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Physical Activity in Oncology: A Scoping Review

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ABSTRACT

Physical exercise can bring several benefits to cancer patients, including improved quality of life, reduced risk of recurrence and lower mortality rates. The aim of this scoping review is to verify the effectiveness of physical activity in cancer patients, identify barriers and facilitating factors, investigate patient preferences, and identify types and programmes of physical exercise suitable for cancer patients at all stages of the disease. The bibliographic search was carried out on the PubMed database in July 2025. Sixteen articles were included in the review, which showed that physical activity is effective and can be recommended for patients with any type of cancer and at all stages of treatment. The main benefits are a reduction in side effects, decreased fatigue, improved functional status, and a consequent improvement in quality of life. When performed during therapy, it improves the effect of treatment. Recommendations include aerobic exercise, resistance training, or a combination of both. The type of physical activity should depend on the patient's condition, and personalised programmes must take into account individual interests and needs. Among the various preferences, we highlight the flexibility of session times, low costs and the proximity of the training setting to the place of residence. Social benefits, improved physical and mental well-being and a sense of empowerment are all facilitating factors. Obstacles include the side effects of treatment, pain, fatigue, comorbidities, and lack of knowledge about the benefits of physical activity.

Healthcare professionals should encourage patients to exercise and help them identify and overcome obstacles. Adequate education and demonstration of the benefits of physical activity can be the first step in motivating them. The current literature on this subject is limited and focuses mainly on women with breast cancer, but some studies confirm the recommendation for physical exercise in other types of cancer as well. In conclusion, physical activity has been shown to be effective and important in cancer patients at all stages of the disease and for different types of cancer. Research in this area needs to continue, both to investigate aspects that are not yet fully understood and to facilitate the design of personalised programmes.

Keywords: Cancer; Physical Activity; Exercise; Side Effect; Quality of Life

Background

Exercise can bring several benefits to cancer patients including improved quality of life, reduced risk of recurrence, and lower mortality rates. It also helps to control the side effects of therapies, fatigue and pain. The mechanisms that contribute to the effectiveness of exercise are many and not completely understood; among the main actions, exercise is able to act directly on the main control systems involved in the development of neoplastic pathology [1]. In the cancer patient, physical activity and counteracting sedentariness are recommended to promote an early return to normal daily activities, even after surgery and, when conditions permit, during cancer treatments [2,3].

Objectives

To test the effectiveness of physical activity in cancer patients, identify barriers and facilitating factors and investigate patient preferences. To identify types and programmes of exercise suitable for cancer patients at all stages of the disease course. The aim of the review is to provide a basis for designing pragmatic research, the results of which will provide the theoretical foundations to facilitate the creation of personalised pathways based on patient preferences.

Methods

A scoping review was produced for this purpose; the literature search was conducted from 29 to 31 July 2025 on the PubMed database. The key words used were 'cancer', 'physical activity', "exercise",

'side effect', 'quality of life'. Primary experimental and observational studies, reviews and meta-analyses, in English, published within the last 3 years were included in the review; case reports and grey literature were excluded.

Results

We included 16 articles in the review, of which 8 were reviews, 3 RCTs, 2 prospective longitudinal observational, 1 non-randomized trial and 1 qualitative study. Of these, 6 dealt with all types of cancer (of which one, however, dealt predominantly with breast), 4 with breast cancer, 2 with lung, 1 with colorectal, 1 with pancreas and biliary tract and 1 with head and neck.

Discussion

All articles in our review agree on the efficacy of physical activity in cancer patients, which is recommended for patients with any type of cancer and at all stages of treatment [4-6], even in advanced patients undergoing palliative cancer therapy [6] with improved quality of life in all biopsychosocial dimensions [4,5,7-14]. The observational study by Avancini, et al. [7] confirms the feasibility of exercise in patients with metastatic cancer, with a recruitment rate of 81%, only 9 dropouts (20%) and 9 non-serious adverse events during the study (median participation rate 92%, adherence 88%, tolerability 100% and during exercise sessions were recorded) [7]. Exercise can also be carried out during chemotherapy or radiotherapy; although cancer therapy has a negative impact on many aspects of patients' lives, reducing their interest in physical activity, exercise has been shown to reduce side effects [4,15,16] and improve response to treatment [4]. Aerobic exercise mitigates the impact of cancer treatment on physiological functions, helps increase blood flow, activates the sympathetic nervous system, regulates the endocrine system and can improve immune system function by mobilising cytotoxic lymphocytes and NK cells, exerting anti-tumour effects. It reduces levels of lactate, a factor that promotes tumour growth, and a significant reduction in tumour necrosis factor alpha (TNF-α), C-reactive protein (CRP), interleukin-8 (IL-8) and IL-6 has been observed [4,6,10].

