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Assessment of Quality of Life in Advanced-Stage Lung Cancer Patients Using EORTC QLQ-C30 Questionnaire

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ABSTRACT

Introduction: Quality of life (QoL) is a multidomain concept that assesses a person through health status, functional status, and symptoms. The patient's QoL is greatly reduced due to the course of disease, severity of symptoms, and side effects of chemotherapy treatment. This study aimed to assess the QoL in advanced lung cancer patients using the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-C30 (EORTC QLQ-C30).

Methods: This descriptive and observational study was conducted at the Pulmonary Polyclinic, Prof. Dr. Chairuddin Panusunan Lubis Universitas Sumatera Utara (USU) Hospital from February to July 2024, with a cross-sectional design using patient medical records and EORTC QLQ-C30 questionnaire. The EORTC QLQ-C30 questionnaire was analyzed with a score formula and categorized as good, moderate, and bad. The sample was 100 lung cancer patients using a purposive sampling technique according to the criteria.

Results: The results showed that almost all QoL was in the moderate category (80%). The general health status was mostly in the moderate category (61.66%), the functional status was mostly in the good category (75.35%), and the symptoms were in the moderate category (35.65%). In the functional scale, the role domain had the lowest mean, 69.99 ± 29.43. In the symptoms scale, the pain domain had the highest mean, 52.66 ± 29.43.

Conclusion: The overall QoL of lung cancer patients was in the moderate category, lower than the healthy population. It needs to be improved, especially in the role domain, by providing supportive-expressive group therapy.

INTRODUCTION

Quality of life (QoL), according to the World Health Organization (WHO), is the multidimensional concept that subjectively assesses each individual's perception of situations in life, such as goals, hopes, standards, and concerns.[1] Health-related quality of life (HRQoL) defines QoL as a person's subjective assessment of physical, social, emotional, and cognitive functioning.[2] Lung cancer is the biggest health problem in Indonesia and the world, with an incidence rate in 2020 in Indonesia of 34,783 new cases, or the equivalent of 8.8% of all cancer cases.[3] The course of cancer, symptoms, and the impact of therapy causes a decrease in QoL.

Lung cancer is the leading cause of oncological-related deaths worldwide. Only 16% of early-stage lung tumors are diagnosed.[4] Therefore, the 5-year survival rate is only 15% due to late diagnosis.[4] Meanwhile, the average length of time a patient survives after a lung cancer diagnosis is eight months. It is known that the quality of life of patients with lung cancer is lower than other cancers, which causes lung cancer not only to be a burden for patients but can also affect the lives of families and society.[5,6] Therefore, there is a social and economic loss in society because lung cancer patients cannot perform their social roles optimally.

Often, when someone is diagnosed with cancer, they assume that the disease can lead to death, causing fear, anxiety, depression, and increasingly poor physical

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health.[7] When treating people with cancer, effective treatments must be identified first to give them a better chance of survival and reduce the amount of pain they experience. Treatment such as surgery, radiation therapy, and pharmacological therapy (chemotherapy, targeted therapy, hormone therapy, and immunotherapy) are treatments used to increase the survival rate of cancer patients.[8] This treatment causes side effects on the body's tissues and organs over a long period, which can affect the patient's health or QoL.

Measuring QoL and evaluating the impact of disease and treatment is necessary.[9] Assessing the QoL of lung cancer patients is important because it can influence treatment decision-making and patient compliance. This study aimed to assess the QoL of advanced-stage lung cancer patients using the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-C30 (EORTC QLQ-C30) at Prof. Dr. Chairuddin Panusunan Lubis Universitas Sumatera Utara (USU) Hospital.

METHODS

Research Design

This descriptive observational study used a cross-sectional design. It was conducted from January to June 2024 at the Pulmonary Polyclinic, Prof. Dr. Chairuddin Panusunan Lubis USU Hospital, and was approved by the Health Research Ethics Committee No. 581/KEPK/USU/2024.

