

ORIGINAL ARTICLE

IJPHY HIGH INTENSITY PHYSICAL TRAINING EXERCISE PROGRAM IN IMPROVING BREAST CANCER RELATED FATIGUE¹Intsar S. Waked²Asmaa F. Attalla³Abdel Hamid N. Deghidi**ABSTRACT**

Background: Breast cancer is a prevalent disease that requires intense and prolonged treatments. Because of improved detection and treatment options, the mortality rate from breast cancer has decreased, greatly increasing the number of survivors who are living with the disease and its side effects. Fatigue is one of the most common debilitating symptoms experienced by patients with cancer. It is a persistent feeling of exhaustion and decreased physical and mental capacity unrelieved by rest or sleep. The purpose of current study was to evaluate the effect of high intensity physical training exercise program in improving breast cancer related fatigue.

Methods: Forty six patients suffering from breast cancer related fatigue, were randomly divided into two groups of equal number. Exercise group (E); received high intensity physical training program while Control group (C) received usual medical care and kept their habitual activity. The intensity of fatigue and quality of life score were measured at the beginning and after eight weeks of treatment.

Results: Results of the study showed that there was significant reduction of fatigue after eight weeks in exercise (E) group more than control group with the percentage of improvement was 53%, 2% respectively. As regard to QOL measurements, there was significant increase of QOL score after treatment in exercise (E) group more than control group with the percentage of improvement was 43%, 3% respectively.

Conclusion: High intensity physical exercise program may have beneficial effects in reduction of fatigue intensity and thereby improving quality of life in breast cancer patient.

Keywords: Breast cancer related fatigue, Exercise, Revised Piper Fatigue Scale, Functional Assessment of Cancer Therapy-Breast

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INTRODUCTION

Breast cancer is the second-leading cause of cancer-related deaths among women aged less than 50 years. Breast cancer is an economic burden, with its cost of illness being comprised of direct cost, morbidity cost, and mortality cost. Over extended periods, cancer expenditures are increasing at a similar rate to overall health costs [1].

Cancer and its treatment result in behavioral symptom distress, and one of the most pervasive and distressing symptoms is fatigue [2]. Cancer-related fatigue (CRF) can be defined as a “persistent, subjective sense of tiredness related to cancer and cancer treatment that interferes with usual functioning” [3]. CRF is more intense than typical fatigue and may be due to the disease itself and/or cancer treatment [4].

Fatigue is one of the most common and debilitating symptoms experienced by patients with cancer. CRF is characterized by feelings of tiredness, weakness, and lack of energy, and is distinct from the “normal” drowsiness experienced by healthy individuals in that it is not relieved by rest or sleep. It occurs both as a consequence of the cancer itself and as a side effect of cancer treatment such as chemotherapy, radiotherapy, although the precise underlying pathophysiology is largely unknown [5] [6].

CRF may be an early symptom of malignant disease and is reported by as many as 40% of patients at diagnosis. Virtually all patients expect fatigue from cancer therapy. It is known that fatigue is the commonest side-effect of chemotherapy and radiotherapy: it has been shown that 65–100% of patients undergoing radiotherapy [7-9] and up to 82–96% of those receiving chemotherapy [10-11] suffer from fatigue during their treatment. Deconditioning due to further reduction of physical activity in cancer patients might even further affect feelings of fatigue [12].

Frequently, the fatigue causes patients to avoid strenuous activities. This reduced level of activity results in a paradoxical relationship, however. Inactivity leads to fatigue in and of its self, while the fatigue leads to inactivity [13]. The fatigue may also lead to cognitive dysfunction and post-exertional malaise that further exacerbate the decreased quality of life feelings [14]. CRF is associated with considerable psychological distress and can impose a significant financial burden by limiting a patient’s ability to work [15].

An important goal for cancer patients is to improve the quality of life (QOL) by maximizing functions affected by the disease and its therapy. Research has provided preliminary evidence for the safety, feasibility, and efficacy of exercise training in breast cancer survivors [16]. Researchers say that a combination of supervised strength and aerobic training not only reduces fatigue, but helps patients actually increase muscle fitness during the first 18 weeks of treatment however there were no guidelines about which exercises more suitable to cancer patient regarding exercises intensity and duration.

