

Is Ocean Sailing Associated with Improved Quality of Life in Young Adult Cancer Patients?

Ist Hochseesegeln mit einer Verbesserung der Lebensqualität junger erwachsener Krebspatienten assoziiert?

Summary

- ▶ **Background:** Young adult cancer survivors frequently suffer from fatigue, depressive symptoms, and impaired quality of life. Ocean-sailing with its specific challenges could have beneficial effects on the physical and mental well-being of this patient group.
- ▶ **Methods:** 28 cancer patients (18 to 40 years) embarked on an 8 to 13-day ocean sailing trip requiring physical exertion. Quality of life (EORTC QLQ-C30), depressive symptoms (PHQ-9), fatigue (FSS), social support (ESSI), and physical activity (BSA) were assessed before the sailing trip and 1, 3 and 6 months thereafter.
- ▶ **Results:** Depressive symptoms improved from baseline (median 8, IQR [4.3; 10]) to 1 month after sailing (median 5.5, IQR [3.3; 7.5]; $p < 0.01$), as did the EORTC QLQ-C30 subscales global health status (from 62.5 [35.4; 66.7] to 75 [52.1; 83.3]; $p < 0.01$), emotional function (from 50 [25; 66.7] to 75 [50; 87.5]; $p < 0.001$), and appetite loss (from 0 [0; 33.3] to 0 [0; 0]; $p < 0.05$). Global health status was still improved after 3 months (66.7 [58.3; 83.3]; $p < 0.05$). Leisure time physical activity (min/week) decreased from baseline (346.3 [202.4; 653.1]) to 6 months (220.6 [130.6; 421.9]; $p < 0.05$).
- ▶ **Conclusion:** Ocean sailing was associated with short-term improvements in quality of life, emotional function, and depressive symptoms, while leisure time physical activity decreased. Randomized controlled trials are warranted to clarify the causal role of ocean sailing for the observed improvements.

KEY WORDS:

Cancer Survivors, Emotional Well-Being, Depressive Symptoms, General Life Satisfaction

Zusammenfassung

- ▶ **Hintergrund:** Viele junge Erwachsene leiden nach einer Krebserkrankung unter Müdigkeit, depressiven Symptomen und einer eingeschränkten Lebensqualität. Hochseesegeln mit seinen spezifischen Herausforderungen könnte das körperliche und psychische Wohlbefinden dieser Patienten verbessern.
- ▶ **Methoden:** 28 Krebspatienten zwischen 18 und 40 Jahren begaben sich auf einen Hochsee-Segeltörn von 8 bis 13 Tagen Dauer. Vor dem Segeltörn sowie 1, 3 und 6 Monate danach wurden Lebensqualität (EORTC QLQ-C30), depressive Symptomatik (PHQ-9), Fatigue (FSS), soziale Unterstützung (ESSI) und körperliche Aktivität (BSA) erfasst.
- ▶ **Ergebnisse:** Die depressive Symptomatik sank von einem medianen Ausgangswert von 8 (IQR, [4.3; 10]) auf 5.5 [3.3; 7.5] nach einem Monat ab ($p < 0.01$), ebenso verbesserten sich die EORTC QLQ-C30 Subskalen Globaler Gesundheitszustand (Abnahme von 62.5 [35.4; 66.7] auf 75 [52.1; 83.3]; $p < 0.01$), emotionale Belastung (Abnahme von 50 [25; 66.7] auf 75 [50; 87.5]; $p < 0.001$) und Appetitverlust (Abnahme von 0 [0; 33.3] auf 0 [0; 0]; $p < 0.05$). Die Verbesserung des globalen Gesundheitszustands hielt auch 3 Monate nach dem Segeln noch an (66.7 [58.3; 83.3]; $p < 0.05$). Die körperliche Freizeitaktivität (Minuten/Woche) lag nach 6 Monaten (220.6 [130.6; 421.9]) signifikant unter dem Ausgangswert (346.3 [202.4; 653.1]; $p < 0.05$).
- ▶ **Schlussfolgerung:** Ein Hochsee-Segeltörn war mit kurzfristigen Verbesserungen der Lebensqualität, der emotionalen Funktion und der depressiven Symptomatik verbunden, während die körperliche Aktivität in der Freizeit mittelfristig abnahm. Der kausale Zusammenhang zwischen Segeln und einer Verbesserung von Lebensqualität, emotionalem Wohlbefinden und körperlicher Aktivität sollte in randomisierten kontrollierten Studien untersucht werden.

