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Original Article

Factors associated with the quality of life of people with lung cancer*

Fatores associados à qualidade de vida de pessoas com câncer de pulmão

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ABSTRACT

Objective: to evaluate the factors associated with health-related quality of life among people with lung cancer undergoing oncological treatment. **Methods:** a cross-sectional study conducted with 74 patients at a referral oncology hospital. Quality of life was assessed using a validated instrument composed of functional and symptom scales. Descriptive analyses, group comparison tests, correlation analyses, and multiple linear regression were performed to identify associated factors. **Results:** the mean quality of life score was 58.08 points. Differences were observed according to sex, with higher scores among men. Associations were found with the presence of comorbidities and a history of COVID-19, as well as a positive correlation with age and a negative correlation with the number of chemotherapy sessions. The multivariate analysis was statistically significant, highlighting self-rated health as the variable with the greatest magnitude of association. **Conclusion:** the quality of life of patients with lung cancer is associated with clinical and subjective factors, particularly self-rated health. **Contributions to practice:** the findings support nursing practice in the continuous assessment of quality of life, guiding interventions focused on clinical, functional, and psychosocial dimensions.

Descriptors: Quality of Life; Lung Neoplasms; Oncology Nursing; Risk Factors.

RESUMO

Objetivo: avaliar os fatores associados à qualidade de vida relacionada à saúde de pessoas com câncer de pulmão em tratamento oncológico. **Métodos:** estudo transversal, desenvolvido com 74 pacientes em um hospital de referência oncológica. A qualidade de vida foi avaliada por instrumento validado composto por escalas funcionais e de sintomas. Foram realizadas análises descritivas, testes de comparação entre grupos, correlação e regressão linear múltipla para identificação de fatores associados. **Resultados:** a média de qualidade de vida foi de 58,08 pontos. Observou-se diferença segundo o sexo, com maiores escores entre homens. Houve associação com presença de comorbidades e histórico da COVID-19, além de correlação positiva com a idade e negativa com o número de sessões de quimioterapia. A análise multivariada foi estatisticamente significativa, destacando a autoavaliação de saúde como variável de maior magnitude. **Conclusão:** a qualidade de vida de pacientes com câncer de pulmão está associada a fatores clínicos e subjetivos, com destaque para a autoavaliação de saúde. **Contribuições para a prática:** os achados subsidiam a atuação da enfermagem na avaliação contínua da qualidade de vida, orientando intervenções voltadas às dimensões clínicas, funcionais e psicossociais.

Descritores: Qualidade de Vida; Neoplasias Pulmonares; Enfermagem Oncológica; Fatores de Risco.

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Introduction

Cancer is one of the leading causes of mortality before the age of seventy in Brazil and worldwide, representing a major public health problem. Among the different types, lung cancer stands out due to its high incidence and mortality rates, accounting for one in every eight cases diagnosed globally[1]. In Brazil, it has a high occurrence, with an estimated 35,380 new cases annually during the 2026–2028 triennium, in addition to a growing increase observed in the Northeast region and in the state of Paraíba[1-2].

In recent years, an increase in lung cancer cases has been observed in the country, mainly associated with factors such as smoking, occupational exposure, and unfavorable socioeconomic conditions[3]. The disease has a high metastatic potential and is frequently diagnosed at advanced stages, which contributes to its poor prognosis, although early detection is associated with better clinical outcomes[2].

Treatment for lung cancer, although contributing to the control of disease progression, also triggers significant adverse effects, such as fatigue, pain, nausea, and neuropathies, which substantially affect patients' Health-Related Quality of Life (HRQoL)[4]. HRQoL is an important construct in oncology care, as it encompasses physical, psychological, and social dimensions that influence treatment adherence and coping with the disease[5]. HRQoL refers to the way clinical conditions and treatment may affect physical, emotional, functional, and social aspects, as well as reflect on the patient's ability to perform daily activities and maintain well-being. This makes its assessment a relevant indicator, particularly in the oncology setting[6].

