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RESEARCH ARTICLE

QUALITY OF LIFE AND COST OF LIVING IN LUNG CANCER PATIENTS

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Abstract

Introduction: Lung cancer accounts for about 34% of cancer deaths in men and 23% in women. Advances in treatment options for lung cancer patients are increasing the survival rate and improving the quality of life.

Aim: To explore the quality of life of lung cancer patients in Greece as well as to estimate the change in their cost of living.

Methods: This is a prospective descriptive observational study. In total, 170 participants were enrolled in the study. Data collection was performed by using a questionnaire of both open-ended and closed-ended questions. Data analysis was performed using SPSS ver. 21.0 (Statistical Package for Social Sciences).

Results: The mean age of patients was 67.4 years, while 72.4% of patients were male. The majority of the patients (71.2%) were retired and 13.6% were employed. The average cost of living due to the disease during the previous semester was €4.518. Patients with lower total cost of living had better general health (p=0,006). Patients who resided with more people, with higher monthly family income and lower total cost of living, had better mental health (0.016, 0.027, 0043, respectively).

Conclusion: The main goal of the therapeutic approach is the quality of life of cancer patient alongside the effectiveness of the treatment. Determining the factors affecting quality of life that the patient considers important is crucial, with cost of living consisting as one of them. Strategies for reducing the cost of living for cancer patients should be considered.

Keywords: Quality of life, cost of living, lung cancer, patient.

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INTRODUCTION

Lung cancer is a type of cancer that affects the trachea, bronchus, or air sacs in the lungs. Although smoking is associated with more than 80% of all lung cancer cases, many people who have never smoked or been exposed to secondhand smoke develop lung cancer, as air pollution and various other genetic factors also contribute to the disease, although to a lesser extent. Lung cancer accounts for about 34% of cancer deaths in men and 23% in women. It is a critical illness and, unfortunately, for about 85% of patients, the diagnosis is made when they are in either stage 3 or 4, as lung cancer progresses silently and only when it has already spread does it cause problems for the patient that lead to the doctor.[1-3]

Having the cells of the lung as its source, it gains a metastatic form, which can also be caused by either genetic or environmental factors. Its early diagnosis by the medical staff offers the patient a better survival rate. Depending on the stage of the cancer, the appropriate treatment is chosen - surgical removal, chemotherapy and/or radiation therapy. The main goal of any therapeutic approach is the patient's quality of life combined with the effectiveness of the treatment. The main symptoms are cough, pain in one area of the chest or localized to one or more sides, fatigue, weakness and unexplained weight loss.[1-5]

Quality of Life (QoL) refers to various dimensions of a person's daily life, such as their functionality, their well-being as well as the general perception of their health at a physical, psychological and social level. Its assessment, however, becomes difficult because it depends on the beliefs and perceptions of the individual as well as on the personal assessment of his situation. Consequently, the individual's quality of life can be defined as his subjective perception of his position in the society to which he belongs and of its value system, in combination with his personal goals and expectations.[6]

Several investigators have assessed QOL in lung cancer patients in relation to psychosocial, demographic and/or clinical factors, and specific QOL assessment tools in various languages have been developed. In the English literature, most studies on patients with lung cancer deal exclusively with recording their quality of life.[7-10] Few have dealt with recording costs related to the disease, while no studies were found to correlate these two variables.[11]

AIM

The aim of the present study was to explore the living conditions of patients with lung cancer in Greece as well as to estimate the change in their cost of living. A supplementary objective was to assess the effect of cost of living on their quality of life.

METHODS

Study design

This is a prospective descriptive observational study, conducted during the period January 2020- January 2022. The study was approved by the Ethics Committee of tertiary-level Oncology hospital, in Attica, Greece.

Sample

The final sample size was determined by specific time and condition constraints. This study was conducted during the recent COVID-19 pandemic so the impact on sampling recruitment methods should be taken into consideration.

According to the inclusion criteria participants should communicate effectively in the Greek language and should be over the age of 18. A total of 200 lung cancer patients were primarily approached and invited to take part in the study. Of those, 179 consented to participating and filling in the questionnaire of the study (response rate 89.5%). Finally, 170 participants were enrolled, as 9 were excluded from the study. Exclusion criteria were incomplete answers (n=9).

