RESEARCH ARTICLE

Quality of Life Determinants in Breast Cancer Patients in Central Rural India

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Abstract

   Introduction: Breast cancer is the most frequently diagnosed cancer among women throughout world, with incidence rates increasing in India. Improved survival in breast cancer patients has resulted in their quality of life (QOL) becoming an important issue. Identifying determinants for QOL may provide insights into how to improve their living conditions. This study aimed to assess socio-demographic and clinical factors, as well as the role of self-efficacy, in relation to QOL among women with breast cancer in rural India. **Methods:** A total of 208 female patients with infiltrating carcinoma of the breast participated in the study. A questionnaire was administered that included sections for socio-demographic characteristics, clinical stage of the cancer and patient delay in seeking health care. A standardized instrument to measure self-efficacy was applied. To assess QOL, the WHOQOL – BREF instrument was used. **Results:** The overall mean score for QOL was 59.3. For domain 1 (physical health) the mean score across all groups was 55.5, for psychological health 58.2, for social relationships 63.2 and for environmental factors, 60.4. The environmental domain in QOL was negatively associated with lower education. Being divorced/widowed/unmarried had a negative association with the psychological health and social relationship dimensions, whereas higher income was positively associated with QOL parameters such as psychology, social relationships and environmental factors. Self-efficacy was positively associated with all four domains of QOL. **Conclusions:** The present study demonstrated a moderate QOL in women with breast cancer in rural India. Young age, lack of education and being without a partner were negatively related to QOL, and employment as casual and industrial workers, high monthly family income and higher self-efficacy were positively associated with QOL. A comprehensive public health initiative is required, including social, financial and environmental support, that can provide better QOL for breast cancer survivors.

Keywords: Breast cancer- QOL- self efficacy- rural India

Introduction

   Breast cancer is the most frequently diagnosed cancer among women throughout the world. It is estimated that 1.67 million women were diagnosed worldwide with breast cancer in 2012 (Globocan, 2012). The incidence rates of breast cancer have been increasing globally during the last 30 years, including low and middle income countries (Globocan, 2012). In India also, the age standardized incidence rates for breast cancer have been increasing in most of the cancer registries (National centre for disease informatics and research, 2013). It is estimated that the number of breast cancer cases in India will increase from 153,297 cases annually in 2011 to 235,490 cases in 2026 (D'Souza et al., 2013).

   Though the incidence of breast cancer is increasing, the overall survival of breast cancer patients is usually longer compared to other cancers (Allemani et al., 2014). With improved survival, the quality of life (QOL) of these patients has become a priority issue. Understanding the factors responsible for better QOL in breast cancer survivors is crucial with the recent emphasis on patient centered approaches within health care systems (World health organization, 2007).

   The World Health Organization defines QOL as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad-ranging concept affected in a complex way by the person's physical health, psychological state, personal beliefs, social relationships and relationship to salient features of their environment (World health organization, 2017). Quality of life is now viewed as a primary endpoint measure for quality of management and care in oncology practice since it reflects the patient's perceptions of the impact of the cancer diagnosis and treatment on their daily living (Yan et al., 2016).

   For cancer patients, QOL is a crucial concern, both when the cancer is diagnosed and when the disease is

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being or has been treated (Cheng et al., 2012, Costa-Requena et al., 2013) Oncologic medical treatments may lead to QOL improvements but, sometimes, a wide variety of side effects can arise bringing about significant health-related complaints.(Decat et al., 2011,Gogou et al., 2015) Likewise, once the cancer is treated, patients may show different levels of QOL, depending on the physical and psychological sequels. (Duijts et al., 2014, Howard- Anderson et al., 2012) Additionally, better QOL has been associated with longer survival of patients with cancer. (Quinten et al., 2009, Epplein et al., 2011) Thus, identifying the determinants of QOL may provide insights into how to improve life conditions in breast cancer patients and, thus, their survival. Several studies have found that socio-demographic factors, such as age, education, marital status, and income, play an important role in determining QOL in breast cancer patients (Schou et al., 2005, Broeckel et al., 2000, Ashing-Giwa et al., 1999) While social and financial support have also been shown to significantly improve QOL, (Yan et al., 2016) clinical parameters, such as disease stage and duration of disease, have not necessarily been associated with QOL (Rabin et al., 2008).