In addition to treatment and its adverse effects, disease progression contributes to increased vulnerability, with a higher risk of anxiety, depression, and social isolation, associated with functional limitations, financial dependence, and reduced autonomy, especially among older adults[7-8].

Given these impacts, the importance of nursing in assessing and addressing the clinical, functional, and psychosocial dimensions that interfere with the quality of life of patients with lung cancer is highlighted. The follow-up of these patients requires the involvement of nurses, whose role is essential in recognizing functional changes, managing symptoms, and meeting care needs throughout treatment[9].

Although the effects of lung cancer on quality of life are well recognized, the literature still addresses these factors in a fragmented manner, generally examining clinical, functional, or psychosocial aspects separately. This limitation hinders a comprehensive understanding of the needs of these patients and compromises the implementation of more effective interventions. In this context, the relevance of the nursing role in the assessment and management of these multiple dimensions is emphasized. Therefore, this study aimed to evaluate the factors associated with health-related quality of life among people with lung cancer undergoing oncological treatment.

Methods

Study design and setting

This was a cross-sectional study guided by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement, conducted at a large, high-complexity state referral hospital for cancer treatment located in the city of João Pessoa, Paraíba, Brazil.

Population and sample

The sample was determined based on the number of patients followed by the thoracic surgeon in the outpatient clinic of the aforementioned institution between January and June 2023, corresponding to a total of 253 individuals.

The sample size calculation indicated weak, moderate, or strong correlations between the variables, with a minimum linear correlation coefficient of 0.32. The choice of this parameter was based on the

adoption of a conservative and plausible estimate of association between variables in studies involving people with cancer, in which, due to the multifactorial nature of clinical, functional, and psychosocial outcomes, the magnitudes of association tend to range from weak to moderate[10]. In addition, the significance level was set at 5% (i.e., 95% confidence level), and statistical power was 80%. The sample size calculation was performed using R software, version 4.2.3, resulting in a final sample of 74 patients.

For this study, the inclusion criteria were: age 18 years or older, diagnosis of primary or secondary lung cancer, and undergoing oncological treatment, with at least four chemotherapy sessions and/or twenty radiotherapy sessions completed at least one month prior to data collection. This criterion was established to ensure a more reliable assessment of quality of life, as a minimum interval of one month after therapeutic exposure contributes to the stabilization of acute adverse effects and the consolidation of the physical, emotional, and functional repercussions resulting from treatment.

Patients with severe communication and/or hearing impairments were excluded, as were those receiving palliative care, due to the clinical and therapeutic particularities inherent to this group. Although palliative care is not limited to the terminal stage of the disease, its inclusion could introduce heterogeneity into the sample and act as a confounding factor in the analysis of quality-of-life scores, since these scores are strongly influenced by disease progression and by comfort-oriented care strategies.

Individuals who did not demonstrate adequate cognitive ability to respond to the research instruments were also excluded. The Mini-Mental State Examination (MMSE) was administered, with total scores ranging from 0 to 30 points. The adopted cutoff scores were 18 points for illiterate individuals and 26 points for those with eight or more years of education[11]. Participants who experienced clinical and/or emotional complications at the time of data collection that precluded completion of the interview were also excluded.

Thus, after eligibility assessment, only two participants were excluded from the study due to clinical complications, such as episodes of hypotension and hypothermia observed during infusion therapy and throughout the interview, which consequently had to be interrupted. It is also noteworthy that no patients invited to participate in the study refused to do so.

Data collection period and procedures

Data collection was conducted between July and December 2023. To facilitate patient participation in the study, prior contact was established with the nurses responsible for the respective departments in order to review daily schedules and identify individuals previously diagnosed with the type of cancer under investigation. Subsequently, these patients were approached consecutively in the waiting areas of the chemotherapy and radiotherapy services during morning and/or afternoon shifts.

Data collection instruments

To collect the independent variables, two structured instruments developed by the authors were used to obtain sociodemographic and clinical data. Sociodemographic variables were classified as categorical, including sex, living arrangement, marital status, self-reported race/color, and religion, and numerical, including age (in years), monthly income (in minimum wages), and education level (in years of schooling).

