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GROUP-BASED EXERCISE IMPROVES FITNESS PARAMETERS IN PREVIOUSLY SEDENTARY INDIVIDUALS WITH CANCER

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ABSTRACT

INTRODUCTION : Exercise rehabilitation has previously been reported effective in attenuating numerous cancer treatment-related toxicities and enhancing the quality of life (QOL) of patients. However, approximately 85% of the patients we see at Maple Tree Cancer Alliance were previously sedentary. These individuals report experiencing much anxiety about starting an exercise program for the first time, and compliance with such programs has been an issue. Therefore, we created a group-based exercise class as an introduction to exercise. Our goal in doing so was to see the impact of this class on fitness parameters, QOL, and exercise compliance after the program ended.

METHODS :82 individuals who were currently undergoing cancer treatment participated in this group-based exercise class. Their results were compared to 200 different individuals who completed one-on-one exercise training. Each group underwent a comprehensive fitness assessment and completed McGill QOL questionnaires at the start of their exercise training, and after 12-weeks of training.Compliance data was also measured for each group. Data was analyzed at the 0.05 level of significance using descriptive statistics

RESULTS : Exercise has a positive impact on fitness parameters for both groups. On average, the one-on-one exercise group experienced greater improvements in all measured parameters. Likewise, QOL improved for both groups, but to a greater extent in the group exercisers. Finally, the group-based exercise had the highest compliance rate (70% vs. 32% in the one-on-one exercise group). ($p<0.001$).

CONCLUSIONS : Based on these data, it appears as though exercise can improve fitness parameters during cancer treatment. The individualized, one-on-one approach is the most effective at improving fitness. However, compliance and QOL was higher for those who exercised in a group-based setting. Therefore, this form of exercise may be appropriate to help individuals who are new to exercise get started on a program in a relaxed, supportive atmosphere.

INTRODUCTION

According to the American Cancer Society, approximately 848,000 men and 810,000 women were diagnosed with cancer in 2015. The most common cancer types of those diagnosed in 2015 were prostate cancer in men (26%) and breast cancer in women (29%). An increasing number of patients diagnosed with cancer are offered chemotherapy either alone or in combination with radiotherapy or surgery[1].

The benefits of these types of invasive treatments include prolonged survival as well as better control of the disease and its related complications. However, patients still continue to see a range of symptoms and side effects associated with the treatments such as nausea, vomiting, impaired muscle function, pain, insomnia, fatigue, etc.[1,2]. Of those, impaired muscle function and cancer-related fatigue were found to be the most common among patients undergoing chemotherapy[1,4]. Cancer-related fatigue is described as being more severe, more distressing and having less chance of relief through rest than in the general population[4]. More recently, studies have examined

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the effects of proper exercise and nutrition to combat some of these cancer-related symptoms.

In the general population, an adequate amount of exercise at varying intensities has been shown to improve health in areas such as fatigue and muscle impairment[3,5]. Similarly, a study done by Santa Mina et al confirmed the benefits of exercise with regards to aspects of cancer such as fatigue and emotional well-being. A lot of previous studies in the areas of cancer and exercise have included predominately women at varying stages of breast cancer. These studies have also primarily focused on the benefits of a single activity of moderate intensity, such as cardiovascular training rather than resistance training[1]. Resistance training and high-intensity exercise has the potential to further improve patients' physical capacity.

Little research has been conducted on the differences in overall benefits from individual exercise training compared to that of group exercise training. Knowing that exercise can provide relief and benefits to cancer patients, our current study aims to determine if group based exercise is just as beneficial as individual exercise.

METHODS

This randomized controlled trial evaluated the effects of a group exercise intervention versus individualized exercise therapy in 82 newly diagnosed cancer survivors. An ethical committee of the recruiting cancer center approved this study prior to the onset of any data collection. Patients were included if they met the following criteria: (i) Men and women with recently diagnosed cancer, (ii) age between 30 and 70 years, (iii) high school education, and (iv) willingness to participate. Patients were excluded if they had (i) a concurrent medical condition likely to interfere with the treatment, (ii) any major psychiatric, neurological illness, and/or autoimmune disorders, and (iii) secondary malignancy. The details of the study were explained to the participants and their informed consent was obtained.

