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Can life satisfaction be considered a predictor of quality of life in patients with lung cancer?

J. POLAŃSKI[1], M. CHABOWSKI[2,3], N. ŚWIĄTONIOWSKA-LONC[4], B. JANKOWSKA-POLAŃSKA[4], G. MAZUR[5]

[1]Home Hospice, Lower Silesian Oncology Center, Wrocław, Poland
[2]Department of Clinical Nursing, Division of Oncology and Palliative Care, Faculty of Health Science, Wrocław Medical University, Wrocław, Poland
[3]Dept of Surgery, 4th Military Teaching Hospital, Wrocław, Poland
[4]Division of Nervous System Diseases, Department of Clinical Nursing, Faculty of Health Science, Wrocław Medical University, Wrocław, Poland
[5]Dept of Internal Medicine, Occupational Diseases, Hypertension and Clinical Oncology, Wrocław Medical University, Wrocław, Poland

Abstract. – OBJECTIVE: To evaluate the association between satisfaction with life and Quality of Life (QoL) in lung cancer patients, and to analyze the correlations of selected variables with QoL.

PATIENTS AND METHODS: 250 patients with lung cancer were enrolled into the study, with a mean age of 63.2± 9.4, and who were treated at the Regional Lung Hospital in Poland between January and June 2019. 110 patients (43.9%) were moderately satisfied with their life (18-23 points from SWLS). 72 (28.8%) had a high level of satisfaction, and 68 (27.2%) had a low level of satisfaction with life.

RESULTS: Patients with a high level of satisfaction with life had a better QoL ($p<0.001$) and experienced less severe symptoms, with the exception of constipation, haemoptoe, soreness in the mouth, dysphagia, hair loss, and pain in the arms. Patients with a high level of satisfaction with life have a significantly lower intensity of behaviors associated with anxious preoccupation ($p<0.001$) and helplessness/hopelessness ($p<0.001$). Destructive coping styles increase as satisfaction with life decreases ($p<0.001$). Patients with a high level of satisfaction with life were more accepting of their illness ($p<0.001$).

CONCLUSIONS: Patients being treated for lung cancer have a moderate level of satisfaction with life. QoL is associated with satisfaction with life and increases depending on the level of satisfaction. Symptoms are less severe when patients are more satisfied with their life. Satisfaction with life was associated with acceptance of the illness and coping strategies. Not smoking, chest pain, time from diagnosis, performance status, and symptomatic treatment adversely affected satisfaction with life. Conversely, a lack of family history of cancer positively affected satisfaction with life.

Key Words:
Life satisfaction, Quality of life, Lung cancer, Coping strategy, Acceptance of the illness.

Introduction

Lung cancer is the most common malignancy in Poland and worldwide[1,2], both in terms of incidence and mortality. The prognosis in lung cancer patients mainly depends on the stage of the cancer and its molecular characteristics[3]. In patients with advanced stages of lung cancer, significant prognostic factors include performance status and weight loss. Despite major advances in oncology, lung cancer treatment is not yet producing satisfactory outcomes, most commonly due to late diagnosis, the elderly age of patients, and comorbidities that restrict the available therapeutic options[4]. Symptom relief poses a major challenge for palliative care teams. Combined modality treatment for lung cancer improves patient survival, but simultaneously causes early and late toxicity, as well as more severe treatment-associated symptoms[5]. Both the underlying disease and the treatment used have a significant impact on patients' quality of life (QoL), wellbeing, and daily social functioning.

QoL in cancer patients depends on the performance status (PS), cancer type, its location, which stage it is, treatment used, and the prospects of a cure or survival with the disease. QoL is considerably lower in lung cancer patients than among healthy individuals and depends on the

 Corresponding Authors: Mariusz Chabowski, MD, Ph.D; e-mail: mariusz.chabowski@gmail.com

severity of the symptoms. Tumor excision often results in a rapid improvement in terms of cancer patients' health but does not always improve QoL. Persistent symptoms interfere with the patient's physical functioning, while the diagnosis and complex treatment have an adverse impact on their psychological condition. The key to improving QoL in lung cancer patients is alleviating symptoms. Most available publications focus on treatment effectiveness and outcomes associated with complex therapeutic protocols. Few studies address patients' ability to cope with their cancer or its impact on QoL.