Clinical and treatment-related information was also collected and classified as categorical variables, including the presence of comorbidities, history of Coronavirus Disease 2019 (COVID-19), type of cancer, self-rated health (very poor, poor, fair, good, excellent), treatment modality, physical activity practice, leisure activities, smoking, and alcohol consumption, as well as numerical variables, including the number of treatment sessions and time since diagnosis.

In addition, the European Organisation for Research and Treatment of Cancer Quality of Life

Questionnaire (EORTC QLQ-C30) was used as the dependent variable to assess health-related quality of life across its 30 items. This instrument was selected because the present study is part of a larger research project that adopted it as a measure of overall quality of life in oncology patients[12].

The items of the EORTC QLQ-C30 are organized into three main components: the global health status/quality of life scale, the functional scale, and the symptom scale. The global health status/quality of life scale consists of two items that assess overall perceptions of health and quality of life; the functional scale comprises five functional domains: role, physical, emotional, cognitive, and social functioning; whereas the symptom scales include three multi-item scales (fatigue, nausea and vomiting, and pain) and six single-item measures (dyspnea, insomnia, appetite loss, constipation, diarrhea, and financial difficulties).

All scores are linearly transformed to a scale ranging from 0 to 100. For the functional scales and the global health status/quality of life scale, higher scores indicate better health status, whereas for the symptom scales, higher scores indicate greater symptom severity and poorer quality of life. Responses are recorded on a four-point Likert-type scale, ranging from "1 = not at all" to "4 = very much"[12].

Data collection procedures

Sociodemographic and clinical data were collected through the administration of individual questionnaires in the waiting areas and in the chemotherapy and radiotherapy departments during morning and/or afternoon shifts, or during chemotherapy administration, which also facilitated participant recruitment due to the extended duration of the infusion.

Prior to data collection, contact was established with the nurses responsible for the departments, and medication prescriptions provided by the pharmacy were reviewed. These prescriptions contained information regarding the type of cancer, enabling the identification and approach of eligible participants.

In the radiotherapy department, the daily patient schedule available through the reception desk was also reviewed. This schedule included information on the type of cancer and the number of treatment sessions. Patients who met the inclusion criteria were invited to participate, received information about the study, and formalized their participation by signing the Informed Consent Form.

The average data collection time ranged from 30 to 50 minutes. At the end of the interview, patients frequently reported that this moment served as an opportunity for listening and dialogue, which contributed to participant engagement and enhanced the quality of the information obtained.

Data analysis

For the analyses conducted in this study, the EORTC QLQ-C30 summary score was calculated as recommended in the instrument's scoring manual. This score was derived from the functional scales (physical, role, emotional, cognitive, and social functioning) and the symptom scales (fatigue, nausea and vomiting, pain, dyspnea, insomnia, appetite loss, constipation, and diarrhea), which had been previously transformed to a 0–100 scale.

The symptom scale scores were reversed (100 – score) to ensure the same interpretative direction as the functional scales, in which higher values represent better quality of life. Thus, the overall score was obtained by calculating the mean of the 13 instrument scales (five functional and eight symptom scales), excluding the global quality of life scale[13].

The data were organized in a Microsoft Excel spreadsheet and subsequently analyzed using SPSS software, version 21.0. Initially, descriptive analyses were performed using measures of central tendency and dispersion, as well as absolute and relative frequencies. The distribution of quantitative variables was assessed using the Kolmogorov–Smirnov test. To analyze differences between the means of two independent groups, Student's t-test was used, whereas

comparisons among three or more groups were performed using analysis of variance (ANOVA).

The association between quantitative variables was assessed using Spearman's correlation test, chosen due to the nonparametric distribution of the variables. Correlation magnitudes were classified as weak when $|r| < 0.3$, moderate when $0.3 \leq |r| < 0.7$, and strong when $|r| \geq 0.7$[14].