It increases endogenous opioid levels, helping to reduce pain and fatigue; 5-hydroxytryptamine and dopamine secreted during physical activity can effectively regulate pleasure factors, thus reduce anxiety and improve quality of life [16]. Physical activity may also have an impact on CTLA-4 (inhibitory immune checkpoint) and provide a better response to immunotherapy [10]. It is therefore recommended to integrate a physical activity programme early in a patient's treatment plan after diagnosis [4]. For cancer patients, regular physical activity brings clear benefits, as it improves daily functioning, aerobic capacity, endurance and muscle mass, enabling them to carry out daily activities without difficulty; it also has a positive impact on mental and psychological health. The positive effects also translate into a reduction in the risk of co-morbidities, improved cardiovascular function and fitness and, consequently, improved well-being and daily function [4,5]. It reduces the risk of cancer recurrence and death. Studies show that physical activity reduces the risk of mortality by 40-50% for breast, colon and prostate cancer, and reduces >50% the risk of recurrence in breast cancer patients [4-5,16]. Several positive effects have also occurred in patients with advanced or metastatic cancer, including increased cardiorespiratory capacity and flexibility, and a decrease in fatigue [7,17]. Physical activity is associated with a significant reduction in Cancer Related Fatigue (CRF) in patients with several cancer types including breast, colorectal, ovarian and prostate, in patients with multiple myeloma [4,6,12,15] and lung cancer [16].

It also has positive effects on anxiety and depression [4,6], however, the review by Mengyn, et al. [10] looking at female breast cancer survivors indicates an effect of physical activity on depression that is not statistically significant [10]. Regarding the type of activity, the benefits of exercise are generally observed with sessions of at least 20 minutes of moderate activity on most days of the week (on average 5 days per week), or at least 150 minutes of exercise per week, including muscle strengthening exercises at least twice a week [4,8]. Specific recommendations include aerobic exercise, resistance training or a combination of both [5,11]. Cancer patients should not be restricted to low-intensity exercise, except for those suffering from nausea and vomiting, and those with Catheter-related Thrombosis (CRT) [4]. The type of physical activity should depend on the individual patient's condition. Individual needs, type of cancer, treatment and medical history should be considered [4-6,8]. Customized exercise programmes should take individual interests and needs into account [13]. Some authors have considered supervised exercise and the availability of a personal trainer who can adapt to each individual's needs to be decisive factors in making patients feel safe and motivated to continue the intervention [6,14], and recommend that supervision should at least take place in the initial period [4,8]. In addition to aerobic and endurance exercises, many studies over the past decade have focused on mind-body activities three such as yoga, Tai Chi Chuan or Qigong, which can have positive effects on quality of life, anxiety and depression [10-11,14].

These mind-body activities can be seen as a gentler form of exercise and be a springboard for aerobic and resistance training at a later stage [11]. Of interest is the study by Mur-Gimeno, et al. [12] who compared water exercise with land-based exercise in women with breast cancer, concluding that water exercise is as effective as traditional land-based training, but could have a more significant effect on behavioural change, especially in maintaining physical activity levels over time. The relaxing environment of water, in combination with the analgesic effect of buoyancy and hydrostatic pressure, could lead to an improvement in emotional and general well-being compared to land-based interventions. Furthermore, immersion in water reduces axial load, thus enabling patients to perform exercises that they might not be able to do outside the pool [12]. Voland, et al. [13] pre-post longitudinal study of young adults with cancer of all types revealed a high

acceptability and feasibility of online exercise programmes, which can be a promising addition to existing exercise opportunities. They are an effective way to increase levels of physical activity in young adults, with a focus on supervised online modules and app-based programmes [13]. Among the various preferences that emerged were the flexibility of session times, low costs and the proximity of the exercise setting to the place of residence [4]. Social benefits, improved physical and mental well-being and a sense of empowerment all serve as facilitating factors for physical activity [11].

