is that counselling centres should be opened at government hospitals (presently not available in any oncology setups in most Indian hospitals). Patients' physical as well as mental health needs to be monitored and analysed.

Acknowledgement

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