

Cancer and Physical Activity

Gomaa M. Othman

PhD. Sports Science and Physiology, Zagazig University

Corresponding Author: Gomaa M. Othman, PhD. Sports Science and Physiology, Zagazig University

Received date: January 09, 2020; **Accepted date:** January 17, 2020; **Published date:** January 23, 2020

Citation: Gomaa M.Othman, (2020) Cancer and Physical Activity. J. Orthopaedics and Surgical Sports Medicine, 3(1);

Doi:10.31579/2641-0427/019

Copyright: © 2020 Gomaa M. Othman, This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

What is known about the relationship between physical activity and cancer risk?

There is substantial evidence that higher levels of physical activity are linked to lower risks of several cancers [2]

Colon Cancer

Colon cancer is one of the most extensively studied cancers in relation to physical activity [3]. A 2009 meta-analysis of 52 epidemiologic studies that examined the association between physical activity and colon cancer risk found that the most physically active individuals had a 24% lower risk of colon cancer than those who were the least physically active [4]. A pooled analysis of data on leisure-time physical activity (activities done at an individual's discretion generally to improve or maintain fitness or health) from 12 prospective U.S. and European cohort studies reported a risk reduction of 16%, when comparing individuals who were most active to those who were least active [5]. Incidence of both distal colon and proximal colon cancers is lower in people who are more physically active than in those who are less physically active [6, 7]. Physical activity is also associated with a decreased risk of colon adenomas (polyps), a type of colon polyp that may develop into colon cancer [8]. However, it is less clear whether physical activity is associated with lower risks that polyps that have been removed will come back [9-11].

Breast Cancer

Many studies show that physically active women have a lower risk of breast cancer than inactive women; in a 2013 meta-analysis of 31 prospective studies, the average breast cancer risk reduction associated with physical activity was 12% [12]. Physical activity has been associated with a reduced risk of breast cancer in both premenopausal and postmenopausal women; however, the evidence for an association is stronger for postmenopausal breast cancer [12-15]. Women who increase their physical activity after menopause may also have a lower risk of breast cancer than women who do not [13, 15].

Endometrial Cancer

Many studies have examined the relationship between physical activity and the risk of endometrial cancer (cancer of the lining of the uterus). In a meta-analysis of 33 studies, the average endometrial cancer risk reduction associated with high versus low physical activity was 20% [16]. There is some evidence that the association between physical activity and endometrial cancer risk may reflect the effect of physical activity on obesity, a known risk factor for endometrial cancer [16-18].

For a number of other cancers, there is more limited evidence of a relationship with physical activity. In a study of over 1 million individuals, leisure-time physical activity was linked to reduced risks of esophageal adenocarcinoma, liver cancer, gastric cardiac cancer (a type of stomach cancer), kidney cancer, myeloid leukemia, myeloma, and cancers of the head and neck, rectum, and bladder [5]. These results are generally corroborated by large cohort studies [19] or meta-analyses [20-22].

Nearly all of the evidence linking physical activity to cancer risk comes from observational studies, in which individuals report on their physical activity and are followed for years for diagnoses of cancer. Data from observational studies can give researchers clues about the relationship between physical activity and cancer risk, but such studies cannot definitively establish that being physically inactive causes cancer (or that being physically active protects against cancer). That is because people who are not physically active may differ from active people in ways other than their level of physical activity. These other differences, rather than the differences in physical activity, could explain their different cancer risk. For example, if someone does not feel well, they may not exercise much, and sometimes people do not feel well because they have undiagnosed cancer.

How might physical activity be linked to reduced risks of cancer?

Exercise has a number of biological effects on the body, some of which have been proposed to explain associations with specific cancers, including:

1. Lowering the levels of hormones, such as insulin and estrogen, and of certain growth factors that have been associated with cancer development and progression [23] [*breast, colon*]
2. Helping to prevent obesity and decreasing the harmful effects of obesity, particularly the development of insulin resistance (failure of the body's cells to respond to insulin)
3. Reducing inflammation
4. Improving immune system function
5. Altering the metabolism of bile acids, resulting in decreased exposure of the gastrointestinal tract to these suspected carcinogens [24, 25] [*colon*]
6. Reducing the amount of time it takes for food to travel through the digestive system, which decreases gastrointestinal tract exposure to possible carcinogens [*colon*]

Is being sedentary linked to health risks?

Yes. Sedentary behavior, such as prolonged periods of television viewing, sitting, and lying down, is a risk factor for developing chronic conditions, including cancer, cardiovascular disease, and type 2 diabetes, and for premature death [26, 27]. In some studies, the association of sedentary behavior with these outcomes is independent of physical activity—that is, the increased risks of disease associated with being sedentary are not lessened by physical activity. However, in one large meta-analysis [28] an increase in cancer mortality was seen only in those sedentary people with the least physical activity.