Table 1: Subject Characteristics

		Gex	IEx
Age (yr)		62 ± 3.4	59 ± 2.2
Gender	Male	34	73
	Female	48	127
Type of cancer	Prostate	2	25
	Breast	54	88
	Colon	12	47
	Lung	7	28
	Brain	0	3
	Other	7	9
Current Course of Treatment	Radiation	21	49
	Chemo-therapy	34	67
	Surgery	22	72
	Other	5	12

Baseline assessments were done on 94 patients at the start of the group exercise (GEx) intervention and on 262 patients prior to the start of individualized exercise training (IEx). At the conclusion of the 8-week group exercise intervention, the same fitness parameters were measured again. On the follow-up test, 82 patients in the GEx group and 200 patients in the IEx group were measured. The reasons for dropouts were attributed to lack of interest, time constraints, and other concurrent illnesses.

Measures

At the initial visit, all pertinent demographic information, medical history, clinical data, intake of medications, investigative notes, and conventional treatment regimen were ascertained from all consenting participants. Subjective symptom checklist was utilized to assess treatment-related side effects, problems with image, and relevant psychological and somatic symptoms related to cancer. The checklist consisted of 31 such items each evaluated on two dimensions; severity graded from no to very severe (0–4), and distress from not at all to very much (0–4). These scales measured the total number of symptoms experienced, total/mean severity and distress score, and was evaluated previously in a similar breast cancer population[8].

Initially, measurements of muscular strength were measured using the hand grip dynamometer. Upper body range of motion was measured via goniometer. Lower body range of motion was assessed via modified sit and reach. Cardiorespiratory endurance was measured with the 6-minute walk test. Muscular endurance was assessed via partial curl up test. Finally, body composition was measured with skinfold calipers. The quality of life (QOL) was measured using McGill

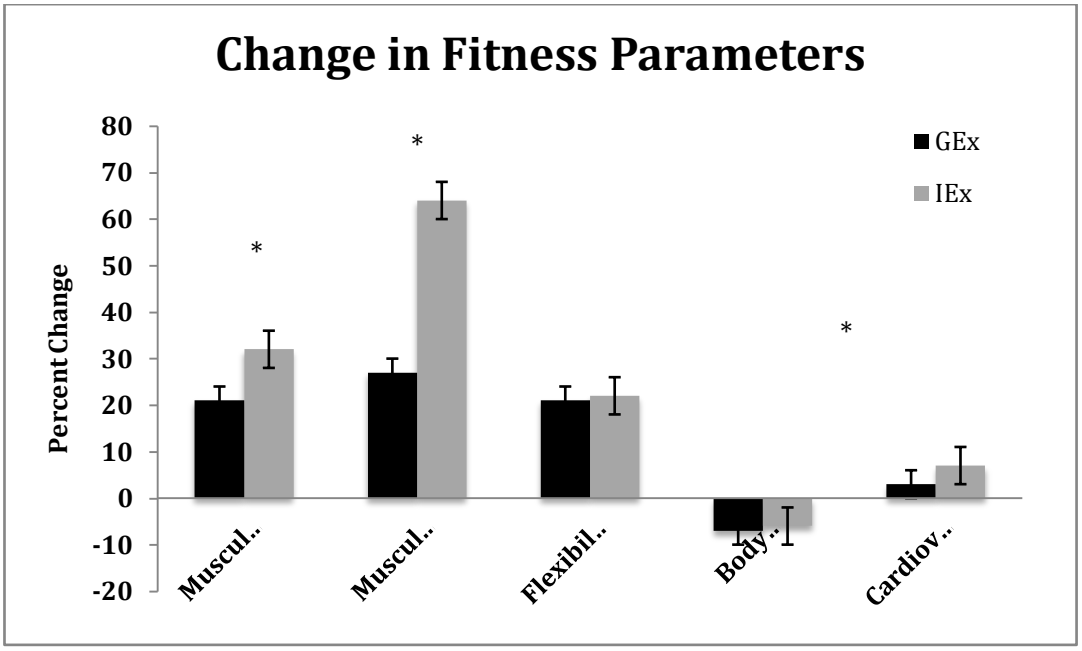

Figure 1: GEx and IEx Improvements in Fitness Parameters. Values are mean scores ± SE. *P<0.05 between groups.