An important factor that is usually considered in cancer studies is self-efficacy, defined as people's beliefs about their capabilities to exercise influence over events that affect their lives (Mohajjel et al., 2013). Self-efficacy has been shown to have a positive effect on health behaviors, symptom control, compliance with cancer treatment, and QOL (Akin et al., 2008). People with high self-efficacy choose to perform more challenging tasks; they set themselves higher goals and stick to them. When setbacks occur, they recover more quickly and remain committed to their goals. Thus, self-efficacy is an important factor in coping with the challenges and demands presented by a chronic condition (Kannan et al., 2011).

Only a few studies from India have focused on the socio-demographic determinants of QOL among female breast cancer patients. The most significant factor noted in these studies was occupation (Deshpande et al., 2013, Kannan et al., 2011). For instance, it was observed that working women had significantly better global health status, which is a part of QOL, than housewives (Deshpande et al., 2013). A recent Indian review on factors associated with QOL among female breast cancer patients also revealed age, literacy, marital status and socio-economic status as key determinants of QOL (Deshpande et al., 2013). However, none of the Indian studies was undertaken in a predominantly rural setting; similarly, self-efficacy and clinical stage as potential determinants of QOL were not examined in Indian breast cancer patients.

Thus this study aimed to assess the socio-demographic and clinical factors, as well as the role of self-efficacy, in relation to QOL among women with breast cancer in rural India.

Materials and Methods

This study was conducted at Kasturba Hospital, a tertiary hospital attached to the Mahatma Gandhi Institute of Medical Sciences in Wardha District, Maharashtra State, India. Most patients using the hospital facilities are from Wardha District and the adjoining districts of Maharashtra State. In 2011, Wardha District had a population of 1,300,774 people, with approximately 47% females (Wardha census, 2011). About 68% of the population in Wardha District live in rural areas; most work in the agricultural sector. The hospital has facilities for cancer diagnosis and treatment, including surgery, radiotherapy and chemotherapy

A total of 384 cases of breast cancer were diagnosed at Hospital from January, 2010 to December, 2012. Three male patients with breast cancer were excluded from this study. Of the 381 female patients, 73 patients died prior to the start of this study, 90 patients could not be contacted and personally interviewed because of their remote location, or they could not be traced. Three women did not agree to participate in the study. Two cases of primary breast sarcoma and one of lymphoma of the breast were also excluded from the study. In 4 four patients details of treatment were not available and hence they were also excluded from study. Finally, 208 female patients with infiltrating carcinoma of the breast were interviewed and participated in the study in the year 2013.

Data collection

Patients' contact information was extracted from the hospital information system and cancer registry records. The questionnaire was pilot-tested in ten women with breast cancer and, as no significant changes were made in the questionnaire, we included these women in the data analysis.

Two trained social workers were recruited to conduct the data collection. The social workers contacted the patients by telephone (if information about the telephone number was available in the patient records), informed and invited them to join the study, obtained verbal consent from the patients, and agreed on the date and time of the face-to-face interview. Patients who had no telephone number were personally contacted to decide a convenient time for the interview. After patients agreed to be interviewed, the social workers travelled to the patients' residences and conducted personal interviews using a semi-structured questionnaire with the participants, after securing their written informed consent in their own language (mainly Marathi and Hindi, the local languages of the region). Patients who came for follow-up radiotherapy or chemotherapy sessions at the surgery outpatient department were enrolled and interviewed by social workers in the premises of Hospital. The study protocol was approved by the Institutional Ethics Committee of the Medical institute in 2012.

The questionnaire included the socio-demographic characteristics of the participants, such as age, religion, education, occupation, marital status and income. Age was classified into four groups (>40, 41–50, 51–60, <61), and religion into two (Hindu and others). Occupation was grouped as manual workers, housewife/casual workers and industry/office workers. The education level was recorded in three categories: higher secondary and above, below secondary, and illiterate. Marital status was coded as married, divorced/widowed and unmarried. The average

monthly family income was self-reported and also divided into three groups: less than 5,000 Indian rupees (IRs); 5,000 –10,000 IRs; and more than 10,000 IRs. Two clinical parameters were also examined as determinants for QOL: the clinical stage of the disease and patient delay in seeking medical help. Patients were divided into four stages based on the TNM staging system for breast tumours (Sobin and Wittekind, 1997). Due to the low number of patients in categories 2 and 4, during the analysis, stages 1 and 2 were combined into an early stage category and stages 3 and 4 into an advanced one. Patient delay was defined as more than three months between the appearance of the first symptoms and the date of initial medical consultation. (Ramirez et al., 1999)

To assess self-efficacy, the instrument developed in 1998 was used (Sud et al., 1998). It has ten items which measure four domains of self-efficacy: self-esteem, self-regulation, orientation towards the future, and optimism. The total score is calculated by adding the sum of all the items and ranges between 10 and 40, with a higher score indicating better self-efficacy. The standardized Hindi version of the scale was used in our study (Sud et al., 1998) which has good levels of internal reliability (Cronbach's alpha 0.93).