SUBJECTS AND METHODS

Subjects

This study was conducted at National Cancer Institute, Egypt between July 2013 and June 2015. Fifty two female patients suffering from fatigue resulting from cancer and its treatment such as chemotherapy or radiotherapy were enrolled in the study. Inclusion criteria were age of the patients ranged from 35-65, patients scheduled for chemotherapy, patients are also scheduled for radiotherapy, only subjects in good physical condition without anemia or cardiovascular, pulmonary, thromboembolic complications, or other important comorbidities, were included. The exclusion criteria were non consenting patients, Bed ridden patients, patient with bone malignancies, patients with central nervous system malignancies, patients with co-morbidities where exercise is contraindicated such as acute or chronic bone, joint, or muscular abnormalities. Forty six patients were met inclusion criteria and randomized into two groups of equal number Exercise group (E), and a control group (C). Concealed randomization was achieved using a computer-generated random list.

Measurement procedures

Validated questionnaires were used; Primary outcome: fatigue (Revised Piper Fatigue Scale). Secondary outcome: quality of life (The Functional Assessment of Cancer Therapy-Breast (FACT-B)). Measurements were done at the beginning and the end of study period.

Primary outcomes: Revised Piper Fatigue Scale [17-19]

Revised Piper Fatigue Scale (PFS-R) is a valid and reliable multidimensional scale that routinely used by medical researchers to scientifically measure fatigue levels in patients during clinical studies. 22-question scale is divided into four different subscales, involves ranking each item on a scale of 0-10, where higher scores indicate greater fatigue. The four subscales are behavioral/severity, sensory, cognitive/mood, and affective meaning. These 22 items are used to calculate the four sub-scale/dimensional scores and the total fatigue scores. Five additional items (# 1 and # 24-27) are not used to calculate subscale or total fatigue scores but are recommended to be kept on the scale as these items furnish rich, qualitative data. To score the PFS, the items contained on each specific subscale were added together and divided by the number of items on that subscale. This gave a subscale score that remains on the same “0” to “10” numeric scale. To calculate the total fatigue score, add the 22- item scores together and divide by 22 in order to keep the score on the same numeric “0” to “10” scale. Severity codes: 0 None, 1-3 Mild, 4-6 Moderate, 7-10 Severe.

Secondary outcomes:

The Functional Assessment of Cancer Therapy-Breast (FACT-B) [20-22]

QOL is essential in understanding the long-term impact of breast cancer diagnosis and treatments. Measuring quality of life in breast cancer patients has been the focus of clinical practice and research in recent decades and is of importance

in assessing treatment outcomes. The FACT-B is widely used in international clinical trials and health services research. a 43-item self-report instrument designed to measure multidimensional quality of life (QL) in patients with breast cancer. FACT-B Total scores can range from 0-144 with the higher the score indicating the greater the overall quality of life. The FACT-B consists of the FACT-General (FACT-G) plus the Breast Cancer Subscale (BCS), which complements the general scale with items specific to QL in breast cancer. The general FACT (FACT-G) is multidimensional consisting of subscales assessing physical, emotional, social, functional well-being, and relationship with doctor. The FACT-B is appropriate for use in oncology clinical trials, as well as in clinical practice. It demonstrates ease of administration, brevity, reliability, validity, and sensitivity to change.

Treatment procedures [23-25]

Patients in Exercise group (E) received high-intensity physical training session lasting 90 minutes, three times per week for 8 weeks. The high-intensity exercise program session involved resistance training on machines, such as leg and chest presses, and cardiovascular training on a stationary exercise bike. The session consisted of 30 minutes of warm-up exercises, 45 minutes of resistance training, and 15 minutes of cardiovascular training. The warm-up consisted of dynamic exercises with the large muscle groups, along with balance and coordination training and had an estimated average intensity of 9 METs (4.5 MET hours per training session)., six machines were used for resistance training: a leg press, a chest press, a pull down, an abdominal crunch, a lower back, and a knee extension. The one repetition maximum test was used to measure the weight a patient could lift once on any specific machine.