To identify factors associated with quality of life, multiple linear regression was performed, considering the quality-of-life score as the dependent variable. Variables with a p-value ≤ 0.20 in the bivariate analyses were entered into the multivariable model. A hierarchical multiple linear regression approach was adopted, with progressive removal of variables presenting the highest p-values, retaining in the final model only those with $p \leq 0.05$. Additionally, multicollinearity was assessed using the Variance Inflation Factor (VIF), and variables with values greater than 10 were considered for exclusion. The significance level adopted for all analyses was 5% ($p < 0.05$).

Ethical considerations

All ethical principles applicable to research involving human participants were rigorously observed, in accordance with Resolution No. 466/2012 of the National Health Council. The study was approved by the Research Ethics Committee of the Federal University of Paraíba under Certificate of Presentation for Ethical Consideration No. 70379523.4.0000.5188 and approval opinion No. 6,143,685/2023.

Results

Among the study participants, women predominated, accounting for 43 (58.1%) individuals. The mean age was 61.3 years. Most participants were married or living in a stable union, 38 (51.4%), had a mean monthly income of 1.57 minimum wages, an average of 7.47 years of education, were retired, 34 (45.9%), and identified as Catholic, 48 (64.9%).

Regarding the participants' clinical characteristics, the highest frequency was observed among those with primary lung cancer, 52 (70,3%), with a mean time since diagnosis of 16 months. Several patients presented one or two comorbidities, with systemic arterial hypertension, 19 (25.7%), and Diabetes Mellitus (DM), 7 (9.5%), being the most prevalent. The majority were smokers, 52 (70.3%). In addition, most participants reported no history of COVID-19 infection, 55 (74.3%), no personal history of cancer, 51 (68.9%), and the presence of a family history of cancer, 51 (68.9%).

Regarding self-rated health, most patients assessed their health status as fair, 34 (45.9%). Most participants were undergoing chemotherapy, 66 (89.2%), with a mean treatment duration of 7.7 months. The majority reported changes during treatment, 52 (70.3%), with changes in routine activities being the most frequently reported, 51 (68.9%). More than one-third of the patients reported having undergone surgery as a previous treatment modality, 26 (35.1%). The most common current treatment interval among participants was every 21 days, reported by 22 (29.7%) patients.

Regarding the symptom scales, the mean scores were as follows: financial difficulties (67.1), fatigue (58.0), pain (52.5), appetite loss (46.4), insomnia (45.9), constipation (28.8), diarrhea (27.5), dyspnea (27.5), and nausea and vomiting (24.8). Regarding the functional scales, the highest mean scores were observed for cognitive functioning (64.2), emotional functioning (61.3), physical functioning (45.2), social functioning (43.2), and role functioning (34.9). The global health status/quality of life scale yielded the highest score among all scales (70.2).

The mean overall quality-of-life score in the sample was 58.1 ± 20.3 points. Table 1 shows a statistically significant difference according to sex, with higher mean quality-of-life scores among men compared with women. Regarding the other sociodemographic variables, higher mean quality-of-life scores were observed among individuals aged 60 years or older, those living with up to two people in the household,

widowed participants, individuals with an income between three and four minimum wages, those with more than 13 years of education, and participants who self-identified as Black.

Table 1 – Quality-of-Life Scores According to the Sociodemographic Characteristics of the Sample (n = 74). João Pessoa, Paraíba, Brazil, 2023