Research Sample

The total sample for this study was 100 lung cancer patients using the purposive sampling method. The inclusion criteria were advanced-stage patients (III and IV) who had completed informed consent and were willing to participate in the trial within one week of receiving therapy. Meanwhile, the exclusion criteria were patients who received non-medical or traditional treatment and patients who could not communicate rationally or experienced mental disorders. Information regarding cancer patients' QoL was obtained directly through the EORTC QLQ-C30 questionnaire interview, and data on patient characteristics was collected from hospital medical records.

Research Instrument

The EORTC QLQ-C30 questionnaire consists of five functional scales (physical, role, emotional, cognitive, and social), nine symptom scales (fatigue, nausea/vomiting, pain, shortness of breath, difficulty sleeping, loss of appetite, constipation, diarrhea, and financial issues) and 1 global QoL scale. Calculating the QoL score with the EORTC QLQ-C30 questionnaire includes two steps: the first step is calculating the raw score, and the second step is a linear transformation. The raw score calculation step uses the formula Raw Score = RS = (I1 + I2 + I3 +….In)/n where I = the value of each question item and n = the number of question items. The second stage, linear transformation, normalizes the raw scores. Thereby, the score range becomes 0-100.

Validity and Reliability

The data processing results by Noviyani, *et al*. (2016) showed that all question items have factor loadings >0.70.[10] It can be said that all the question items contained in the EORTC QLQ-C30 questionnaire are valid. The results of construct validity calculations produce a value of VE = 0.90, meaning the EORTC QLQ-C30 questionnaire meets the contract validity requirements. The reliability test provides a value of >0.50, indicating that all question items in the EORTC QLQ-C30 questionnaire are reliable. The construct reliability test gives a value of RF = 1, indicating that the EORTC QLQ-C30 questionnaire meets the construct reliability requirements.[10]

Data Analysis

Data were analyzed descriptively to explain the frequency distribution of research subjects based on characteristics.

RESULTS

From the research results, 100 lung cancer patients were obtained. Table 1 displays the characteristics of patients with lung cancer at Prof. Dr. Chairuddin Panusunan Lubis USU Hospital. It can be seen that the majority of lung cancer patients were >56 years old (59 patients, 59.0%). Most lung cancer patients were males (85 patients, 85.0%). Most patients were highly educated or had studied >9 years (82 patients, 82.0%). The normal body mass index/BMI (18.6 to 25.0) was 53 patients (53.0%). A total of 57 patients (57.0%) had no comorbidities. Most lung cancer patients had undergone treatment for 6 cycles (41 patients, 41.0%). Most treatment types used were chemotherapy (91 patients, 91.0%).

Table 1. Characteristics of lung cancer patients

Characteristics	n	%
Age		
>56 years old	59	59.0
≤56 years old	41	41.0
Gender		
Male	85	85.0
Female	15	15.0
Education level		
Low	18	18.0
High	82	82.0

Characteristics	n	%
Marital status	13	13.0
Widower/widow	11	11.0
Unmarried	76	76.0
Married		
Job-status		
Unable to work	50	50.0
Able to work	50	50.0
Body mass index		
Underweight	25	25.0
Overweight	22	22.0
Normal	53	53.0
Comorbid		
Yes	43	43.0
No	57	57.0
Treatment duration		
1 cycle	5	5.0
2 cycles	4	4.0
3 cycles	11	11.0
4 cycles	26	26.0
5 cycles	13	13.0
6 cycles	41	41.0
Therapy types		
Chemotherapy	91	91.0
Therapeutic targets	9	9.0
Cancer types		
Mixed germ cell tumors	4	4.0
Squamous cell carcinoma	32	32.0
Large cell carcinoma	2	2
Adenocarcinoma	62	62
Cancer stages		
Stage IV	76	76.0
Stage III	24	24.0
Family support		
Not good enough	15	15.0
Enough	27	27.0
Good	58	58.0
Quality of life		
Moderate	80	80.0
Good	20	20.0

Note: Education level (low = ≤ 9 years, high = > 9 years); Treatment duration (1 cycle = per 21 days; 2 cycles = 21 days after cycle 1; 3 cycles = 21 days after cycle 2; 4 cycles = 21 days after cycle 3; 5 cycles = 21 days after cycle 4; 6 cycles = 21 days after cycle 5)

The type of cancer suffered by most patients was adenocarcinoma (62 patients, 62.0%), followed by squamous cell carcinoma (32 patients, 32.0%). Most patients were at stage IV (76 patients, 76.0%). Fifty-eight patients (58.0%) said their families supported them during therapy. Most patients had a moderate QoL (80 patients, 80.0%), while 20 patients (20.0%) had a good QoL.