The aim of the resistance training component was to accomplish three continuous series of five to eight repetitions at 70-100% of the one repetition maximum test. Resistance training was estimated to have an intensity of 5.5 METs (4 MET hours per training session). Cardiovascular training involved interval training on stationary bicycles with a workload of 70-250 W, equivalent to 85-95% of each participant's maximum heart rate. This training was estimated to have an intensity of 15 METs (3.75 MET hours per training session). Practical and safety guidelines include; patients were advised to wear proper clothing, to work within recommended exercise level, and did not work to exhaustion, to stop training if they feel any pain or abnormal sensation, to keep diaries in order to register their activities daily and any notes. Patients assigned to the control group (C) received conventional medical care. They were asked to maintain their habitual physical activity pattern.

STATISTICAL ANALYSIS

Continuous variables were presented as mean and standard deviation while categorical variables were described by frequency and percentage. Paired T-test was used to test the differences in outcome measures within group while independent t-test was used to compare the effect between both groups for parametric statistics while Manwhitney

used to compare the effect between both groups for non-parametric statistics. Differences were assumed significant at p value <0.05. Statistical analysis were performed using statistical package for the Social Sciences (SPSS) version 20.0.

RESULTS

Out of 52 patients, 46 patients were met the inclusion criteria and were classified randomly into 2 groups of equal number. Exercise Group (E) received high intensity physical training program and Control Group received only usual medical care. All 46 patients complete treatment procedures and analysis. Table (1) showed demographic and clinical characteristics at baseline of treatment. The two groups were comparable in respect to age (p = 0.587), Education level (p = 0.512), cancer stage (p = 0.743), type of cancer treatment (p = 0.936), employment (p = 0.365), marital status (p = 0.205), baseline fatigue level (p = 0.092), baseline quality of life (p = 0.502), there were no significant differences as p value > 0.05.

Table 1: Demographic and clinical characteristics of patients at baseline of treatment

Variable	Exercise group (N. 23)	Control group (N.23)	P value
Age (years)	49.82±9.9	48.3±8.9	0.587*
Education level			0.512*
• Illiterate	8 (34.8%)	6 (26.1%)	
• Primary	8 (34.8%)	9 (39.1%)	
• Secondary	3 (13.0%)	2 (8.7%)	
• College/uni- versity	4 (17.4%)	6 (26.1%)	
cancer stage			0.743*
• Local	5 (21.7%)	7 (30.4%)	
• Loco-regional	9 (39.1%)	7 (30.4%)	
• Metastasis	9 (39.1%)	9 (39.1%)	
Type of cancer treatment			0.936*
• Mastectomy	6 (26.1%)	7(30.4%)	
• Chemotherapy	9 (39.1%)	8 (34.8%)	
• Radiotherapy	3 (13.0%)	2 (8.7%)	
• Conservative surgery	5(21.7%)	6 (26.1%)	
Employment			0.365*
• Employ	16 (69.6 %)	13 (56.5%)	
• Not employ	7 (30.4%)	10 (43.5%)	
Marital status			0.205*
• Married	18 (78.3%)	14 (60.9%)	
• Not married	5 (21.7%)	9 (39.1%)	
Baseline fatigue level	8.39±1.26	8.95±0.93	0.092*
Baseline quality of life	78.13±12.14	80.43±10.90	0.502*