Variables	n (%)	Mean ± SD*	Statistic	p-value†
Sex				
Male	31 (41.9)	63.88 ± 18.06	2.14‡	0.036
Female	43 (58.1)	53.90 ± 21.02		
Age group				
< 60	32 (43.2)	53.01 ± 18.67	-1.91‡	0.060
≥ 60	42 (56.8)	61.95 ± 20.88		
Living arrangement				
Up to 2	46 (62.2)	60.69 ± 21.52	1.43‡	0.158
> 3	28 (37.8)	53.79 ± 17.70		
Marital status				
Married/Common-law partner	38 (51.4)	60.53 ± 20.99		
Single	18 (24.3)	49.73 ± 14.94	3.70§	0.260
Divorced	10 (13.5)	61.00 ± 24.65		
Widowed	8 (10.8)	61.60 ± 20.34		
Monthly income (minimum wages)‖				
Up to 2	66 (89.2)	56.64 ± 20.22	2.71§	0.113
3 to 4	7 (9.5)	66.89 ± 17.15		
> 4	1 (1.3)	91.45 ± 0.00		
Education (years)				
Illiterate	12 (16.2)	57.18 ± 18.11		
1 to 4	9 (12.2)	53.59 ± 23.33		
5 to 8	27 (36.5)	61.98 ± 19.30	5.68§	0.164
9 to 12	16 (21.6)	48.48 ± 20.34		
> 13	10 (13.5)	68.04 ± 18.89		
Self-reported race/color				
White	25 (33.8)	62.29 ± 20.12		
Brown	37 (50.0)	53.21 ± 20.17		
Black	10 (13.5)	67.40 ± 19.19	4.69§	0.202
Indigenous	1 (1.4)	56.41 ± 0.00		
Asian	1 (1.4)	41.67 ± 0.00		
Religion				
Spiritual but not religious	8 (10.8)	52.96 ± 21.35		
Catholic	48 (64.9)	58.73 ± 18.52		
Evangelical	15 (20.3)	61.46 ± 24.79		
Spiritist	1 (1.4)	17.44 ± 0.00	4.69§	0.294
Other	2 (2.7)	57.93 ± 13.15		
Atheist	–	–		

*SD: Standard Deviation; †Significance level of the statistical test; ‡Student's t-test; §One-way analysis of variance (ANOVA); ‖2023 minimum wage (BRL 1,412.00)

Table 2 shows a statistically significant difference according to the presence of comorbidities, with higher mean quality-of-life scores among participants without comorbidities compared to those with comorbidities. A significant difference was also identified according to COVID-19 history, with lower scores among individuals who reported previous infection compared to those with no history of the disease.

Regarding the other clinical and treatment-related variables, higher mean quality-of-life scores were observed among participants who reported difficulties during treatment, those diagnosed with primary lung cancer, individuals who rated their health as excellent, and those undergoing radiotherapy in combination with chemotherapy.

Table 2 – Quality-of-Life Scores According to Clinical and Cancer Treatment Variables (n = 74). João Pessoa, Paraíba, Brazil, 2023

Variables	n (%)	Mean ± SD*	Statistic	p-value†
Comorbidities				
No	46 (62.2)	52.51 ± 18.22	-3.21‡	0.002
Yes	28 (37.8)	67.24 ± 20.57		
History of COVID-19				
Yes	19 (25.7)	49.05 ± 20.18	-2.31‡	0.024
No	55 (74.3)	61.20 ± 19.59		
Difficulty during treatment				
Yes	28 (38.4)	60.95 ± 17.28	1.139‡	0.258
No	45 (61.6)	55.48 ± 21.41		
Lung cancer				
Primary	52 (70.3)	62.11 ± 20.46		
Secondary	21 (28.4)	52.38 ± 20.08	1.466§	0.238
Does not know	1 (1.3)	44.96 ± –		
Self-rated health				
Very poor	1 (1.3)	67.22 ± –		
Poor	10 (13.5)	41.96 ± 17.63		
Fair	34 (45.9)	53.62 ± 16.43	4.69§	0.001
Good	23 (31.1)	66.85 ± 20.56		
Excellent	6 (8.1)	75.06 ± 21.32		
Current treatment				
Radiotherapy	5 (6.8)	46.36 ± 8.20		
Chemotherapy	66 (89.2)	58.25 ± 20.83	2.71§	0.176
Radiotherapy and chemotherapy	3 (4.1)	73.89 ± 10.76		
Other	–	–		

*SD: Standard Deviation; †Significance level of the statistical test; ‡Student's t-test; §One-way analysis of variance (ANOVA)

Table 3 shows the correlation between age and quality-of-life scores, indicating that older age

was associated with higher levels of quality of life. A correlation was also identified between the number of treatment sessions and quality-of-life scores, suggesting that a greater number of sessions was associated with lower levels of quality of life. The other variables analyzed—income, years of education, time since diagnosis, and family history of cancer—showed correlation coefficients close to zero in relation to quality-of-life scores.