To assess QOL, the instrument WHOQOL – BREF was used; this is a multi-dimensional QOL assessment tool applicable cross-culturally (WHO, 1997). It includes 26 items based on four domains: i) physical health (7 items), incorporating activities of daily living, dependence on medical aids, energy and fatigue, pain, sleep, rest and work capacity; ii) psychological health (6 items), that includes bodily image, negative and positive feelings, self-esteem, personal beliefs, thinking, learning, memory and concentration aspects; iii) social relationships (3 items) including personal relationships, social support and sexual activity and, iv) environment (8 items) incorporating financial resources, physical safety, health and social care, opportunities for acquiring new information, participation in leisure activities, physical environment and transport, along with a self-rated QOL (1 item) and satisfaction with health (1 item). It is self-administered and each item is scaled from 1-5 in a positive direction (i.e., higher scores denote higher QOL). Each domain score (the mean score of items within that domain) is converted to a scale of 0-100 and denotes an individual's perception of QOL in that domain. The Cronbach alphas for the respective domains, obtained from the total sample, were 0.78 (physical health), 0.75 (psychological health), 0.87 (social relationships), and 0.76 (environment).

The study protocol was approved by the Institutional Ethics Committee of the Mahatma Gandhi Institute of Medical Sciences, Sevagram in 2012.

Statistical analysis

Frequencies and means of the different domains of QOL were calculated, according to the socio-demographic and clinical characteristics. A linear regression analysis was performed to assess the relationship between the different variables and QOL. First, a crude model was run where all variables were assessed individually. All significant variables in the crude model were later included at the same time in a multivariate model. The significance level was set at $p \leq 0.05$.

Results

The overall mean score for QOL was 59.3. For domain 1 (physical health), the mean score across all groups was 55.5, for psychological health 58.2, for social relationships 63.2, and for environmental domain 60.4.

Table 1 presents the mean values of the different domains of QOL by socio-demographic and clinical characteristics. The mean QOL was higher in all domains in the age group 51 to 60 years. Women other than Hindus had a higher QOL in the physical and psychological health domains, but Hindus had better social relationships. Industrial/office workers scored higher for physical, psychological health and environment, but housewives and casual workers had much better social relationships. Unmarried women had higher physical, psychological and environment means, but married women reported better social relationships. More educated women, and women with a higher income, ranked higher in all QOL domains. Patients who had delayed more than 12 weeks in seeking medical help achieved a lower mean score than those without delay in all four domains, while the differences by clinical stages were very similar. The mean score for self-efficacy was 20.7 (SD 6.63).

In the crude regression analysis (Table 2), age above 61 years had a significant negative association with social relationships, as did non-Hindus in the social domain. Housewives had a significant positive association with all four components of QOL, whereas the casual/industry/office workers had a positive relationship with the physical, psychological and environmental domains. Those with lower education had a much lower QOL in all four domains. Divorced/widowed women scored a lower QOL in the psychological and social parameters, whereas unmarried women had a lower association with social relationships. Higher monthly family income had better QOL in all four aspects. Patient delay was negatively associated only with social relationships and clinical stage was not significantly associated with any of the parameters. Self-efficacy had a positive relationship with all four domains of QOL.

