

Health status, lifestyle habits, and perceived social support in long-term cancer survivors: a cross-sectional study

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Abstract

Background: The purpose of this study was to compare health status, lifestyle habits, and perceived social support between cancer survivors and people who have never had cancer.

Methods: Descriptive, cross-sectional multicenter study nested in phases II and III of the cluster randomized clinical trial ERIA, designed to analyze the effects of a complex primary care intervention compared with care as usual on smoking cessation, improved adherence to the Mediterranean diet, and increased physical activity. For the cross-sectional study, patients were divided into two groups: cancer survivors and people who had never had cancer (controls). Thirty eight Primary care centers Spanish provinces of Barcelona, Girona, Balearic Islands, Malaga, Seville, Salamanca, Soria, Toledo, Vigo, Vizcaya, and Zaragoza. Adults aged between 45 and 75 years with at least two risk behaviors. Patients being treated for active cancer or in end-of-life care were excluded.

Primary outcomes: Sociodemographic variables, diet, physical activity, smoking, body mass index, Charlson Comorbidity Index, and self-perceived health and social support.

Results: Of the 4259 people included, 190 (4.46%) were cancer survivors. Their mean \pm SD age was 62.8 \pm 7 years versus 58.7 \pm 8 years ($P<0.01$) for people who had never had cancer. Long-term sick leave was also more common in this group (11.9% vs 3.5%, $P<0.001$). No between-group differences were observed for smoking, adherence to the Mediterranean diet, physical activity, obesity, or perceived social support. Cancer survivors reported worse health (OR 1.82; IC95% 1.02–2.75) and were more likely to have two or more comorbid conditions (OR 1.68; 95% CI 1.18–2.39), chronic pulmonary obstructive disease (OR 2.17; 95% CI 1.25–3.78), and depression (OR 1.65; 95% CI 1.06–2.57). In the multiple regression analysis, older age and worse self-perceived health continued to be significantly associated with having survived cancer.

Conclusions: Cancer survivors have more chronic diseases, a greater likelihood of being on long-term sick leave, and worse self-perceived health than people without a history of cancer, regardless of age. The two groups perceived similar levels of social support.

Background

More and more people are surviving cancer thanks to advances in early detection and diagnostic techniques and treatment. Survival rates are increasing worldwide, even for the most aggressive forms of cancer [1]. In Spain, over 50% of adults are still alive 5 years after diagnosis [2] and the estimated number of prevalent cases at 5 years exceeds 500,000 [3]. The aging of the population has also had a notable impact on the rise in cancer cases. These trends call for greater attention to be paid to long-term cancer survivorship.

There are various approaches to and definitions of survivorship. The term *survivorship* was first used in the 1980s by Mullan, a physician and “patient” who cofounded the National Coalition for Cancer Survivorship in the United States [4]. As explained by Grunfel and Earle [5], “the period after completing

primary and adjuvant cancer treatment until recurrence or death is now recognized as a unique phase in the cancer control continuum. The term “survivorship” has been adopted to connote this phase. Survivorship is a time of transition: Issues related to diagnosis and treatment diminishes in importance, and concerns related to long-term follow-up care, management of late effects, rehabilitation, and health promotion dominate.”

Cancer survivors may develop other conditions as a result of their cancer treatment, such as pain, chronic fatigue, early menopause, infertility, heart disease, kidney failure, hypertension, and osteoporosis. Some of these are transient, but others can become chronic and significantly affect quality of life [6]. Cancer survivors may also be at increased risk of a second cancer if the risk factors associated with the original cancer persist. Some survivors die of causes that can be prevented by secondary prevention strategies or lifestyle changes. There is increasing evidence that interventions aimed at promoting healthy eating, regular exercise, and maintenance of a healthy weight can offset some of the adverse effects of cancer and cancer treatment [7–11]. Alongside smoking cessation, these behaviors reduce not only the risk of cancer recurrence but also the risk of other health conditions, such as cardiovascular disease, diabetes, and other cancers [12–14]. Apart from its physical and functional repercussions, cancer can also cause psychological distress, such as fear of recurrence, anxiety, and altered self-image, a loss of self-esteem, depression, and even doubts about one’s future [15–17]. It also has social impacts in the form of job loss or change, missed promotion opportunities, and difficulties with social and personal relationships [18].