How much physical activity is recommended for general health benefits?

The U.S. Department of Health and Human Services 2008 Physical Activity Guidelines for Americans recommends that, for substantial health benefits, adults engage in at least 150 minutes (2 hours and 30 minutes) of moderate-intensity aerobic physical activity, 75 minutes (1 hour and 15 minutes) of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity activity, every week. Aerobic physical activity should be performed in episodes of at least 10 minutes, preferably spread throughout the week. Examples of moderate-intensity and vigorous-intensity physical activities can be found on CDC's Physical Activity website.

For children and adolescents, the guidelines recommend at least 60 minutes (1 hour) of physical activity daily. Most of the 60 or more minutes a day should be either moderate- or vigorous-intensity aerobic physical activity, and should include vigorous-intensity physical activity at least 3 days a week. As part of their 60 or more minutes of daily physical activity, children and adolescents should include muscle-strengthening physical activity on at least 3 days of the week and bone-strengthening physical activity on at least 3 days of the week.

Is physical activity beneficial for cancer survivors?

Research indicates that physical activity may have beneficial effects for several aspects of cancer survivorship—specifically, weight gain, quality of life cancer recurrence or progression, and prognosis (likelihood of survival) [29, 30]. Most of the evidence for the potential benefits of physical activity in cancer survivors comes from people diagnosed with breast, prostate, or colorectal cancer [26].

Weight gain.

Both reduced physical activity and the side effects of cancer treatment can contribute to weight gain after a cancer diagnosis. In a cohort study (a type of epidemiologic study), weight gain after breast cancer diagnosis was linked to worse survival [31]. In a 2012 meta-analysis of randomized controlled clinical trials examining physical activity in cancer survivors, physical activity was found to reduce both body mass index and body weight [32].

Quality of life.

A 2012 Cochrane Collaboration systematic review of controlled clinical trials of exercise interventions in cancer survivors indicated that physical activity may have beneficial effects on overall health-related quality of life and on specific quality-of-life issues, including body image/self-esteem, emotional well-being, sexuality, sleep disturbance, social functioning, anxiety, fatigue,

and pain [33]. In a 2012 meta-analysis of randomized controlled trials examining physical activity in cancer survivors, physical activity was found to reduce fatigue and depression and to improve physical functioning, social functioning, and mental health [32].

Recurrence, progression, and survival.

Being physically active after a cancer diagnosis is linked to better cancer-specific outcomes for several cancer types [34].

Breast cancer

Consistent evidence from epidemiologic studies links physical activity after diagnosis with better breast cancer outcomes [35, 36]. For example, a large cohort study found that women who exercised moderately (the equivalent of walking 3 to 5 hours per week at an average pace) after a breast cancer diagnosis had approximately 40% to 50% lower risks of breast cancer recurrence, death from breast cancer, and death from any cause compared with more sedentary women [37]. The potential physical activity benefit with regard to death from breast cancer was most apparent in women with hormone receptor-positive tumors [37].

Another prospective cohort study found that women who had breast cancer and who engaged in recreational physical activity roughly equivalent to walking at an average pace of 2 to 2.9 mph for 1 hour per week had a 35% to 49% lower risk of death from breast cancer compared with women who engaged in less physical activity [38].

Colorectal cancer

Evidence from multiple epidemiologic studies suggests that physical activity after a colorectal cancer diagnosis is associated with reduced risks of dying from colorectal cancer [39]. In a large prospective cohort of patients with colorectal cancer, those who engaged in leisure-time physical activity had a 31% lower risk of death than those who did not, independent of their leisure-time physical activity before diagnosis [40].

Prostate cancer: Limited evidence from a few epidemiologic studies has suggested a possible link between physical activity and better outcomes among men diagnosed with prostate cancer. In one study, men with nonmetastatic prostate cancer who engaged in vigorous activity for at least 3 hours per week had a 61% lower risk of death from prostate cancer compared with men who engaged in vigorous activity for less than 1 hour per week [41]. Another study of men with localized prostate cancer found that higher levels of physical activity were associated with reduced overall and prostate cancer-specific mortality [42]. Findings from epidemiologic studies cannot completely exclude reverse causation as a possible explanation of the link between physical activity and better cancer outcomes. That is, people who feel good are more likely to exercise and be physically active than people who do not feel good.