Table 3 – Correlation Between Sociodemographic and Clinical Variables and Quality-of-Life Scores (n = 74). João Pessoa, Paraíba, Brazil, 2023

Variables	Quality-of-Life Score	p-value*
Age	0.263†	0.024
Income	-0.160‡	0.172
Years of education	0.064‡	0.587
Time since diagnosis	0.028‡	0.815
Family history of cancer	0.091‡	0.443
Number of sessions	-0.236‡	0.043

*Significance level of the statistical test; †Pearson's correlation test; ‡Spearman's correlation test

Table 4 presents the multiple linear regression model, using the quality-of-life score as the dependent variable. The model was statistically significant ($F = 10.197$; $p < 0.001$), with a multiple correlation coefficient of $R = 0.655$, $R^2 = 0.428$, and adjusted $R^2 = 0.386$, indicating that the variables included in the model explained approximately 38.6% of the variability in quality-of-life scores within the sample.

A statistically significant association was observed between quality of life and self-rated health, presence of comorbidities, history of COVID-19, and age. Participants with better self-rated health presented higher quality-of-life scores compared with those with a poorer perception of their own health status. Likewise, individuals without comorbidities exhibited higher quality-of-life scores than those with comorbidities.

In addition, participants with no history of COVID-19 demonstrated better quality of life compared with those who had previously experienced the disease. Increasing age was also associated with higher quality-of-life scores. Among the variables analyzed, self-rated health showed the greatest magnitude of association with the outcome.

Table 4 – Multiple Linear Regression Model Using the Quality-of-Life Score as the Dependent Variable (n = 74). João Pessoa, Paraíba, Brazil, 2023

Variables	B*	95% CI†	β‡	VIF§	p-value‖
Age	0.496	0.12 – 0.87	0.244	1.040	0.011
Comorbidities	1.575	0.63 – 2.52	0.301	1.015	0.002
Type of cancer	-3.381	-7.39 – 0.63	-0.156	1.056	0.103
History of COVID-19	12.428	4.07 – 20.78	0.269	1.014	0.005
Self-rated health	8.976	4.69 – 13.26	0.379	1.015	<0.001

*B: unstandardized regression coefficient; †95% CI: 95% confidence interval; ‡β: standardized regression coefficient; §VIF: Variance Inflation Factor; ‖p-value: level of statistical significance

Discussion

In the present study, the overall mean quality-of-life score was 58.08 ± 20.32 points, indicating a moderate level of participants' perception of their own quality of life. This finding suggests that, although these patients are experiencing a potentially debilitating and, at times, aggressive condition, some maintain a relatively preserved perception of overall well-being, which may be related to personal, social, and clinical factors that shape the experience of illness and coping with the disease[15].

With regard to sociodemographic variables, a statistically significant difference was identified between sexes, with higher quality-of-life scores observed among male participants. This result may reflect differences in how men and women cope with a cancer diagnosis and adhere to treatment, as national studies have shown that women tend to report higher levels of emotional distress, depressive symptoms, and concerns related to the impact of the disease on daily life and personal relationships[16].

Furthermore, sex-related differences in symptom burden and quality-of-life domains reveal greater symptom severity among women, which may negatively affect their perception of quality of life. These findin-

gs reinforce that gender differences may be associated with distinct physical, emotional, and social impacts resulting from illness and oncological treatment[15-16].

Regarding age, higher quality-of-life scores were observed among individuals aged 60 years or older. This finding may be associated with adaptation mechanisms to the disease, as older adults, in some cases, demonstrate greater acceptance of the illness process when compared with younger individuals. Thus, it can be inferred that younger patients face greater challenges related to the changes imposed by the disease, including impairments in occupational status, functional capacity, income, and social conditions[16].