In the multivariate regression analysis, eight patients who were industrial and office workers were included with housewives and casual workers in the category of occupation. Similarly four patients who were unmarried were also incorporated in the divorced and widowed group. In the multivariate regression analysis (Table 3), age above 50 years was significantly associated with environmental factors. Religion other than Hindu continued to have significant lower scores in social relationships (β=-7.2 CI=-13.8, -0.6). After adjustment, occupation was no longer a significant factor and a negative association was seen only between lower education and environmental factors. Divorced/widowed/unmarried women had a negative association with the psychological health and social relationship dimensions. Higher monthly income was associated with higher QOL parameters in terms of psychological, social relationships and environmental

Table 1.Socio- Demographic and Clinical Characteristics and Mean of Different Domains of QOL amongst Women with Breast Cancer in Rural India

Socio-demographic characteristics	Total patients n (%)	Physical health Mean (SD)	Psychological health Mean (SD)	Social relationships Mean (SD)	Environment Mean (SD)
Age at diagnosis					
< 40	44 (21.2)	55.3 (16.8)	57.9 (19.7)	65.9 (16.8)	57.6 (15.1)
41 to 50	78 (37.5)	56.1 (18.0)	58.9 (18.6)	64.3 (20.2)	61.1 (16.2)
51 to 60	51 (24.5)	56.5 (17.7)	61.4 (19.6)	67.3 (17.2)	63.4 (14.3)
> 61	35 (16.8)	54.2 (15.8)	54.6 (15.9)	54.6 (21.0)	59.5 (16.2)
Religion					
Hindu	167 (80.2) 41 (19.8)	55.4 (16.8)	58.3 (18.7)	65.2 (19.5)	60.9 (15.2)
Others	41 (19.8)	56.9 (19.0)	59.6 (18.9)	57.9 (17.7)	60 (17.2)
Occupation					
Manual	71 (34.2)	51.8 (13.4)	52.8 (15.2)	58.2 (18.1)	53.8 (12.8)
Housewife/	129 (62.0)	57.0 (18.1)	61.2 (19.3)	67.1 (19.3)	64.1 (15.4)
casual worker Industry /office	8 (3.8)	70.6 (22.7)	66.5 (24.7)	57.8 (20.1)	66.6 (20.8)
Education					
Higher secondary	43 (20.7)	63.9 (19.1)	67.8 (16.8)	73 (19.1)	70.2 (14.7)
Below secondary Illiterate	115 (55.3)	55.1 (16.9)	57.7 (19.9)	63.2 (18.3)	59.8 (14.7)
Illiterate	50 (24.0)	50.1 (13.6)	52.5 (14.1)	57.1 (19.1)	54.5 (14.6)
Marital status					
Married	174 (83.6)	56 (17.3)	59.7 (18.1)	69.1 (15.5)	61.4 (15.4)
Divorced/ Widowed	30 (14.3)	52.2 (15.4)	50.9 (19.8)	34.7 (12.0)	55.7 (14.9)
Unmarried	4 (1.9)	67.5 (23.4)	65.7 (26.1)	50 (16.2)	67.5 (23.4)
Average monthly family income					
< 5,000	100 (48.0)	51.5 (14.1)	52.4 (16.6)	57.8 (18.0)	54.8 (12.6)
5 - 10,000	86 (41.4)	58.1 (16.8)	62.9 (17.0)	66.1 (17.1)	63.5 (134)
> 10,000	22 (10.6)	65.5 (25.1)	69.6 (23.9)	81.5 (20.9)	76.8 (20.8)
Patient delay					
<=12 weeks	106 (50.1)	56.1 (17.6)	60.3 (18.4)	67.0 (18.2)	62.5 (16.4)
>=13 weeks	102 (49.9)	55.3 (16.9)	56.7 (18.9)	60.4 (19.9)	58.9 (14.4)
Clinical stage					
Stage 1 and 2	77 (38.7)	55.6 (16.1)	59.6 (16.1)	64.2 (18.1)	62.2 (13.6)
Stage 3 and 4	122 (61.3)	55.5 (16.9)	57.3 (19.2)	62.2 (19.7)	58.9 (15.7)

factors. The association between patient delay and QOL disappeared after adjustment, but self-efficacy remained positively associated with all four domains of QOL.

Discussion

In this study, we assessed QOL and its determinants among a group of breast cancer patients who had been diagnosed, treated and followed up at a single health care institution in rural India.

Understanding the effect of breast cancer and its treatment on patients' QOL has long been a central question in cancer research. Traditionally, effective responses of the tumour to the treatment and patient survival have been used to assess patient outcomes (Perry et al., 2007). Two major changes in cancer treatment have occurred over the past decade. The first is the recognition that the patients' well-being is equally important in cancer treatment as their survival. The second is the use of QOL and psychosocial questionnaires to assess the well-being of cancer patients after treatment.