References

1. Lauby-Secretan B., Scoccianti C., Loomis D., et al. (2016) Body Fatness and Cancer--Viewpoint of the

- IARC Working Group. *New England Journal of Medicine* 375(8):794-798.
2. World Cancer Research Fund/American Institute for Cancer Research. (2007) *Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective* Exit Disclaimer. Washington DC: AICR.
 3. Kruk J., Czerniak U., (2013) Physical activity and its relation to cancer risk: updating the evidence. *Asian Pacific Journal of Cancer Prevention* 14(7):3993-4003.
 4. Wolin KY, Yan Y, Colditz GA, Lee IM, (2009) Physical activity and colon cancer prevention: a meta-analysis. *British Journal of Cancer* 100(4):611-616.
 5. Moore SC, Lee IM, Weiderpass E, et al. (2016) Association of leisure-time physical activity with risk of 26 types of cancer in 1.44 million adults. *JAMA Internal Medicine* 176(6):816-825.
 6. Boyle T, Keegel T, Bull F, Heyworth J, Fritschi L, (2012) Physical activity and risks of proximal and distal colon cancers: a systematic review and meta-analysis. *Journal of the National Cancer Institute* 104(20):1548-1561.
 7. Robsahm TE, Aagnes B, Hjartaker A, et al (2013) Body mass index, physical activity, and colorectal cancer by anatomical subsites: a systematic review and meta-analysis of cohort studies. *European Journal of Cancer Prevention* 22(6):492-505.
 8. Wolin KY, Yan Y, Colditz GA, (2011) Physical activity and risk of colon adenoma: a meta-analysis. *British Journal of Cancer* 104(5):882-885.
 9. Slattery ML. (2004) Physical activity and colorectal cancer. *Sports Medicine* 34(4):239-252.
 10. Wolin KY, Tuchman H, (2011) Physical activity and gastrointestinal cancer prevention. *Recent Results in Cancer Research* 186:73-100.
 11. Colbert LH, Lanza E, Ballard-Barbash R, et al (2002) Adenomatous polyp recurrence and physical activity in the Polyp Prevention Trial (United States). *Cancer Causes and Control* 13(5):445-453.
 12. Wu Y, Zhang D, Kang S. (2013) Physical activity and risk of breast cancer: a meta-analysis of prospective studies. *Breast Cancer Research and Treatment* 137(3):869-882.
 13. Eliassen AH, Hankinson SE, Rosner B, Holmes MD, Willett WC. (2010) Physical activity and risk of breast cancer among postmenopausal women. *Archives of Internal Medicine* 170(19):1758-1764.
 14. Hildebrand JS, Gapstur SM, Campbell PT, Gaudet MM, Patel AV (2013) Recreational physical activity and leisure-time sitting in relation to postmenopausal breast cancer risk. *Cancer Epidemiology, Biomarkers & Prevention* 22(10):1906-1912.
 15. Fournier A, Dos Santos G, Guillas G, et al (2014) recent recreational physical activity and breast cancer risk in postmenopausal women in the E3N cohort. *Cancer Epidemiology, Biomarkers & Prevention* 23(9):1893-1902.
 16. Schmid D, Behrens G, Keimling M, et al (2015) a systematic review and meta-analysis of physical activity and endometrial cancer risk. *European Journal of Epidemiology* 30(5):397-412.
 17. Du M, Kraft P, Eliassen AH, et al (2014) Physical activity and risk of endometrial adenocarcinoma in the Nurses' Health Study. *International Journal of Cancer* 134(11):2707-2716.
 18. Friedenreich C, Cust A, Lahmann PH, et al (2007) Physical activity and risk of endometrial cancer: The European prospective investigation into cancer and nutrition. *International Journal of Cancer* 121(2):347-355.
 19. Behrens G, Matthews CE, Moore SC, et al (2013) the association between frequency of vigorous physical activity and hepatobiliary cancers in the NIH-AARP Diet and Health Study. *European Journal of Epidemiology* 28(1):55-66.
 20. Behrens G, Jochem C, Keimling M, et al (2014) the association between physical activity and gastroesophageal cancer: systematic review and meta-analysis. *European Journal of Epidemiology* 29(3):151-170.
 21. Behrens G, Leitzmann MF. (2013) the association between physical activity and renal cancer: systematic review and meta-analysis. *British Journal of Cancer* 108(4):798-811.
 22. Keimling M, Behrens G, Schmid D, Jochem C, Leitzmann MF (2014) The association between physical activity and bladder cancer: systematic review and meta-analysis. *British Journal of Cancer* 110(7):1862-1870.
 23. Winzer BM, Whiteman DC, Reeves MM, Paratz JD (2011) Physical activity and cancer prevention: a systematic review of clinical trials. *Cancer Causes and Control* 22(6):811-826.
 24. Wertheim BC, Martinez ME, Ashbeck EL, et al (2009) Physical activity as a determinant of fecal bile acid levels. *Cancer Epidemiology, Biomarkers & Prevention* 18(5):1591-1598.
 25. Bernstein H, Bernstein C, Payne CM, Dvorakova K, Garewal H. (2005) Bile acids as carcinogens in human gastrointestinal cancers. *Mutation Research* 589(1):47-65.
 26. Schmid D, Leitzmann MF (2014) Association between physical activity and mortality among breast cancer and colorectal cancer survivors: a systematic review and meta-analysis. *Annals of Oncology* 25(7):1293-311.
 27. Biswas A, Oh PI, Faulkner GE, et al. (2015) sedentary time and its association with risk for disease incidence, mortality, and hospitalization in adults: a systematic review and meta-analysis. *Annals of Internal Medicine* 162(2):123-132.
 28. Ekelund U, Steene-Johannessen J, Brown WJ, et al. (2016) Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality? A harmonised meta-analysis of data from more than 1 million men and women. *Lancet* 388(10051):1302-1310.