There is no absolute preference for exercising in a group rather than alone; in some cases, patients preferred to start in a group and then later continue alone [8], in others they enjoyed the group format as they felt understood and comfortable surrounded by other people with the same illness, being able to share information [11,14]. The social support from exercising in a group, or with a partner, can provide accountability and increase activity levels. However, coordinating exercise in a group setting may be more difficult and require more effort than individual training [8,9]. Taking into account preferences and whether exercise is enjoyable is important to ensure long-term adherence to programmes [12]. Preferences may change over time, so it may be appropriate to re-evaluate the intervention periodically to further adapt it [8]. Barriers to physical activity faced by cancer patients are a very complex issue, related to several variables, including the type and extent of the cancer, the presence or absence of metastases. Side effects of treatments are to be considered as one of the main barriers, having a great impact on motivation [4,18]. Patients' attitudes towards their illness and their coping strategies play a key role, and particularly the concern that physical activity may have a negative impact on their illness [4], factors partly related to the lack of knowledge of the benefits of physical activity [4,18]. Pain has been reported to be an obstacle in its own right, closely related to other obstacles such as anxiety, fear and avoidant behaviour; it is synonymous with "threat" as pain experiences are closely intertwined with the cancer experience [11].

It is important to help patients make sense of their pain and also to inform them that physical activity itself can be helpful in reducing pain [11,18]. Similarly, fatigue can also be considered a barrier, but evidence shows that exercise is the most effective non-pharmacological intervention in decreasing CRF [18]. Comorbidities are identified as a barrier, representing a significant negative predictor of physical activity levels in cancer patients. On the other hand, physical activity reduces the risk of developing comorbidities, heart disease. However, as patients with comorbidities have difficulty being physically active, advice and activities need to be tailored to each patient's needs [18]. Income could also be a moderating factor, but it is an understudied variable [9]. Health professionals should encourage patients to exercise, and spend time with patients to point out obstacles and try to find a solution to overcome or reduce them. Appropriate education and demonstration of the benefits of physical activity may be the first step to motivate them [18]. One of the objectives is to help patients to become more independent in their physical activity behaviour by providing them with the necessary education to feel more capable and autonomous [8]. Finally, let us not forget that the health care professional, in order to be competent in this field and to be able to foster the empowerment of cancer patients in exercising, needs a targeted training course himself/herself [18].

Other Considerations

The current literature on this subject is limited and focuses mainly on women with breast cancer. However, some studies found confirm the indication for exercise in other types of cancer as well. The study by De Lazzari, et al. [15] evaluated the feasibility and effects of exercise in patients with aPBC (pancreatic and biliary tract cancer) undergoing systemic palliative treatment, concluding that exercise is safe and feasible in patients with aPBC undergoing palliative therapy, and can positively influence physical function, improve well-being and quality of life, and decrease fatigue [15]. In lung cancer patients, physical activity is also a non-pharmacological approach that can induce improvement and is an adjunct to chemotherapy and surgical treatment [16,17]. From a clinical point of view, the effects of exercise in lung cancer patients are improved fatigue and lung function and better sleep quality, resulting in improved quality of life [16,17]. In operable lung cancer patients, exercise before surgery reduces the risk of postoperative lung complications and improves rehabilitation. In patients with inoperable lung cancer, exercise helps to maintain lung function and muscle strength. Studies report that all levels of exercise intensity are well tolerated by lung cancer patients and the frequency most often applied in the different studies is two to three times per week, with a duration per session ranging from 5 to 120 minutes [16]. Finally, the study by Doughty, et al. [18] conducted in head and neck cancer patients concludes that current evidence supports the safety of physical activity for these patients at all stages of treatment [18].

However, there are specific barriers or particular concerns for some of these types of cancer; for the colon it may be fear of ostomy detachment, irregular bowel activity, incontinence or reduced mobility [14]; for the head-neck, dryness of the mouth or throat resulting from treatment or fear of choking during physical activity [18].

Conclusions

Physical activity has been shown to be effective and important in cancer patients at all stages of the disease course and for different types of cancer. Research in this area needs to continue, both to investigate aspects that are not yet fully understood and to facilitate the design of personalised pathways.

Future Perspectives

This review has provided the theoretical basis for the project of the Oncology Department - ASL AL Alessandria - Piedmont- Italy "AFiOn: Attività Fisica in Oncologia", which envisages conducting

qualitative-quantitative research aimed at exploring in depth the perceptions, experiences and desires related to the practice of physical activity in a specific cohort of patients, highlighting their attitudes, desires and possible barriers. Subsequently, on the basis of the results, structuring specific pathways aimed at helping cancer patients regain psychophysical well-being, reduce stress, improve mood, and promote physical and mental wellbeing. The project is currently being evaluated by the Interagency Ethics Committee.

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