BRIEF RESEARCH ARTICLE

CrossMark

Risk of malnutrition and emotional distress as factors affecting health-related quality of life in patients with resected cancer

C. Calderon[1] · A. Carmona-Bayonas[2] · C. Beato[3] · I. Ghanem[4] · R. Hernandez[5] · M. Majem[6] · A. Rosa Diaz[5] ·
O. Higuera[4] · M. Mut Lloret[7] · P. Jimenez-Fonseca[8]

Abstract

Introduction This study analyzes the prevalence of malnutrition, depression, anxiety, and somatization and which factor has the biggest effect on quality of life (QoL) in individuals with resected cancer.

Methods A prospective study was conducted among 747 participants. Participants completed the EORTC-QLQ30, MST, and BSI-18 questionnaires.

Results Prevalence for risk of malnutrition, depression, anxiety, and somatization were 36.4%, 35.5%, 35.2%, and 48.8%, respectively. Hierarchical multiple regression analyses revealed that malnutrition risk, somatization, depression, and anxiety accounted for 50.8% of the variance in functional scale, 45.3% in symptom scale, and 52.2% in global health. Malnutrition, somatization, depression, and anxiety displayed high explanatory power on all health-related QoL (HRQoL) scales.

Conclusion The risk of malnutrition and psychological symptoms is strongly associated with HRQoL in cancer patients; thus, medical oncologists should develop effective interventions that contribute to lowering the risk of malnutrition and psychological distress, thereby improving subjects' HRQoL before initiating adjuvant chemotherapy.

Keywords BSI18 · Cancer · EORTC-QLQ30 · Health-related quality of life · Malnutrition · MST · Psychological symptoms

✉ P. Jimenez-Fonseca
palucaji@hotmail.com

1 Department of Clinical Psychology and Psychobiology, Faculty of Psychology, University of Barcelona, Barcelona, Spain

2 Department of Hematology and Medical Oncology, Hospital Universitario Morales Meseguer, UMU, IMIB, Murcia, Spain

3 Department of Medical Oncology, Hospital Universitario Virgen de la Macarena, Sevilla, Spain

4 Department of Medical Oncology, Hospital Universitario La Paz, Madrid, Spain

5 Department of Medical Oncology, Hospital Universitario de Canarias, Tenerife, Spain

6 Department of Medical Oncology, Hospital Universitari Santa Creu i Sant Pau, Barcelona, Spain

7 Department of Medical Oncology, Hospital Universitario Son Espases, Mallorca, Spain

8 Department of Medical Oncology, Hospital Universitario Central de Asturias, Oviedo, Spain

Introduction

Following curative resection of cancer, patients must manage a wide range of physical and psychological symptoms prior to undertaking adjuvant chemotherapy [1]. These symptoms can compromise tolerance to treatment and compliance. Thus, the overall 5-year survival rate is three to four times higher among those who complete complementary chemotherapy [2, 3]. Treatment toxicity, and physical and psychological symptoms during this period upset these individuals, as they are associated with a decline in health-related quality of life (HRQoL), decreased psychological well-being, and interference with their activities and the plans they have for their lives [4, 5].

The most usual symptoms among subjects with resected cancer include malnutrition, depression, anxiety, and somatization, which have been evaluated separately in various studies [4, 6, 7]. Malnutrition, present in 39% of cancer patients [8], is a critical predictor of toxicity and negatively related to clinical outcomes and to increased mortality [6]. Psychological distress affects 8–50% of all patients [4, 5, 7, 9, 10].

This study seeks to examine the concurrent prevalence of risk of malnutrition, depression, anxiety, and somatization in individuals with resected cancer and determine which of these factors exerts a major effect on HRQoL in people with non-metastatic, resected cancer. This could aid oncologists in designing effective interventions to improve patients' expectations for survival.
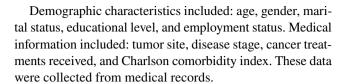
Methods

Participants and procedure

A cross-sectional, multicentre study was conducted in 15 Spanish hospitals. Candidates were ≥ 18 years of age who had undergone cancer surgery in the previous month and who initiated adjuvant chemotherapy between June 2015 and July 2018 at 15 Spanish hospitals. The Spanish Agency of Medicines and Medical Devices (AEMPS) classified it as a prospective, observational study; the centers obtained ethics committee approval, and all participants provided written informed consent in advance. Subjects were asked to complete a set of validated, self-report measures.

