Exercise Interventions in Cancer Patients

Subjects: Others | Oncology
Contributor: Ladislav Batalik

Cancer is a chronic disease requiring long-term treatment. Exercise interventions are increasingly being recognized as an important part of treatment and supportive cancer care for patients and survivors.

Keywords: cancer ; rehabilitation ; exercise ; home-based exercise ; cancer survivors ; cardiorespiratory fitness ; physical activity

1. Introduction

Exercise interventions are increasingly recognized as an important part of treatment and supportive care for patients and cancer survivors [1]. The scientific evidence from previous systematic reviews suggests that exercise interventions provide a number of physical and psychosocial benefits that can mitigate the effects of cancer treatment. The benefits have been shown to include the improved cardiorespiratory fitness (CRF), health-related quality of life (HRQOL) of physical and immune function, and reduced fatigue and depression [2][3][4]. Despite the recognized benefits, a number of barriers affect the implementation of exercise interventions in cancer survivors: legal and organizational barriers, including a significant lack of specialized rehabilitation services, low awareness, or lack of referral from health-care providers [5]; barriers in the area of patients include inconvenient place, time of day, or insufficient capacity to offer physical exercise rehabilitation programs [6].

An alternative form of exercise intervention, home-based (HB) exercise, for cancer survivors has the potential to overcome several accessibility barriers that limit patients from participating in traditional center-based (CB) exercise interventions under professional supervision. As is well known, recent studies of HB exercise interventions have provided evidence of feasibility and safety, supporting that HB exercise appears to be a suitable alternative to CB programs [7][8]. Particularly during the current COVID-19 pandemic, an alternative model of remote access and its variations are strongly recommended in chronic diseases [9].

2. Exercise Interventions in Cancer Patients and Survivors

2.1. CRF

The evaluation of the CRF was one of the main criteria for selecting eligible studies for review. CRF was, therefore, part of all nine studies [10][11][12][13][14][15][16][17][18], with four studies having the CRF as the primary outcome [12][13][15][16]. Oxygen consumption (VO_2peak or VO_2max) [10][11][12][13][14][15][18] was used in seven studies to evaluate CRF, of which the VO_2peak/six minute walk test (6MWT) combination [15] was used once and the VO_2peak/treadwalk test was used once [18]. One study further evaluated CRF using the steep ramp test and exercise test at 70% of maximum workload [16] and one study used only the 6MWT [17].

In four of the nine studies, improvement in CRF was reported in the HB exercise group [10][12][14][15]. Husebo et al. [17] further reported a significant difference from baseline and six months post-treatment for total sample (home-based exercise and usual care). Significant improvements were not reported in the other four studies [11][13][16][18].

A total of eight studies compared CRF results between HB exercise and usual care groups [10][12][13][14][15][16][17][18]. Five of these studies reported a significant CRF improvement in the HB intervention [10][13][14][15][18], and one study reported that the effect ceased to be significant after six months of follow-up [10]. The remaining three studies found nonsignificant differences between groups [12][15][17]. Cornette et al. [15] found a significant difference in per-protocol analysis (not intention-to-treat). Two studies also compared HB and CB exercise interventions [11][16]. Whereas Alibhai et al. [11] found nonsignificant difference between interventions, van Waart et al. [16] reported improved CRF results for the CB in comparison with the HB exercise intervention.

2.2. Physical Activity (PA)

A total of seven studies compared the PA levels [10][12][13][15][16][17][18]. Six studies used International Physical Activity Questionnaire [12][13][15][17], Physical Activity Scale for the Elderly [16], and Seven-day Physical Activity Recall [18] questionnaires for evaluation. One study used an accelerometer for PA evaluation [10].

Five of the seven studies reported a significant improvement in PA levels with HB exercise in the intervention group [10][12][15][18], and one study, in the total study sample [17]. In two studies, these results were not reported [13][16]. Cornette et al. [15] reported that the HB exercise group doubled its total PA, but did not describe statistical significance in this context. McNeil et al. [10] reported, in addition to a significant increase in PA levels (both intervention exercise groups), participants reduced sedentary time in the lower-intensity exercise group.

Two of the seven studies further described a statistically significant increase in PA with HB exercise compared with the usual-care group [10][18]; however, Pinto et al. [18] added that group differences attenuated over time. Lahart et al. [13] stated that the effect of the intervention was likely beneficial (91%) on total and moderate PA levels compared with usual care. Another three studies reported a nonsignificant difference between HB exercise and usual care [12][16][17].

