

SPORT, PHYSICAL ACTIVITY AND BREAST CANCER

PATRIZIA BELFIORE, DAVIDE DI PALMA, ANTONIO ASCIONE

Department of Sport Sciences and Wellness, Parthenope University, Naples, Italy

ABSTRACT

Introduction. Breast cancer is a big problem in Italy and in the world. Many women are affected. It absorbs many economic resources because it tends to develop complications. Sport and physical activity have positive effects on the pathology and its complications.

Methods: Number of cases and costs were compared in the presence and absence of physical activity.

Results: Our results support the idea that physical activity protects against breast cancer.

Conclusion: This study demonstrates the importance of physical activity and sport in the management of breast cancer and its complications.

Keywords: Sport, Physical Activity, Breast cancer.

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Introduction

Breast cancer is a potentially serious disease if it is not detected and treated early. It is due to the uncontrolled multiplication of some cells of the mammary gland that are transformed into malignant cells.

This means that they have the ability to detach themselves from the tissue that generated them to invade the surrounding tissues and also the other organs of the body⁽¹⁻³⁾.

In theory, tumors can be formed from all types of breast tissue, but the most frequent are the glandular cells or those that form the wall of the ducts⁽⁴⁻⁶⁾.

The level of breast cancer expenditure in Italy in 2015 supported by the National Health System amounted to almost 300 million euro, with an average cost of about € 6,000 / patient. Of these, about 34.6% were for hospitalizations, 17.4% for drug use and 48% for specialist services^(7,8).

The evaluation of breast cancer (BC) screening is the subject of a controversial debate regarding its benefit and harms^(9,10).

Breast cancer is classified into five stages:

- Stage 0: it is also called in situ carcinoma.
- Stage I: it is a cancer in the initial phase, with less than 2 cm of diameter and without involvement of the lymph nodes.
- Stage II: it is a cancer in the initial phase of less than 2 cm in diameter but has already involved the lymph nodes under the armpit.
- Stage III: it is a locally advanced tumor of variable size.
- Stage IV: it is an already metastasized cancer that has involved other organs outside the breast.

Physical Activity and sport in the management of breast cancer

Breast cancer is associated with multiple risk factors that are commonly divided into non-changeable and changeable, such as lack of physical activity⁽¹¹⁾.

Approximately 25% of global cancer cases are due to weight and a sedentary lifestyle.

The prevalence of inactivity in the general population is about 40% worldwide, and the attrib-

utable fraction of the appropriate population for breast cancer associated with physical inactivity was approximately 10%⁽¹²⁾.

Physical activity and sport are associated with a reduced risk of breast cancer, a reduced risk of relapse and better survival. Sport reduces postoperative side effects and improves quality of life (Table 1). Genetic tests for the research of BRCA1 and 2 genes, responsible for some hereditary forms of breast cancer, are useful prevention tools in particular situations.

Cancer complications	Benefits of sport
Fatigue	Decrease of fatigue and increase in energy
Ache	Decreased pain
Little thoracic flexibility / oppression	Greater chest flexibility
Muscle weakness	Improvement of muscle strength
Anxiety / Depression	Decrease in anxiety / depression
Increase or weight loss	Maintain or reduce body fat
Lymphedema	No deterioration

Table 1: Cancer complications and benefits of sport.

At any age, women who regularly perform sport or physical activity would have a 15-20% relative risk reduction of developing this tumor. The effect would appear to be greater in the postmenopausal period, with a relative risk reduction of 6% for each hour / week of sport performed, provided that physical exercise is prolonged over time^(13,14).

As for relapses, sport would reduce the risk, but not proportionally to the amount of physical activity performed.

Sport improves cardio-respiratory function by helping to regain the ability to perform the usual activities often compromised by treatments⁽¹⁵⁾.

It is also beneficial for overweight and for cardiovascular health, and even after breast cancer, reduces the risk of recurrence. It is estimated that one in eight women will develop breast cancer during her lifetime. Thanks to medical progress, most can be cured. Studies have shown that physical activity initiated after breast cancer reduces the risk of recurrence by 25% (in particular by reducing overweight), decreases mortality by 30% and improves quality of life by considerably reducing fatigue⁽¹⁶⁻¹⁸⁾.

Methods and data

The study conducted is based on the analysis of data evoked by scientific texts and articles after a process of systematic review of the literature on pubmed. Following this, an economic analysis has been set up. Two scenarios were simulated: the presence and absence of the physical activity/sport program. The difference between costs sustained in both scenarios represents the potential savings.

