

RESEARCH BRIEF

The Effects of Group Exercise on Fatigue and Quality of Life During Cancer Treatment

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Purpose/Objectives: To determine the feasibility of participating in a structured group exercise program (SGEP) for adult patients receiving cancer treatment and to test the impact of an SGEP on reducing cancer-related fatigue (CRF) and improving quality of life (QOL).

Design: One-group, prospective, pre- and post-test design.

Setting: Two community outpatient infusion centers.

Sample: Convenience sample of 12 adults with varying cancer diagnoses receiving cancer treatment.

Methods: Nine of 12 subjects participated in SGEP twice weekly for six weeks. Exercises focused on strengthening proximal muscle groups and improving functional ability. All subjects completed the Fatigue Symptom Inventory and the Short Form-36 version 2 (SF-36v2) Health Survey at baseline and six weeks.

Main Research Variables: Feasibility of the intervention, CRF, and QOL.

Findings: No difference in reported fatigue was found. The SF-36v2 subscale score for bodily pain showed a significant decrease in this symptom. Subscale scores for physical role, vitality, and social function increased but did not yield statistical significance. Social interactions resulted in strong group cohesiveness. A postprogram questionnaire identified themes of support, learning from shared information, and the usefulness of having an exercise program that also serves as an informal support group.

Conclusions: SGEP is feasible, safe, and well tolerated by adult patients with cancer and may have positive effects on CRF and QOL.

Implications for Nursing: The benefits of exercise for patients with cancer receiving treatment are well documented. Using a multidisciplinary approach, oncology nurses, working with an exercise physiologist, can safely create an SGEP, combining the power of group interactions with the appeal of a wellness-promoting behavior, and provide an additional tool to assist in the management of physiologic and psychosocial effects of cancer treatment.

Key Points . . .

- ▶ To date, little is known about the efficacy of a group-based exercise program; the benefits of exercise as an intervention for the management of cancer-related fatigue in adults with cancer have been well documented in the literature, but most studies have examined individual, home-based exercise programs.
- ▶ Combining the positive effects of group interaction with the well-documented benefits of exercise may have an effect on reducing cancer-related fatigue and improving quality of life in adult patients receiving cancer treatment.
- ▶ Additional research with a larger, more homogenous cohort and longer duration of the intervention is needed to validate the findings of this pilot study.

as a multidimensional phenomenon, CRF has physiologic and psychosocial components (Ahlberg, Ekman, Gaston-Johansson, & Mock, 2003; Lesage & Portenoy; National Comprehensive Cancer Network; Ream et al.). Metabolic changes in skeletal muscle and the effects of cytokines create a reduction in protein stores resulting in muscular weakness, wasting, and a subsequent decrease in functioning, contributing significantly to the physiologic development of CRF (Ahlberg et al.; Dimeo, Stieglitz, Novelli-Fischer, Fetscher, & Keul, 1999; Lesage & Portenoy; Winningham, 2001). Rest has been the primary intervention for the treatment of fatigue, but evidence clearly illustrates that further inactivity

Cancer-related fatigue (CRF) affects 60%–100% of all patients with cancer and remains the most prevalent and difficult cancer-related side effect to manage, profoundly affecting everyday functioning and quality of life (QOL) (Lesage & Portenoy, 2002; Mock et al., 2001; National Comprehensive Cancer Network, 2004; Ream, Richardson, & Alexander-Dann, 2002; Stricker, Drake, Hoyer, & Mock, 2004). Described throughout the literature

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can exacerbate the symptom (Lesage & Portenoy; Ream et al.; Winningham).

A self-perpetuating downward spiral of inactivity and activity intolerance is created: Individuals rest by decreasing activity, resulting in even greater muscular and cardiopulmonary deconditioning and intolerance to perform normal activities (Stricker et al., 2004; Winningham, 2001). As physical abilities decline, psychosocial distress ensues; dependency on others disempowers patients with cancer, reducing self-esteem and increasing feelings of helplessness and hopelessness, which significantly affect QOL (Ahlberg et al., 2003; Lesage & Portenoy, 2002; Smith, 1996; Turner, Hayes, & Reul-Hirche, 2004).