The overall mean score for QOL was 59.3, slightly lower than in other studies. For domains 1 and 2, the mean scores in the total sample were 55.5 and 58.2, respectively. For domains 3 and 4 they were 63.2 and 60.4, respectively. The mean scores in a study from Brazil were above 65 in all domains using the same questionnaire (Oliveira et al., 2014). Though not comparable because different questionnaires were used to assess QOL, the mean global health status found in a Malaysian study, probably representing domains 1 and 2 in the WHOQOL-BREF, was 65.7 (Ganesh et al., 2016). A comprehensive review of QOL in breast cancer patients from Arab countries found the mean scores ranged from 45.3 to 74.6 (Rahou et al., 2016). None of the Indian studies has used the WHOQOL- BREF for assessing QOL in breast cancer patients; however, the mean score was found to be 42.2 in one of the Indian studies Kannan el al., (2011), whereas

Table 2. Bivariate Linear Regression Analysis of Factors Related to Quality of Life among Breast Cancer Women in Rural India

Patient characteristics	Physical health Coefficient (95% CI)	Psychological health Coefficient (95% CI)	Social relationship Coefficient (95% CI)	Environment Coefficient (95% CI)
Age				
< 40	0	0	0	0
41 to 50	0.7 (-5.6, 7.2)	0.9 (-6, 7.9)	-1.5 (-8.6, 5.4)	3.4 (-2.2, 9.2)
51 to 60	1.1 (-5.8, 8.2)	3.4(-4.1, 11)	1.4 (-6.3, 9.1)	5.8 (-0.5, 12.1)
> 61	-1.1 (-8.8, 6.6)	-3.3 (-11.6, 5.3)	-11.2 (-19.7, -2.7)	1.8 (-5.05, 8.8)
Religion				
Hindu	0	0	0	0
Others	1.5 (-4.4, 7.4)	1.3 (-6.1, 7.7)	-7.2 (-13.8, -0.6)	-0.8 (-6.2, 4.5)
Occupation				
Manual	0	0	0	0
Housewife	5.1 (0.2, 10.1)	8.3 (3, 13.7)	8.95 (3.4, 14.4)	10.2 (5.9, 14.5)
Casual worker Industry / office	18.8 (6.3,31.2)	13.6 (0.1,27)	-0.3 (-14.3,13.5)	12.7 (1.8,23.6)
Education				
Higher secondary	0	0	0	0
Below secondary	-8.8 (-14.7, -2.9)	-10 (-16.4, -3.7)	-9.8 (-16.3, -3.2)	-10.3 (-15.5, -5.1)
Illiterate	-13.7 (-20.6, -6.9)	-15.3 (-22.7, -7.9)	-15.8 (-23.4,-8.1)	-15.7 (-21.7, -9.7)
Marital status				
Married	0	0	0	0
Divorced/Widowed	-3.8 (-10.5, 2.8)	-8.8 (-16, -1.6)	-34.3 (-40.2, -28.4)	-5.7 (-11.7, 0.3)
Unmarried	11.4 (-5.7, 28.5)	5.9 (-12.4, 24.4)	-19.1(-34.1,-4.06)	6.0 (-9.3, 21.5)
Monthly income				
< 5,000	0	0	0	0
5- 10,000	6.5 (1.6, 11.3)	10.5 (5.3, 15.6)	8.2 (3.02, 13.4)	8.6 (4.6, 12.7)
> 10,000	13.9 (6.1, 21.7)	17.2 (9, 25.4)	23.6 (15.3, 32.0)	22.0 (15.5, 28.5)
Patient delay				
≤12 weeks	0	0	0	0
≥13 weeks	0.8 (-5.6, 3.8)	3.5 (-8.6, 1.5)	-6.6 (-11.8, -1.3)	-3.5 (-7.8, 0.6)
Clinical stage				
Stage 1 and 2	0	0	0	0
Stage 3 and 4	0.0 (-4.8,4.7)	-2.2 (-7.4,2.9)	-2.1 (-7.6,3.2)	-3.3 (-7.6,1.0)
Self efficacy				
Self efficacy	1.7 (1.4,2.0)	1.7 (1.4, 2.0)	1.1 (0.8,1.5)	1.5 (1.2,1.7)

it was 77.93 in another study of patients younger than 35 years (Damodar et al., 2014)

From the multivariate regression analysis, patients above 50 years of age showed a significant positive association only with environmental factors. Several studies have observed a negative relationship between age and physical and emotional well-being (Oliveira et al., 2014, Avis et al., 2005). A study of Turkish breast cancer patients found that the overall QOL was negatively affected in younger patients (Akin et al., 2008) Age at diagnosis has also been found to be inversely associated with QOL, in terms of physical and psychological well-being and overall QOL scores, in a study from the USA (Schou et al., 2005). Environmental factors, such as financial resources, social care, and transport facilities are likely to be more available in older aged people because

financial stability may increase their QOL. Younger patients may also be more negatively affected than older patients regarding the psychological and emotional well-being domains, because of changes in their physical appearance following surgery and chemotherapy.