Measures

Quality of life (QoL) was evaluated by the Spanish version of the European Organization for Research and Treatment of Cancer QoL Questionnaire (EORTC-QLQ30), which was specifically designed for cancer patients [11]. The questionnaire consists of 30 items divided among functional scales (physical, social, role, cognitive, and emotional), symptom scales (fatigue, nausea/vomiting, pain, dyspnea, sleeping disturbances, appetite loss, constipation, diarrhea, and financial impact), and global QoL. Higher functional scale and overall health status scores and lower symptom scale scores indicate better QoL.

Risk of malnutrition was evaluated by the Malnutrition Screening Tool (MST). This tool is a fast, straightforward nutrition screening tool based on weight loss and appetite changes, yielding a score of 0–5; risk of malnutrition was defined as a score ≥ 2 [12]. It has been validated in cancer patients [12].

We measured psychological distress with the Brief Symptom Inventory (BSI) (Derogatis and Spencer 1982). The BSI-18 is a valid, reliable, widely used screening measure [13]. The 18-item questionnaire contains three subscales: somatization (six items), anxiety (six items), and depression (six items). For the purpose of the current study and according to the cutoff recommended by Derogatis [14], a T-score ≥ 63 was used as indicative of caseness. The Spanish version of the BSI has proven good reliability and validity [15].

Demographic characteristics included: age, gender, marital status, educational level, and employment status. Medical information included: tumor site, disease stage, cancer treatments received, and Charlson comorbidity index. These data were collected from medical records.

Statistical analysis

Descriptive statistics were used to analyze participants' sociodemographic and clinical characteristics. Cutoffs for risk of malnutrition, depression, anxiety, and somatization were based on appropriate values as per previous studies conducted in a population similar to that of this study [12, 14]. Pearson correlations were performed to identify correlated factors affecting HRQoL. Multiple linear regressions were used to determine if higher functional scores are related to HRQoL. Significance was set at $p < 0.05$. Statistical analyses were performed with Statistical Package for Social Sciences (SPSS) software, 23.0 version (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp.).

Results

Patient characteristics

The study population comprised 747 patients, 433 (58%) women and median age was 59.6 (range 26–85) years. The most frequent primary tumor sites were colon (43.4%) and breast (31.9%), and the most common stage, III (42.8%). Half of the sample (52%) had a Charlson index score of 0. All underwent adjuvant chemotherapy and 32.8% received associated radiotherapy (see Table 1).

Prevalence of malnutrition risk, somatization, depression, and anxiety

Prevalence rates of malnutrition risk (MST score ≥ 2), depression, anxiety, and somatization (all BSI T-score ≥ 63) were 36.4%, 35.5%, 35.2%, 48.8%, respectively.

Malnutrition risk and psychological factors related with HRQoL

The results of the correlation analysis revealed associations between the risk of malnutrition, somatization, depression, and anxiety with functional, symptom, and global HRQoL scales (see Table 2). The results of the hierarchical multiple regression analysis indicated that the risk of malnutrition, somatization, depression, and anxiety concurrently described 50.8% of the variance in the functional scale ($F = 189.47$, $p < 0.001$), 45.3% in the symptom scale

Table 1 Demographic and clinical characteristics of the study population ($n = 747$)

Characteristics	n	%
Age (mean; SD)	59.6 (12.3)	
Gender		
Male	314	42.0
Female	433	58.0
Marital status		
Married/partnered	566	75.8
Single, divorced, or widowed	181	24.2
Educational level		
< Graduated high school	447	59.8
≥ Graduated	300	40.2
Employment status		
Employed	300	40.2
Unemployed	447	59.8
Tumor site		
Colon	324	43.4
Breast	238	31.9
Gastrointestinal	66	8.8
Lung	35	4.7
Others	84	11.2
Stage		
I	140	18.7
II	265	35.5
III	320	42.8
Unknown	22	2.9
Treatment		
Chemotherapy	502	67.2
Chemo- and radiotherapy	245	32.8

n number of patients, SD standard deviation, % percentage

Table 2 Pearson product–moment correlations between malnutrition risk (MST), psychological factors (BSI-18), and EORTC scales

Factors	Functional scale	Symptom scale	Global HRQoL
Malnutrition	− 0.205**	0.247**	− 0.251**
Somatization	− 0.587**	0.613**	− 0.623**
Depression	− 0.613**	0.512**	− 0.595**
Anxiety	− 0.549**	0.435**	− 0.507**

**p < 0.001

($F = 153.77$, $p < 0.001$), and 52.2% in the global HRQoL ($F = 202.22$, $p < 0.001$) (see Table 3).