In this context, similar findings have been reported, as a greater impact on quality of life was observed among patients with lung cancer aged between 18 and 45 years. Accordingly, the study reinforces that younger individuals experienced a more aggressive disease progression, often accompanied by greater emotional distress, suggesting that older adults exhibit greater resilience in coping with the adversities associated with cancer diagnosis and treatment[17].

Furthermore, in the present study, participants living with up to two people had higher mean quality--of-life scores. This finding may be associated with greater social support within the context of cancer care, particularly among those who do not live alone. The relationship between social support and improved quality of life reinforces that households with fewer residents may facilitate closer and less conflictual caregiving relationships, which are associated with better coping with the disease, lower emotional burden, and higher levels of optimism[18].

Higher mean quality-of-life scores were also observed among widowed individuals, followed by divorced individuals. This pattern differs from the expectation that support from spouses or partners may positively influence the health habits and well-being of individuals with cancer. An international study found that 74% of spouses experienced economic or social changes following the diagnosis, and 56% withdrew from their social and leisure activities due to the impact of treatment-related expenses on household income[3].

In addition, the absence of a spouse may be compensated for by alternative forms of social support, such as assistance from family members, friends, neighbors, and community health networks, which may also contribute to a better perception of quality of life in certain contexts[19]. Higher levels of quality of life were also associated with an income ranging from three to four minimum wages. In this regard, family income may provide financial security to cover treatment-related expenses and support the continuity of care through the purchase of supplies, food, and medications. Therefore, favorable socioeconomic conditions are inferred to exert a significant influence on the overall well-being of people with cancer, contributing to reduced financial concerns and better health management[16].

Regarding education, it was found that most participants with higher mean quality-of-life scores had more than 13 years of schooling. This finding highlights the importance of health literacy, as higher educational attainment may enhance the ability to understand therapeutic recommendations and, consequently, improve treatment adherence, self-care, and self-efficacy levels[20].

In the clinical context, individuals with comorbid conditions presented higher mean quality-of-life scores when compared with those without concomitant health conditions. This finding indicates a pattern that differs from what would be expected, as the presence of additional chronic conditions generally tends to negatively affect quality of life, particularly among oncology patients. Such conditions may influence the perception of well-being due to increased symptom burden, functional limitations, and polypharmacy. Therefore, identifying the presence of chronic diseases is essential to support therapeutic planning and promote better prognostic outcomes[21].

In addition, higher mean quality-of-life scores were observed among participants who reported some difficulty during treatment and among those who self-

-rated their health as "good" or "excellent." Although seemingly divergent, these findings suggest that both the challenges experienced throughout treatment and the subjective perception of health status play an important role in the illness experience of individuals with lung cancer, emerging as relevant indicators across physical, psychological, and emotional domains[22].

Among the study participants, those diagnosed with primary lung cancer also stood out, as they presented higher mean quality-of-life scores. This result may be understood in light of the lower systemic impairment generally observed in primary tumors, which tend to be associated with less severe damage and a lower degree of functional decline when compared with secondary or metastatic disease. Consequently, their clinical course tends to be more favorable, positively influencing perceptions of health and well-being[23].

Regarding this aspect, higher mean scores were observed among patients undergoing radiotherapy combined with chemotherapy. However, this finding partially contradicts some studies, as there is undeniably a transient decline in quality of life during cancer treatment, particularly due to treatment-related toxicity and the associated clinical frailty. On the other hand, combined therapies may reduce symptom worsening by providing better control of tumor progression, which can mitigate negative effects on patient well-being[22-23].

With respect to the correlation between age and quality-of-life scores, older age was significantly associated with higher scores. This finding suggests that factors related to aging, such as psychological adaptation, life experience in dealing with illness, and greater acceptance of treatment-related changes, may influence perceptions of health status, thereby contributing to higher levels of quality of life[24].