Belonging to a religion other than Hindu was associated with lower scores in social relationships. Most of the Hindu families are joint families with many close relatives and that may account for their higher scores in social relationships. None of the available studies in the literature has shown an association between religion and social relationships in breast cancer patients, but a US study of ethnicity found no significant differences between African-American and whites in terms of QOL (Ashing-Giwa et al., 1999).

A significant positive association was seen between

Table 3. Multivariate Linear Regression Analysis of Factors Related to Quality of Life among Breast Cancer Women in Rural India

Patient characteristics	Physical health Coefficient (95% CI)	Psychological health Coefficient (95% CI)	Social relationship Coefficient (95% CI)	Environment Coefficient (95% CI)
Age				
< 40	0	0	0	0
41 to 50	-2.2 (-7.1, 2.6)	-1.0 (-6.4, 4.4)	-2.6 (-7.5, 2.2)	3.2 (-0.9, 7.4)
51 to 60	-0.9 (-6.4, 4.4)	0.6 (-5.4, 6.8)	-1.7 (-7.2, 3.7)	4.9 (0.2, 9.5)
> 61	0.6 (-5.7, 7)	1.0 (-6.1, 8.2)	-1.3 (-7.7, 5)	6.7 (1.3, 12.2)
Religion				
Hindu	0	0	0	0
Others	2.6 (-1.8, 7)	2.5 (-2.5, 7.5)	-5.9 (-10.4, -1.3)	-0.8(-4.6, 3)
Occupation				
Manual	0	0	0	0
Housewife/ Casua worker Industry /office	-0.3(-3.8, 4.6)	2.4 (-2.5, 7.1)	1.9 (-2.3, 6.2)	3.4 (-0.1, 7.1)
Education				
Higher secondary	0	0	0	0
Below secondary	-4.5 (-9.6, 0.4)	-3.9 (-9.6, 1.6)	-0.9 (-6., 4.1)	-5.0 (-9.3, -0.7)
Illiterate	-5.5(-11.9, 0.8)	-3.4 (-10.6, 3.7)	-1.9 (-8.3, 4.4)	-5.9(-11.4,-0.4)
Marital status				
Married	0	0	0	0
Divorced/Widowed/ Unmarried	-2.6 (-7.7, 2.3)	-7.4 (-13,-1.8)	-30.8 (-35.8,-25.7)	-4 (-8.3, 0.2)
Monthly income				
< 5,000	0	0	0	0
5 - 10,000	1.6 (-2.5, 5.9)	4.9 (0.1, 9.7)	2.1 (-2.1, 6.4)	3.6 (-0.1, 7.2)
> 10,000	3.8 (-3.2, 10.8)	6.8 (-1.0, 14.6)	11.4 (4.4, 18.5)	11.9 (5.9, 17.9)
Patient delay				
≤12 weeks	0	0	0	0
≥13 weeks	2.9 (-0.8, 6.8)	0.9 (-3.4, 5.2)	-1.9 (-5.8, 1.9)	-0.2 (-3.5, 3.0)
Self efficacy				
Self efficacy	1.6 (1.3, 1.9)	1.5 (1.1, 1.8)	0.8 (0.5, 1.1)	1.1 (0.8, 1.4)

the group of casual/industrial/office workers and physical health. Studies have shown contradictory associations between employment status and QOL (Akin et al., 2008). Employment can provide financial support to handle the disease but, because of regular hospital visits and work load, it may worsen the QOL (Akin et al. 2008). Although unemployed women may experience financial difficulties, they could attend for hospital visits in a more convenient way than the employed women. Furthermore, friends and colleagues at the employment site may also play a crucial role in increasing the QOL (Akin et al., 2008).

