

# Physical activity, fatigue and quality of life in breast cancer patients

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## SUMMARY

**Objective:** to evaluate the relationship between levels of physical activity, fatigue and quality of life (QOL) in women diagnosed with breast cancer.

**Methods:** 215 women between the ages of 40 and 65 years were recruited at a cancer clinic. Physical activity levels were assessed by using the International Physical Activity Questionnaire (IPAQ), fatigue levels by using the revised Piper scale, and QOL by means of EORTC QLQ-C30 and WHOQOL-Bref. Statistical analysis was performed using Minitab statistical software, version 16.

**Results:** the mean age of subjects was 52.66 years (SD=8.6); patients were mostly white (58.14%) and overweight (55.81%). Most women were fatigued (72.09%) while physically active women showed lower symptoms of fatigue ( $p<0.001$ ). Mean scores for QOL were significantly lower among fatigued women ( $p<0.001$ ). More active women scored higher on all scales of QOL (EORTC), especially for functional capacity ( $p<0.001$ ), compared with the sedentary patients. A significant association was found between level of physical activity and overall QOL (WHOQOL-Bref) for all domains ( $p<0.001$ ). Climacteric symptoms ranged from mild to strong and did not show any statistically significant results; however, the most active women had the fewest symptoms.

**Conclusion:** physical activity appears to positively influence fatigue and QOL in women diagnosed with breast cancer.

**Keywords:** motor activity, fatigue, women, breast cancer prevention, quality of life.

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## INTRODUCTION

Breast cancer (BC) is the leading malignancy affecting women worldwide. Even though BC is considered a chronic degenerative disease, the prognosis is relatively good when diagnosed early and treated in a timely manner.<sup>1</sup> Recently the increased survival rate of patients has made satisfactory quality of life (QOL) and well-being essential for women living with BC. This being said, both being diagnosed with cancer and its treatment can diminish QOL and may cause a number of symptoms during and after treatment: physical weakness, weight loss, and decreased endurance, all negatively impact several domains of QOL.<sup>2,3</sup>

Physical activity (PA), with its contributions towards health, QOL and disease prevention has been well docu-

mented in previous studies.<sup>4</sup> It has been shown to improve muscle strength, health and energy, influence mood, body image and self-esteem, thus reducing the physical and emotional symptoms experienced during cancer treatment.<sup>5</sup> Some studies point to specific effects caused by PA on an organism already affected by cancer. Physical activity seems to promote greater physical improvements during the recovery process, which takes place following surgery, chemotherapy and radiotherapy. This also indirectly benefits the patient by increasing the adaptability of both muscular and cardiac functional capacity.<sup>3,5</sup> These physical alterations occur as acute responses and adaptations to the higher energy expenditure, as well as the stress on multiples organs and the enzyme system.<sup>5</sup> Thus, a seden-

tary lifestyle for post cancer patients seems to cause additional decline of functional capacity, and should be avoided as much as possible.<sup>2,5</sup>

Studies have also found PA to prevent cancer by stimulating active biological mechanisms of the immune system. Likewise, exercise during cancer treatment greatly contributes to strengthening immunity.<sup>1,3</sup>

Treatment for BC includes surgery, radiotherapy, chemotherapy, and hormone therapy. All are employed to increase patient survival, but are unfortunately also associated with morbidity and reduced QOL.<sup>6</sup>

Fatigue is the symptom most frequently reported by women experiencing BC. Besides being a multifactorial and subjective symptom, one's definition and understanding of fatigue can complicate matters since not only biological, but also cognitive and psychological aspects are involved.<sup>1,5</sup>

Studies show that feeling tired and weak causes suffering, poses limitations on functionality and impairs QOL. Unlike normal or daily fatigue, cancer-related fatigue persists despite getting adequate rest and sleep.<sup>1,5,7</sup> Even though fatigue is a frequent symptom, which negatively influences QOL of cancer patients, little is known concerning its mechanisms.<sup>2</sup>