The analysis also identified a correlation between the number of treatment sessions and quality--of-life scores, suggesting that the greater the number of treatment sessions, the lower the level of quality of life. This finding may be explained by the cumulative effect of therapeutic exposure, which tends to intensify emotional changes and increase the risk of clinical deterioration, including symptoms such as severe fatigue, nausea, and vomiting, thereby compromising overall well-being. Thus, the observed correlation highlights the importance of multidisciplinary interventions focused on providing biopsychosocial support throughout treatment[24].

After adjustment of the linear regression model, quality of life was no longer predominantly determined by treatment-related factors and began to incorporate clinical and subjective elements. Advancing age was associated with better quality of life, with an average increase of approximately 0.5 points per year. Although seemingly counterintuitive, this result is consistent with recent studies indicating greater adaptation to illness and a more stable perception of well-being among older individuals, particularly in the context of chronic diseases[25].

With regard to comorbidities, individuals without associated diseases scored approximately 1.6 points higher on the quality-of-life scale. This result suggests that multimorbidity intensifies the effects of cancer[26]. The accumulation of chronic conditions is associated with poorer functional status and a greater symptom burden. As a result, quality of life declines regardless of the primary condition. Furthermore, more rapid multimorbidity trajectories are associated with more pronounced declines over time[27-28].

A history of COVID-19 emerged as one of the most influential factors in the model, being associated with poorer quality of life among individuals who had previously been infected. This finding suggests that the infection may have long-lasting effects, possibly related to persistent symptoms such as fatigue, dyspnea, and functional impairment[29].

However, caution is warranted when interpreting the magnitude of this effect because of the potential for survival bias. In the model, self-rated health demonstrated the strongest effect, with an increase of approximately 9 points in the quality-of-life score for each additional level of self-rated health. This finding highlights the central role of subjective perceptions of

well-being. Recent evidence indicates that self-rated health remains a strong predictor of quality of life and mortality even after adjustment for clinical variables[30].

Taken together, the results indicate that quality of life was influenced more by subjective factors and recent conditions than by isolated clinical characteristics. This pattern suggests that the experience of illness, rather than its objective burden alone, shapes the perception of well-being. In this regard, the central role of variables such as self-rated health raises the possibility that part of what is measured as quality of life is anchored in how individuals interpret their own condition, which both imposes limitations and expands the interpretive potential of the findings.

Study limitations

The cross-sectional design limits causal inference. The sample, drawn from a single healthcare setting, may restrict the generalizability of the findings. In addition, the possibility of survival bias may have led to an overestimation of quality-of-life levels, and the use of self-reported measures may introduce subjective variation in assessment.

Contributions to practice

The findings of this study indicate that the assessment of quality of life in patients with lung cancer should not be restricted to objective clinical parameters but should systematically incorporate self-rated health as a central indicator in clinical follow-up.

The identification of factors such as comorbidities and a history of COVID-19 enables the stratification of patients with greater vulnerability and supports the implementation of earlier and more individualized interventions. In this context, nursing practice plays a strategic role by integrating clinical, functional, and subjective dimensions into decision-making, thereby facilitating continuous monitoring, symptom management, and the adaptation of care to patients' specific needs throughout cancer treatment.

Conclusion

The findings demonstrated that the quality of life of patients with lung cancer is associated with both clinical and subjective factors. Self-rated health, comorbidities, a history of COVID-19, and age emerged as key factors. These findings indicate that the perception of health status plays a central role in the experience of illness. The results reinforce the need for integrated care approaches. The role of nursing is particularly important in the continuous assessment of clinical, functional, and psychosocial dimensions.

Author contributions

Concept and design, or analysis and interpretation of data: **Lima RB, Souza AES, Melo DA, Soares JS**. Manuscript drafting or critical revision of important intellectual content: **Lima RB, Soares JS**. Final approval of the version to be published and agreement to be accountable for all aspects of the manuscript, ensuring that questions related to the accuracy or integrity of any part of the manuscript are appropriately investigated and resolved: **Silva CR, Santos EMB, Costa KNFM**.

Data availability

The authors declare that the data are fully available within the article.

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