Data input

Reference populations

The reference population is that of women affected by the disease in Italy in 2015, about 48,000.

Costs data

A woman suffering from breast cancer costs the health system about € 15,500,00 in the two and a half years after the intervention, more precisely the annual patient cost is € 6,237, which includes direct costs (drugs, hospitalizations and benefits specialist).

Specifically € 1,081 of drugs, € 2,158 of hospitalizations and € 2,998 of specialized services.

Results

Table 2 lists the costs for breast cancer management in the presence and absence of physical activity.

Hospitalizations	without physical activity	104,619,840	105,655,680	106,691,520	107,727,360
	With physical activity	784,648,800	79,241,760	80,018,640	80,795,520
Medications	without physical activity	52,406,880	52,925,760	53,444,640	149,660,160
	With physical activity	39,305,160	39,694,320	40,083,480	40,472,640
Specialized services	without physical activity	145,343,040	146,782,080	53,444,640	149,660,160
	With physical activity	109,007,280	110,086,560	111,165,840	112,245,120
TOTAL					299,376,000

Table 2: Direct costs in euro for the management of breast cancer in the absence and presence of physical activity.

Table 3 shows the savings that can be achieved over the years.

Hospitalizations	0	26,154,960	26,413,920	26,672,880	26,931,840
Medications	0	13,101,720	13,231,440	13,361,160	28,242,240
Specialized services	0	36,335,760	36,695,520	53,444,640	37,415,040
TOTALE	0	75,592,440	76,340,880	93,478,680	92,589,120

Table 3: Expected savings in 5-year.

Conclusion

Breast cancer is the cause of greater mortality in women, burdened by complications and relapses that affect the quality of life of patients. It has a high health cost, so there is a need for adequate prevention and promotion of health and proper lifestyles also as post-operative tumor therapy⁽¹⁹⁻²³⁾.

Our work investigated how adequate physical activity can reduce the risk of breast cancer recurrence and the result was 25%. With this data we have succeeded in creating a model that quantifies the expected savings.

Our results support the idea that physical activity protects against breast cancer. Activity during both leisure time and work reduced the overall risk. There was a significant inverse dose-response relation between leisure-time activity and the risk of breast cancer⁽²⁴⁾. The effect was evident in women doing sports and repeated assessment is the preventive effect of physical activity⁽²⁵⁾.

This study provides additional support for a beneficial relation between physical activity after a breast cancer diagnosis and survival. Given the consistencies already evident in the literature, findings from ongoing prospective cohort studies and randomized control trials in breast cancer survivors will be important in providing evidence on how to improve longevity after a breast cancer diagnosis.

