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European Journal of Cancer 40 (2004) 673–680

European Journal of Cancer

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Age-specific detriments to quality of life among breast cancer patients one year after diagnosis

V. Arndt[a,b,1,*], H. Merx[b,1], T. Stürmer[a,b], C. Stegmaier[c], H. Ziegler[c], H. Brenner[a,b]

[a]*German Centre for Research on Ageing, Department of Epidemiology, Bergheimer Strasse 20, D-69115 Heidelberg, Germany*
[b]*University of Ulm, Department of Epidemiology, D-89081 Ulm, Germany*
[c]*Saarland Cancer Registry, Virchowstrasse 7, D-66119 Saarbrücken, Germany*

Received 30 June 2003; received in revised form 3 November 2003; accepted 12 December 2003

Abstract

The aim of our study was to identify any differences in the quality of life (QOL) of breast cancer survivors one year after diagnosis when the acute treatment effects should not longer be apparent. QOL was assessed in a population-based cohort of 387 women with breast cancer from Saarland (Germany) using the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire Core 30 (EORTC-QLC30). Functional and symptom QOL-scores were compared with published reference data from the general population. Breast cancer survivors and women from the general population reported similar scores of global health/QOL. However, major deficits among women with breast cancer were found, for emotional, social, role and cognitive functioning. Age-specific comparisons between breast cancer patients and the reference population revealed that these deficits are predominantly found in younger age groups. The overall QOL of life of breast cancer survivors one year after diagnosis is comparable to women from the general population. However, some differences exist that seem to predominantly affect younger women who show a poorer QOL in certain domains.

Keywords: Quality of life; Breast neoplasm; Cancer survivors; EORTC-QLQ-C30; Young women

1. Introduction

Cancer of the breast is the most frequent malignant tumour among women and accounts for more than 1 000 000 new cases worldwide each year [1]. Breast cancer survivors represent the largest group of long-term cancer survivors. They comprise approximately 40% of all female cancer survivors in developed countries [2], and it can be expected that this number will increase over the next few decades due the demographic age-shift with populations living for longer and due to further advances made in breast cancer therapy.

Beside disease-free and overall survival time, quality of life (QOL) is a decisive outcome measure for cancer patients. The term QOL refers to a multidimensional concept which includes at least the dimensions physical, emotional and social functioning. QOL has become an important outcome measure in the treatment of cancer patients during the last decade and has been assessed in many clinical trials to evaluate the effects of specific therapies. In contrast, only a few studies have compared breast cancer survivors with non-cancer patients in order to identify the specific needs of these women [3–15]. In general, older people reported worse quality of life and worse physical functioning, but better emotional functioning, than younger people. However, the interpretation of these studies may be limited, as many of these studies were based on selective samples of patients from one or few hospitals [4–11] or included women with a wide range of survival times [8,13].

The objective of this study was to describe the QOL of patients with breast cancer one year after their diagnosis from a large population-based cohort. At this time, it could be expected that the acute treatment effects would have declined and our aim was to identify any differences in the QOL of breast cancer survivors in comparison with women from the general population.

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[*] Corresponding author. Tel.: +49-6221-54-8144; fax: +49-6221-54-8142.

E-mail address: arndt@dzfa.uni-heidelberg.de (V. Arndt).

[1] VA and HM contributed equally to the manuscript.

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doi:10.1016/j.ejca.2003.12.007

2. Patients and methods

2.1. Study design

This analysis is based on data obtained from the Verlauf der diagnostischen Abklärung bei Krebserkrankungen (VERDI)-study, a population-based state-wide prospective cohort study on risk factors, diagnostic procedures and prognosis for various forms of cancer in Saarland (a state in Southwest Germany covering a population of approximately 1 million inhabitants) [16–18]. Potential study participants were identified by their clinicians during their first hospitalisation. With the exception of two hospitals, which did not offer in-patient cancer treatment, all of the other 34 hospitals from the study region participated in the recruitment. For this analysis, all women aged 18–80 years, with sufficient German language skills and with primary invasive breast cancer, diagnosed between October 1, 1996 and February 28, 1998 were eligible.