QOL is a multidimensional, intricate concept that synthesizes the unique physical, functional, spiritual, psychological, and social well-being of each individual (George & Clipp, 2000; Mast, 1995; Smith, 1996). Perceived QOL incorporates the person as a whole; it takes into account an individual's distinct perspective regarding health and illness, serving as a "personal standard" for life, and embraces all that makes an individual's life valuable and meaningful (George & Clipp; Mast).

Although seemingly counterintuitive, exercise is emerging as a promising intervention to reduce CRF and improve QOL (Ahlberg et al., 2003; Campbell, Mutrie, White, McGuire, & Kearney, 2005; Christopher & Morrow, 2004; Drake, Falzer, Xistris, Robinson, & Roberge, 2004; Galvao & Newton, 2005; Headley, Ownby, & John, 2004; Irwin & Ainsworth, 2004; Kolden et al., 2002; Mock et al., 2001; Smith, 1996). The positive functional and psychosocial effects of exercise on the well-being of healthy individuals and older adults with chronic diseases, such as chronic obstructive pulmonary disease, have been well researched and documented in the literature, but exercise only recently has been considered an appropriate and important intervention for individuals with cancer (Christopher & Morrow; Drake et al.; Galvao & Newton; Stricker et al., 2004). Most studies in this area of research involve individual, home-based exercise programs (Drake et al.; Galvao & Newton; Headley et al.; Irwin & Ainsworth; Mock et al.; Stricker et al.). Few studies have used a structured group-based exercise format (Adamsen, Rasmussen, & Pedersen, 2001; Campbell et al.; Kolden et al.; Turner et al., 2004).

The powerful effects of group dynamics are well documented (Adamsen et al., 2001; Forsyth, 1990; Yalom, 1985). Group theorists describe a "mutually shared field" that is generated when individuals who differ from one another, yet possess some commonality, are gathered together (Forsyth). With a collective gathering and sharing of common ground, social interactions arise between individuals (or the group as a whole) that become motivational and inspirational; through these social interactions, drawn from shared commonalities, change occurs (Forsyth; Yalom).

In his model, group theorist Irvin Yalom (1985) identified factors that arise within groups that are instrumental in eliciting change: instillation of hope, universality, imparting information, altruism, development of socializing techniques, imitative behavior, interpersonal learning, and group cohesiveness. A structured group exercise program (SGEP) integrates the known physiologic benefits of exercise with the psychosocial effects of group interaction. Beneficial effects include increased motivation, encouragement, cooperation, a sense of belonging and a subsequent decrease in social isolation, an

increased sense of support, greater self-confidence, enhanced knowledge, and subsequent improved QOL and general well-being (Adamsen et al., 2001; Christopher & Morrow, 2004; Kolden et al., 2002; Turner et al., 2004).

To date, few studies have explored the feasibility of a group exercise intervention and the effects of that intervention on CRF and QOL in adult patients during cancer treatment. Research by Kolden et al. (2002) explored the feasibility and effects of SGEP for 40 sedentary women with primary breast cancer receiving adjuvant therapy. Campbell et al. (2005) also examined the effects of a supervised group exercise program on physical functioning, fatigue, and QOL in women with early-stage breast cancer during treatment. Both of the studies showed that SGEP was feasible, safe, and well tolerated with notable physical and psychosocial health benefits for women with breast cancer receiving treatment.

Pilot studies by Turner et al. (2004) and Christopher and Morrow (2004) used a structured group exercise intervention in female cancer survivors following treatment. Their data suggested that SGEP had a positive impact on the reduction of CRF and improved QOL. Both studies noted that participants reported benefits from the social support of the group (Christopher & Morrow; Turner et al.).

Purpose

The purposes of the current pilot study were to determine the feasibility of participation in SGEP by adult patients receiving cancer treatment and to test the impact of SGEP on reducing CRF and improving QOL.

This pilot study is unique in that it integrates the known benefits of exercise with the powerful effects of group dynamics in a group of adult patients with mixed cancer diagnoses at various stages of treatment. By incorporating the wellness-promoting activity of exercise in a group setting, an opportunity is created for group factors to emerge that are instrumental in eliciting change, which may affect CRF and QOL in adult patients receiving cancer treatment.