2.3. Fatigue and HRQOL

The fatigue outcome was measured in five studies using the Functional Assessment of Cancer Therapy–Fatigue [11][18], Multidimensional Fatigue Inventory [15][16], Fatigue Quality List [16], and Schwartz Cancer Fatigue Scale [17] questionnaires. Reporting fatigue results was insufficient in all the studies. Only one study reported results with statistically nonsignificant difference in the HB group [18]. Three studies reported a nonsignificant difference between the HB exercise and usual-care groups [15][17][18]. An exception is the study by van Waart et al. [16], where a significant reduction in fatigue was found in the HB group, but these results were obtained from a subscale of the questionnaire primarily focused on quality of life. A comparison of average scores at baseline and six months post-treatment further showed a nonsignificant difference, suggesting a return to baseline levels of fatigue [17]. One study [16] reported significantly better physical fatigue results in the CB than HB exercise interventions. Alibhai et al. [11] found nonsignificant important changes in fatigue between interventional groups in HB and CB exercise interventions.

A total of four studies investigated the HRQOL [11][15][16][18]. One study reported significant improvement in physical functioning, less nausea and vomiting, and less pain with HB exercise than in the usual-care group [16]. The other two studies found a nonsignificant difference [15][18]. One study reported a 77.4% probability of inferiority (the Functional Assessment of Cancer Therapy–Prostate) of HB to CB exercise [11].

3. Future Directions

For further research on HB exercise intervention evaluations, we recommend researchers to:

- define the outcomes and evaluate the effect relevant to the phase of cancer rehabilitation,
- establish a timeframe to define the phase of cancer rehabilitation,
- determine relevant measurements of outcomes for different cancer populations, and
- conduct further pilot studies in understudied cancer populations to ensure the feasibility of interventions and data analysis for future research, e.g., sample size determination.

For the future methodological design of clinical trials with sufficient evidence of feasibility, we recommend using:

- specified eligibility criteria (clearly stated and fulfilled eligibility criteria),
- unbiased randomization with description (a description of the randomization method used to allocate patients into study groups should be provided),
- allocation concealment,
- blinding of the assessor (for at least one primary outcome), and
- intention-to-treat analysis.

For studies reporting HB exercise training interventions for cancer survivors during the rehabilitation phase, future studies are recommended to report:

- specifications of the time range between cancer treatment completion and study enrolment,
- participation rate,
- limitations on recruitment flow and exercise intervention implementation,
- adherence to exercise intervention and compliance with the exercise prescription,
- adverse events (any serious medical events, deaths, and hospitalizations),
- activity monitoring in control groups,
- exercise volume and energy expenditure (exercise session and intervention duration, session frequency, and exercise intensity and modality),
- between-group statistical comparisons, and
- findings from all analyses conducted including effect sizes.