In the functional domain, a higher score indicates a better level of response. Hence, a high value or score on the functional scale also indicates high health. On the functional scale, the average score was 75.34 ± 20.94. The domain that had the highest average value was social function (80.66 ± 24.81), followed by emotional function (78.74 ± 24.88), cognitive function (74.33 ± 29.43), physical function (72, 99 ± 22.53), and role function (69.99 ± 29.68).

The average score on the symptom scale was 35.65 ± 17.12. The domain with the highest score was pain (52.66 ± 29.95), followed by symptoms of fatigue (50.87 ± 21.89) and insomnia (46.66 ± 30.70).

Table 2. Average value of quality of life for lung cancer patients

Domain	Mean ± SD	Category
Functional Scale		
Physical function	72.99 ± 22.53	Good
Role function	69.99 ± 29.68	Good
Emotional function	78.74 ± 24.88	Good
Cognitive function	74.33 ± 29.43	Good
Social function	80.66 ± 24.81	Good
Average	75.34 ± 20.94	Good
Symptom Scale		
Fatigue	50.87 ± 21.89	Moderate
Nauseous vomit	26.99 ±23.42	Bad
Pain	52.66 ± 29.95	Moderate
Dyspnea	32.66 ± 22.70	Bad
Insomnia	46.66 ± 30.70	Moderate
Anorexia	38.99 ± 27.64	Moderate
Constipation	23.33 ± 20.91	Bad
Diarrhea	17.98 ± 19.19	Bad
Financial difficulties	30.66 ± 28.29	Bad
Average	35.65 ± 17.12	Moderate
Global Health Status		
General Health	59.11 ± 12.86	Moderate
Average	59.11 ± 12.86	Moderate

Table 3. Quality of life of lung cancer patients based on the patient's characteristics

Variable	Quality of Life		Total
	Moderate	Good	
Age			
>56 years old	59 (100.0%)	0 (0.0%)	59 (100.0%)
≤56 years old	21 (51.2%)	20 (48.8%)	41 (100.0%)
Gender			
Male	69 (81.2%)	16 (18.8%)	85 (100.0%)
Female	11 (73.3%)	4 (26.7%)	15 (100.0%)
Education level			
Low	18 (100.0%)	0 (0.0%)	18 (100.0%)
High	62 (75.6%)	20 (24.4%)	82 (100.0%)
Marital status			
Widower/widow	12 (92.3%)	1 (7.7%)	13 (100.0%)
Not married yet	11 (100.0%)	0 (0.0%)	11 (100.0%)
Marry	57 (75.0%)	19 (25.0%)	76 (100.0%)
Job-status			
Unable to work	39 (78.0%)	11 (22.0%)	50 (100.0%)
Able to work	41 (82.0%)	9 (18.0%)	50 100.0%)