Although the health and quality of life of cancer survivors are important public health issues, knowledge in this area is still lacking, particularly in Spain [19].

The aim of this study was to compare the presence of comorbid conditions and self-perceptions of health and social support between long-term cancer survivors and controls with similar characteristics but without a history of cancer from a clinical trial examining the effects of a multiple risk behavior intervention.

Methods

We performed a descriptive, cross-sectional multicenter study nested within phases II and III of the ERIA trial, a parallel cluster randomized clinical trial designed to analyze the effects of a complex individual-, group-, and community-level multiple risk intervention on the uptake of healthy behaviors in adult members of a primary care population aged between 45 and 75 years. The trial was conducted in accordance with the Medical Research Council guidance on complex interventions [20]. Definitive (phase III) trial was launched after the exploratory phase II trial. The design was a multirisk intervention study aimed at promoting smoking cessation, adherence to the Mediterranean diet, and sufficient levels of physical activity. It was conducted between 2014–2015 and 2016–2018 by the Primary Care Prevention and Health Promotion Network (RedIAPP) in 38 primary care centers in the Spanish provinces of Barcelona, Girona, the Balearic Islands, Malaga, Seville, Salamanca, Soria, Toledo, Vigo, Vizcaya, and Zaragoza. The trial protocol has already been published [21].

The participants were recruited by general practitioners (GPs) from among their patient panel at the time of the trial. To be included, an individual had to 1) be aged between 45 and 75 years and registered at one of the participating primary care centers, 2) be registered with a GP participating in the study and have made an appointment to see this GP or nurse, and 3) engage in two of the following risk behaviors: smoking, low adherence to the Mediterranean diet, and insufficient physical activity. Cardiovascular risk and depression had been used as inclusion criteria in the exploratory phase II trial, but were eliminated in the phase III trial due to feasibility issues. Exclusion criteria were cognitive impairment, dependency in activities of daily living, severe mental disease, long-term home care, active or palliative cancer treatment, and non-residence in the area at the time of the intervention. The flow of participants through the study is shown in Fig. 1.

To meet the objectives of this study, the participants recruited for the clinical trial were divided into two groups: cancer survivors (patients who met the criteria for survivorship) and controls without a history of cancer. Cancer survivorship was defined as the period from completion of primary or adjuvant cancer treatment to recurrence, death, or cure. Terminally ill patients were not included as they did not meet the inclusion criteria for the clinical trial. ClinicalTrials.gov, NCT03136211.

Based on the assumption that 50% of cancer survivors and 40% of people without a history of cancer would rate their health as fair or poor, we estimated that the study will be powered at 78% with a confidence level of 5%.

Numerous variables obtained at baseline during the trial were used for this study: 1) sociodemographic variables, namely age, sex, level of education, civil status, and employment status, classified as working/not working (homemaker, retiree, student) unemployed and long-term sick leave; 2) perceived social support measured using the Duke-UNC questionnaire [22, 23], (< 32 points indicating low support and ≥ 32 points indicating standard support); 3) self-perceived health status classified as excellent/very good/good or fair/poor; 4) comorbidity measured using the non-cancer conditions in the Charlson Comorbidity Index (CCI) and the presence of each condition separately [24], including cancer and year of diagnosis where applicable; 5) and other measures related to lifestyle habits, namely smoking (yes/no); adherence to the Mediterranean diet measured using the 14-item PREDIMED dietary screener [25]: (0–8 points indicating low adherence and ≥ 9 points indicating good adherence) [5]; and physical activity, assessed using the Brief Physical Activity Assessment tool for primary care settings [26, 27], where patients are classified as *sufficiently active* if they perform three or more 20-minute vigorous activity sessions, five or more 30-minute moderate activity sessions, or five or more sessions of any combination of moderate and vigorous sessions. If they do not meet these criteria, they are classified as *insufficiently active*.