Growing scientific evidence suggests that aerobic exercise can improve BC related fatigue. In a recent study by Backman et al., women undergoing chemotherapy were asked to walk daily during a 10 week period. This resulted in increased mobility, as well as decreased swelling, pain and fatigue.<sup>7</sup> Scientific evidence also points to the fact that PA might protect arm and shoulder mobility, as well as reduce lymphedema in women diagnosed with BC. This being said, consensus has yet to be reached on how much, how long and what type of activity is required to reach these results consistently in women suffering from BC. PA is defined as any bodily movement produced by skeletal muscles that results in energy expenditure above resting: this includes daily activities, work, household activities, leisure activities, etc.<sup>4,8</sup> This is quite different from exercise, which is defined as a PA systematically performed with the objective of maintaining or improving one or more health factors.<sup>4,8</sup> While BC victims should remain physically active, their physical capacity is reduced by several treatment-induced symptoms, unfortunately imposing restrictions on exercise.<sup>2,6</sup>

Studies indicate that BC is most frequently diagnosed in the years during and after menopause.<sup>3</sup> Symptoms can be aggravated by antineoplastic therapy, especially during chemotherapy, which can induce a short-term or permanent state of estrogen deficiency, thus worsen-

ing the diagnosis.<sup>2</sup> Recent studies show a significant increase in the occurrence of the disease among young women.<sup>9</sup> Since premenopausal women represent about 40% of newly diagnosed cases, it is crucial to analyze the QOL domains that are affected by both the diagnosis and treatment, planning interventions for rehabilitation as soon possible.<sup>9,10</sup>

QOL can be affected by immediate or long term medical side effects, especially where chronic illnesses are concerned. These side effects can interfere with patient collaboration during treatment and can lead to treatment dropout. PA could reduce these symptoms, increasing well-being and minimizing the risk of treatment dropout and late complications. Thus women can not only achieve an increase in life expectancy, but also improved well-being, which results in overall higher QOL.<sup>1,11</sup>

The present study aims to evaluate the relationship between levels of PA, fatigue and QOL for women diagnosed with BC.

## METHODS

This cross-sectional study included 215 women diagnosed with BC, recruited at a cancer clinic. Data was collected by the researcher from March 2013 to June 2014.

The inclusion criteria for the study were women aged 40-65 years undergoing treatment for BC. Exclusion criteria were women outside the age range who had cognitive deficits which hindered their understanding of the study, or any other associated pathology.

The selected women first underwent their routine medical visit before reading and signing a consent form and, then, being asked to fill out a questionnaire. Sociodemographic data as well as clinical data were collected.

The level of PA was assessed using the International PA Questionnaire (IPAQ).<sup>12</sup> The IPAQ assesses the frequency in days, and the duration in minutes of activities such as leisure, occupational, commuting and housework for more than ten continuous minutes during a normal week. The score was determined by adding up the number of days or hours and minutes the subjects claimed to have performed the listed activities in the week prior to completing the questionnaire. For the classification of levels of PA, two categories were used: active and inactive.

Fatigue was evaluated using the Piper-scale.<sup>13</sup> This scale has 22 self-reported items measuring the level of general fatigue on a scale of 0 to 10, and four areas of subjective fatigue (emotional, sensory, cognitive and behavioral), which together produce a score for total fatigue. According to this method, a score of 0 represents no fatigue, while the ranges of 1 to 3 points, 4 to 6 points, and

7 to 10 points indicate mild, moderate and severe levels of fatigue.

To assess QOL specifically in women undergoing BC treatment, the widely used European Organization for Research and Treatment of Cancer's quality of life questionnaire (EORTC-QLQ-C30)<sup>11</sup> was chosen. It includes five functional scales (physical, cognitive, emotional, social and role performance), three symptom scales (fatigue, nausea and pain), six individual items and two questions about general health and financial impact of the disease and treatment.