* No significant difference

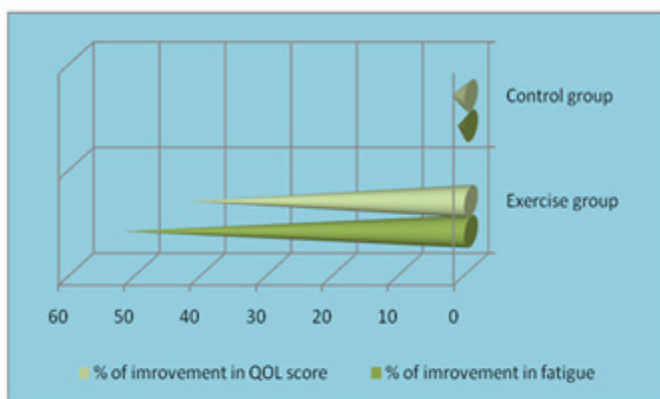
Table (2) represent statistical analysis of fatigue intensity & quality of life measurements. There was significant reduction of fatigue after treatment in Exercise (E) group with the percentage of improvement was 53% while for Control group there was no significant difference pre & post treatment as p value=0.103. When comparing exercise & control groups there were highly significant differences post treatment as p =0.000. As regard to QOL measurements, there was significant increase of QOL score after treatment in Exercise (E) group with the percentage of improvement was 43% while for Control group there was no significant difference pre & post treatment as p value=0.067. When comparing exercise & control groups regarding QOL score there were highly significant differences post treatment as p =0.000.

Table 2: Statistical analysis of fatigue intensity & quality of life measurements

Variable		Exercise group		Control group		P value between both group
		pre	post	pre	post	
Fatigue Intensity PFS-R	fatigue intensity	8.39±1.26	3.91±1.64	8.95±0.93	8.7±0.9	0.000**
	P value	0.000**		0.103*		
	% of improvement	53%		2%		
QOL Measurement FACT-B	QOL score	78.13±12.14	112.1±11.08	80.43±10.90	82.86±12.34	0.000**
	P value	0.000**		0.067*		
	Percentage of improvement	43%		3%		

* No significant difference ** Significant difference

Figure 1: Percentage of improvement in QOL and Fatigue



DISCUSSION

Previously physicians recommended rest in order to relieve from cancer related fatigue (CRF), However this approach often acts counterproductive as lack of activity leads to “atrophy of muscles and loss of cardio-respiratory fitness.”[26-27]The rationale for recommending physical activity interventions following cancer diagnosis relates to improving psychosocial factors during and after cancer treatments, minimizing biological processes associated with cancer promotion and enhancing behavioral changes linked with minimizing lifestyle risk factors for recurrence

of cancer [28-30].

This randomized controlled study was designed to evaluate the effect of application of high intensity physical exercise program in improving breast cancer related fatigue (BCRF). Forty six patients suffering from BCRF was randomized into 2 groups of equal number, exercise group who received high intensity physical training program and control group who received usual medical care and kept their habitual activity. Fatigue intensity and QOL scoring were measured at the beginning of the study and after 8 weeks by PEF-R scale and FACT-B scale respectively.

Results of the study showed that there was significant reduction of fatigue after 8 weeks in exercise (E) group more than control group with the percentage of improvement was 53%, 2% respectively. As regard to QOL measurements, there was significant increase of QOL score after treatment in exercise (E) group more than control group with the percentage of improvement was 43%, 3% respectively, This confirm the effectiveness of exercises in improving fatigue and quality of life in patients with breast cancer. The mechanism believed for improving fatigue is that engaging in exercise early in the breast cancer treatment process helps to change physical and emotional dynamics at a critical time, both by breaking the “vicious cycle” of “a self-perpetuating detraining state” that induces fatigue, and by increasing feelings of “general self-efficacy and mastery” among patients in treatment.

In this study, high intensity physical exercise program was applied for 90 minutes and this results in improving fatigue and quality of life. These findings were supported by the findings Dimeo et al 's study [31], who stated that even brief periods of exercise may be sufficient to reduce fatigue and also it appears that exercising for longer duration reduces fatigue more, but providing an exercise recommendation that is realistic and achievable for women is paramount.

Another study of Admasen et al [25], reported that supervised exercise programs that include high and low intense cardiovascular and resistance training can help reduce fatigue in patients with cancer who are undergoing adjuvant chemotherapy or treatment for advanced disease. The exercise training also improves patients' vitality, muscular strength, aerobic capacity and emotional well-being, according to research.