Conceptual Framework

The theoretical perspective that guided the current pilot study embraces a multidimensional framework. The conceptual model, developed by the authors, integrates the multiple physiologic and psychological effects of cancer treatment and CRF with the powerful and well-documented effects of group dynamics and benefits of exercise (see Figure 1). Providing the wellness-promoting behavior of exercise in a group setting encourages the following factors to emerge: instillation of hope ("If others can do it, so can I."), a sense of universality (arising from a shared commonality of cancer and cancer treatment), sharing of information (management of side effects and coping strategies), altruism (developing mutual support), increased ability to listen and relate to others, and the opportunity to observe how others with similar problems cope effectively (Yalom, 1985).

According to Yalom (1985), the presence of the previously mentioned factors can be influential in promoting change, and the present study's researchers believed that the factors may have a significant role in improving CRF and QOL during cancer treatment. This conceptual framework illustrates the interrelationship of the psychosocial and physiologic

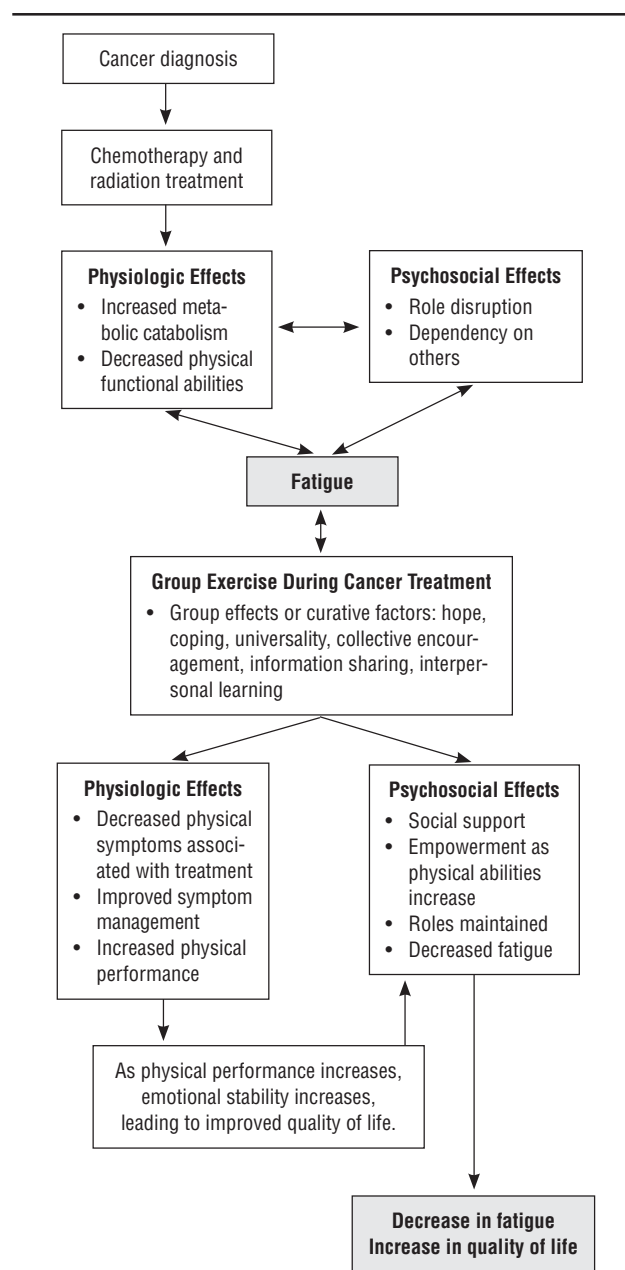


Figure 1. Effects of Group Exercise on Fatigue and Quality of Life During Cancer Treatment: A Conceptual Framework

dimensions of fatigue and uses a group exercise program to interrupt the downward, self-perpetuating spiral of cause and effect, thereby reducing CRF and improving QOL.

Built on the empirics of physiology and psychosocial research, the current study's conceptual model incorporates nursing phenomena. Originating from evidence-based practice and guided by research in the area of CRF, QOL, and structured exercise as a symptom management intervention, the holistic model integrates multiple ways of knowing. Praxis exists at the core, demonstrated by the integration of personal experiences of individuals with cancer and the personal and professional experiences of oncology nurses,

in relation to the physiologic and psychosocial dimensions of CRF and QOL.