Out of 458 patients deemed suitable for participation by their treating physicians, 387 (84.5%) fulfilled all of the inclusion criteria stated above and were willing to participate. Fifty-four women did not meet the inclusion criteria for the following reasons: non-invasive tumour ($N=14$), recurrent tumour ($N=13$), age over 80 years ($N=7$), duplicate report ($N=2$), date of diagnosis outside of study period ($N=14$), or living outside of study region ($N=4$). Three women died before the interview could be conducted and 14 eligible women with breast cancer withdrew their consent to participate in the study.

Overall, the study participants represented approximately 50% of all new incident breast cancer cases during the study period. The study population did not differ substantially from the source population of all female breast cancer patients from Saarland in terms of basic demographic characteristics, with the exception of a slightly higher proportion of younger women in our cohort compared with all women with invasive breast cancer. Data privacy regulations required that only patients identified and informed by their treating physicians could be recruited. It is likely that the participation rate would have been substantially higher if patients could have been contacted directly by the Saarland Cancer Registry, which has over 95% completeness of incident cases. The study was approved by local and regional ethics committees and all of the participants gave their written informed consent.

2.2. Data collection

Baseline data including the patient's age, education level, marital status, as well as their date of diagnosis and comorbidity were derived from structured face-to-face interviews. The interviews were conducted by trained interviewers within a few days to weeks after the diagnosis of breast cancer, in most cases during their first hospitalisation due to breast cancer. Information regarding tumour stage at the time of diagnosis and initial therapy were abstracted from the hospital records.

One year after the diagnosis of cancer, all study participants were sent a letter with detailed information describing the purpose of the follow-up study together with a QOL questionnaire (for details see below) and a stamped-addressed return envelope. Non-respondents were mailed up to two reminders and contacted by phone if the patients did not respond after three mailings. If all these attempts did not result in any response, the vital status of the non-respondents was obtained from the residents' registration office. Among the respondents, over 95% returned the questionnaires within 3 months after the first contact by mail.

2.3. QOL questionnaire

QOL one year after diagnosis was assessed with the Quality of Life Questionnaire Core 30 Items (QLQ-C30) of the European Organisation for Research and Treatment of Cancer (EORTC) [19]. The QLQ-C30 is a validated, brief, self-reporting, cancer-specific measure of health-related QOL. The EORTC QLQ-C30 is composed of 5 multi-item functional scales that evaluate physical, role, emotional, cognitive and social functions and one global health status/QOL scale. Three multi-item symptom scales measure fatigue, pain and nausea/vomiting and six single items assess symptoms such as dyspnoea, insomnia, appetite loss, constipation, diarrhoea and financial difficulties. High functional scores represent a better functioning/QOL, whereas a high symptom score indicates more severe symptoms. The time-frame for all scales in the questionnaire was the previous week.

2.4. Statistical methods

The scoring of the EORTC QLQ-C30 items was performed according to the EORTC scoring manual [20]. All scores were linearly transformed to a 0–100 scale. In case of missing items, multi-item scores were calculated as the mean of non-missing items if at least half of the items from the corresponding scale had been completed [20].

The score distribution of most of the function and symptom scales was asymmetrical. Nevertheless, we used mean scores as descriptive measures to enable comparison of the results with published QLQ-C30 reference data from the German general population [21]. The reference data were derived from a representative sample of the German adult population comprising 1139 women and 889 men (age range 16–92 years). The members of the reference population were selected by nationwide random-route-technique and interviewed in their private homes by skilled interviewers in 1998. Only

QOL data referring to women were considered for our analysis. Age-standardised reference QOL scores were calculated by weighting the age-specific mean scores from the reference population according to the age-structure of the breast cancer patients. Age-standardised and age-specific means were compared and interpreted in a descriptive way following the findings from Osoba and colleagues [22] and Michelson and colleagues [23] that differences of more than 10 points are clinically meaningful. Statistical testing was not employed as no information regarding the precision of the age-specific reference values was published.

3. Results

3.1. Characteristics of the study population

Baseline characteristics of the breast cancer patients according to their vital status and follow-up are shown in Table 1. The mean age at diagnosis was 58 years (age range 30–80 years). The level of education in our study sample was relatively low. Only one quarter of all breast cancer patients completed 10 years or more of schooling in contrast to approximately 34% of reference population after correction for differences in the age distribution. However, no differences were observed between the breast cancer and reference groups with respect to occupation (data not shown).