Other recent controlled studies [32-33] have shown that aerobic exercises prevent worsening fatigue and psychological stress in patients receiving high-dose therapy. Furthermore, in women with breast cancer receiving chemotherapy, exercise can significantly reduce the level of fatigue, and as the duration of exercise increases, the intensity of fatigue declines. Regarding side effects, our study reported that no one report any discomfort or side effect during application of high intensity physical exercise program.

CONCLUSION

According to findings of current study and the findings of previous studies, it was concluded that high intensity phys-

ical exercise program may have beneficial effects in reduction of fatigue intensity and thereby improving quality of life in breast cancer patient.

CONFLICT OF INTEREST

We certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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REFERENCES

- [1] Brown ML, Lipscomb J, Snyder C: The burden of illness of cancer: economic cost and quality of life. *Annu Rev Public Health*. 2001; 22:91-113.
- [2] Berger AM, Visovsky C, Hertzog M, Holtz S, Loberiza FR Jr. Usual and Worst Symptom Severity and Interference With Function in Breast Cancer Survivors. *J Support Oncol*. 2012; 10(3):112-118.
- [3] Mock V, Atkinson A, Barsevick A, et al. NCCN Practice Guidelines for Cancer-Related Fatigue. *Oncology (Williston Park)*. 2000;14:151-161.
- [4] Hofman M, Ryan JL, Figueroa-Moseley CD, Jean-Pierre P, Morrow GR: Cancer-related fatigue: the scale of the problem. *Oncologist*. 2007;12(Suppl 1):4-10
- [5] Cella D, Davis K, Breitbart W, et al. Cancer-related fatigue: Prevalence of proposed diagnostic criteria in a United States sample of cancer survivors. *J Clin Oncol*. 2001; 19(14):3385-3391.
- [6] Irvine D, Vincent L, Graydon JE, et al. The prevalence and correlates of fatigue in patients receiving treatment with chemotherapy and radiotherapy. A comparison with the fatigue experienced by healthy individuals. *Cancer Nurs*. 1994; 17(5):367-378.
- [7] Ream L, Richardson A. Fatigue: a concept analysis. *Int J Nurs Stud* 1996; 33(5):519-529.
- [8] [8] Virginia Carrieri-Kohlman, et al. *Pathophysiological Phenomena in Nursing: Human Response to Illness*. 3rd ed; 2003.
- [9] Blesch K, Paice J, Wickam R et al. Correlates of fatigue in people with breast or lung cancer. *Oncol Nurs Forum* 1991; 18(1): 81-87.
- [10] Tierney A, Leonard R, Taylor J et al. Side effects expected and experienced by women receiving chemotherapy for breast cancer. *BMJ* 1991; 302: 272.
- [11] Nerenz DR, Leventhal H, Love RR. Factors contributing to emotional distress during chemotherapy. *Cancer*. 1982; 50(5): 1020-1027.
- [12] Ballard-Barbash R. Physical activity levels among breast cancer survivors. *Med Sci Sports Exerc*. 2004. 36(9):1484-1491.
- [13] Dimeo F. C and Thomas F. Effects of exercise on cancer-related fatigue. *Cancer*. 2001. 92(6), 1689-1693.
- [14] Dimeo F.C., Thomas F., Raabe-Menssen C., Propper F. and Mathias M. Effect of aerobic exercise and relaxation training of fatigue and physical performance on cancer patients after surgery. A randomised controlled trial. *Support Care Cancer*. 2004; 12(11); 774-779.
- [15] Hofman M1, Ryan JL, Figueroa-Moseley CD, Jean-Pierre P, Morrow GR. Cancer-related fatigue: the scale of the problem. *Oncologist*. 2007;12Suppl 1:4-10.
- [16] Courneya KS, Mackey JR, McKenzie DC. Exercise after breast cancer: Research evidence and clinical guidelines. *Physician Sportsmed*. 2002;30:33-42