Methods

Sample and Setting

Following institutional review board approval, participants were recruited via informational flyers posted in the waiting area of a local community outpatient infusion clinic. Twelve individuals receiving outpatient cancer treatment expressed an interest to participate in the study and met individually with the researcher. Written informed consent was obtained at that time. Inclusion criteria were English speaking, Karnofsky performance status greater than 80, and no preexisting heart disease or chronic obstructive pulmonary disease. Exclusion criteria were symptomatic bone metastases, serum hemoglobin lower than 10 g/dl, and resting pain greater than 2 on a 0–10 scale. Prior to beginning the intervention, patients obtained their oncologist's permission for participation.

Study Intervention

Subjects participated in SGEP, meeting for an hour twice weekly for six weeks. Exercises focused on flexibility, muscle strength, and endurance, with an emphasis on strengthening proximal muscle groups and improving functional ability. All exercises were reviewed by an exercise physiologist and a medical oncologist and followed the American College of Sports Medicine's (2000) general guidelines for exercise testing and prescription. An oncology-certified nurse with experience in teaching exercise to patients conducted the intervention, which was held at an outpatient physical therapy gymnasium in a local community hospital.

Each class began with seated chair warm-up exercises involving gentle stretching of the neck and upper torso followed by repeated flexion and extension of extremities using 2–3 lb dumbbell weights. Weight size varied by participant and was determined by individual preference and instructor guidance. Subjects then transitioned to standing exercises (additional stretching and mild aerobic marching in place), simple mat exercises (abdominal core strengthening and stretching), and basic yoga-type cooldown exercises. An opportunity to address participant questions and engage in informal discussion was provided at the beginning and end of each exercise class. Each exercise phase (chair, standing, floor, and cooldown) was approximately 10 minutes in duration, with most strengthening exercises consisting of one set of 10 repetitions. Emphasis was placed on slow, purposeful movement and breathing techniques.

Instruments

Fatigue and QOL were assessed using the **Fatigue Symptom Inventory (FSI)** (Hann, Denniston, & Baker, 2000) and the **Short Form-36 version 2 (SF-36v2)** (Ware, Kosinski, & Dewey, 2002). Both instruments were self-administered at the beginning and end of the six-week intervention. A **demographic questionnaire** gathered participants' age, gender, living situation, cancer type, and previous exercise history.

The FSI is a 14-item inventory with three subscales: fatigue severity, frequency, and perceived interference with QOL. Subjects rate the extent to which they agree with each item using a 0–10 Likert scale. Established as a reliable and valid measure of fatigue in patients with cancer, the FSI

has a Cronbach's alpha coefficient ranging from 0.93–0.95, with convergent, divergent, and construct validities supported by significant correlations with the Profile of Mood States–Fatigue subscale and the Short Form-26 vitality scale (Hann et al., 2000).

The SF-36v2, a generic measure of health-related QOL, has eight subscales: physical functioning, role-physical, bodily pain, general health, vitality, social function, role-emotional, and mental health. This QOL measurement instrument was selected because it most completely addressed the constructs identified in the conceptual framework guiding the pilot study. The interrelatedness of the psychosocial and functional domains of QOL is identified with physical functioning, and psychosocial dimensions are measured in terms of social activities and relationships. Subjects supply Likert-type responses to questions regarding their perceived ability to complete activities of daily living, with higher scores indicating the best state. Brief, yet comprehensive, the SF-36v2 has been found to be an effective psychometric tool, with subscale reliability coefficients ranging from 0.78–0.93 (Ware et al., 2002). Self-reported improvement in treatment-related side effects (specifically fatigue), mood, and social and physical functioning abilities as measured by the SF-36v2 served as indicators for increased QOL in the present study.

Data Analysis

Demographic data were analyzed using descriptive statistics. Subscale scores on the FSI and SF-36v2 were calculated and compared using a paired t test.

Results

Twelve individuals consented to participate in the study. One was hospitalized prior to beginning the study, one never attended for unknown reasons, and one withdrew a third of the way through the program, stating that she was “unable to keep up with everyone else.” The nine participants completing the study were all women who ranged in age from 25–76 years ($\bar{X} = 58$), had various types and stages of cancer, and had done some physical activity prior to diagnosis (see Table 1).