Literature on the subject features few reports on the impact of coping strategies on the QoL of lung cancer patients. Studies evaluating illness acceptance and perception or satisfaction with life are scarce. Personalized treatment is the best way of improving patients' QoL. Patients receiving early psychological, social, and spiritual support are less susceptible to the psycho-social consequences of their disease[6].

Identifying the factors affecting patient QoL is important. Initial QoL and physical status assessment provide valuable prognostic data on lung cancer patients[7,8]. A lung cancer patient typically experiences more alarming symptoms than patients with other cancers. Beside symptoms specific to lung cancer, other determinants of QoL include anxiety, depression, and social isolation.

There is now an increasing awareness in clinical practice of the importance of a patient's psycho-emotional state and their coping strategies for treatment outcomes. Time devoted to a patient has a significant impact on the therapeutic benefits, and understanding the patient, their concerns about their illness, and their perception of that illness is also significant. Patient wellbeing is an important component of health and may even be considered synonymous with it. Subjective wellbeing comprises positive feelings, the absence of negative feelings, and satisfaction with life. Satisfaction with life is the result of a comparison between one's situation and one's standards. It is sometimes considered synonymous with QoL or included as a component of it.

Cancer is often associated with emotional turmoil, including elements of depression, anxiety, and stress. Clinical observations and evidence indicate that cancer patients are less happy, more anxious, and more depressed than healthy populations. Though the role of patients' psycho-emotional state in cancer treatment is discussed at times, information on cancer patients' perception of their illness, acceptance, satisfaction, and coping strategies is scarce, especially with reference to their QoL[9-11].

In this paper, we decided to address satisfaction with life and its association with QoL. QoL is semantically close to satisfaction with life, but not all researchers regard these concepts as synonymous. QoL is a broader concept, encompassing a process of satisfying one's material and non-material needs through the fulfillment of the biological, psychological, spiritual, social, political, cultural, economic, and environmental standards or values of individuals, families, and communities[12]. Satisfaction with life and QoL are analyzed in research from the cognitive or experiential (emotional) point of view. From the cognitive point of view, achieving satisfaction and improving one's QoL is associated with independence, freedom of choice, and unrestricted access to important resources. The emotional aspect is associated with an individual's capacity to interpret, evaluate, and reflect upon one's attitude towards other people, their actions, and the world. Şimşek et al[13] believe that in an evaluation of life as a whole, one should regard life as a project spread over time, with purpose as a central concept. In this approach, subjective satisfaction results from the evaluation of life in terms of the past, the present and the prospects for the future.

The aim of the study was to evaluate the association between satisfaction with life and QoL in lung cancer patients, and to analyze the correlations of selected variables with QoL.

Patients and Methods

The study was performed between January and June 2019 at the Regional Lung Hospital in Rościszów, Poland. It included 250 patients who met the inclusion criteria. The study was approved by the Wroclaw Medical University Bioethics Committee (Approval No. KB–729/2019).

Inclusion Criteria

Lung cancer diagnosis confirmed by histopathological examination, age >18 years, patient's consent to participate, understanding of all questionnaire items.

Exclusion Criteria

Age 75< years, lack of definite cancer diagnosis, lack of consent to participate, severe chronic comorbidities that could distort the patient's perception of their health (other malignancies, exac-

erbated heart failure, severe Chronic Obstructive Pulmonary Disease, asthma, hemodynamic instability), cognitive impairment interfering with unassisted completion of the questionnaire.

Research Instruments

All the patients included in the study took part in a survey in accordance with the set criteria, and their socio-demographic and clinical data were obtained from their medical records. All the patients who took part were informed about the purpose and nature of the study and advised that they could withdraw from it at any time. All the patients provided written informed consent that they would participate in the survey. As a general rule, questionnaires were completed by the patients without assistance, but with the researcher present. In case of difficulties with completing the questionnaire, a patient could ask the researcher for help, but even in that case, all responses were solely their own.