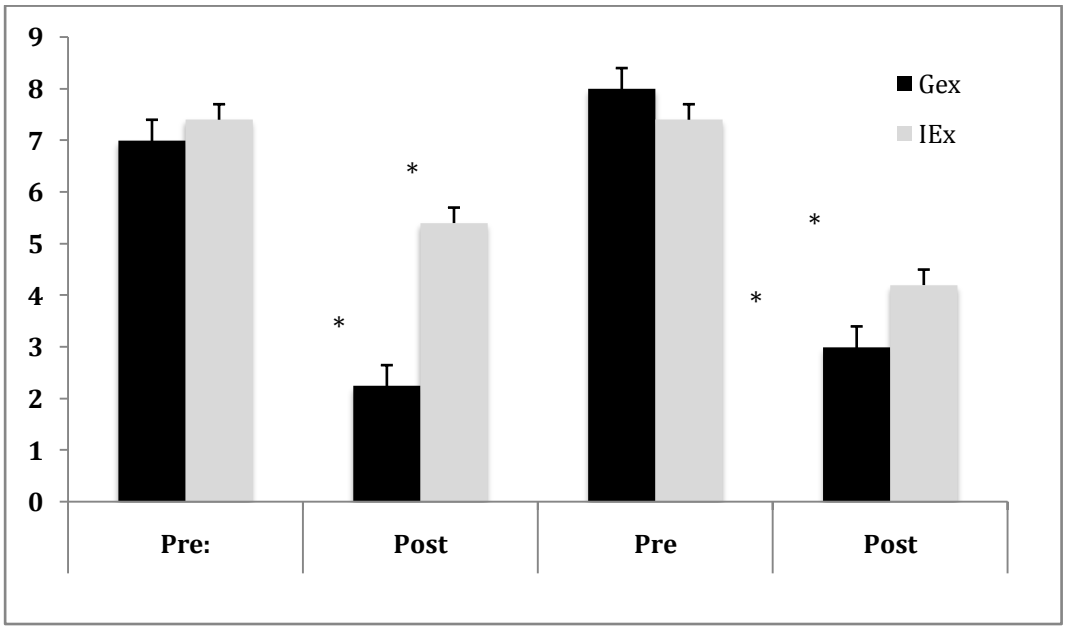

Figure 2. Depression and Anxiety Scores.

QOL Questio/nnaires. All participants were re-assessed following the 8-week program.

The GEx class consisted of a set of range of motion and strengthening exercises, as well as interval cardiovascular training. The sessions began with a guided warm up (10 min), followed by a the exercise phase (40 min) with interval training with aerobic and strength exercises. Subjects were encouraged to remain active at home at least 3 days a week between classes. Their instructors through telephone calls, text messages, and daily logs monitored their home exercise on a day-to-day basis.

The IEx group consisted of traditional strength training with a certified Cancer Exercise Specialist. Patients first underwent a comprehensive fitness

assessment, measuring body composition, aerobic endurance, flexibility, and muscular strength and endurance, using the methods described above. Following this, an exercise program was created and individualized according to each patient's strengths and weaknesses. Patients exercised with a Cancer Exercise Specialist once each week, for 60 minutes each session. Each workout session included a cardiovascular component, flexibility exercises, and whole-body strength training. Each patient did 3 sets of 10 repetitions of 8-10 exercises targeting all the major muscle groups in the body. Patients were also given an at-home workout program and resistabands, and were encouraged to exercise three times each week on their own at home. Their trainers monitored exercise compliance through telephone calls, texts, and daily logs.

Statistical methods

Data were analyzed using Statistical Package for Social Sciences version 20.0 for PC windows 2000. Mean scores for fitness parameters and QOL measures were calculated for the complete sample. Compliance data was also measured for each group. The data were averaged and analyzed using a one-way ANOVA test. All data was analyzed at the 0.05 level of significance.

RESULTS

A total of 282 men and women completed the study.Eighty two participants comprised the GEx group and 200 comprised the IEx group. There were no dropouts due to injuries. Table 1 presents the Subject Characteristics. The GEx and IEx groups were similar with respect to medical characteristics and heterogeneous in thetreatment regimen.

Exercise had a positive impact on fitness parameters for both groups (Figure 1). Muscular strength, muscular endurance, and flexibility significantly improved from baseline levels in both the GEx and the IEx groups ($p<0.05$).The IEx exercise group experienced greater improvements in cardiovascular endurance, muscular strength, and muscular endurance ($p<0.05$) than the GEx counterparts. There were no significant differences between groups for flexibility and body composition.

Two questions on the McGill Quality of Life questionnaire were also analyzed. Patients were asked to indicate on a scale of 1-10 the level of depression and anxiety they have experienced over the last 2 d. Mean depression and anxiety scores improved in both groups, but to a greater extent in the GEx group (Figure 3). It was determined that individuals in the GEx group experienced significantly lower levels of depression (GEx = 2.25 ± 0.3, IEx = 5.4 ± 0.4; $P< 0.05$) and anxiety (GEx = 3 ± 0.25, IEx = 4.2 ± 0.6; $P< 0.05$) than their NR counterparts. Finally, the GEx had the highest compliance rate (87% vs. 76% in the IEx group). ($p<0.05$).