SCHLÜSSELWÖRTER:

Krebsüberlebende, Emotionales Wohlbefinden, Depressive Symptome, Allgemeine Lebenszufriedenheit

Introduction

Fortunately, about 80% of teenagers and young adults with a malignant disease in high-income countries can be cured today. Nevertheless, the impact of cancer on physical and psychological well-being at this age is serious. Many studies reported decreased physical fitness (aerobic capacity and muscle strength), fatigue, impaired quality of life (QoL), and decreased emotional well-being in this patient

group (1, 2, 3, 17, 22). Moreover, they are concerned about changes in their appearance and attractiveness and are afraid of being abandoned by friends and missing time in school or higher education (4).

Intervention studies to improve QoL and emotional well-being in young adult cancer survivors are scarce. A recent Cochrane review of 6 studies in children and adolescents showed some positive

1. UNIVERSITY MUNICH, *Patients' Support Group, Comprehensive Cancer Center, Munich, Germany*
2. LMU MUNICH, *Institute of Medical Psychology, Medical Faculty, Munich, Germany*
3. HEAD OF THE ORGANIZATION "SEGELREBELLEN" ('SAILING REBELS'), *Munich, Germany*
4. COBURG UNIVERSITY OF APPLIED SCIENCES, *Division of Integrative Health Promotion, Coburg, Germany*
5. KLINIK BARMELWEID AG, *Department of Psychosomatic Medicine and Psychotherapy, Barmelweid, Switzerland*



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CORRESPONDING ADDRESS:

Prof. Dr. med. habil. Karin Meissner
Division of Health Promotion
Coburg University of Applied Sciences
Friedrich-Streib-Str. 2
96450 Coburg
✉: karin.meissner@hs-coburg.de

Table 1

Overview of questionnaires.

DOMAIN	QUESTIONNAIRE/ SCALE	DESCRIPTION
Quality of Life	EORTC QLQ-C30	Quality of Life Questionnaire of the European Organization for Research and Treatment of Cancer (5)
Perceived/ Expected Well-Being	VAS (0-100)	Visual analogue scales
Depressive Symptoms	PHQ-9	Depression module of the Patient Health Questionnaire (14)
Fatigue	FSS	Fatigue Severity Scale (15)
Self Efficacy	GSE	General Self-Efficacy Scale (8)
Life Satisfaction	FLZ	Life Satisfaction Questionnaire (10)
Social Support	ESSI	ENRICH Social Support Inventory (12)
Physical Activity	BSA	Physical Activity, Exercise, and Sport Questionnaire (20)

effects of exercise interventions on physical fitness, body composition, flexibility, cardiorespiratory fitness, muscle strength, and health-related QoL (6). The interventions, however, were not as effective as in adults. Emotional support and contact with other young cancer survivors appear to be crucial (19, 24). Dragon boat racing and sailing combine these factors and intervention studies showed positive effects on muscle strength, body composition, self-esteem, self-efficacy, and QoL, and thus the feeling of “being normal” (18, 21, 23).

Ocean sailing with its special challenges not only requires physical exertion, but also promotes camaraderie and teamwork in a confined space of a boat as well as the feeling of achieving something together in an extraordinary environment. The aim of this pilot study was to examine whether a multi-day ocean sailing trip with other young cancer patients was associated with improvements in QoL, depressive symptoms, fatigue, life satisfaction, social support, and the level of physical activity.

Material and Methods

The protocol of this monocentric, prospective cohort study was approved by the ethical committee of the Medical Faculty, LMU Munich (approval no. 17-432). All participants provided written informed consent.

Young adults, who registered for an ocean sailing trip organized by the non-profit organization “Segelrebelln” (‘sailing rebels’), were recruited for the study. We included patients between 18 and 40 years with a diagnosis of any type of malignant tumor and approval of the attending physician for the sailing trip. Patients with ongoing chemotherapy, radiation, and/or lack of approval by the physician were excluded.

Interested patients received written information about the study and were subsequently contacted by telephone to clarify inclusion and exclusion criteria as well as open questions. Two weeks before the sailing trip, study participants received the first email link to an online questionnaire implemented in RED-Cap for their baseline evaluation (11). The email links to the follow-up questionnaires were sent 1, 3 and 6 months after sailing.