In addition to a descriptive analysis of the study variables, we performed a bivariate analysis to investigate associations between independent variables and being in the cancer survivor group or the non-cancer group; the χ^2 test was used for categorical variables and the *t* test for continuous variables. Statistical significance was established as $p < 0.05$. Odds ratios with 95% confidence intervals (CI) were

calculated to assess strength of association. Finally, we performed multiple logistic regression analysis of variables with a p value of less than 0.20 in the bivariate analysis using backward elimination. Each time a variable was eliminated from the model, changes to the B coefficients were checked to assess confounding. Statistical analyses were performed in SPSS, version 23. The study was approved by the ethics committees at each of the participating centers.

Results

In total, 4,259 people were included in the study: 190 cancer survivors (4.46%; 95% CI, 3.82–5.09) and 4069 controls without a history of cancer. The median time since diagnosis was 6.5 years (interquartile range, 3–10 years).

The sociodemographic variables for the overall group are summarized in Table 1. People who had survived cancer were on average older than those without a history of cancer, but no significant differences were observed for sex or civil status. In the cancer survival group, there were higher proportions of people not working, people with a long-term sick leave, and people with a primary level education or no schooling.

The results for lifestyle habits, comorbidities, and social functioning are shown in Table 2. Almost four of every 10 people in the overall group smoked, and while the rate was somewhat lower among cancer survivors, the difference with controls was not significant. Adherence to the Mediterranean diet and physical activity levels were also low overall. Almost 80% of the members of both groups had low adherence to the Mediterranean diet, and almost 90% were insufficiently active. Engagement in healthy behaviors was not more common among patients who had survived cancer.

Cancer survivors had significantly worse self-perceived health, more comorbidities, and higher rates of depression, diabetes, and chronic obstructive pulmonary disease (COPD). Non-significant between-group differences were observed for other diseases, such as obesity, hypertension, and other conditions not shown in Table 2 because of their low prevalence (peptic ulcer, cerebrovascular disease, heart failure, connective tissue disease, osteoporosis, AIDS, and mild liver disease) were not significant. Both groups had similar perceptions of social support.

Multivariate analysis confirmed that cancer survivors had worse self-perceived health than people who had never had cancer (Table 3).

Discussion

The aim of this study was to compare differences in health status, lifestyle habits, and perceived social support between cancer survivors and controls with similar characteristics that have never had cancer. Several differences were observed for sociodemographic variables. In addition, cancer survivors reported worse health than non-cancer controls, probably because they had a higher number of comorbidities and a higher rate of long-term sick leave.

The 4.46% prevalence rate for cancer survivors in our study is similar to previously reported rates [28], and higher than that reported by Bray et al [29]. In this last case, the difference is probably due to the differences in age (Bray et al included individuals aged over 14 years).

Cancer survivors were on average older than controls, perhaps because two-thirds of cancer cases occur in people aged over 60 years. Older age would also explain why cancer survivors were more likely not to be working and to have permanent disability, although the unemployment rate was lower in this group than in the control group. Other authors have found that cancer survivors experience difficulties returning to their normal lives, and to work in particular [30]. Islam et al [31] reported that patients with cancer were 1.4 times more likely to be unemployed than healthy people due to disease- and treatment-related problems, highlighting the importance of support programs to help them return to work when they are able to [32].