At the time of the diagnosis of cancer, 62.0% of breast cancer cases were living with a spouse. The tumour was confined to the breast in 52.1% of the women. Comorbidity was defined as the prevalence of heart disease, stroke, hypertension, diabetes, asthma, other cancers, or arthritis, and was reported by almost two thirds of all women at baseline.

Fourteen women (3.6%) died during the first year after diagnosis. These women tended to be older ($P < 0.01$) and to more often have advanced tumours ($P < 0.001$). Out of the 373 survivors, 314 (84.2%) participated in the QOL survey and returned the questionnaire. Respondents and non-respondents were

Table 1
Baseline characteristics of patients with breast cancer according to their vital status and participation in the 1-year follow-up

	Respondents ($n = 314$)		Non-respondents ($n = 59$)		Deceased ($n = 14$)		Total ($n = 387$)	
	N	(%)	*N*	(%)	*N*	(%)	N	(%)
Age at diagnosis (years)								
30–49	88	(28.0)	16	(27.1)	2	(14.3)	106	(27.4)
50–59	85	(27.1)	10	(16.9)	1	(7.1)	96	(24.8)
60–69	87	(27.7)	16	(27.1)	4	(28.6)	107	(27.6)
70–80	54	(17.2)	17	(28.8)	7	(50.0)	78	(20.2)
Mean age (S.D.)[a]	57.2	(11.5)	59.7	(12.6)	65.3	(11.7)	57.9	(11.8)
Employment status[d]								
Employed	104	(33.2)	18	(31.0)	3	(21.4)	125	(32.5)
Not employed	209	(66.8)	40	(69.0)	11	(78.6)	260	(67.5)
Last occupation[d]								
Worker	37	(17.5)	10	(26.3)	3	(42.9)	50	(19.5)
Employee/Official	174	(82.5)	28	(73.7)	4	(57.1)	206	(80.5)
Education[d]								
<10 years	231	(73.6)	47	(81.0)	10	(71.4)	288	(74.6)
$\geqslant 10$ years	83	(26.4)	11	(19.0)	4	(28.6)	98	(25.4)
Living with spouse								
Yes	206	(65.6)	31	(52.5)	3	(21.4)	240	(62.0)
No	108	(34.4)	28	(47.5)	11	(78.6)	147	(38.0)
Stage of disease[b,d]								
Local	168	(54.7)	28	(47.5)	2	(14.3)	198	(52.1)
Regional	134	(43.7)	26	(44.1)	8	(57.1)	168	(44.2)
Distant	5	(1.6)	5	(8.5)	4	(28.6)	14	(3.7)
Comorbidity[c]								
Yes	203	(64.6)	38	(64.4)	12	(85.7)	253	(65.4)
No	111	(35.4)	21	(35.6)	2	(14.3)	134	(34.6)

[a] S.D., standard deviation.

[b] ‘local’ = T1–T3 and N0/M0, ‘regional’ = N1–N3/M0 or T4/N0/M0, ‘distant’ = M1 and any T and any N.

[c] Defined as reporting treatment for cardiovascular disease, diabetes mellitus, asthma, chronic obstructive pulmonary disease, other cancers or arthritis during past year.

[d] Some data are missing in these groups.

similar with respect to age ($P = 0.29$), education ($P = 0.23$) and comorbidity status ($P = 0.97$). However, tumour stage was more favourable among respondents ($P = 0.01$), and respondents tended to live more often with a partner ($P = 0.06$).

Participants of the follow-up also provided detailed information regarding the type of surgery and other therapeutic procedures. In total, 55.6% of all women underwent breast-conserving therapy. Radiation, chemotherapy and hormonal therapy were reported by 75.2%, 57.1% and 54.9% of the women, respectively. Radiation and chemotherapy treatments were given more often to younger women with breast cancer than to older women. For example, chemotherapy was reported by 74.8% of all breast cancer patients aged 30–59 years and by 32.7% of all breast cancer patients aged 60–80 years.

3.2. QOL one year after the diagnosis of cancer

Table 2 presents the mean scores for the QLQ-C30 subscales. The percentage of missing data, both at the item level and at the score level, was generally low, ranging from 1 to 5%. The mean score for the global health status for breast cancer patients was 65.3. The best functional outcomes were found for the physical, cognitive and social functioning subscales. Emotional functioning scored the lowest. Almost 90% of all women with breast cancer reported that they felt depressed, irritable, tense, or worried.