Questionnaires

A self-constructed questionnaire asked for age, sex, height, weight, type of cancer, cancer treatment, and characteristics of the sailing trip. Health-related QoL during the last 4 weeks was assessed by the 30-item questionnaire European Organisation for Research and Treatment of Cancer (EORTC QLQ-C30; 5), which covers global health as well as physical, role, emo-

tional, cognitive, and social functioning, the most common symptoms of tumor patients (fatigue, nausea/vomiting, pain, dyspnea, insomnia, appetite loss, constipation, diarrhea), and financial burden. Scales for global health and functioning range from 0-100, with higher scores indicating better QoL or functioning, whereas higher scores (range, 0-100) on the symptom scales reflect impaired QoL. Perceived well-being over the past 4 weeks and expected well-being in about 4 weeks was rated using visual analogue scales (VAS) from 0 (“very bad”) to 100 (“excellent”). Depressive symptomatology during the last 2 weeks was assessed by the depression module of the Patient Health Questionnaire (PHQ-9; 14), with scores ranging from 0 to 27 and higher scores indicating more severe depression. Fatigue was assessed by the 9-item Fatigue Severity Scale (FSS; 15), with scores ranging from 1 to 7 and higher scores indicating greater fatigue. Self-efficacy was evaluated by the 10-item General Self-Efficacy Scale (GSE; 8), which assesses confidence in overcoming a difficult situation and attributing success to one’s own competence. The sum score ranges from 10 to 40, with higher scores indicating higher self-efficacy. The Life Satisfaction Questionnaire (FLZ; 10) was used to assess general life satisfaction during the last 4 weeks in eight domains (friends/acquaintances, leisure time/hobbies, health, income/financial security, occupation/work, housing/living conditions, family life/children, and partner relationship/sexuality) as well as health-related life satisfaction in eight domains (physical condition/fitness, ability to relax/stay on an even keel, energy/zest for life, mobility, vision and hearing, freedom from anxiety, freedom from aches and pains, and independence from help/care). For each item, patients rate both subjective satisfaction with and subjective importance on 5-point Likert scales. Weighted sum scores for general life satisfaction and health-related life satisfaction range from -96 to 160, with higher scores indicating higher satisfaction. Social Support during the last 4 weeks was assessed using the 5-item ENRICH Social Support Inventory (ESSI; 12). The sum score ranges from 5 to 25, with higher values indicating higher social support (13). Leisure and sport-related physical activity was assessed using the Physical Activity, Exercise, and Sport Questionnaire (BSA; 20), which evaluates the frequency and duration of various physical activities during the last month in minutes per week, categorized by the domains leisure and sport. See Table 1 for an overview of questionnaires.

Statistical Analysis

Data were analyzed using SPSS (IBM, version 26). Changes in outcome parameters from baseline to follow-up at 1, 3 and 6 months were evaluated using Wilcoxon signed-rank tests. Due

Table 2

Outcome parameters at baseline and 4 weeks, 3 months, and 6 months after sailing. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (Wilcoxon signed-rank test for comparison with baseline). Abbreviations: EORTC=European Organisation for Research and Treatment of Cancer, IQR: Interquartile Range, PHQ=Patient Health Questionnaire, FSS=Fatigue Severity Scale, GSE=General Self-Efficacy Scale, FLZ=Life Satisfaction Questionnaire, ESSI=ENRICH Social Support Inventory, BSA=Leisure and sport-related Physical Activity.