References

1. Schmitz, K.H.; Campbell, A.M.; Stuiver, M.M.; Pinto, B.M.; Schwartz, A.L.; Morris, G.S.; Ligibel, J.A.; Cheville, A.; Galvão, D.A.; Alfano, C.M. Exercise is medicine in oncology: Engaging clinicians to help patients move through cancer. CA. Cancer J. Clin. 2019, 69, 468–484.
2. Spence, R.R.; Heesch, K.C.; Brown, W.J. Exercise and cancer rehabilitation: A systematic review. Cancer Treat. Rev. 2010, 36, 185–194.
3. Schmitz, K.H.; Holtzman, J.; Courneya, K.S.; Mâsse, L.C.; Duval, S.; Kane, R. Controlled physical activity trials in cancer survivors: A systematic review and meta-analysis. Cancer Epidemiol. Biomark. Prev. 2005, 14, 1588–1595.
4. Kruijsen-Jaarsma, M.; Revesz, D.; Bierings, M.B.; Buffart, L.M.; Takken, T. Effects of exercise on immune function in patients with cancer: A systematic review. Exerc. Imunol. Rev. 2013, 19, 120–143.
5. Stubblefield, M.D. The underutilization of rehabilitation to treat physical impairments in breast cancer survivors. PM R 2017, 9, 317–323.
6. IJsbrandy, C.; Hermens, R.P.M.; Boerboom, L.W.M.; Gerritsen, W.R.; van Harten, W.H.; Ottevanger, P.B. Implementing physical activity programs for patients with cancer in current practice: Patients' experienced barriers and facilitators. J. Cancer Surviv. 2019, 13, 703–712.
7. Rossi, A.; Garber, C.E.; Ortiz, M.; Shankar, V.; Goldberg, G.L.; Nevadunsky, N.S. Feasibility of a physical activity intervention for obese, socioculturally diverse endometrial cancer survivors. Gynecol. Oncol. 2016, 142, 304–310.
8. Stefani, L.; Klika, R.; Mascherini, G.; Mazzoni, F.; Lunghi, A.; Petri, C.; Petreni, P.; Di Costano, F.; Maffulli, N.; Galanti, G. Effects of a home-based exercise rehabilitation program for cancer survivors. J. Sports Med. Phys. Fitness 2019, 59, 846–852.
9. Scherrenberg, M.; Wilhelm, M.; Hansen, D.; Völler, H.; Cornelissen, V.; Frederix, I.; Kemps, H.; Dendale, P. The future is now: A call for action for cardiac telerehabilitation in the COVID-19 pandemic from the secondary prevention and rehabilitation section of the European Association of Preventive Cardiology. Eur. J. Prev. Cardiol. 2020, 27, 1–21.
10. McNeil, J.; Brenner, D.R.; Stone, C.R.; O'Reilly, R.; Ruan, Y.; Vallance, J.K.; Courneya, K.S.; Thorpe, K.E.; Klein, D.J.; Friedenreich, C.M. Activity Tracker to Prescribe Various Exercise Intensities in Breast Cancer Survivors. Med. Sci. Sports Exerc. 2019, 51, 930–940.
11. Alibhai, S.M.H.; Santa Mina, D.; Ritvo, P.; Tomlinson, G.; Sabiston, C.; Krahn, M.; Durbano, S.; Matthew, A.; Warde, P.; O'Neill, M.; et al. A phase II randomized controlled trial of three exercise delivery methods in men with prostate cancer on androgen deprivation therapy. BMC Cancer 2019, 19, 2.
12. Gehring, K.; Kloek, C.J.; Aaronson, N.K.; Janssen, K.W.; Jones, L.W.; Sitskoorn, M.M.; Stuiver, M.M. Feasibility of a home-based exercise intervention with remote guidance for patients with stable grade II and III gliomas: A pilot randomized controlled trial. Clin. Rehabil. 2018, 32, 352–366.
13. Møller, T.; Andersen, C.; Lillelund, C.; Bloomquist, K.; Christensen, K.B.; Ejlertsen, B.; Tuxen, M.; Oturai, P.; Breitenstein, U.; Kolind, C.; et al. Physical deterioration and adaptive recovery in physically inactive breast cancer patients during adjuvant chemotherapy: A randomised controlled trial. Sci. Rep. 2020, 10, 9710.

14. Hvid, T.; Lindegaard, B.; Winding, K.; Iversen, P.; Brasso, K.; Solomon, T.P.; Pedersen, B.K.; Hojman, P. Effect of a 2-year home-based endurance training intervention on physiological function and PSA doubling time in prostate cancer patients. Cancer Causes Control 2016, 27, 165–174.
15. Cornette, T.; Vincent, F.; Mandigout, S.; Antonini, M.T.; Leobon, S.; Labrunie, A.; Venat, L.; Lavau-Denes, S.; Tubiana-Mathieu, N. Effects of home-based exercise training on VO2 in breast cancer patients under adjuvant or neoadjuvant chemotherapy (SAPA): A randomized controlled trial. Eur. J. Phys. Rehabil. Med. 2016, 52, 223–232.
16. Van Waart, H.; Stuiver, M.M.; van Harten, W.H.; Geleijn, E.; Kieffer, J.M.; Buffart, L.M.; de Maaker-Berkhof, M.; Boven, E.; Schrama, J.; Geenen, M.M.; et al. Effect of Low-Intensity Physical Activity and Moderate to High-Intensity Physical Exercise During Adjuvant Chemotherapy on Physical Fitness, Fatigue, and Chemotherapy Completion Rates: Results of the PACES Randomized Clinical Trial. J. Clin. Oncol. 2015, 33, 1918–1927.
17. Husebø, A.M.; Dyrstad, S.M.; Mjaaland, I.; Søreide, J.A.; Bru, E. Effects of scheduled exercise on cancer-related fatigue in women with early breast cancer. Sci. World J. 2014, 15, 1–9.
18. Pinto, B.M.; Papandonatos, G.D.; Goldstein, M.G.; Marcus, B.H.; Farrell, N. Home-based physical activity intervention for colorectal cancer survivors. Psychooncology 2013, 22, 54–64.

Retrieved from https://encyclopedia.pub/entry/history/show/23636