Discussion

This study analyzed the prevalence of malnutrition, depression, anxiety, and somatization to determine which of these factors had the greatest impact on HRQoL in people surgically treated for non-metastatic cancer prior to undertaking adjuvant chemotherapy. The presence of malnutrition, together with psychological symptoms were seen to have strong explanatory power in all HRQoL scales (functional, symptom, and global).

Our findings of 36.4% malnutrition risk and 48.8% somatization are similar to figures previously reported in oncology patients, 29–56% [16–18] and 40–50% [19, 20], respectively. Somatization and depression are the two most common symptoms in oncological populations [20]. The rate of depression in our series (35.5%) is relatively higher than in earlier research (9–33%) [21–23]. This discrepancy might be explained by the differences in types of tumors and treatments and by psychosocial variables, such as age or marital status [24]. In general, people with cancer undergoing adjuvant chemotherapy report higher rates of physical problems and psychological distress, including anxiety and somatization, than patients only treated with surgery [25]. Subjects, generally younger ones, who receive higher dosages of chemotherapy communicate more depression and somatization [26, 27]. Another possible explanation for this disparity could be the cutoffs used on the questionnaire scoring; for instance, the BSI cutoff in this study was T-score ≥ 63, as in most clinical trials [13, 28, 29], albeit higher than the one used by another study (T-score ≥ 50) [28]. The higher rates of depression may also be due to the timing of administration; 1 month following resection in our series. Thus, the prevalence of depression appears to be strikingly lower (7.5%) 6 months post-diagnosis among individuals with colorectal cancer [30]. As for somatization, it is worth investigating if the higher scores on this scale might be due to patients' tendency to hide and avoid expressing

Table 3 Linear regression analysis of factors correlated with functional, symptom, and global quality of life (QoL) scale

Predictive variables	Functional QoL			Symptom QoL			Global QoL		
	B	β	p value	B	β	p value	B	β	p value
Malnutrition	− 1.28	− 0.09	0.001	1.67	0.13	0.001	− 1.69	− 0.13	0.001
Somatization	− 0.90	− 0.35	0.001	1.01	0.45	0.001	− 0.92	− 0.41	0.001
Depression	− 0.84	− 0.30	0.001	0.54	0.22	0.001	− 0.74	− 0.29	0.001
Anxiety	− 0.36	− 0.16	0.001	0.12	0.06	0.001	− 0.19	− 0.10	0.001
Constant	108.81		0.001	− 87.11		0.116	192.63		0.010

their negative emotions, such as anger, when they find themselves in adverse situations, such as having cancer [31]. It would, therefore, be compelling for future research to analyze the relationship between somatization–depression and emotional repression in people of this type.

The results also reveal that physical factors, such as the risk of malnutrition, and psychological factors, such as depression, anxiety, and somatization, account for a large proportion of variance in HRQoL rating tools. These outcomes are consistent with earlier studies that point to the management of depression as being decisive to cancer patients' emotional well-being, in addition to having a long-term impact on QoL [32, 33]. This is cardinal in our study, since the presence of depression and somatization in people preparing to receive chemotherapy may increase withdrawal rates and/or dose reductions due to the adverse effects of treatment.

This study has several limitations. First of all, the study is cross-sectional; hence, we cannot infer causality in the relationships between HRQoL and nutritional status, depression, anxiety, and somatization. Second, the use of self-report subjective measures cannot accurately reflect patients' experiences, expectations, and behavior and incur such limitations as response bias (social desirability, inaccurate memory, etc.). Finally, factors other than those investigated in this study can affect HRQoL.

To the best of our knowledge, this study is the first to examine nutritional risk, depression, anxiety, and somatization concurrently to determine which account best for the proportion of variance in HRQoL in subjects with resected cancer who are getting ready to receive adjuvant chemotherapy. The results can be used to develop effective interventions that contribute to improving quality of life in this population, which should be our prime objective.