VARIABLE	BASELINE (N=28)	1 MONTH (N=26)	3 MONTHS (N=27)	6 MONTHS (N=26)
CURRENT CANCER TREATMENT, N (%)				
Chemotherapy	0 (0)	1 (4)	0 (0)	0 (0)
Hormone and/or antibody therapy	7 (25)	6 (23)	7 (26)	8 (30)
Radiotherapy	0 (0)	0 (0)	0 (0)	0 (0)
Surgery	0 (0)	2 (7)	1 (4)	0 (0)
QUALITY OF LIFE (EORTC QLQ-C30), MEDIAN (IQR)				
Global Health Status (0-100)	62.5 (35.4; 66.7)	75 (52.1; 83.3)**	66.7 (58.3; 83.3)*	65.7 (21)
Physical Function (0-100)	93.3 (81.7; 100)	93.3 (80; 100)	93.3 (86.7; 100)	96.7 (80; 100)
Role Function (0-100)	50 (50; 100)	66.7 (33.3; 100)	83.3 (50; 100)	75 (45.8; 100)
Emotional Function (0-100)	50 (25; 66.7)	75 (50; 87.5)***	66.7 (22.2; 75)	58.3 (39.6; 77.1)
Cognitive Function (0-100)	66.7 (20.8; 83.3)	66.7 (58.3; 83.3)	66.7 (50; 83.3)	66.7 (62.5; 83.3)
Social Function (0-100)	66.7 (33.3; 95.8)	83.3 (33.3; 100)	66.7 (33.3; 100)	66.7 (45.8; 100)
Fatigue (0-100)	50 (33.3; 86.1)	44.4 (27.8; 66.7)	33.3 (22.2; 77.8)	44.4 (33.3; 77.7)
Nausea/vomiting (0-100)	0 (0; 12.5)	0 (0; 0)	0 (0; 0)	0 (0; 16.7)
Pain (0-100)	16.7 (0; 50)	16.7 (0; 41.7)	16.7 (0; 50)	25 (0; 50)
Dyspnoea (0-100)	16.7 (0; 58.3)	0 (0; 33.3)	0 (0; 33.3)	16.7 (0; 33.3)
Insomnia (0-100)	33.3 (0; 91.7)	33.3 (0; 66.7)	33.3 (0; 66.7)	33.3 (0; 66.7)
Appetite loss (0-100)	0 (0; 33.3)	0 (0; 0)*	0 (0; 33.3)	0 (0; 33.3)
Constipation (0-100)	0 (0; 33.3)	0 (0; 16.7)	0 (0; 0)	0 (0; 0)
Diarrhoea (0-100)	0 (0; 33.3)	0 (0; 0)	0 (0; 33.3)	0 (0; 33.3)
Financial problems (0-100)	33.3 (0; 66.7)	0 (0; 33.3)	0 (0; 66.7)*	0 (0; 33.3)
DEPRESSIVE SYMPTOMS (PHQ-9) (0-27), MEDIAN (IQR)				
	8 (4.3; 10)	5.5 (3.3; 7.5)**	7 (5; 9)	5 (3; 10)
FATIGUE (FSS) (1-7), MEDIAN (IQR)				
	4.2 (2.6; 6)	3.9 (2.4; 5.2)	3.7 (2.3; 5.4)	4.4 (2; 5.9)
PERCEIVED WELL-BEING (LAST 4 WKS) (VAS 0-100), MEDIAN (IQR)				
	57.5 (36; 74.8)	72 (58.3; 88.8)*	73 (43; 82)	68 (48.8; 80.3)
EXPECTED WELL-BEING (NEXT 4 WKS) (VAS 0-100), MEDIAN (IQR)				
	70 (56.3; 80.5)	73.5 (54.8; 88)	81 (70; 88)	80.5 (58.5; 89)
SELF EFFICACY (GSE) (10-40), MEDIAN (IQR)				
	29.5 (28; 32)	30 (26.5; 35.3)	29 (26; 35)	30 (26.8; 33.5)
LIFE SATISFACTION QUESTIONNAIRE (FLZ), MEDIAN (IQR)				
General Life Satisfaction (-96 to 160)	37 (5.3; 53)	47 (13.3; 72.8)*	51 (16; 67)	48.5 (18.3; 73.8)
Health-related Life Satisfaction (-96 to 160)	63.5 (39; 83.8)	71 (41.8; 100.5)	78 (31; 103)	75 (27.3; 103.5)
SOCIAL SUPPORT (ESSI) (5-25), MEDIAN (IQR)				
	15 (13; 18)	15.5 (14; 18)	16 (14; 18)	16 (14; 18.3)
PHYSICAL ACTIVITY (BSA), MEDIAN (IQR)				
Leisure-time physical activities (min/week)	346.3 (202.4; 653.1)	346.9 (190.6; 518.1)	335 (230; 706.3)	220.6 (130.6; 421.9)*
Sport activities (min/week)	195 (152.5; 476.3)	172.5 (96.3; 523.8)	232.5 (105; 450)	150 (78.8; 278.8)

to the pilot character of the study, p-values were not adjusted for multiple comparisons. The level of significance was set at $\alpha = 5\%$.

Results

28 participants (22 women) took part in the study (mean age 29.7 years, range 19 to 40). The body mass index (BMI) ranged from 18.6 to 28.4 kg/m². 9 patients (31%) suffered from breast- or ovarian cancer, 7 patients (25%) from lymphoma or leukemia, 4 patients (14%) from brain tumors and 3 patients (11%) from osteosarcoma. Further diagnoses were melanoma, seminoma, and a gastrointestinal tumor. 17 patients (61%) had previously received chemotherapy, radiotherapy and/or surgery, 7 patients were receiving hormone and/or antibody therapy at study

onset, and 4 patients (19%) stated that cancer treatment was planned for the future. The average time between primary diagnosis and the sailing trip was 42 months (range, 8 to 244).