With respect to the symptoms, the QOL of breast cancer survivors was most severely affected by 'fatigue', 'insomnia' and 'pain'. Over 80% reported problems with fatigue ('Were you tired', 'Have you felt weak', 'Did you need a rest'). Approximately 65–70% reported symptoms referring to 'insomnia' ('Have you trouble sleeping') and pain ('Have you had pain', 'Did pain interfere with your daily activities'). Dyspnoea ('Were you short of breath') and financial difficulties ('Has your physical condition or medical treatment caused you financial difficulties?') were reported by 43.5% and 39.5% of participants, respectively. Other symptoms such as 'nausea and vomiting', 'constipation', 'diarrhoea', and 'appetite loss' were reported less frequently (approximately 15–20%).

3.3. Comparison with age-standardised reference data from the general population

Women with breast cancer and women from the general population reported virtually identical mean scores of global health/QOL (Fig. 1). In addition, breast cancer patients scored their physical functioning only slightly worse than women from the general population. However, larger differences were found for role functioning, emotional functioning, social functioning, and cognitive functioning.

All mean symptom scores were higher in the breast cancer group than in the reference group indicating more frequent and/or more severe symptoms among

Table 2
Prevalence of functional deficits and symptoms and mean QOL-C30 scores of breast cancer patients one year after diagnosis

	Respondents *N*	Number of items *N*	Proportion of patients reporting any level of concern	Score[a] Mean (S.D.)[b] (%)
Functional scales				
Physical functioning	306	5	(57.5)	80.8 (21.7)
Role functioning	304	2	(53.0)	71.1 (29.3)
Emotional functioning	312	4	(88.1)	59.2 (29.0)
Cognitive functioning	312	2	(51.6)	79.0 (27.6)
Social functioning	311	2	(55.6)	76.0 (29.0)
Global health status/QOL	312	2	(n.a.[c])	65.3 (22.0)
Symptom scales				
Fatigue	306	3	(83.7)	38.0 (29.5)
Nausea and vomiting	305	2	(20.7)	7.3 (18.3)
Pain	307	2	(64.8)	29.4 (30.0)
Dyspnoea	301	1	(43.5)	20.5 (27.2)
Insomnia	307	1	(69.4)	44.1 (36.9)
Appetite loss	305	1	(15.1)	8.0 (21.6)
Constipation	306	1	(17.6)	10.5 (25.5)
Diarrhoea	303	1	(16.2)	7.9 (20.4)
Financial difficulties	309	1	(39.5)	22.5 (32.7)

[a] Note: Higher scores referring to 'Functional scales' and 'Global health status/QOL' indicate better functioning whereas higher scores referring to 'Symptom scales' indicate more/severe symptoms.

[b] S.D., standard deviation; QOL, quality of life; C30, Core 30 questionnaire.

[c] Not applicable.

women with breast cancer (Fig. 2). The differences were most pronounced in the subscales "fatigue", "insomnia", "pain", "dyspnoea", and "financial difficulties".

3.4. Age-specific scores

Fig. 3 shows the mean functional scores of the breast cancer survivors and of the reference group within the different age groups. Although the magnitude differed, differences between the breast cancer patients and the reference group were largest for all subscales among the younger age groups and diminished or were virtually non-existent in the older age groups. Deficits among breast cancer survivors were most prominent for emotional, social, role and cognitive functioning, whereas only minor differences existed in the physical functioning and global health/QOL subscales. Fig. 3 also indicates that the association between age and functional