Variable	Quality of Life		Total
	Moderate	Good	
Body mass index			
Thin	19 (76.0%)	6 (24.0%)	25 (100.0%)
Fat	16 (72.7%)	6 (27.3%)	22 (100.0%)
Normal	45 (84.9%)	8 (15.1%)	53 (100.0%)
Comorbid			
Yes	34 (79.1%)	9 (20.9%)	43 (100.0%)
No	46 (80.7%)	11 (19.3%)	57 (100.0%)
Treatment duration			
1 cycle	4 (80.0%)	1 (20.0%)	5 (100.0%)
2 cycles	4 (100.0%)	0 (0.0%)	4 (100.0%)
3 cycles	10 (90.9%)	1 (9.1%)	11 (100.0%)
4 cycles	21 (80.0%)	5 (19.2%)	26 (100.0%)
5 cycles	12 (92.3%0	1 (7.7%)	13 (100.0%)
6 cycles	29 (70.7%)	12 (29.3%)	41 (100.0%)
Therapy types			
Chemotherapy	75 (82.4%)	16 (17.6%)	91 (100.0%)
Therapeutic targets	5 (55.6%)	4 (4.44%0	9 (100.0%)
Cancer types			
Mixed germ cell tumors	3 (75.0%)	1 (25.0%)	4 (100.0%)
Squamous cell carcinoma	25 (78.1%)	7 (21.9%)	32 (100.0%)
Large cell carcinoma	1 (50.0%)	1 (50.0%)	2 (100.0%)
Adenocarcinoma	51 (82.3%)	11 (17.7%)	62 (100,0%)
Cancer stages			
Stage IV	61 (80.3%)	15 (19.7%)	76 (100,0%)
Stage III	19 (79.2%)	5 (20.8%)	24 (100.0%)
Family support			
Not good enough	15 (100.0%)	0 (0.0%)	15 (100.0%)
Enough	26 (96.3%)	1 (3.7%)	27 (100.0%)
Good	39 (67.2%)	19 (32.8%)	58 (100.0%)

DISCUSSION

Demographic Characteristics of Lung Cancer Patients

This study showed that the majority of lung cancer patients were >56 years old (59 patients, 59.00%) with a moderate QoL category (100.0%). This is similar to the study by Witwaranukool, *et al*. (2024) and Koch, *et al*. (2022), which showed that the mean age of patients was 56 years old ± 11 and 66 years old (standard deviation/SD 9.9), respectively.[11,12] The number of lung cancer incidents in Indonesia has increased over time and occurs at a younger age compared to other countries.[13] In other countries, it is around 63-68 years old, while in Indonesia, it is around 58 years old. The age factor is the most dominant in influencing the QoL because the older someone is, the more they are exposed to the risk of lung cancer. For example, the longer someone smokes or is exposed to another biomass. Advanced age also poses a risk for poor QoL because the body is already weak, plus the presence of comorbidities makes it more susceptible to side effects or symptoms of chemotherapy.

Most lung cancer patients (85 patients, 85.0%) in this study were males with moderate (81.2%) and good (18.8%) QoL categories. It is similar to the studies by Soeroso, *et al*. (2023) and Ermayanti, *et al*. (2022), where males were the most dominant (75% and 77.8%, respectively).[14,15] Males have a higher incidence of lung cancer and a higher mortality rate. A study revealed that women's better response to treatment primarily drove survival differences by sex.[16] Women are more likely to undergo surgery and less likely to be treated with immunotherapy or chemotherapy.[16]

Most patients were highly educated or had completed education for >9 years (82 patients, 82.0%) with moderate (75.6%) and good (24.4%) QoL categories. Another study also found that 65.3% of patients were highly educated and tended to have good knowledge about cancer.[17] Patients with a high level of education tend to be able to recognize the symptoms of early stages of cancer. Therefore, they can receive earlier treatment, which impacts the patient's QoL.

Most lung cancer patients were married (76 patients, 76.0%) with moderate (75.0%) and good (25.0%) QoL categories. According to Wu, *et al*. (2017), marriage could improve patient survival.[18] The study indicated that among individuals with lung adenocarcinoma, marital status appeared to be an independent predictive factor.[18] Widowed, divorced, or unmarried patients had a markedly increased chance of dying from cancer as compared to married patients. The significance of offering sufficient psychological and social assistance to cancer patients, particularly unmarried patients, was underscored by these findings.[19]

Biological Characteristics of Lung Cancer Patients

The BMI of 53% of the patients was included in the normal category, ranging between 18.6 and 25.0. The QoL of these subjects was categorized as moderate. Hardiano, *et al*. (2016) stated that there was no significant change in BMI before and after undergoing chemotherapy, most of which were in the normal category at 49%.[20] The influence of BMI on survival remains unclear. However, another study found that, compared to patients with a normal BMI, underweight patients had a lower survival rate, while obese patients had a higher survival rate.[21] This is likely due to differences in nutritional status and lifestyle in each country. Nutritional status can influence chemotherapy treatment results and determine the tolerance of side effects to cancer therapy.