The sailing trips took place between May and September in 2018 and 2019 in the North Sea (68%), in the Atlantic (21%) or in the Baltic Sea (11%). The median duration was 11 days (range, 8 to 13). 16 participants (57%) had never been sailing before. All patients completed the sailing trip. Follow-up questionnaires were returned by 26 patients after 1 month, 27 patients after 3 months and 26 patients after 6 months.

Outcome variables before sailing and 1, 3 and 6 months thereafter are displayed in Table 2. Evaluation of the EORTC-QLQ C30 subscales indicated improvements in global health status, emotional role function, and appetite loss from baseline to

one month after sailing. Global health status and financial burden were improved after three months. None of the EORTC-QLQ C30 subscales improved from baseline to six months. Depressive symptoms (PHQ-9), perceived well-being (VAS) and general life satisfaction (FLZ) improved from baseline to one month. Fatigue severity (FSS), self-efficacy (GSE), expected well-being (VAS) and social support (ESSI-D) did not change during the observation period. Evaluation of physical activity (BSA) indicated a significant decrease in leisure time physical activity from baseline to six months, while sport activity remained stable.

To evaluate the role of positive expectations for improved well-being, a stepwise linear regression analysis was performed, with expected and perceived well-being at baseline as the independent variables, and perceived well-being 1 month after sailing as the dependent variable. Expected well-being predicted perceived well-being after sailing ($\beta=0.46$, $p=0.022$), explaining 22% of the variance ($R^2=0.22$).

Discussion

Results of this prospective pilot study with 6-months follow-up indicate that a single ocean sailing trip was associated with improvements in global health status, emotional function, depressive symptoms, and general life satisfaction in young adult cancer patients. Most of these improvements were noted one month after sailing, the global health status was still improved after three months. No changes from baseline were significant after six months, except for a decrease in leisure time physical activity.

The observed improvements may be related to the special situation of this group of patients between the ages of 19 and 40. Because of topics like partnership and family planning, they tend to worry about their appearance and attractiveness (4) and are seeking emotional support from their peers (19, 23). Ocean sailing with other young adult cancer patients could thus meet the emotional needs of these patients, which, together with physical activity, could explain the observed improvements in QoL, emotional well-being, depressive symptoms, and general life satisfaction. However, randomized controlled trials are required before any causal conclusions can be drawn.

Before the sailing trip, 43% of the participants suffered from severe fatigue, with FSS scores above the cut-off point of 5 (16). One month after sailing, only 26% of participants reported severe fatigue, but on average, fatigue scores did not significantly improve. Even though systematic reviews showed beneficial effects of physical activity on fatigue in cancer patients, effect sizes are usually small, especially in young cancer patients (7, 9, 11). Repeated sailing trips may be necessary to improve fatigue in this patient group.

Interestingly, sailing had no or little impact on physical functioning and/or the level of physical activity. The decrease in leisure time physical activities 6 months after sailing may best be explained by seasonal changes due to winter time.

Limitations

This is a pilot study with a small sample size and a rather heterogeneous group of mainly female cancer patients. The uncontrolled design of the study does not allow causal conclusions to be drawn about the relationship between ocean sailing and the observed improvements, as possible confounders were not controlled for. For example, the impact of seasonal variation on changes in well-being remains unclear. Moreover, we found some evidence for the role of positive expectations for the improvement in well-being after the sailing trip. Finally, it should be noted that we did not monitor physical activity, and individual levels of physical activity may have varied during the sailing trip. However, 89% of the sailing trips took place in the North Sea and Atlantic Ocean, often for days without reaching a port, and the physical exertion on such trips is usually quite high.

Conclusions

To date, this is the first study to suggest possible beneficial short-term effects of an ocean sailing trip on QoL, emotional well-being, depressive symptoms, and general life satisfaction in young adult cancer patients. Physical outdoor activity combined with the camaraderie and team-work experience of a sailing trip could be essential. Randomized controlled trials are warranted to clarify the causal role of ocean sailing and its single components for the observed improvements.

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Conflict of Interest

The authors have no conflict of interest.

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