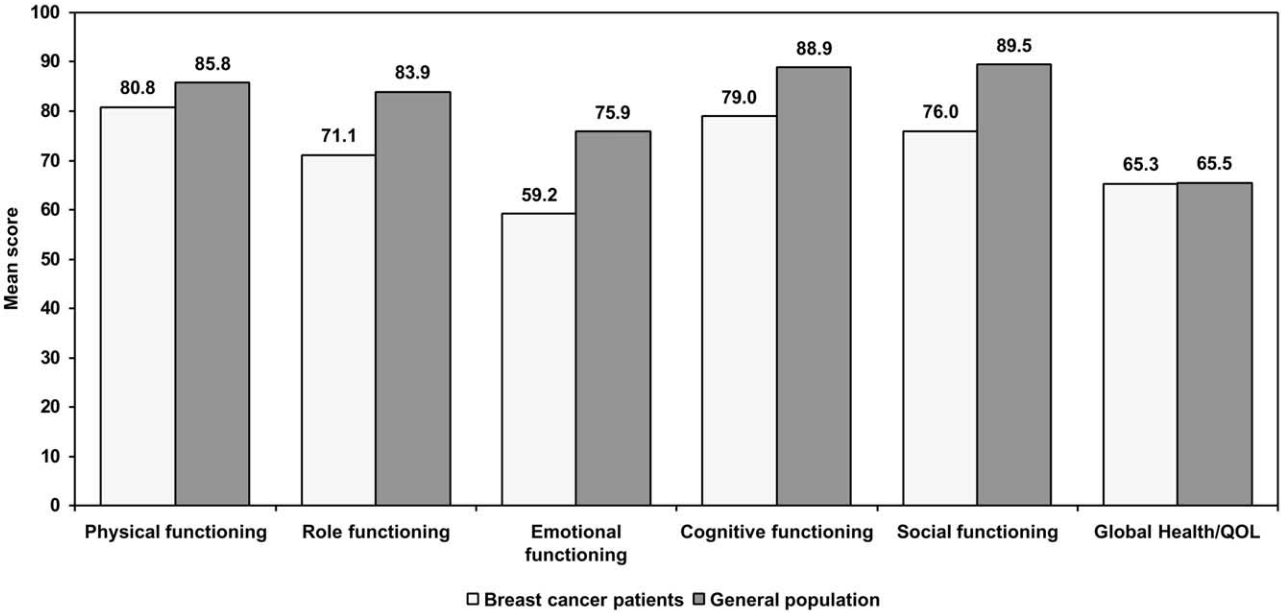

Fig. 1. Mean functional scores of patients with breast cancer compared with age-standardised mean scores of women from the general population. QOL, quality of life. Physical functioning (1.2 SEM); Role functioning (1.7 SEM); Emotional functioning (1.6 SEM); Cognitive functioning (1.6 SEM); Social functioning (1.6 SEM); Global health/QOL (1.2 SEM).