In conclusion, these results have interesting implications, such as ensuring that individuals with cancer who are initiating adjuvant chemotherapy are at their best both physically and psychologically. The risk of malnutrition and the presence of depression, anxiety, and somatic symptoms can influence tolerance and compliance with adjuvant treatment, with the risk of compromising long-term survival.

Compliance with ethical standards

Conflict of interest None to declare. This is an academic study.

Ethical approval The study has been performed in accordance with the ethical standards of the Declaration of Helsinki and its later amendments. This study is an observational trial without intervention.

Informed consent Signed informed consent was obtained from all patients.

References

1. Nakajima T. What make differences in the outcome of adjuvant treatments for resected gastric cancer? World J Gastroenterol. 2014;20:11567.
2. Sasako M, Sakuramoto S, Katai H, Kinoshita T, Furukawa H, Yamaguchi T, et al. Five-year outcomes of a randomized phase III trial comparing adjuvant chemotherapy with S-1 versus surgery alone in stage II or III gastric cancer. J Clin Oncol. 2011;29:4387–93.
3. Proskurina AS, Gvozdeva TS, Potter EA, Dolgova EV, Orishchenko KE, Nikolin VP, et al. Five-year disease-free survival among stage II–IV breast cancer patients receiving FAC and AC chemotherapy in phase II clinical trials of Panagen. BMC Cancer. 2016;16:651.
4. Krebber AMH, Buffart LM, Kleijn G, Riepma IC, Bree R, Leemans CR, et al. Prevalence of depression in cancer patients: a meta-analysis of diagnostic interviews and self-report instruments. Psychooncology. 2014;23:121–30.
5. Hong JS, Tian J. Prevalence of anxiety, and depression and their risk factors in Chinese cancer patients. Support Care Cancer. 2014;22:453–9.
6. Pinho NB, Martucci RB, Rodrigues VD, D'Almeida CA, Thuler LCS, Saunders C, et al. Malnutrition associated with nutrition impact symptoms and localization of the disease: results of a multicentric research on oncological nutrition. Clin Nutr. 2018. https://doi.org/10.1016/j.clnu.2018.05.010.
7. Kroenke K, Johns SA, Theobald D, Wu J, Tu W. Somatic symptoms in cancer patients trajectory over 12 months and impact on functional status and disability. Support Care Cancer. 2013;21:765–73.
8. Gyan E, Raynard B, Durand JP, Lacau Saint Guily J, Gouy S, Movschin ML, et al. Malnutrition in patients with cancer. PEN J Parenter Enter Nutr. 2017. https://doi.org/10.1177/0148607116688881.
9. Jimenez-Fonseca P, Calderón C, Hernández R, Ramón Cajal T, Mut M, Ramchandani A, et al. Factors associated with anxiety, and depression in cancer patients prior to initiating adjuvant therapy. Clin Transl Oncol. 2018. https://doi.org/10.1007/s12094-018-1873-9.
10. Kroenke K, Zhong X, Theobald D, Wu J, Tu W, Carpenter JS. Somatic symptoms in patients with cancer experiencing pain or depression. Arch Intern Med. 2010;170(18):1686–94.
11. Aaronson NK, Ahmedzai S, Bergman B, Bullinger M, Cull A, Duez NJ, et al. The European Organization for Research and Treatment of Cancer QLQ-C30: a quality-of-life instrument for use in international clinical trials in oncology. J Natl Cancer Inst. 1993;85:365–76.
12. Ferguson ML, Bauer J, Gallagher B, Capra S, Christie DRH, Mason BR. Validation of a malnutrition screening tool for patients receiving radiotherapy. J Med Imaging Radiat Oncol. 1999;43:325–7.
13. Recklitis CJ, Blackmon JE, Chang G. Validity of the brief symptom inventory-18 (BSI-18) for identifying depression and anxiety in young adult cancer survivors: comparison with a structured clinical diagnostic interview. Psychol Assess. 2017;29:1189–200.
14. Derogatis LR, Melisaratos N. The brief symptom inventory: an introductory report. Psychol Med. 1983;13(3):595–605.
15. Andreu Y, Galdón MJ, Dura E, Ferrando M, Murgui S, García A, et al. Psychometric properties of the brief symptoms inventory-18 (Bsi-18) in a Spanish sample of outpatients with psychiatric disorders. Psicothema. 2008;20:844–50.
16. Di Bella A, Blake C, Young A, Pelecanos A, Brown T. Reliability of patient-led screening with the malnutrition screening tool: agreement between patient and health care professional

scores in the cancer care ambulatory setting. J Acad Nutr Diet. 2018;118:1065–71.