Overall QOL was assessed using the World Health Organization quality of life scale abbreviated version (WHOQOL-Bref).<sup>14</sup> This instrument presents 26 questions divided into four domains: social, psychological, physical and environmental relationships. Each domain consists of scores of questions whose answers range from 1 to 5 points. Climacteric symptoms were assessed using the Blatt-Kupperman index (BKMI).<sup>15</sup>

#### Statistical analysis

Descriptive statistics were first calculated in order to characterize the study group: mean and median for quantitative variables, and frequency tables for qualitative variables were determined. The calculation of the EORTC-QLQ-C30 scores was performed according to its manual. To detect significant differences between the medians of the domains of QOL (EORTC) in relation to the categorized variables (PA and QOL), the nonparametric Kruskal-Wallis test was used. In order to evaluate possible associations between the qualitative variables, Pearson's chi square test was used. A significance level of 5% was considered for the tests. The statistical software program used was Minitab, version 16.

This study was approved by the Ethics Committee of the Federal University of Rio Grande do Norte (UFRN) - 04809012.8.0000.5292 CEP/UFRN.

## RESULTS

The women in this study were found to have a mean age of 52.66 years (SD=8.6). Most of them were married (54.88%), had a high school education (44.65%), were white (58.14%), had an income of up to two minimum wages (53.02%), and were Catholic (63.23%).

The clinical and treatment variables calculated an average time of diagnosis of 12 months (39.07%). Most subjects had undergone mutilating surgery (68.37%), suffered from disease stage III (38.14%), left laterality (50.23%) and had received chemotherapy (83.26%), radiotherapy (70.70%) and/or endocrine therapy (44.19%). Generally the women were overweight (55.81%) and pre-menopausal (61.40%) (Table 1).

**TABLE 1** Distribution of women diagnosed with breast cancer according to socio-demographic and clinical variables, Alloy 2014, Natal/RN-Brazil.

| Variables                      | n   | %     |
|--------------------------------|-----|-------|
| Number of participants         | 215 | 100   |
| <b>Age</b>                     |     |       |
| < 60 years                     | 169 | 78.97 |
| ≥ 60 years                     | 45  | 21.03 |
| <b>Marital status</b>          |     |       |
| Married                        | 33  | 15.35 |
| Single                         | 118 | 54.88 |
| Ever United                    | 64  | 29.77 |
| <b>Formal education</b>        |     |       |
| Untutored                      | 5   | 2.33  |
| Primary                        | 96  | 44.65 |
| Secondary                      | 77  | 35.81 |
| College                        | 37  | 17.21 |
| <b>Race</b>                    |     |       |
| Caucasian                      | 125 | 58.14 |
| Non-caucasian                  | 90  | 41.86 |
| <b>Income (minimum salary)</b> |     |       |
| 0 - 2                          | 114 | 53.02 |
| 2 - 4                          | 76  | 35.35 |
| 4                              | 25  | 11.63 |
| <b>Religion</b>                |     |       |
| Catholic                       | 136 | 63.26 |
| Non-catholic                   | 79  | 36.74 |
| <b>Clinical variables</b>      |     |       |
| <b>Diagnosis time</b>          |     |       |
| Up to 30 days                  | 26  | 12.09 |
| 31 days to 12 months           | 84  | 39.07 |
| 13-24 months                   | 32  | 14.88 |
| 25 to 36 months                | 17  | 7.91  |
| 37-60 months                   | 26  | 12.09 |
| More than 60                   | 30  | 13.95 |
| <b>Surgery</b>                 |     |       |
| Mutilating                     | 147 | 68.37 |
| Non-mutilating                 | 68  | 31.63 |
| <b>Clinical stage</b>          |     |       |
| <i>In situ</i>                 | 15  | 6.98  |
| I                              | 28  | 13.02 |
| II                             | 63  | 29.30 |
| III                            | 82  | 38.14 |
| IV                             | 27  | 12.56 |
| <b>Laterality</b>              |     |       |
| Bilateral                      | 5   | 2.33  |

(continue)