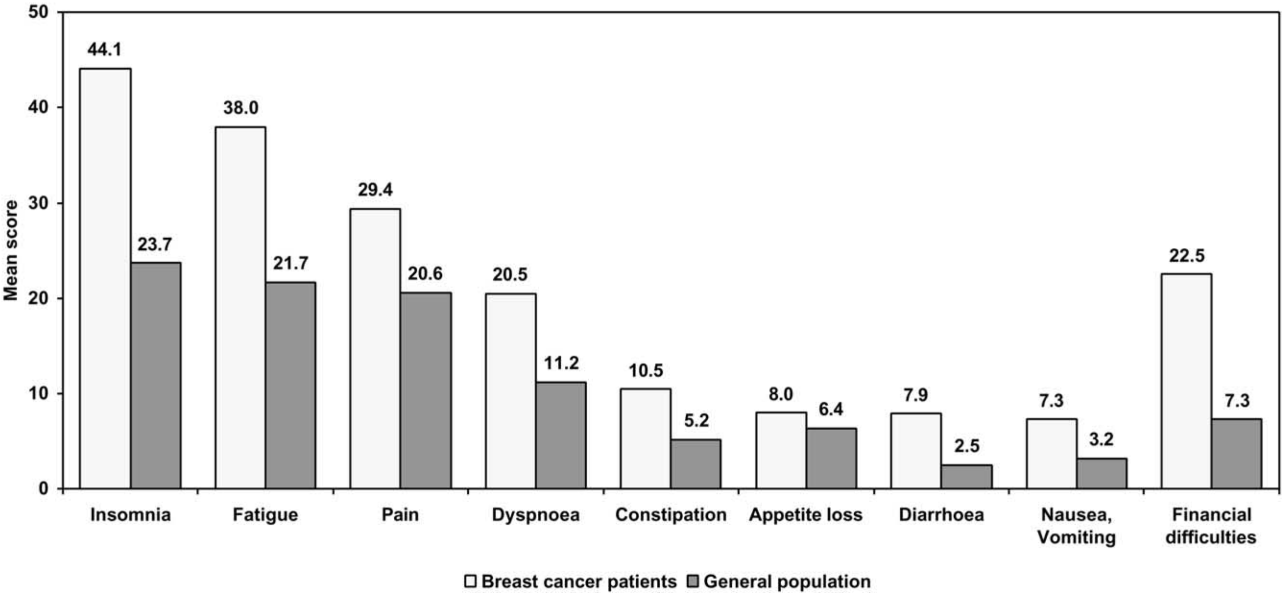

Fig. 2. Mean symptom scores of patients with breast cancer compared with age-standardised mean scores of women from the general population. Insomnia (2.1 SEM); Fatigue (1.7 SEM); Pain (1.7 SEM); Dyspnoea (1.6 SEM); Constipation (1.5 SEM); Appetite loss (1.2 SEM); Diarrhoea (1.2 SEM); Nausea and vomiting (1.0 SEM); Financial difficulties (1.9 SEM).

scores was different for the breast cancer patients and women from the general population. For example, physical functioning and global health/QOL declined with increasing age among breast cancer patients whereas older breast cancer patients, tended to report better role, emotional, cognitive and social functioning than younger breast cancer patients. By contrast, all scores tended to decrease with age in the general population.

With respect to the symptom subscales, the differences between the breast cancer patients and the reference group were also largest in the younger age categories and diminished in the older groups (Fig. 4). In contrast to breast cancer patients who scored 'insomnia', 'fatigue', and 'pain' almost independently of their age, most symptom scores of the reference population increased with older age. Interestingly, younger breast cancer patients reported more financial difficulties than older age groups, whereas financial problems appeared to be more common among older women in the general population.