Lower education (below secondary and illiterate) was negatively associated with environmental factors. Several studies, including those from India, have reported an association between educational level and QOL. (Epplein et al., 2011; Kannan et al., 2011) The environmental domain includes a broad range of aspects. More educated patients may require less time and attention from the health care team members who provide information regarding medical treatment and follow-up care, compared to less educated patients (Al-Naggar et al., 2011). Similarly,

this association may be partly caused by less educated women's restricted access to financial resources and social care.

Divorced/widowed women showed a negative association with psychological health and social relationships, while unmarried women were negatively associated with the dimension of social relationships. Studies from US and China also have observed that married or co-habiting patients had higher QOL scores than those living alone or who were divorced (Yan et al., 2016; Broeckel et al., 2000). Reasons for this could include the financial and emotional support provided to patients by their partners.

Higher monthly income was positively associated with scores in the psychological, social relationships and environmental domains of QOL, a finding that corresponds with the literature. (Yan et al., 2016; Broeckel et al., 2000; Kannan et al., 2011) Higher income can be linked to many aspects of better patient care, such as prompt treatment, access to better rehabilitation and having less worry about the financial burdens of treatment and absence from work

(Yan et al., 2016).

No association between patient delay and clinical stage and QOL was found in our study. While no other research has examined patient delay, several studies have shown a lack of association between the clinical stage of the disease and QOL (Yan et al., 2016; Ashing-Giwa et al., 1999). One of the possible explanations is that most of these studies have only looked at the stage of disease; a comprehensive study, including treatment protocol and the clinical stage of the disease correlating with QOL, may be necessary to capture an association.

Self-efficacy was a positive determinant significantly associated with all four domains of QOL after multivariate analysis. An earlier systematic review from 2000-2012 found that self-efficacy had a positive effect on health behaviors, symptom control, compliance with cancer treatment, and QOL (Mohajjel et al., 2013). It has been argued that self-efficacy may influence QOL by reducing perceived stress and thus increasing QOL (Kreitler et al., 2007).

The present study had several strengths. We used validated standardized scales for the QOL and the self-efficacy assessments. Though the WHO-BREEF scale used in this study is generic and not specific for breast cancer, it includes all measures of QOL, such as physical health, psychological health, social relationships and environmental domains. An earlier study by Oliveira et al., (2014) compared the WHOQOL-BREF with other cancer specific questionnaires and concluded that WHOQOL-BREF can be used to assess QOL in patients with breast cancer because the measurement properties of the instrument are adequate and it can detect clinical changes over time (Oliveira et al., 2014).

This study also included a large sample size, compared to most other studies (Oliveira et al., 2014, Rahou et al., 2016). However, it is possible that further associations might be found with a still larger sample size. Another important strength of this study to consider is that all cases were diagnosed and treated in the same rural hospital setting; therefore, the findings of this study could be applied to socio-geographically similar parts of Central India.

Some limitations are also worth mentioning. Most of the interviews were conducted at patients' homes; this may have hindered some responses, especially those related to social relationships, due to lack of privacy. Information on co-morbidities was not collected which may have influenced the QOL of the patients. Another limitation could be related to the unavailability of the WHOQOL-BREEF questionnaire in the local language, Marathi; it was available only in Hindi. However, we piloted the questionnaire before using it obtaining a good understanding. Given the cross sectional nature of the study design, data on QOL in patients prior to the diagnosis or before starting the treatment were not available, and it was therefore not possible to assess the temporality of the relationship.

In conclusions, in summary, we noted a moderate QOL in women with breast cancer in rural India. Young age, lack of education and being without a partner were negatively related to QOL. However, casual and industrial workers, high monthly family income and higher self-efficacy were positively associated with QOL. To conclude, we can say that there is a need to provide education and support over a long period to patients with breast cancer. Patients lacking education need extensive information about their treatment and follow-up; this can be easily addressed by ensuring counselling, supplemented by free availability of information booklets in national and regional languages.

A breast cancer follow-up clinic, which evaluates patients' QOL issues in detail and provides effective and appropriate counselling services to patients and families, can help these patients. Social support from the immediate partners, family members and friends plays an important role in the QOL of women with breast cancer and should be a prominent component of any treatment and rehabilitation programme for breast cancer patients in developing countries. A comprehensive public health initiative including social, financial and environmental support systems can provide a better QOL for survivors of breast cancer.

Abbreviations

QOL: Quality of life; IR: Indian rupees; WHOQOL-BREF: World heath organization Quality of life BREF.

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