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ORIGINAL ARTICLE

Impact of moderate intensity aerobic exercise on chemotherapy-induced anemia in elderly women with breast cancer: A randomized controlled clinical trial

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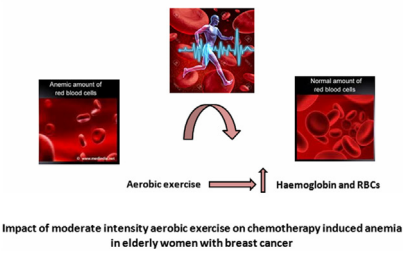
GRAPHICAL ABSTRACT



Impact of moderate intensity aerobic exercise on chemotherapy induced anemia in elderly women with breast cancer

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ABSTRACT

Exercises are often recommended for patients suffering from anemia to improve physical conditioning and hematologic parameters. Hence, the present study aimed to investigate the impact of moderate intensity aerobic exercise on chemotherapy-induced anemia. Thirty elderly women with breast cancer underwent chemotherapy and were randomly assigned into two equal groups; Group A received aerobic exercise for 25–40 min at 50–70% of the maximum heart rate, 3 times/week for 12 weeks in addition to usual daily living activities, medication and nutritional support. Group B who did not train served as controls. Hemoglobin (Hb), and red blood cell count (RBCs) were evaluated pre-treatment and after 12 weeks of training. There were significant declines of both Hb ($t = 16.30$; $P < 0.001$) and RBCs ($t = 10.38$; $P < 0.001$) in group B relative to group A. Regarding group A, Hb increased from 11.52 ± 0.62 to 12.10 ± 0.59 g/dL with a 5.03% change, while RBCs increased from 4.24 ± 0.37 to 4.49 ± 0.42 million cells/μL with a 5.89% change. Between-group differences were noteworthy regarding Hb ($t = -5.34$; $P < 0.001$) and RBCs ($t = -5.314$; $P < 0.001$). The results indicate that regular participation in moderate intensity aerobic exercise can enhance chemotherapy-induced anemia.

Introduction

Chemotherapy-induced anemia (CIA) is a common complication in patients receiving myelosuppressive chemotherapy [1]. Blood hemoglobin (Hb) level of less than 12 g/dL is frequently defined as anemia, but many individuals may not feel much difference until the hemoglobin level falls below 11 g/dL [2]. Anemia is associated with fatigue and dyspnea on exertion, which can affect a patient's capacity to perform normal daily living activities [1,3].

Current treatment choices for CIA incorporate red blood cell (RBC) transfusions and erythropoiesis-stimulating agents (ESAs); however, both treatments are associated with an increased risk of thrombotic events [4]. Also, ESAs might be connected with conceivable diminished survival and shortened time to tumor progression in patients with cancer, and RBC transfusions carry a risk of infection, transfusion-related reactions, and possible decreased survival [4–6]. Given these safety concerns, other treatment alternatives for CIA that are efficacious and safe are required.

The overall goal of treatment in individuals with CIA is reduction in transfusion requirements and maximization of quality of life [7]. Exercise could be an appropriate non-pharmacologic intervention to counteract the decline in erythrocyte observed in many breast cancer patients undergoing chemotherapy. Aerobic exercise training (AET) is associated with improved hemorheology [8,9] and can increase blood volume through an increase in plasma volume and RBC mass [10]. Few studies have evaluated the effect of exercise training on erythrocyte in breast cancer patients undergoing adjuvant chemotherapy. Previous studies have reported positive changes in erythrocyte with exercise in cancer patients, but the samples were clinically heterogeneous, with inefficient training intensity or brief interventions of 6–7 weeks, which occurred after chemotherapy [11,12]. So the purpose of this study was to examine whether moderate-intensity aerobic exercise would have an effect on erythrocyte in elderly women with breast cancer compared with non-training ones also undergoing chemotherapy.

Patients and method

Thirty women patients with breast cancer (aged 60–70 years), who underwent chemotherapy, were screened and randomly assigned to either Control or Intervention group to participate in this 12-week randomized-controlled trial. They were recruited from National Cancer Institute, Cairo University, to participate in this study.

Patients were selected to be enrolled into this study after they had fulfilled the inclusion criteria of the study; female patients with breast cancer undergoing chemotherapy, they were medically stable and not receiving Erythropoietin therapy, their BMI ranged from 30 to 35, and they had an inactive lifestyle for at least the previous 6 months. *Patients had provided informed consent for participation in the study and for publication of the results. This study was approved by University Ethics Committee for scientific research [No: P.T.REC/012/001353].*

Exclusion criteria were BMI more than 35, age older than 70 or younger than 60 years. Patients who received Erythropoietin treatments, suffered uncorrected visual problems, had scars under their feet, and had a history of serious cerebrovascular or cardiovascular diseases, or severe musculoskeletal problems restricting physical activity.

Initial medical screening was performed for every patient by an oncologist and clinical history was recorded for all participants.

Study protocol and the objectives of the study were altogether explained to all participants, who were asked to maintain their pharmacologic treatment, general eating routine, and typical daily activities and lifestyle all through the study.

Design of the study

Patients who fulfilled the inclusion criteria of the study were randomly assigned to either group A, the study group, who received aerobic exercise for 25–40 min at 50–70% of the maximum heart rate, 3 times/week for 12 weeks in addition to usual daily living activities, medication and nutritional sup-