- [17] Travier N, Velthuis MJ, Steins Bisschop CN, van den Buijs B, et al, Effects of an 18-week exercise programme started early during breast cancer treatment: a randomized controlled trial. *BMC Med*. 2015; 13: 121.
- [18] Piper B.F., Dibble S.L., Dodd M.J., Weiss M.C., Slaughter R.E. and Paul S.M. The revised piper fatigue scale: Psychometric evaluation in women with breast cancer. *Oncology Nursing Forum*. 1998; 25(4):677-684.
- [19] Reeve BB, Stover AM, Alfano CM, Smith AW, Ballard-Barbash R, Bernstein L, McTiernan A, Baumgartner KB, Piper BF. The Piper Fatigue Scale-12 (PFS-12): psychometric findings and item reduction in a cohort of breast cancer survivors. *Breast Cancer Res Treat*. 2012;136(1):9-20.
- [20] Cantarero-Villanueva I, Fernández-Lao C, Díaz-Rodríguez L, Cuesta-Vargas AI, Fernández-de-las-Peñas C, Piper BF, Arroyo-Morales M. The Piper Fatigue Scale-Revised: translation and psychometric evaluation in Spanish-speaking breast cancer survivors. *Qual Life Res*. 2014;23(1):271-6.
- [21] Brady MJ1, Cella DF, Mo F, Bonomi AE, Tulsky DS, Lloyd SR, Deasy S, Cobleigh M, Shiimoto G. Reliability and validity of the Functional Assessment of Cancer Therapy-Breast quality-of-life instrument. *Clin Oncol*. 1997; 15(3):974-86.
- [22] Thompson P, (2007). The relationship of fatigue and meaning of life in breast cancer survivors. *Oncology Nursing Forum*, 34(3), 653-660.
- [23] Dimeo F.C., Thomas F. Raabe-Menssen C., Propper F. and Mathias M. Effect of aerobic exercise and relaxation training of fatigue and physical performance on cancer patients after surgery. A randomised controlled trial. *Support Care Cancer*. 2004; 12(11):774-779.
- [24] Saltin B, Gollnick PD. Skeletal muscle adaptability: significance for metabolism and performance. In: Peachey LD, Adrian PH, Geiger SR, eds. *Handbook of physiology, sektion 10: skeletal muscle*. American Physiological Society, 1983:555-631.
- [25] Adamsen L, Quist M, Andersen C, Møller T, Herrstedt, J, Kronborg D et al. Supervised exercise program significantly improved fatigue in cancer patients undergoing chemotherapy; *BMJ* 2009.
- [26] Cramp F, Daniel J. Exercise for the management of cancer-related fatigue in adults. *Cochrane Database Syst Rev*. 2008, 16;(2):CD006145.
- [27] Jose S, Diwan SK. Effect of standardized exercise program on reported fatigue in patients of cancer receiving chemotherapy. *Clin Cancer Investig J* 2014;3(5):373-6
- [28] Nieman DC, Cook VD, Henson DA, Suttles J, Rejeski WJ, Ribisl PM, Fagoaga OR, Nehlsen-Cannarella SL.

- Moderate exercise training and natural killer cell cytotoxic activity in breast cancer patients. *Int J Sports Med.* 1995; 16(5):334-7.
- [29]Stoll BA. Diet and exercise regimens to improve breast carcinoma prognosis. *Cancer.* 1996;78(12):2465-70.
- [30]Courneya KS. Exercise interventions during cancer treatment: biopsychosocial outcomes. *Exerc Sport Sci Rev.* 2001;29(2):60-4
- [31]Dimeo, f. c., m. h. m. Tilmann, h. Bertz, l. kanz, r. Mertelmann, and j. keul. Aerobic exercise in the rehabilitation of cancer patients after high dose chemotherapy and autologous stem cell transplantation. *Cancer.*1997; 79(9):1717-1722.
- [32]Dimeo FC, Stieglitz RD, Novelli-Fischer U et al. Effects of physical activity on the fatigue and psychologic status of cancer patients during chemotherapy. *Cancer.* 1999; 85(10): 2273–2277.
- [33]Schwartz AL, Mori M, Gao R et al. Exercise reduces daily fatigue in women with breast cancer receiving chemotherapy. *Med Sci Sports Exerc* 2001; 33(5): 718–723.

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