29. Speck RM, Courneya KS, Masse LC, Duval S, Schmitz KH. (2010) an update of controlled physical activity trials in cancer survivors: a systematic review and meta-analysis. *Journal of Cancer Survivorship* 4(2):87-100.
30. Rock CL, Doyle C, Demark-Wahnefried W, et al. (2012) Nutrition and physical activity guidelines for cancer survivors. *CA: A Cancer Journal for Clinicians* 62(4):243-274.
31. Bradshaw PT, Ibrahim JG, Stevens J, et al. (2012) Post diagnosis change in bodyweight and survival after breast cancer diagnosis. *Epidemiology* 23(2):320-327.
32. Fong DY, Ho JW, Hui BP, et al. (2012) Physical activity for cancer survivors: meta-analysis of randomised controlled trials. *British Medical Journal* 344:e70.
33. Mishra SI, Scherer RW, Geigle PM, et al (2012) Exercise interventions on health-related quality of life for cancer survivors. *The Cochrane Database of Systematic Reviews* 8:Cd007566.
34. Arem H, Moore SC, Park Y, et al (2014) Physical activity and cancer-specific mortality in the NIH-AARP Diet and Health Study cohort. *International Journal of Cancer* 135(2):423-431.
35. Chlebowski RT (2013) Nutrition and physical activity influence on breast cancer incidence and outcome. *Breast* 22 Suppl 2:S30-37.
36. Ibrahim EM, Al-Homaidh A. Physical activity and survival after breast cancer diagnosis: meta-analysis of published studies. *Medical Oncology* 2011; 28(3):753-765.
37. Holmes MD, Chen WY, Feskanich D, Kroenke CH, Colditz GA. (2005) Physical activity and survival after breast cancer diagnosis. *JAMA* 293(20):2479-2486.
38. Holick CN, Newcomb PA, Trentham-Dietz A, et al. (2008) Physical activity and survival after diagnosis of invasive breast cancer. *Cancer Epidemiology, Biomarkers & Prevention* 17(2):379-386.
39. Ballard-Barbash R, Friedenreich CM, Courneya KS, et al (2012) Physical activity, biomarkers, and disease outcomes in cancer survivors: a systematic review. *Journal of the National Cancer Institute* 104(11):815-840.
40. Arem H, Pfeiffer RM, Engels EA, et al (2015) Pre- and postdiagnosis physical activity, television viewing, and mortality among patients with colorectal cancer in the National Institutes of Health-AARP Diet and Health Study. *Journal of Clinical Oncology* 33(2):180-188.
41. Kenfield SA, Stampfer MJ, Giovannucci E, Chan JM (2011) Physical activity and survival after prostate cancer diagnosis in the health professional's follow-up study. *Journal of Clinical Oncology* 29(6):726-732.
42. Bonn SE, Sjölander A, Lagerros YT, et al (2015) Physical activity and survival among men diagnosed with prostate cancer. *Cancer Epidemiology, Biomarkers & Prevention* 24(1):57-64.



This work is licensed under Creative Commons Attribution 4.0 License

To Submit Your Article Click Here: [Submit Article](#)

DOI:10.31579/2641-0427/019

Ready to submit your research? Choose Auctores and benefit from:

- ❖ fast, convenient online submission
- ❖ rigorous peer review by experienced research in your field
- ❖ rapid publication on acceptance
- ❖ authors retain copyrights
- ❖ unique DOI for all articles
- ❖ immediate, unrestricted online access

At Auctores, research is always in progress.

Learn more <https://www.auctoresonline.org/journals/orthopaedics-and-surgical-sports-medicine>