Our study shows similar behaviors among cancer survivors and controls without a history of cancer in terms of exercise, diet, and smoking, with very high levels of unhealthy behaviors and overweight/obesity in both groups. This observation supports previous reports that modifiable cardiovascular risk factors such as hypertension, obesity, smoking, and physical inactivity are more common in cancer survivors than in the general population.³³ One would expect people who have survived cancer to be more motivated to lead a healthy lifestyle and one would also expect them to receive guidance from their health care providers on how to make suitable changes, particularly in terms of diet and exercise, to prevent recurrent and new cancers, reduce cardiovascular risk factors, and improve quality of life [13, 34]. Nevertheless, healthy lifestyle choices among cancer survivors and support from health care providers in making these choices would appear to be suboptimal. Weaver et al [33], found that just one in three cancer survivors reported having had a health promotion discussion with their health care provider. It has also been found that some survivors are unsure about how to make changes and perceive a lack of support from their health care team [35]. Lifestyle interventions are known to bring about positive lifestyle changes that result in improved health and functioning [36], and these changes should be a primary goal for cancer survivors.

In our study, cancer survivors had worse perceived health than patients without a history of cancer. Depression, COPD, and chronic non-malignant conditions were all more common in this group, supporting previous findings showing a higher prevalence of chronic lifestyle- or treatment-related diseases in cancer survivors compared with members of the general population [6, 36]. No significant differences were observed for obesity, but this may be because both groups had similar obesity-related risk factors.

Although one might expect a patient who has had cancer to experience social functioning difficulties, in our series, the cancer survivors perceived a similar level of social support to people without a history of cancer. For some authors, social functioning may be affected in the early years of diagnosis and beyond [37–40] but others have found no differences in perceptions of family support or satisfaction with partners between cancer survivors and members of the general population [41]. It may be that adults who

survive a cancer become more resilient to adverse situations and learn mechanisms to maintain their self-esteem and continue to enjoy good social and personal relationships.

The main limitations of this study are related to the nature of the sample: as the participants were recruited for a clinical trial, they are not representative of the general population. The clinical trial participants had to have at least two modifiable risk behaviors or factors and this means that unhealthy behaviors will have been overrepresented in our sample, preventing us from making population-based estimates of differences between cancer survivors and patients without a history of cancer. Worse health status and higher permanent disability rates among survivors could have been influenced by the older age of this group, although it should be noted that poor self-perceived health remained a significant predictor of cancer survivorship after adjusting for confounders.

Another limitation of our study is the relatively small size of the cancer survivor group. Even though the study was powered at close to 80%, the small sample will have prevented us from detecting significant differences between certain subgroups of patients (e.g., patients with a given non-prevalent chronic disease). This lack of stratified data on some of the more uncommon diseases in the CCI also prevented us from gaining a broader perspective of health problems that may affect cancer survivors.

The main strength of our study was the use of a comparison group with similar characteristics to the cancer survivor group, as this enabled us to discern differences possibly attributable to a history of cancer rather than other factors such as sex or other sociodemographic variables.

The results of this study indicate a need to encourage cancer survivors to make positive lifestyle changes that will bring them better general health and protect against recurrent and new cancers and other chronic diseases. Primary care providers should systematically evaluate lifestyle behaviors of patients with cancer, advise them on associated health risks and benefits, and encourage them to cultivate healthy habits. Further research is needed to investigate why more cancer survivors do not engage in healthy lifestyle behaviors.

Conclusions

In this series, we observed that cancer survivors had more chronic diseases, a higher rate of permanent disability, and worse self-perceived health than people with similar characteristics who had never had cancer. The two groups, however, had similar perceptions of social support. A large proportion of cancer survivors engaged in unhealthy lifestyle practices that could negatively affect both their health and quality of life. Health care providers must take an active role in assessing their patients' lifestyle habits after a diagnosis of cancer and discuss the beneficial effects that leading a healthy lifestyle can have on quality of life and prognosis.