The EORTC QLQ-C30 (European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30) with the QLQ-LC13 lung cancer-specific module is a standardized instrument (version 3.0) dedicated to cancer patients. The QLQ-C30 allows for a comprehensive analysis of a patient's perceived health and functioning in the physical, emotional, and social dimension. It comprises 30 items — 5 functional scales; 3 symptom scales: fatigue, nausea and vomiting, and pain; and 6 items for recording the severity of shortness of breath, insomnia, appetite loss, constipation, diarrhea, and financial difficulties. The final two items are used to globally evaluate a respondent's health. Answers are given using a Likert-type scale. The EORTC QLQ-LC13 comprises 13 items specific to lung cancer symptoms. Our use of the questionnaire was approved by the Quality of Life Group within the EORTC, based in Brussels[14].

The Satisfaction with Life Scale (SWLS) by Diener et al[15] is used for evaluating satisfaction with life in both healthy and ill adults. It comprises 5 statements rated on a 7-item scale. The sum of scores from individual items reflects the patient's satisfaction with life. The total score may range between 5 and 35 points, with higher scores indicating more satisfaction with life. Sten results of 1-4 are considered low, sten 5-6 — moderate, and sten 7-10 — high. The Polish version of the SWLS was performed by Juczynski[16].

The severity of pain was evaluated using a visual analog scale (VAS). It consisted of a 10 cm line, on which the patient marked a point corresponding to their pain level, with 0 indicating no pain, 5 – moderate pain, and 10 – intolerable pain.

Other validated questionnaires used in the study included the Acceptance of Illness Scale (AIS), and the MiniMAC (Mental Adjustment to Cancer), which evaluates the patient's use of four strategies for coping with their cancer. Patients' medical records were used to collect medical and socio-demographic data.

To obtain a precise prognosis and make decisions on a further course of treatment, it is necessary to evaluate cancer patients' performance status. The most common instrument for assessing performance status is the ECOG (the Eastern Cooperative Oncology Group)/WHO/Zubrod scale, also called simply the WHO scale. It comprises 6 grades, between 0 and 5, with 0 indicating full activity with no symptoms, and 5 indicating death[17].

Statistical Analysis

Comparisons of qualitative variable values in groups were performed using the chi-squared test (with the Yates correction for 2x2 tables), or Fisher's exact test in the case of low expected counts. Comparisons of quantitative variable values in three groups were performed using ANOVA (for normal distributions of a variable in the groups analyzed) or the Kruskal-Wallis test (otherwise). Where statistically significant differences were found, post-hoc analysis was performed using Fisher's LSD test (for normal distributions) or the Dunn test (for distributions other than normal) to identify groups that were significantly different. Variable distribution normality was verified using the Shapiro-Wilk test. All analyses used a significance threshold of 0.05. i.e., all p-values of less than 0.05 were interpreted as showing significant associations. The analyses were performed using the R software, version 3.6.1.[18].

Results

In the group taking part in the study, the mean age of lung cancer patients was 63.2± 9.4. Most patients were not professionally active (70.4%) so they were retirees or disability pensioners, had vocational (45.9%) or high school education (33.5%), were in a relationship (59.9%), and lived in cities (69.6%). In terms of clinical characteristics, the most common complaints included a chronic cough (83.3%), dyspnea (65%), and chest pain (44%), while the most common comorbidities included diabetes (29.2%), asthma/COPD

(23%), and heart failure (23%). The mean number of hospitalizations per year was 1.5±2.1. Despite the lung cancer diagnosis, 42.4% still smoked. In terms of the severity of cancer, most patients had no metastases, and were either moderately restricted in activity (39.4%) or unable to work (35%). In terms of clinical classification, most patients were in stage IIIA (25.6%) or IVA (20.8%) (Table I).

Satisfaction with Life

SWLS scores were converted into a sten scale, and patients were divided into three categories based on their satisfaction level, namely: sten 1-4 — low satisfaction level, sten 5-6 — moderate satisfaction level, and sten 7-10 — high satisfaction level.110 out of 250 studied patients (43.9%) were found to be moderately satisfied with life. 72 (28.8%) had a high level of satisfaction, while 68 (27.2%) had a low level of satisfaction with life (Table II).