Scores are mean values representing change in score from baseline to post-intervention ± SE. $P<0.05$ from baseline.

DISCUSSION

The current study examined the benefits of group-based physical exercise compared to individual exercise training. Our results show that there are benefits to both individual and group training. Our study population included a range of ages, cancer types, disease statuses, and hormone/medication use. A large majority of our subjects were women in varying stages of breast cancer.

Studies conducted in healthy adult populations have shown that combined resistance and cardiovascular training programs can have a range of beneficial effects such as improvements in physical functioning and aerobic capacity[3,5]. Similarly, the results from the current study's group and individual programs confirm that patients with cancer, even those undergoing chemotherapy, can gain physiological benefits from combined resistance and cardiovascular training.

We were likely to see an increase in physical functioning for both the individual program and the group program based on the fact that 85% of cancer patients are sedentary at the time of diagnosis[2]. Severe fatigue results from extreme muscular deconditioning and can be triggered by a sedentary lifestyle[6], so any type of physical exercise should show improvements in those areas. Even further, our results show more of an increase in physiological domains as it relates to individual exercise training compared to group training. One possible explanation for this is that patients feel more comfortable when an exercise program is tailored to their needs and the session is one-on-one rather than in a group setting.

LIMITATIONS

The current study included results from those currently participating in either group exercise or individual training with the intention to lessen the

severity of the symptoms and side effects related to cancer and its treatments. The results found from these subjects were not compared to results that would have been seen of a cancer-free control group. Future research should aim to determine if improvements in physical functioning increases to the same degree for both cancer and cancer-free subjects in individual training compared to group exercise.

Our study included a predominately female population. Cancer, however, is evenly distributed between sexes and therefore may show different results having more males included in the study. Continued research in the areas of cancer and exercise should be developed with greater appeal to male patients.

Another limitation is based on the fact that cancer is not only debilitating in the physical domains but emotional and social domains as well. To reduce error, assessing the subject's overall quality of life during the exercise trial would have helped establish causation that it was the exercise that helped combat a majority of their physical symptoms.

REFERENCES

1. Adamsen, L., Quist, M., Andersen, C., Møller, T., Herrstedt, J., Kronborg, D., … Rørth, M. (2009). Effect of a multimodal high intensity exercise intervention in cancer patients undergoing chemotherapy: randomised controlled trial. The BMJ, 339, b3410. http://doi.org/10.1136/bmj.b3410
2. Cuesta-Vargas, A. I., Carabantes, F., Caracuel, Z., Conejo, I., & Alba, E. (2016). Effectiveness of an individualized program of muscular strength and endurance with aerobic training for improving germ cell cancer-related fatigue inmen undergoing chemotherapy: EFICATEST study protocol for a randomized controlled trial. Trials, 17, 8. http://doi.org/10.1186/s13063-015-1143-x
3. Fentem, P. H. (1994). ABC of sports medicine. Benefits of exercise in health and disease. BMJ : British Medical Journal, 308(6939), 1291–1295.
4. Holzner, B., Kemmler, G., Meraner, V., Maislinger, A., Kopp, M., Bodner, T., Nguyen-Van-Tam, D., Zeimet, A. G., Fleischhacker, W. W. and Sperner-Unterweger, B. (2003), Fatigue in ovarian carcinoma patients. Cancer, 97: 1564–1572. doi: 10.1002/cncr.11253
5. Kraemer, W., Adams, K., Cafarelli, E., Dudley, G., Dooly, C.,& Feigenbaum, M. (2009). American college of sports medicine position stand: Progression models in resistance training for healthy adults. Medicine Science Sports Exercise,41(3): 687-708. doi: 10.1249/MSS.0b013e3181915670.
6. Lucia, A., Earnest, C., & Perez, M. (2003). Cancer-related fatigue: Can exercise physiology assist oncologists? Lancet Oncology, 4(10): 616-625.
7. Mina, D. S., Petrella, A., Currie, K. L., Bietola, K., Alibhai, S. M. H., Trachtenberg, J., … Matthew, A. G. (2015). Enablers and barriers in delivery of a cancer exercise program: the Canadian experience. Current Oncology, 22(6), 374–384. http://doi.org/10.3747/co.22.2650
8. Bhaskaran SA. Bangalore: National Institute of Mental Health and Neurosciences; 1996. Behavioural management of patients with cancer.