**TABLE 1** (cont.) Distribution of women diagnosed with breast cancer according to socio-demographic and clinical variables, Alloy 2014, Natal/RN-Brazil.

| Variables                | n   | %     |
|--------------------------|-----|-------|
| <b>Laterality</b>        |     |       |
| Right                    | 102 | 47.44 |
| Left                     | 108 | 50.23 |
| <b>Treatment</b>         |     |       |
| <b>Chemotherapy</b>      |     |       |
| Yes                      | 179 | 83.26 |
| No                       | 36  | 16.74 |
| <b>Radiotherapy</b>      |     |       |
| Yes                      | 152 | 70.70 |
| No                       | 63  | 29.30 |
| <b>Hormone therapy</b>   |     |       |
| Yes                      | 95  | 44.19 |
| No                       | 120 | 55.81 |
| <b>Body mass index</b>   |     |       |
| Normal weight            | 52  | 24.19 |
| Overweight               | 120 | 55.81 |
| Obese                    | 43  | 20.00 |
| <b>Menopausal status</b> |     |       |
| Premenopausal            | 132 | 61.40 |
| Postmenopausal           | 83  | 38.60 |

In Table 2, when fatigue scores (PIPER) and overall QOL scores (WHOQOL-Bref) were compared with levels of PA (IPAQ), significant statistical results were obtained. The most physically active women had the least fatigue symptoms ( $p < 0.001$ ) compared with the sedentary ones. All mean QOL scores were significantly lower for women who complained of fatigue ( $p < 0.001$ ).

In Table 2, when the scores between general QOL (WHOQOL-Bref) and climacteric symptoms (BKMI) are

compared with levels of PA, the most active women had better QOL compared with the sedentary patients ( $p < 0.001$ ). Climacteric symptoms ranged from mild to severe, but were not found to be significant ( $p = 0.89$ ).

Table 3 presents data on QOL specific to women undergoing BC treatment (EORTC) as compared with women who had completed the treatment. It was observed that the most active women in both groups scored higher on all scales of QOL (EORTC), especially functional capacity ( $p < 0.001$ ), compared with the sedentary patients.

Results identified a significant positive correlation between PA level and overall QOL (WHOQOL-Bref) in all domains ( $p < 0.001$ ). The averages for each of the domains in both questionnaires were significant ( $p < 0.001$ ), but higher scores were found for physically active women than for their sedentary counterparts.

**TABLE 2** Comparison of fatigue scores (PIPER) and QOL WHOQOL-Bref in women diagnosed with breast cancer, active and non-active (IPAQ) Natal/RN-Brazil in 2014.

| Variables          | IPAQ       |             | p-Value |
|--------------------|------------|-------------|---------|
|                    | Active     | Inactive    |         |
| <b>PIPER</b>       |            |             |         |
| Without fatigue    | 8 (14.29)  | 59 (37.11)  | < 0.001 |
| With fatigue       | 48 (85.71) | 100 (62.89) |         |
| <b>WHOQOL-Bref</b> |            |             |         |
| Without good QOL   | 19 (33.93) | 112 (70.44) | < 0.001 |
| With good QOL      | 37 (66.07) | 47 (29.56)  |         |
| <b>IMBK</b>        |            |             |         |
| Absent             | 17 (30.36) | 42 (26.42)  | 0.891   |
| Mild               | 12 (21.43) | 41 (25.79)  |         |
| Moderate           | 17 (30.36) | 50 (31.45)  |         |
| Severe             | 10 (17.86) | 26 (16.35)  |         |

**TABLE 3** Comparisons of scores of QOL (EORTC-QLQ-C30 / WHOQOL-Bref) in women diagnosed with breast cancer active and non-active (IPAQ), Natal/RN-Brazil in 2014.