Abbreviations

RedIAPP

Primary Care Prevention and Health Promotion Network;

GPs

General Practitioners;

CCI

Charlson Comorbidity Index;

COPD

chronic obstructive pulmonary disease;

AIDS

acquired immune deficiency syndrome

SD

Standard deviation

OR

ODDS ratio

Declarations

Ethics approval: This protocol and the template informed consent forms were reviewed and approved by the Research Ethics Committee of the IDIAP Jordi Gol (approval number P16/025). PHC professionals have introduced the study to participants and obtained written consent from people who agreed to participate in the trial. The study will comply with all applicable laws on the protection of personal data. All data collection forms have been identified by a coded ID [identification] number only to maintain participant confidentiality.

Consent for publication: all authors agree with the content of the manuscript and subscribe publication.

Availability of data and material: **Data and material are** available under request to the corresponding author.

Competing interests: The authors declare that they do not have any conflict of interest that may inappropriately influence this work.

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Author's contribution: BLS and ME did the conceptualization of the sub-study, data acquisition, analysis, and writing of the original draft. EZdO, JL, B BR, TL, MCC did the conceptualization of phase II and III of the EIRA trial, coordinate data acquisition, reviewed and edited the draft of the manuscript. All authors read and approved the final version of the manuscript.

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Tables

Table 1. Sociodemographic characteristics of study participants

Sociodemographic variables	Cancer survivors	Controls a without history of cancer	P
	N=190 N (%)	N=4.069 N (%)	
Mean (SD) age, y	62.8 (7.5)	58.7 (8.1)	<0.001
Sex			
Male	85 (44.7)	1.762 (43.3)	0.70
Female	105 (55.3)	2.307 (56.7)	
Civil status			
Single	4 (2.1)	114 (2.9)	<0.001
Married/living with a partner	61 (32.1)	1.058 (26.8)	
Separated/divorced	102 (53.7)	2.104 (53.3)	
Widowed	16 (8.4)	478 (12.1)	
Employment status			
Not working	119 (72.6)	1.616 (40.9)	<0.001
Working	51 (26.8)	1.777 (45.0)	
Unemployed	7 (3.7)	413 (10.5)	
Long-term sick leave	13 (6.8)	14 (13.6)	
Level of education			
Higher/university education	28 (14.7)	583 (14.8)	0.004
Secondary education	54 (28.4)	1.523 (38.6)	
Primary education	85 (44.7)	1.573 (39.8)	
No schooling	23 (12.1)	270 (6.8)	

SD = standard deviation.

Table 2 Distribution of lifestyle behaviors, comorbidity, and social function

Variables	Cancer survivors N (%)	Controls without a history of cancer N (%)	OR (95% CI)	P
Lifestyle				
Smoking				
No	120 (63.2)	2.428 (59.7)	1	
Yes	70 (36.8)	1.641 (40.3)	0.86 (0.63-1.16)	0.33
Adherence to Mediterranean diet				
Good (score ≥9)		646 (16.3)	1	
Low (score 0-8)	35 (18.4)	3.325 (83.7)	0.86 (0.59-1.25)	0.43
Physical activity				
Insufficiently active	168 (89.4)	3.590 (88.8)	1	
Sufficiently active	20 (10.6)	453 (11.2)	1.06 (0.66-1.70)	0.81
Health status and social function				
Self-perceived health				
Excellent/very good/good	42 (44.2)	1.187 (59.1)	1	
Fair/poor	53 (55.8)	823 (40.9)	1.82 (1.02-2.75)	0.005
Weight				
Normal		750 (19.0)	1	
Overweight	34 (17.9)	1.442 (36.6)	0.94 (0.61-1.45)	0.80
Obese	62 (32.6)	1.753 (44.4)	1.18 (0.79-1.76)	0.41
No. of health problems				
0		1741 (42.8)	1	
1	67 (35.3)	1.325 (32.6)	1.13 (0.79-1.62)	0.48
≥2	58 (30.5)	1.003 (24.6)	1.68 (1.18-2.39)	0.004
Depression				
No	166 (87.4)	3.742 (92.0)	1	
Yes	24 (12.6)	327 (8.0)	1.65 (1.06-2.57)	0.02
Hypertension				
No	107 (56.3)	2.506 (61.6)	1	
Yes	83 (43.7)	1.563 (38.4)	1.24 (0.92-1.66)	0.14
Chronic obstructive pulmonary disease				
No		3.915 (96.2)	1	
Yes	175 (92.1)	154 (3.8)	2.17 (1.25-3.78)	0.006
Diabetes mellitus not affecting target organs				
No		3.405 (83.7)	1	
Yes	149 (78.4)	664 (16.3)	1.41 (0.98-2.01)	0.057
Self-perceived social support				
No		41 (21.6)		