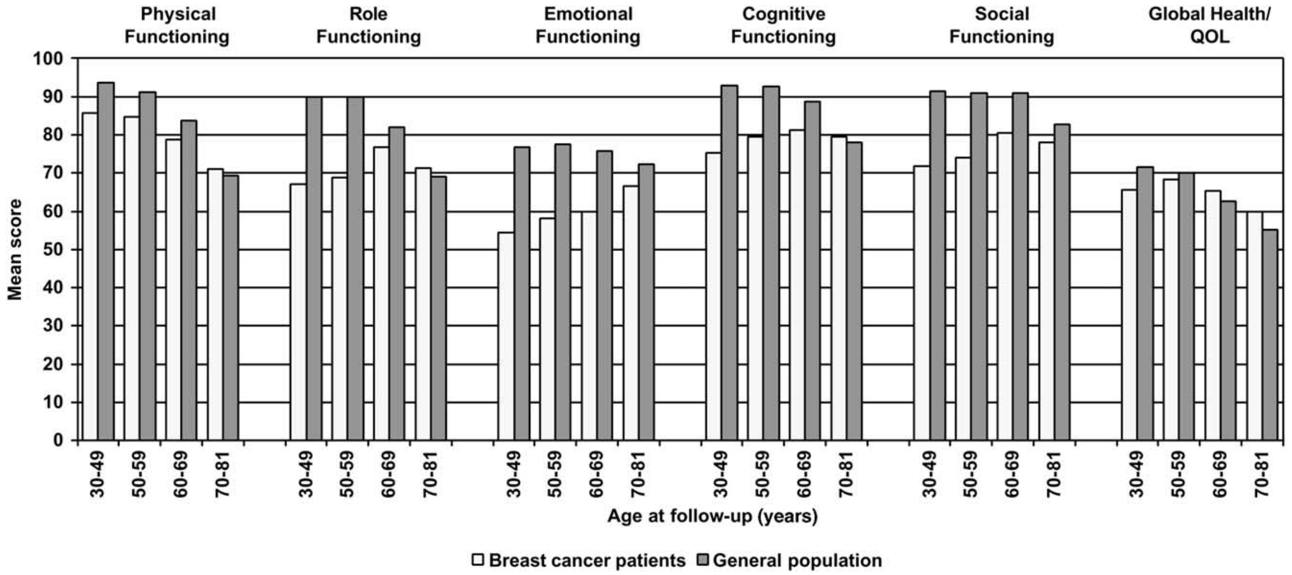

Fig. 3. Age-specific mean functional scores of patients with breast cancer compared with women from the general population. SEM's for age 30–49; age 50–59; age 60–69; age 70–81 as follows: physical functioning (2.0; 2.1; 2.5; 3.3); role functioning (3.5; 3.1; 3.1; 4); emotional functioning (3.1; 2.9; 2.8; 3.8); cognitive functioning (3.4; 2.9; 2.8; 3.8); social functioning (3.4; 3.2; 2.8; 4.0); global health/QOL (2.5; 2.2; 2.3; 3.2).

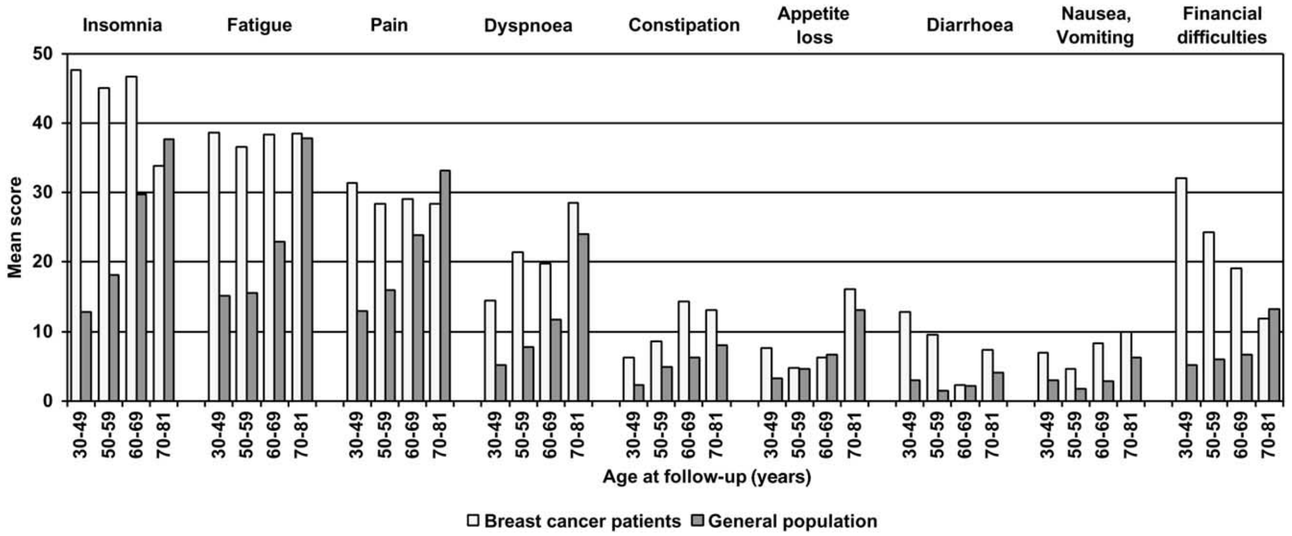

Fig. 4. Age-specific mean symptom scores of patients with breast cancer compared with women from the general population. SEM's for age 30–49; age 50–59; age 60–69; age 70–81 as follows: insomnia (4.1; 4.1; 4.3; 4.1); fatigue (3.1; 3.0; 3.4; 4.3); pain (3.4; 3.1; 3.3; 4.1); dyspnoea (2.6; 3.0; 2.9; 4.4); constipation (2.0; 2.6; 3.2; 4.0); appetite loss (2.6; 1.6; 2.1; 3.8); diarrhoea (2.9; 2.3; 1.1; 2.8); nausea, vomiting (2.2; 1.2; 2.0; 3.3); financial difficulties (4.3; 3.5; 3.1; 3.4).

4. Discussion

QOL has become an important outcome measure in the treatment of cancer patients and the specific needs of cancer survivors deserve more attention. Our results suggest that overall QOL/global health and physical functioning of breast cancer patients is comparable to women from the general population one year after the diagnosis of breast cancer when most acute treatment-related effects should have disappeared. In contrast, deficits in emotional, social, role, and cognitive functioning are still apparent and affect predominantly younger women with breast cancer. Specific symptoms like insomnia, fatigue and financial difficulties also seem to be of particular concern for breast cancer survivors and may affect their QOL.