Feasibility of the intervention was demonstrated by the ability to recruit individuals with a variety of cancers at various stages. Participants exhibited a high level of motivation, attending an average of 90% of the 12 sessions, and expressed a desire to continue the program beyond the study. The exercises were well tolerated with no adverse reactions.

No noticeable changes were seen pre- and post-test on the FSI subscale scores, but reduction in bodily pain was seen in the SF-36v2 ($p < 0.02$). Although not significant, changes were noted between pre- and post-test subscale means with a slight improvement in physical role, social function, and vitality and minor decreases in general health, physical functioning, and mental health. The absence of noticeable variations in fatigue and the minor decrease in some health measures likely are related to widely divergent disease and treatment stages.

Limitations

The primary limitation of the pilot study is its small sample size, creating inadequate power to demonstrate significant differences in the outcome variables and preventing normal distribution generalizations. Direct recruitment by oncology

Table 1. Demographic Characteristics

Characteristic	n	%
Gender		
Female	9	100
Age (years)		
$\bar{X} = 58$	–	–
Range = 25–76	–	–
Marital status		
Married	7	78
Widowed	1	11
Never married	1	11
Type of cancer and stage		
Breast, stage II	2	22
Breast, stage III	2	22
Breast, stage IV	1	11
Colon, stage IV	1	11
Lung, stage I	1	11
Ovarian, stage I	1	11
Pancreatic, stage IV	1	11
Cancer treatment		
Chemotherapy	8	89
Radiation and biologic response modifier	1	11
Work status		
Part-time	1	11
Leave of absence	3	33
Retired	5	56
Exercise prior to diagnosis		
Frequently (≥ 4 times a week)	3	33
Moderately (3 times a week)	2	22
Some (1–2 times a week)	4	44
None	–	–

N = 9

Note. Because of rounding, not all percentages total 100.

nurses who have direct patient contact in an outpatient infusion clinic may be one way to effectively enroll additional subjects. The lack of a comparison group, self-selected participation, the brief duration of the intervention, and the lack of a formal measurement of group process are additional limitations of the study. To facilitate application to clinical practice and the development of evidence-based SGEP guidelines, future studies should address intervention variables such as group size, participant age, type of exercises, instructor personality, and measurement of group processes.

Discussion

Participants expressed positive reactions regarding SGEP verbally and in a written course evaluation. Most had not planned to follow an exercise regimen during cancer treatment and would not have joined a formal support group but were drawn by the opportunity to engage in a “normal” wellness-promoting behavior (exercise) in a structured, professionally supervised setting. They expressed surprise and pleasure at the camaraderie that evolved. Group members independently established an e-mail list through which they shared information and personal status updates and encouraged attendance by developing a common social obligation toward self and the group.

Yalom's (1985) curative factors were clearly visible over time. Collective reciprocity was seen as the group, grounded by commonalities intrinsic to the cancer experience, shared personal stories, fears, concerns, and struggles, supporting and

educating one another while engaging in the beneficial intervention of physical activity. Although not formally measured, cohesion among group members was evidenced by increased spontaneity of verbal interactions and the development of trust and genuine camaraderie (e.g., attempts were made to coordinate chemotherapy treatment appointments and meet for group walks). The results of the pilot study suggest that SGEP can be safe, feasible, beneficial, and well tolerated and may have a positive impact on QOL.

Implications for Nursing

To manage CRF and improve QOL, interventions must address the physiologic and psychological phenomena intrinsic to the fatigue experience and be easy to implement in a variety of clinical settings. SGEP combines the power of group dynamics with the appeal of a wellness-oriented activity. The positive physiologic and psychosocial effects of exercise are

well documented; studies have demonstrated that even moderate exercise can increase muscle tone, improve strength, boost cardiovascular health, and enhance an individual's mood and sense of well-being (Campbell et al., 2005; Drake et al., 2004; Galvao & Newton, 2005; Kolden et al., 2002). Establishing SGEP in clinical practice may be an effective way to use the foundation of physical activity to combat the uncertainty, lack of motivation, and social isolation frequently observed among patients with cancer. Building on current research that confirms the benefits of exercise for adult patients with cancer, the present pilot study provides encouraging data that suggest SGEP is feasible and well tolerated by adult patients receiving cancer treatment and that the intervention may have positive effects on CRF and QOL.

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