| Variables               | Active |        | Inactive |        | p-Value |
|-------------------------|--------|--------|----------|--------|---------|
|                         | Mean   | Median | Mean     | Median |         |
| <b>EORTC</b>            |        |        |          |        |         |
| Global health           | 67.86  | 66.67  | 47.38    | 50.00  | < 0.001 |
| Functional health       | 84.25  | 88.89  | 64.68    | 68.89  | < 0.001 |
| Symptoms                | 11.22  | 7.69   | 26.32    | 23.08  | < 0.001 |
| <b>WHOQOL - Domains</b> |        |        |          |        |         |
| Physical domain         | 69.13  | 75.00  | 50.45    | 50.00  | < 0.001 |
| Psychological domain    | 63.84  | 66.67  | 48.56    | 50.00  | < 0.001 |
| Social domain           | 66.52  | 66.67  | 49.37    | 50.00  | < 0.001 |
| Environmental domain    | 66.52  | 65.63  | 52.69    | 53.13  | < 0.001 |
| Overall QOL             | 66.50  | 68.32  | 50.27    | 51.90  | < 0.001 |

## DISCUSSION

BC diagnosis severely impacts and heavily burdens the life of a woman. Its treatment triggers acute chronic effects that may significantly contribute to a distressing decline in QOL.<sup>4,6</sup>

Even though premenopausal women are known to represent only about 35% of new cases,<sup>9</sup> this study found the majority of the sample (61.40%) to be premenopausal. Similar results were observed in a study conducted in the United States, where it was found that BC was more prevalent among women who were aged between 25 and 39 years.<sup>10</sup>

Exogenous factors (obesity, sedentary lifestyle and improper diet) increase BC risk by 40% during pre-menopausal years.<sup>16,17</sup> These factors possibly caused the higher prevalence in our study, since most of the sample was pre-menopausal. Moreover, one can easily conclude that sedentary behavior and an inadequate, high-fat, diet would reflect the high percentage of overweight individuals in our sample (55.81%). Other studies show similar results.<sup>18</sup>

Since scientific evidence points to a higher frequency of BC during and after menopause, climacteric symptoms could potentially be affected by PA. In a previous study that included a population of postmenopausal and perimenopausal women, our group found higher QOL and lower incidence of menopausal symptoms in active women as compared to their sedentary counterparts.<sup>19</sup> This study did not find a statistically significant relationship between climacteric symptoms and PA. However, the most active women had lower symptom scores compared with the sedentary patients. This result was probably due to the fact that most of the women included in this study (61.40%) were not yet menopausal. In our study, we detected a high prevalence of symptoms of fatigue (72.09%). Previous research demonstrates a high variability in prevalence from 14 to 96%. We believe that several external factors can affect this prevalence, including lifestyle habits, emotional or psychological state, and treatment. Chemotherapy is known as a potent trigger for fatigue.<sup>7</sup> In our study, we observed that 83.26% of women underwent this treatment, corroborating the data found. In a similar study, conducted in the United States with 359 cancer patients undergoing chemotherapy and radiotherapy, the prevalence of cancer-related fatigue was around 40%. It was also observed that early diagnosis of fatigue could facilitate treatment and boost QOL for these patients.<sup>20</sup>

Our analysis compared fatigue scores (PIPER) and overall QOL (WHOQOL-Bref) with levels of PA (IPAQ), leading to statistically significant results. The most physically active women had the lowest percentage of fatigue symptoms ( $p < 0.001$ ) compared with the sedentary pa-

tients. Mean scores for QOL were significantly lower for women who complained of fatigue (all  $p$ -values  $< 0.001$ ).

Similar results were found in another study that analyzed women undergoing mastectomy for symptoms of fatigue and QOL. It was concluded that women who were more physically active in the months after surgery, psychologically adapted much better in the early stages of treatment, with fewer symptoms of fatigue and higher QOL.<sup>21</sup>

Our study showed a significant positive correlation between QOL (EORTC-QLQ-30) and PA ( $p < 0.001$ ). It was observed that the most active women had better rates in all the scales, especially for functional capacity ( $p < 0.001$ ).