The Comparison Between QoL and Satisfaction with Life

Questionnaires QLQ-C30 and LC-13 comprise functional scales, where higher scores indicate better QoL, and symptom scales, where higher scores indicate greater symptom severity, and thus, poorer QoL. Values of $p<0.05$ indicate significant differences between groups. To accurately identify the correlations between satisfaction with life and QoL, we performed post-hoc analyses, which demonstrated that patients with a high level of satisfaction with life had better QoL than others in terms of overall QoL, physical functioning, and social functioning. QoL including daily living, emotional functioning, and cognitive functioning increased along with satisfaction with life. Patients with a high level of satisfaction with life experienced a lower severity of symptoms such as fatigue, nausea and vomiting, pain, shortness of breath, loss of appetite, constipation, diarrhea, and financial difficulties than other patients. The severity of insomnia also decreased as satisfaction with life increased. Hemoptysis and hair loss also decreased with higher life satisfaction, but not significantly (Table III).

What Affects Satisfaction with Life – Multiple-Factor Analysis for Socio-clinical Variables

The SWLS and the MiniMAC

The MiniMAC questionnaire is used for evaluating patients' use of four coping strategies with

Table I. Socio-clinical characteristics of the study group.

Variable	Total	
Number of patients (N)	250	
Age (years):		
M±SD	63.2 ± 9.4	
Residence:	N	%
Urban	176	69.6%
Rural	74	30.4%
Source of income:		
Professional activity	68	26.5%
Social welfare/disability pension/retirement	181	70.4%
Family support	8	3.1%
Relationship status:		
Married/in a relationship	154	59.9%
Single/widowed	103	40.1%
Education:		
Primary	27	11.3%
Vocational	112	45.9%
High school	82	33.5%
College/University	21	9.3%
Family history of cancer		
Yes	94	38.1%
No	156	61.9%
WHO PS:		
0	46	18.4%
1	105	42%
2	85	34%
3	11	4.4%
4	3	1.2%
5	0	0
Clinical stage:		
IA	23	9.2%
IB	21	8.4%
IIA	15	6.0%
IIB	36	14.4%
IIIA	64	25.6%
IIIB	28	11.2%
IIIC	5	2.0%
IVA	52	20.8%
IVB	6	2.4%
Number of hospitalizations:		
M±SD	1.5 ± 2.1	
Me (Q1; Q3)	1 (0; 2)	
Min – Max	0 – 11	
Smoking?		
Yes	109	42.4%
No, never	40	16.0%
Quit	90	35.4%
No, but others at home smoke a lot	11	6.2%
Chronic illness		
Diabetes mellitus	75	29.2%
Ischemic heart disease	42	18.3%
Renal insufficiency	11	4.3%
Heart failure	59	23.0%
Asthma/COPD	59	23.0%
Metastasis		
None	155	60.7%
Bone	18	7.0%
Brain	14	6.2%

Table continued

Table I (continued). Socio-clinical characteristics of the study group.

Variable	Total	
Liver	34	14.8%
Adrenal	30	11.7%
Blood-borne to multiple organs	20	7.8%
Symptoms:		
Chronic coughing	214	83.3
Shortness of breath	163	65.0
Chest pain	113	44.0
Hemoptysis	73	29.6
Recurrent infections	65	25.3
Superior vena cava syndrome	7	2.7
Cardiac arrhythmia	14	5.4
Hoarseness	66	25.7
Performance status		
0 – no symptoms, full activity	58	18.2
1 – some symptoms, reduced activity, light work	132	39.45
2 – ability to perform self-care, but not to work	110	35.0
3 – only limited activity	15	4.45
4 – reliance on care from others	7	2.4

WHO PS - Performance status.

regard to cancer. Scores for each strategy range between 7 and 28 points, and higher scores indicate more behaviors associated with the given strategy. Moreover, the MiniMAC makes it possible to assess two styles of coping with cancer. Each style includes two strategies: the constructive style includes a fighting spirit and positive redefinition, while the destructive style includes anxious preoccupation and helplessness/hopelessness.

Scores for each style range between 14 and 56 points, and higher scores indicate more behaviors associated with the given style. To accurately identify the correlations, post-hoc analysis was carried out. It showed that:

- patients with a high level of satisfaction with life have a significantly lower intensity of behaviors associated with anxious preoccupation than others;
- the intensity of behaviors associated with helplessness/hopelessness and the destructive coping style increases as satisfaction with life decreases (Table IV).