This study found that 57 patients (57%) without comorbidities had moderate (80.7%) and good (19.3%) QoL. While 43 patients (43%) with comorbidities, including diabetes mellitus (DM), hypertension, breast and heart cancer, had moderate (79,1%) and good (20,9%) QoL. Roy, *et al*. (2018) reported that hypertension (64.3%), hyperlipidemia (56.1%), osteoarthritis (34.3%), hypothyroidism (21.8%), DM (21.8%), and coronary artery disease (21.8%) were the comorbid conditions most often found in cancer patients.[22] Comorbidities are more common in cancer survivors as they live longer. Patients with lung cancer (58%), kidney cancer (54%), stomach cancer (53%), bladder cancer (53%), and prostate cancer (51%) had the highest estimated prevalence of comorbidities.[23] A study demonstrated that individuals with comorbidities had a lower QoL and a greater mortality rate compared to those without comorbidities.[24]

Prognosis Factors for Lung Cancer Patients

This study found that most lung cancer patients had undergone treatment for 6 cycles (41 patients, 41.0%) with moderate (70.7%) and good (29.3%) QoL categories. Data on chemotherapy cycles showed that most patients had just undergone several chemotherapy sessions. The questionnaire data showed that patients with high or frequent chemotherapy cycles tended to be better at adapting to chemotherapy, in contrast to patients who had just undergone chemotherapy and were afraid of the side effects of chemotherapy.[25] A study by Karczmarek-Borowska, *et al*. (2014) revealed a negative association between the number of chemotherapy cycles and life quality.[26] This relationship was particularly evident in patients over 65 years old.[26] The longer the chemotherapy treatment, the lower the QoL.[26]

This study found that most types of therapy used were chemotherapy (91 patients, 91.0%) with moderate (82.4%) and good (17.6%) QoL categories, followed by targeted therapy (9 patients, 9.0%). Chemotherapy, targeted therapies, and/or immunotherapy are frequently the preferred treatments for malignancies that recur at distant sites.[27] The main goal of treatment for advanced lung cancer patients is not to cure the patient but rather to maintain and improve the patient's QoL.[28]

The type of cancer suffered by most patients was adenocarcinoma (62 patients, 62.0%), with the QoL category being moderate (82.3%) and good (17.7%), followed by squamous cell carcinoma (32 patients, 32.00%) in moderate (78.1%) and good (21.9%) QoL categories. Similarly, Soeroso, *et al*. (2018) also found that the type of cancer suffered by most patients was adenocarcinoma (65 patients, 92.9%) and squamous cell carcinoma (5 patients, 7.1%).[29] According to Malik, *et al*. (2013), smoking behaviors and the kind of cigarettes smoked might have an impact on the most frequent type of lung cancer, adenocarcinoma.[30] This is supported by studies that show that, although squamous cell carcinoma was once the most frequent type of lung cancer in terms of cytology and histology, adenocarcinoma has overtaken it in recent decades.[30] This could happen because of shifting preferences for the kind of cigarettes that are smoked.[30]

This study found that most patients were at stage IV (76 patients, 76.0%) with moderate (80.3%) and good QoL (19.7%), and 24 patients at stage III (24.0%). In patients with advanced lung cancer (stages III and IV), early palliative treatment can improve QoL. Reynaldi, *et al*. (2020) revealed that patients with advanced lung cancer had a worse QoL.[31] This was due to a significant decline in the patient's functional status, especially in the social domain, as well as their physical and role domain health status and ongoing symptoms. In addition to hair loss, coughing, exhaustion, appetite loss, peripheral neuropathy, sleeping trouble, pain, chest pain, and financial difficulties, lung cancer patients also face these symptoms.[31]