Several studies have found that PA positively influences QOL of cancer patients, since it preserves physical ability and lifestyle,<sup>2,3</sup> in addition to reducing the side effects during treatment. Accordingly, BC survivor rehabilitation requires that daily activities be reintegrate to their lifestyle in the shortest possible time after completing treatment.<sup>1,5,22</sup>

Overall QOL, as assessed by the WHOQOL-Bref, was found to be higher in active women compared with their sedentary counterparts. Active women had better results in all psychological, social and physical environmental domains, indicating a significant association between QOL and PA. Daley et al. found similar results in a group of 108 women treated for BC who underwent 24 weeks of training and noted an overall improvement in QOL, depression, behavior and aerobic conditioning.<sup>23</sup>

In another randomized study, 573 BC survivors were assessed 12 months after adjuvant treatments by means of a 2 km walk, run test, physical fitness and QOL evaluation (EORTC). Results detected a positive correlation between increased PA and improved quality of life.<sup>24</sup>

Several studies support the numerous benefits gained from PA, including both decreased risk of BC and decreased relapse in women diagnosed with the illness.<sup>25</sup> However, there is still no consensus on what intensity such exercise should be performed. Some research claims it should be from moderate to high.<sup>20,25</sup> However, there is also evidence that physical leisure activities would already be sufficient to obtain similar results.<sup>25</sup>

It is also important to consider that the relationship between PA and improved QOL, well-being and symptoms of fatigue in women undergoing treatment for BC is complex. The latter involves several mechanisms, such as immune, neuroendocrine changes and body composition. Biopsychosocial factors should not be overlooked, and they should be considered in future studies on this topic.

This study showed a positive correlation between PA, fatigue and QOL for women diagnosed with BC. This al-

lows us to conclude that the PA is a favorable way to boost QOL and well-being of these women naturally.

It would be interesting to see further studies on the subject measure physical parameters directly instead of evaluating symptoms based on self-assessment. This may have inadvertently created some confounding factors in our investigation. A different approach and longitudinal design may provide a more detailed picture of the relationship between PA, fatigue and QOL in women diagnosed with BC.

## RESUMO

Influência da atividade física sobre fadiga e qualidade de vida em pacientes com câncer de mama

**Objetivo:** avaliar a relação entre os níveis de atividade física, fadiga e qualidade de vida (QV) em mulheres diagnosticadas com câncer de mama.

**Métodos:** foram selecionadas 215 mulheres com idades entre 40 e 65 anos selecionadas em um hospital de referência para tratamento de câncer de mama, no estado do Rio Grande do Norte, Brasil. Os níveis de atividade física foram avaliados por meio do Questionário Internacional de Atividade Física (IPAQ), a fadiga por meio da escala de Piper revisada, e a QV por meio do EORTC-QLQ-C30 e WHOQOL-Bref. A análise estatística foi realizada utilizando o software estatístico Minitab, versão 16.

**Resultados:** a idade média dos participantes foi de 52,66 anos (DP = 8,6), em sua maioria brancas (58,14%) e classificadas com sobrepeso (55,81%). Detectou-se alta prevalência de fadiga (72,09%), enquanto as mulheres fisicamente ativas apresentaram sintomas mais baixos de fadiga ( $p < 0,001$ ). Os escores médios de qualidade de vida foram significativamente menores para as mulheres sedentárias ( $p < 0,001$ ). Mulheres mais ativas apresentaram escores mais altos de QV (EORTC), principalmente na capacidade funcional ( $p < 0,001$ ), quando comparadas com as sedentárias. Foi encontrada uma associação significativa entre nível de atividade física e qualidade de vida global (WHOQOL-Bref) para todos os domínios ( $p < 0,001$ ). Sintomas climatéricos variaram de leve a forte intensidade e não apresentaram resultados estatisticamente significativos, porém as mulheres mais ativas apresentaram menor número de sintomas.

**Conclusão:** Mulheres com níveis mais altos de atividade física apresentaram menos sintomas de fadiga e escores mais altos de qualidade de vida.

**Palavras-chave:** atividade motora, fadiga, mulheres, neoplasias da mama, qualidade de vida.

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