The SWLS and the AIS

To accurately identify correlations between the two scales, post-hoc analysis was carried out. It demonstrated that patients with a high level of satisfaction with life were more accepting of their illness than other patients (Table V).

The SWLS and other socio-clinical factors

In our study, we sought factors that affect a patient's satisfaction with life. We chose a linear regression model that included the following significant (p<0.05) independent predictors of SWLS scores:

- no family history of cancer: increases the SWLS score by a mean of 2.205 points;
- diagnosis made in 2018: decreases the SWLS score by a mean of 3.552 points compared to earlier years;
- having never smoked: decreases the SWLS score by a mean of 2.245 points compared to smoking currently;
- having quit smoking: decreases the SWLS score by a mean of 1.612 points compared to smoking currently;
- symptomatic treatment: decreases the SWLS score by a mean of 2.527 points;
- chest pain: decreases the SWLS score by a mean of 1.389 points;
- performance status grade 3 or 4: decreases the SWLS score by a mean of 5.56 points compared to grade 0 (Table VI).

R^2 for the model was 43.9%, which means that variables included in the model account for 43.9% of variance in SWLS scores, and the remaining 56.1% depends either on variables not included in the model or on random factors.

Discussion

Satisfaction with life is defined as the global perception of one's quality of life based on one's individual criteria. It is not easy to unambiguously answer the question why some people have a high level of satisfaction with life, while others do not. Studies in many populations have demon-

Table II. The number of patients according to satisfaction with life score.

SWLS score	Interpretation	n	%
5-17	Low satisfaction with life level	68	27.2%
18-23	Moderate satisfaction with life level	110	43.9%
24-35	High satisfaction with life level	72	28.8%

Table III. The comparative analysis of the domains of QoL and satisfaction with life

QoL		Low level of satisfaction with life – A	Moderate level of satisfaction with life – B	High level of satisfaction with life – C	*p**
Overall QoL	mean±SD	35.24±16.68	37.81±18.07	52.38±23.29	<0.001
Physical functioning	mean±SD	61.43±19.39	67.85±16.29	78.47±20.69	<0.001
Activities in daily life	mean±SD	47.38±23.85	58.85±24.3	80.41±29.11	<0.001
Emotional functioning	mean±SD	41.55±20.58	50.66±25.18	79.28±23.9	<0.001
Cognitive functioning	mean±SD	63.1±20.24	72.42±19	86.26±23.14	<0.001
Social functioning	mean±SD	51.9±23.83	57.08±30.44	86.04±23.09	<0.001
Fatigue	mean±SD	55.08±20.85	50.25±23.01	27.63±27.97	<0.001
Nausea and vomiting	mean±SD	24.05±24.51	20.5±23.15	6.98±14.34	<0.001
Pain	mean±SD	50±21.61	43.07±22.57	22.52±23.96	<0.001
Shortness of breath	mean±SD	50±25.85	47.2±22.59	31.98±25.55	<0.001
Insomnia	mean±SD	60.95±26.6	46.31±27.61	25.68±30.49	<0.001
Loss of appetite	mean±SD	41.43±28.05	36.87±27.59	24.77±32.2	<0.001
Constipation	mean±SD	23.81±26.7	23.3±28.83	12.61±23.86	0.005
Diarrhea	mean±SD	14.76±24.5	12.09±24.83	1.8±7.59	<0.001
Financial difficulties	mean±SD	50±29.9	43.66±30.56	21.62±30.44	<0.001
Shortness of breath	mean±SD	47.46±20.01	40.71±22.55	25.08±23.77	<0.001
Coughing	mean±SD	55.24±21.9	54.28±24.07	42.47±26.79	<0.001
Hemoptoe	mean±SD	20.95±24.85	15.63±21.4	12.16±18.77	0.084
Sore mouth or tongue	mean±SD	18.57±25.15	11.8±18.86	5.86±16.88	0.001
Dysphagia	mean±SD	21.9±26.55	18.29±23.57	8.56±18.35	0.001
Tingling hands or feet	mean±SD	24.29±29.45	17.99±21.38	8.11±15.42	<0.001
Hair loss	mean±SD	20±32.8	19.76±31.06	10.81±22.14	0.123
Pain in the chest	mean±SD	34.29±27.79	31.56±27.76	17.57±24.81	<0.001
Pain in arms or shoulders	mean±SD	18.57±27	18.29±25.97	7.66±17.92	0.004
Pain in other body parts	mean±SD	36.71±28.67	26.73±28.72	13.7±28.24	<0.001
No improvement with pain medication	mean±SD	58.64±17.49	54.72±17.93	48.68±20.09	0.046

*p= normal distribution in groups, ANOVA + post-hoc analysis results (Fisher's LSD test); NP = distribution in groups not normal, Kruskal-Wallis test + post-hoc analysis results (Dunn test).