References

- 1) Paci E. Euroscreen Working Group. Summary of the evidence of breast cancer service screening outcomes in Europe and first estimate of the benefit and harm balance sheet. *J Med Screen* 2012;19 Suppl 1: 5-13.
- 2) Biller-Andorno N, Jüni P. Abolishing mammography screening programmes? A view from the Swiss Medical Board. *N Engl J Med* 2014; 370: 1965-7.
- 3) Hoyle M, Anderson R. Whose costs and benefits? Why economic evaluations should simulate both prevalent and all future incident patient cohorts. *Med Decis Making* 2010; 30: 426-37.
- 4) Lee S, Zelen M. A stochastic model for predicting the mortality of breast cancer. *J Natl Cancer Inst Monogr* 2006; 36: 79-86.
- 5) Rue M, Vilapriño E, Lee S, Martínez-Alonso M, Carles MD, Marcos-Gragera R, Pla R, Espinas JA. Effectiveness of early detection on breast cancer mortality reduction in Catalonia (Spain). *BMC Cancer* 2009; 9: 326-35.
- 6) Arrospeide A, Soto-Gordoa M, Acaiturri T, Lopez-Vivanco G, Abecia LC, Mar J. Coste del tratamiento del cancer de mama por estadio clínico en el País Vasco. *Rev Esp Salud Pública* 2015; 89: 1-5.
- 7) Del Turco MR, Ponti A, Bick U, Biganzoli L, Cserni G, Cutuli B, Decker T, Dietel M, Gentilini O, et al. Quality indicators in breast cancer care. *Eur J Cancer* 2010; 46 :2344-56.
- 8) Canadian Partnership Against Cancer. Report from the Evaluation Indicators Working Group: Guidelines for Monitoring Breast Cancer Screening Programme Performance. 3rd ed. Toronto: Canadian Partnership Against Cancer; 2013.
- 9) Carles M, Vilapriño E, Cots F, Gregori A, Pla R, Román R, Sala M, Macià F, Castells X, Rue M. Cost-effectiveness of early detection of breast cancer in Catalonia (Spain). *BMC Cancer*. 2011; 11: 192-203.
- 10) Baeten SA, Baltussen RM, Uyl-de Groot CA, Bridges JF, Niessen LW. Reducing disparities in breast cancer survival—the effect of large-scale screening of the uninsured. *Breast J* 2011; 17: 548-9.
- 11) Physical activity and breast cancer risk: impact of timing, type and dose of activity and population subgroup effects - *Br J Sports Med*. 2008 Aug;42(8): 636-47. Epub 2008 May 16
- 12) Campbell A, Mutrie N, White F, et al. A pilot study of a supervised group exercise program as a rehabilitation treatment for women with breast cancer receiving adjuvant treatment. *Eur J Oncol Nurs* 2005; 9: 56-63.
- 13) Crowley SA. The effect of a structured exercise program on fatigue, strength, endurance, physical self-efficacy, and functional wellness in women with early stage breast cancer. Ann Arbor, MI: University of Michigan; 2003. p. 127.
- 14) Fairey AS, Courneya KS, Field CJ, et al. Effects of exercise training on fasting insulin, insulin resistance, insulin-like growth factors, and insulin-like growth factor binding proteins in postmenopausal breast cancer survivors: a randomized controlled trial. *Cancer Epidemiol Biomarkers Prev* 2003; 12: 721-7
- 15) Schmitz KH, Ahmed RL, Hannan PJ, et al. Safety and efficacy of weight training in recent breast cancer survivors to alter body composition, insulin and insulin-like growth factor axis proteins. *Cancer Epidemiol Biomarkers Prev* 2005; 14: 1672-80.
- 16) Liguori G, Belfiore P, D'Amora M, Liguori R e Plebani M. The Principles of Health Technology Assessment in Laboratory Medicine. *ClinChem Lab Med* 2017 Jan 1; 55(1): 32-37.
- 17) Gallè F, Di Onofrio V, Romano Spica V, Mastronuzzi R, Russo Krauss P, Belfiore P, Buono P, Liguori G. Improving physical fitness and health status perception in community-dwelling older adults through a structured program for physical activity promotion in the city of Naples, Italy: A randomized controlled trial. *GeriatrGerontolInt*. 2017 Oct; 17(10): 1421-1428.
- 18) Orio F, Tafuri D, Ascione A, Marciano F, Savastano S, Colarieti G, Orio M, Colao A, Palomba S, Muscogiuri G. Lifestyle changes in the management of adulthood and childhood obesity. *Minerva Endocrinologica* 2016;

- vol. 41, p. 509-515.
- 19) Di Palma D, Ascione A, Peluso Cassese F. Management of sports activity and disability in Italy. *Sport Science* 2017; 10 Suppl 1: 18-22.
 - 20) Belfiore P, Di Palma D, Ascione A. Adapted Physical Activity (Apa) For The Tutelage Of Patients With Type Ii Diabetes. *Acta Medica Mediterranea* 2018; 34: 1257. DOI: 10.19193/0393-6384_2018_5_193.
 - 21) Di Palma D, Ascione A, Belfiore P. Experimental Approach Of Water Polo Training To Improve Psycho-Physical. *Acta Medica Mediterranea* 2018; 34: 1253. DOI: 10.19193/0393-6384_2018_5_192.
 - 22) Ascione A, Belfiore P, Di Palma D. Sports Program To Promote The Wellbeing Of People With Disabilities. *Acta Medica Mediterranea* 2018; 34: 1261. DOI: 10.19193/0393-6384_2018_5_194.
 - 23) Belfiore P, Di Palma D, Gallé F, Di Onofrio V, Scaletti A, Liguori G. L'Esercizio Fisico Adattato nel management del paziente con diabete di tipo 2: una Budget Impact Analysis. *Ig. Sanità Pubbl.* 2016; 72: 32-331
 - 24) Di Palma D, Tafuri D. Special needs and inclusion in sport management: a specific literature review. *Sport Science* 2016; 9(2), 24-31
 - 25) Belfiore P, Miele A, Gallé F e Liguori G. Adapted physical exercise and stroke: a systematic review. *J Sports Med Phys Fitness. Minerva Medica* 2018 DOI doi: 10.23736/S0022-4707.17.07749-0

Corresponding author

DAVIDE DI PALMA

Parthenope University (Naples, Italy)

Email: davide.dipalma@uniparthenope.it

(Italy)