17. Shaw C, Fleuret C, Pickard JM, Mohammed K, Black G, Wedlake L. Comparison of a novel, simple nutrition screening tool for adult oncology inpatients and the malnutrition screening tool (MST) against the patient-generated subjective global assessment (PG-SGA). Support Care Cancer. 2015;23:47–54.

18. Isenring E, Cross G, Daniels L, Kellett E, Koczwara B. Validity of the malnutrition screening tool as an effective predictor of nutritional risk in oncology outpatients receiving chemotherapy. Support Care Cancer. 2006;14(11):1152–6.

19. Kirchhoff AC, Krull KR, Ness KK, Armstrong GT, Park ER, Stovall M, et al. Physical, mental, and neurocognitive status and employment outcomes in the childhood cancer survivor study cohort. Cancer Epidemiol Biomark Prev. 2011;20:1838–49.

20. Carlson LE, Angen M, Cullum J, Goodey E, Koopmans J, Lamont L, et al. High levels of untreated distress and fatigue in cancer patients. Br J Cancer. 2004;90:2297–304.

21. Bevilacqua LA, Dulak D, Schofield E, Starr TD, Nelson CJ, Roth AJ, et al. Prevalence and predictors of depression, pain, and fatigue in older-versus younger-adult cancer survivors. Psychooncology. 2018;27:900–7.

22. Beekers N, Husson O, Mols F, van Eenbergen M, van Poll-Franse LV. Symptoms of anxiety, and depression are associated with satisfaction with information provision and internet use among 3080 cancer survivors. Cancer Nurs. 2015;38:335–42.

23. Lee MS, Tyson DM, Gonzalez BD, Small BJ, Lechner SC, Antoni MH, et al. Anxiety, and depression in Spanish-speaking Latina cancer patients prior to starting chemotherapy. Psychooncology. 2018;27(1):333–8

24. Aizer AA, Chen M, McCarthy EP, Mendu ML, Koo S, Wilhite TJ, et al. Marital status and survival in patients with cancer. J Clin Oncol. 2013;31:3869–76.

25. Howard-Anderson J, Ganz PA, Bower JE, Stanton AL. Quality of life, fertility concerns, and behavioral health outcomes in younger breast cancer survivors: a systematic review. J Natl Cancer Inst. 2012;104:386–405.

26. Zebrack BJ, Zeltzer LK, Whitton J, Mertens AC, Odom L, Berkow R, et al. Psychological outcomes in long-term survivors of childhood leukemia, Hodgkin's disease, and non-Hodgkin's lymphoma: a report from the Childhood Cancer Survivor Study. Pediatrics. 2002;110:42–52.

27. Cohee AA, Adams RN, Johns SA, Von AhD, Zoppi K, Fife B, et al. Long-term fear of recurrence in young breast cancer survivors and partners. Psychooncology. 2017;26:22–8.

28. Wiesel TRW, Nelson CJ, Tew WP, Hardt M, Mohile SG, Owusu C, et al. The relationship between age, anxiety, and depression in older adults with cancer. Psychooncology. 2015;24:712–7.

29. Goldzweig G, Andritsch E, Hubert A, Brenner B, Walach N, Perry S, et al. Psychological distress among male patients and male spouses: what do oncologists need to know? Ann Oncol. 2010;21:877–83.

30. Lynch BM, Steginga SK, Hawkes AL, Pakenham KI, Dunn J. Describing and predicting psychological distress after colorectal cancer. Cancer. 2008;112:1363–70.

31. Brandão T, Schulz MS, Matos PM. Psychological adjustment after breast cancer: a systematic review of longitudinal studies. Psychooncology. 2017;26:917–26.

32. Park S, Kang CH, Hwang Y, Seong YW, Lee HJ, Park IK, et al. Risk factors for postoperative anxiety, and depression after surgical treatment for lung cancer. Eur J Cardio Thorac Surg. 2016;49:e16–21.

33. Kulkarni AR, Pusic AL, Hamill JB, Kim HM, Qi J, Wilkins EG, et al. Factors associated with acute postoperative pain following breast reconstruction. JPRAS Open. 2017;11:1–13.