Standard (score ≥ 32)	180 (95.2)	3.609 (95.4)	1	
Low (score < 32)	9 (4.8)	296 (7.6)	0.61 (0.30-1.20)	0.15

OR = ODDS ratio; CI = confidence interval.

Table 3 Multiple logistic regression analysis		
Variables	OR (95% CI)	P
Age		
	1.04 (1.001-1.081)	0.014
Self-perceived health		
Excellent/very good/good		
Fair/poor	1	
	1.81 (1.18-2.78)	0.006
Employment status		
Not working	1	
Working	0.56 (0.29-1.06)	0.07
Unemployment	0.43 (0.15-1.16)	0.09
Long term sick leave	1.49 (0.67-3.32)	0.32

OR = ODDS ratio; CI = confidence interval.

Figures

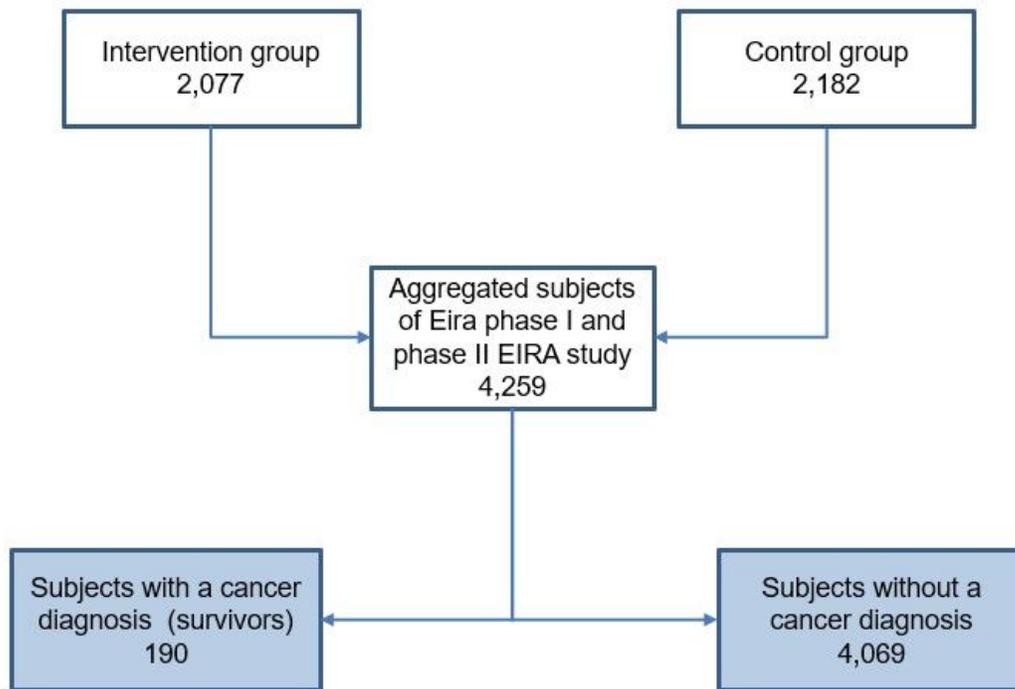


Figure 1

Flow of subjects. Phase II and III study EIRA.

Supplementary Files

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- [STROBEchecklistv4combinedPlosMedicine.docx](#)