Table IV. The influence of the styles and strategies of MiniMAC on satisfaction with life.

MiniMAC		Low level of satisfaction with life – A	Moderate level of satisfaction with life – B	High level of satisfaction with life – C	*p**
Anxious preoccupation	mean±SD	21.56±3.2	21.1±4.24	16.76±5.16	<0.001
	median	22	22	16	NP.
	quartiles	19.25-23.75	18-25	14-20	A,B>C
Fighting spirit	mean±SD	20.27±3.01	20.16±3.2	20.57±3.1	0.775
	median	20	21	21	NP.
	quartiles	18-22	18-22	18-22.75	
Helplessness/hopelessness	mean±SD	17.6±3.48	15.66±3.36	13.07±3.79	<0.001
	median	17	15	13	NP.
	quartiles	16-20	14-18	10.25-15	A>B>C
Positive redefinition	mean±SD	20.5±2.39	20.81±2.71	20.01±3.94	0.227
	median	20	21	20	NP.
	quartiles	19-22	19-22	17-22.75	
Constructive style	mean±SD	40.77±4.7	40.96±5.1	40.58±6.07	0.781
	median	41	41	40	NP.
	quartiles	38-44	38-45	36-44.75	
Destructive style	mean±SD	39.16±4.59	36.76±6.08	29.82±8.07	<0.001
	median	38	36	29.5	NP.
	quartiles	37-42	33-41	26-33.75	A>B>C

Table V. The post-hoc analysis of the acceptance of disease and satisfaction with life.

AIS [points]	Low level of satisfaction with life – A	Moderate level of satisfaction with life – B	High level of satisfaction with life – C	*p**
mean±SD	22.61±7.21	24.12±8.02	33.31±8.2	<0.001
median	23	24	37	
quartiles	17-28.75	17-31	30-40	C>B, A

* Distribution in groups not normal, Kruskal-Wallis test + post-hoc analysis results (Dunn test)
**p* = normal distribution in groups, ANOVA + post-hoc analysis results (Fisher's LSD test); NP = distribution in groups not normal, Kruskal-Wallis test + post-hoc analysis results (Dunn test)

strated that people pursue satisfaction in life and that they are generally happy with their lives[19]. It seems that health is among the prerequisites for a good life. Research reveals that illness is associated with a lower level of satisfaction with life compared to the healthy population[10,20].

In our study, most patients had a moderate level of satisfaction with life, while around 30% had a high level. Greater satisfaction with life may indicate a more positive outlook on one's situation. Cancer patients may try to find a positive side to their illness. Both ill and healthy individuals may be satisfied with their life, though sources of satisfaction differ between the two groups. In healthy individuals, satisfaction with life is associated with extraversion and negative emotionality, while in ill ones predictors of satisfaction include social inhibition and conscientiousness. This indicates that for healthy individuals satisfaction comes from their own activity and contacts with others, while for ill individuals it comes from the performance of social and professional roles[21].

The main contributors to life satisfaction are not yet completely understood, and the weights attributed to each vary individually. However, research has found that they are likely to fall into one of four sequential categories: life chances, course of events, flow of experience, and evaluation of life[22].

In our study, satisfaction with life was adversely affected by duration of illness, being a non-smoker, chest pain, symptomatic treatment, and a high degree of disability. Lack of a family history of cancer contributed to more satisfaction with life.