Factors of Social Environmental in Lung Cancer Patients

This study found that most patients received good family support in undergoing treatment (58 patients, 58.0%) in moderate (67.2%) and good (32.8%) QoL categories. According to Susilawati (2017), family support is assistance from other family members through products, services, information, and advice to make the support recipient feel appreciated, comfortable, and loved.[32] Putri, *et al*. (2023) showed that family support for lung cancer patients undergoing chemotherapy was high (67.2%), and QoL for lung cancer patients undergoing chemotherapy was good (88.52%).[33] Data analysis using the Spearman rank test with a value of $p = 0.016$ showed that the QoL for patients with lung cancer

receiving chemotherapy was significantly correlated with the support of their families.[33]

Cancer patients undergoing chemotherapy need family support. The support provided will reduce depression and provide calm for the patient and enthusiasm for recovery.[34] This is similar to the study by Hakim, *et al.* (2018), which found that, from 47 patients (65.5%), there was a strong association between family support and the QoL of cancer patients receiving chemotherapy (p-value = 0.014).[35] The correlation coefficient results showed a value of 0.308, meaning it has a low correlation value. Cancer patients' QoL improves with increased family support, as the positive correlation coefficient indicated that the two factors were positively correlated.[35]

Quality of Life of Lung Cancer Patients based on EORTC QLQ-C30

Table 2 provides an overview of cancer patients' QoL based on the assessment or answer score of the EORTC QLQ-C30 questionnaire. It shows cancer patients' global health status scale, with an average QoL score of 59.11 ± 12.86. Questions describing global health status relate to the patient's assessment of their overall health condition and QoL after treatment.

The functional scale with the highest score was social function, with an average score of 80.66 ± 24.81. Meanwhile, the lowest score on the functional scale was for role function, 69.99 ± 29.43. Medical conditions and treatment side effects can affect physical function and role function in cancer patients.[36] Cancer patients who are undergoing therapy need emotional and social support to overcome psychological impacts during the diagnosis and treatment process.[37] This support can be obtained from the family, environment, and community of fellow cancer patients.[38] Therefore, cancer patients remain optimistic while undergoing therapy.[38]

Pain had the highest average score on the symptom scale, 52.66 ± 29.95. Meanwhile, diarrhea had the lowest score, 17.98 ± 19.19. Correlation analysis showed that the greater the severity of symptoms, the lower the QoL. Chemotherapy has many side effects, including pain. Apart from chemotherapy, pain can also occur due to cancer.[39] This pain can occur at any time after treatment begins and will get worse as treatment continues.[40]

Similarly, Heydarnejad, *et al.* (2011), using the EORTC QLQ-C30 in cancer patients, found that there was a significant relationship ($p < 0.05$) between pain and the QoL of cancer patients.[41] Husen, *et al.* (2016) showed that the mean pain level of lung cancer patients undergoing chemotherapy was 6.5 ± 2.22.[42] The mean total score of patients' QoL was 799.6 ± 81.05.[42] Analysis results indicated no statistically significant correlation ($p = 0.8$) between the degree of pain and QoL among lung cancer patients receiving chemotherapy.[42] The degree of pain had a significant correlation ($r = -0.854$) with global health status ($p < 0.001$) and shortness of breath ($r = 0.537$) with $p = 0.04$.[42]

CONCLUSION

The general health status was mostly moderate. Functional status was mostly in the good category, with the role domain having the lowest mean, which included daily tasks or work difficulties. This needs to be improved by providing expressive supportive group therapy. Symptom status was in the moderate category, with the highest mean in the pain domain. The overall QoL of lung cancer patients was in the moderate category, meaning it was lower than the healthy population.

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Conflict of Interest

The authors declared there is no conflict of interest.

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Authors' Contributions

Collected data and wrote the manuscript: AA. Conception and design, data acquisition or analysis, and interpretation: AA, RL, AA. Critical revision: TA, NN, NNS. Critical review: KBS, DWTL. All authors contributed and approved the final version of the manuscript.

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