Results from longitudinal studies with repeated measurements of QOL [24,25] indicate that most acute-treatment related symptoms (such as nausea, vomiting, hair loss) decline during the first year after diagnosis, but that some intermediate and late effects (e.g. pain, fatigue, weight gain, menopausal symptoms, and fertility concerns) may persist. Many treatment-related psychosocial problems also resolve during the first year after diagnosis [13] as the patient's mood and functional health status improves [26], but more subtle forms of distress may still exist in breast cancer survivors [8,10], as indicated by the deficits in emotional, social, role, and cognitive functioning measured in our sample.

However, these deficits might be temporary, as there is growing evidence that the diagnosis and treatment of breast cancer is not a stressor with uniformly negative outcomes, but rather a transitional event, with the potential for positive as well as negative outcomes [8,12]. According to Leedham and Ganz [27], most women treated for breast cancer do well after completion of therapy, but high-risk groups for psychosocial problems exist. Our results indicate that young women with breast cancer, in particular, express psychosocial deficits and suffer from specific symptoms and financial problems. Similar findings that younger women with breast cancer did worse than older ones on a broad number of quality of life dimensions have been reported by others in Refs. [24,25,28,29]. Specifically, young women seem to suffer from psychological distress during the first year after diagnosis [30,31]. It has been hypothesised that young breast cancer patients (<50 years) are a vulnerable group in terms of a poorer survival and more severe psychosocial effects [13], as younger women may view breast cancer as a greater threat to their lives and have a poorer mental health than older patients [25]. Another explanation might be that younger women may possess fewer coping strategies and resources needed to manage a life-threatening disease [29], whereas older persons consider their physical health differently and tend to assess their health in terms of their age peers [23]. Our data also indicate that younger women with breast cancer undergo chemotherapy and radiation more often than older women. This might be another explanation of the differences in QOL observed.

Financial problems were reported by almost 40% of the breast cancer survivors and the differences compared with women from the general population were striking. This is even more noteworthy as Germany has a good social security system. Costs of diagnostic procedures and treatment are covered by public and private health insurance plans, to which 98% of the German population subscribe. Subsidies may be given for hiring a domestic aid or paying extra child-care, but it is likely that not all of the extra costs are covered. Similarly, alternative or complementary treatment options not covered by health insurance plans and loss of earnings, which selectively affects women at pre-retirement age, may also account for some of the observed differences. The latter might explain why predominantly younger women with breast cancer are affected by financial problems, a finding that has also been reported by Mor and colleagues in Ref. [32], who found economic problems being reported in twice as many young women with breast cancer in the United States compared with older patients.

To our knowledge, this is the first report from a population-based study comparing QOL among breast cancer survivors one year after diagnosis with controls from the general population. Most of the pertinent literature has focused either on long-term survivors (>5 years after diagnosis) [3–6,10,14], included women with a wide range of survival times [8,13], or was based on selective samples of patients from one or few hospitals [4–11]. The strengths of our study include the large sample size, the high overall response rate and the state-wide recruitment of patients from a range of hospitals. Although our findings might describe a somewhat too optimistic picture as women with advanced breast cancer were less willing to participate in the study, we were able to identify some important deficits in breast cancer survivors which persist after acute treatment and rehabilitation measures have been completed. Our results are primarily descriptive and therefore no direct statistical testing was performed. Some findings may be due to chance, but the uniform age trends observed for several endpoints are unlikely to be explained by chance alone. Differences in educational level between the breast cancer group and the reference population might explain some of the observed deficits among breast cancer patients, but it is unlikely to substantially affect our results as the two groups were similar with respect to occupational status. However, further analysis addressing the impact of socio-economic factors on health-related QOL are warranted.

In conclusion, the overall QOL of breast cancer patients one year after diagnosis appears to be comparable with the QOL of the general population. However, differences are observed that predominantly affect younger women.

5. Conflict of interest statement

There is no conflict of interest for any author of this study. There are no financial or other relationships that might bias the work or interfere with our objective judgement(s).

Acknowledgements

This study was supported by the German Cancer Foundation (Deutsche Krebshilfe), Project Number 70-2413-Br 3 I.

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