According to Rieker et al[23], 76% of cancer patients are able to see good sides to their illness, and the changes that are observed are mostly associated with positive redefinition. Satisfaction with life and coping with cancer are often linked to using positive coping strategies, including those termed "fighting spirit" and "positive redefinition". One can find life satisfaction in illness by changing one's way of thinking, finding a positive meaning in ordinary things, and seeking goals and priorities that divert one's attention[24]. The scarce data available in the literature also points to the importance of satisfaction with treatment-related communication and satisfaction with the treatment as part of overall satisfaction with life and QoL[25,26]. Samuel et al[26] report that satisfaction with life, as part of QoL, depends on the symptoms, specifically pain, and on the patient's involvement in the treatment process. Patients who reported optimum involvement in treatment-related decision-making and who complied with treatment had higher QoL scores than those who were not that active[26]. One could reverse the above conclusion to say that patients who are more satisfied with life and have a higher QoL are more involved in their treatment and demonstrate better compliance. In our study, symptomatic treatment was found to adversely affect satisfaction with life, in a similar way to chest pain. This may point to adverse effects from medication, or the accumulation of both disease symptoms and symptoms from treatment.

Notably, our study on associations between QoL and satisfaction with life demonstrated that QoL was poorer in patients with a low level of satisfaction, and better in those who were more satisfied. Similar correlations were found with regard to symptoms, both from the underlying cancer and from its treatment. More satisfaction with life was associated with lower severity of all the symptoms that were analyzed, except for hemoptysis and hair loss. In patients with advanced lung cancer, hemoptysis is one of the three most common respiratory symptoms beside dyspnea and coughing. It requires palliative care and is highly worrying for patients, both due to the experience of the symptom itself and to the sight of blood. Patients who have this symptom may fear

Table VI. The socio-clinical factors affecting satisfaction with life.

Factor		Regression parameter	95%	CI	*p*
Age [years]	0.004	-0.078	0.086	0.918	
Number of hospitalizations	-0.048	-0.38	0.284	0.775	
FEV1 [L]	-0.501	-1.751	0.748	0.43	
FVC [L]	0.064	-0.934	1.062	0.899	
FEV1/FVC [%]	0.033	-0.019	0.084	0.213	
Sex	Female	ref.			
	Male	-0.633	-1.929	0.662	0.336
Residence	Urban	ref.			
	Rural	-1.043	-2.441	0.354	0.143
Source of income	Professional activity	ref.			
	Social welfare, disability pension, retirement, family support	0.445	-1.298	2.189	0.615
Relationship status	In a relationship	ref.			
	Single	-0.574	-1.946	0.797	0.41
Education	Primary	ref.			
	Vocational	1.085	-1.05	3.219	0.317
	High school	0.804	-1.578	3.187	0.506
	College/University	2.254	-0.815	5.324	0.149
Family history of cancer	Yes	ref.			
	No	2.205	0.9	3.509	0.001*
Year of diagnosis	2017 or earlier	ref.			
	2018	-3.552	-5.725	-1.379	0.001*
Cancer type	Small-cell carcinoma	ref.			
	Non-small-cell carcinoma	1.239	-0.409	2.886	0.14
T parameter	T1	ref.			
	T2	0.366	-1.387	2.118	0.681
	T3	-0.243	-2.685	2.199	0.845
	T4	-0.946	-3.209	1.317	0.411
N parameter	N0	ref.			
	N1	-0.024	-1.785	1.738	0.979
	N2	-0.48	-2.273	1.314	0.598
	N3	1.434	-1.482	4.349	0.333
	Nx	2.012	-0.806	4.83	0.161
M parameter	M0	ref.			
	M1	0.605	-1.227	2.437	0.515
	M2, M3	-1.57	-5.6	2.459	0.443
	Mx	-0.562	-2.799	1.674	0.62
Cigarette smoking	Yes	ref.			
	Never	-2.245	-4.182	-0.307	0.023*
	Quit	-1.612	-3.056	-0.169	0.029*
	No, but others at home smoke a lot	-1.931	-4.515	0.653	0.142
Surgical treatment	No	ref.			
	Yes	-1.849	-3.851	0.153	0.07
Radiation therapy	No	ref.			
	Yes	-1.34	-2.883	0.202	0.088
Chemotherapy	No	ref.			
	Yes	-1.603	-3.314	0.108	0.066
Symptomatic treatment	No	ref.			
	Yes	-2.527	-4.517	-0.537	0.013*
Chronic coughing	No	ref.			
	Yes	1.089	-0.681	2.859	0.227
Shortness of breath	No	ref.			
	Yes	-1.036	-2.487	0.414	0.16
Chest pain	No	ref.			
	Yes	-1.389	-2.712	-0.065	0.04*
Hemoptysis	No	ref.			
	Yes	-1.072	-2.523	0.378	0.146

Table continued

Table VI (continued). The socio-clinical factors affecting satisfaction with life.

Factor		Regression parameter	95%	CI	*p*
Recurrent infections	No	ref.			
	Yes	0.958	-0.536	2.453	0.208
Cardiac arrhythmia	No	ref.			
	Yes	-0.595	-3.447	2.256	0.681
Hoarseness	No	ref.			
	Yes	-1.069	-2.514	0.376	0.146
Performance status	0	ref.			
	1	-0.856	-2.6	0.889	0.335
	2	-1.17	-3.118	0.777	0.237
	3 or 4	-5.56	-8.812	-2.308	0.001*

*statistically significant (p<0.05); 95% CI –confidence interval; FVC - forced vital capacity; FEV1 - forced expiratory volume in 1 second; FEV1/FVC - forced expiratory volume in one second % of vital capacity.

rejection by society or even their friends and relatives, which results in a sense of abandonment and isolation — which may explain the lack of association between hemoptysis and satisfaction with life. It seems that in patients who cough up blood, it is difficult to influence the level of illness acceptance, satisfaction, or QoL[27].

According to Kapela et al[28], satisfaction with life is associated with illness acceptance and coping style. The literature demonstrates a positive correlation between satisfaction with life and QoL in cancer patients[29]. Our previous research showed that patients with a high level of illness acceptance used positive strategies for coping with pain and illness considerably more often, and did not experience as much stress or depression[30,31]. Therefore, individuals who are very satisfied with their life have a more positive perception of events. This could explain the high level of satisfaction with life observed among cancer patients who try to find positives in their illness.

Alarmingly, some authors have detected a negative impact of high QoL on using healthy strategies for coping with cancer. Patients who reported high QoL were most likely to use emotional coping methods, meaning that they distanced themselves from their emotions instead of confronting the threat. Such mechanisms improve a patient's wellbeing, but do not help with solving any problems. The use of defense mechanisms is maladaptive and favors isolation from emotions associated with the illness and treatment, undermining satisfaction[32].

This study brings new insights into the relationship between life satisfaction and QoL.

Satisfaction with life is an important contributor to happiness and development[33]. Fostering psychological wellbeing is important, as it not only makes people happier, but also more active and better disposed towards themselves, others, and the world[34].

In general, happier people fare better, precisely due to their psychological wellbeing. They have better interpersonal relationships, they are healthier, and they may live longer, fulfill their potential, and achieve their dreams[35]. Therefore, it seems that implementing interventions to help individuals develop capabilities associated with wellbeing and satisfaction with life may be socially valuable[14,36,37].

Conclusions

Patients being treated for lung cancer have a moderate level of satisfaction with life.

QoL is associated with satisfaction with life and increases as satisfaction grows. Symptoms are less severe when patients are more satisfied with their life.

Satisfaction with life is associated with illness acceptance and coping strategies.

Not smoking, chest pain, time from diagnosis, performance status, and symptomatic treatment adversely affected satisfaction with life. Conversely, a lack of family history of cancer positively affected satisfaction with life.

Clinical Implications

The identification of patient subgroups with different levels of satisfaction with life warrants a personalized approach to patients, considering their emotional health and the nature of their struggle against a life-threatening condition, so

as to improve the effectiveness of the psychological assistance provided to these patients. In the light of these results, it may be justified to work with cancer patients (especially those who feel "overwhelmed" by the illness and/or the resulting difficulties in life) with a view to improving their functioning by increasing satisfaction with life and QoL and decreasing symptom severity.

Study Limitations

The limitations of the study include a heterogeneous group of respondents, as well as possible bias due to the self-reported measures used. What is more, there was no control group, so the statistical associations were only calculated among lung cancer patients. Despite these limitations, the results detected associations between QoL and satisfaction with life. In our opinion, this may help physicians improve treatment. The results of the study are very promising, although further research in a larger population of patients is required.

Conflict of Interest

The Authors declare that they have no conflict of interests.

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