Measurements

The final form of the questionnaire included both open-ended and closed-ended questions. The first part of the questionnaire concerned demographic, socioeconomic and lifestyle characteristics. The second part of the questionnaire was used for the assessment of the changes in patients' financial cost of living (which includes open-ended questions regarding both the financial cost due to illness and the loss of income due to job changes or other forced expenses to deal with the consequences of the disease). The questionnaire was created by Stergianni et al.,[12] and permission has been obtained for its use. Finally, the third part of the questionnaire included the tool used to assess

patients' quality of life by using the Short Form Questionnaire-36 – SF 36 (which includes questions that explore the physical functioning of the individual, its physical role, physical pain, general health as well as its vitality and social function. In addition, it includes questions concerning the role of emotions as well as his mental health status.[13]

Data collection

The first author informed the participants of the purpose and the nature of the study. Once participants voluntarily agreed to participate, they were given an envelope containing the questionnaire of the study and an informed consent form. The questionnaire was distributed in person by the first author. Upon completion, the questionnaire and the signed consent form were returned to the first author in a closed envelope, to maintain the anonymity and confidentiality of the data.

Ethics

Written informed consent was obtained from all study participants in order to take part in the research. Study participants were informed about the purpose of the study, the confidentiality of data and the voluntary nature of participation. During the conduct of this study, all the basic principles of ethics provided by the Declaration of Helsinki were followed.

Data analysis

Continuous variables are presented as mean values ± standard deviation and categorical variables as frequencies. The Kolmogorov-Smirnov test and normality plots were used to test the normal distribution of quantitative variables. Several statistical tests were used for bivariate relationships. Mann-Whitney test, to investigate the existence of a relationship between a quantitative variable that did not follow a normal distribution and a dichotomous variable. Kruskal-Wallis test to investigate the existence of a relationship between a quantitative variable that did not follow a normal distribution and a categorical variable with >2 categories. Spearman's correlation coefficient: to investigate the existence of a relationship between a quantitative variable that did not follow the normal distribution and an ordinal variable, as well as to investigate the existence of a relationship between two quantitative variables that did not follow the normal distribution. Data analysis was performed using SPSS ver. 21.0 (Statistical Package for Social Sciences). A probability level of less than or equal to 0.05 was considered significant.

RESULTS

Demographic characteristics

The studied sample included 170 patients with lung cancer and their demographic characteristics are presented in ***Table 1***. The mean age of the patients was 67.4 years while 72.4% of patients were male. As far as family status is concerned, 80% were married and 92% had children. All patients lived with someone else. Most patients resided permanently in Attica (78%). Regarding the educational level, 38.2% of the patients were primary school graduates, 25.3% were junior high school graduates, 17.6% were high school graduates, 11.2% had a TEI/HEI degree, 6.5% were IEK graduates and 1.2% were illiterate.

Professional characteristics

The occupational characteristics of the patients are shown in ***Table 2***. Most patients were retired (71.2%), while 15.3% were unemployed and 13.6% were working. Among employees, 61.9% worked ≤40 hours per week. All patients were insured for health problems and most of them belonged in Greek National Health Service Organization (EOPPY) (67.1%) or in a public health service organization (17.6%). Over half of the studied sample 67% of patients had a monthly family income of ≤1000€, 26.5% had 1001-1500€ and 6.5% had >1500€. The average number of days the patient was absent from work during the previous semester was 134, while the average number of days absent from work for family members during the previous semester was 25. In detail, the patients' cost of living due to the disease during the previous six months is presented in ***Table 3***. The average cost of living for the patients due to the disease during the previous semester was €4.518. The lowest average cost price was €140, and the highest one was €23,632.

Use of health services and quality of life

Most patients had been admitted to hospital during the previous six months (92.9%). 66.5% of patients had received a special diet or nutritional supplements and 4.7% had made changes in their home due to the disease. The number of health services used by patients during the previous semester is presented in detail in ***Table 4***. ***Table 5*** presents the Cronbach's alpha internal consistency coefficients for the scales of the SF-36 for the assessment of quality of life. Cronbach's alpha internal consistency coefficients ranged from 0.75 to 0.90, indicating very good reliability of the SF-36. Descriptive results for the SF-36 scales are presented in ***Table 6***. Higher SF-36 values also indicate better quality of life. Scores on the physical and mental health summary scales were significantly lower than 50, indicating that patients' quality of life was significantly worse than average in both physical and mental health. The lowest mean score was on the 'social functioning' scale, while the highest mean score was on the 'physical pain' scale. In ***Table 7*** multivariate linear regression analysis is presented. According to the results of the multivariate linear regression, the following are obtained:

- Patients with higher monthly family income had better mental health.
- Patients who resided with more people had better mental health.
- Patients with lower total cost of living had better mental health.
- Patients with higher monthly family income had better physical functioning.
- Younger patients had better physical ability.
- Patients with lower total cost of living had better overall health.
- Patients who lived with more people had a better social role.
- Patients with a lower total cost of living had a better social role.
- Younger patients had a better emotional state.
- Patients with higher monthly family income had better mental health.

DISCUSSION

Based on the above results, the study presents important findings that highlight the characteristics of people suffering from lung cancer, as well as the effects of the disease on their daily life. Initially, the research involved a sample of people who had suffered from lung cancer, whose demographics consisted mostly of men. Also, most individuals were married with children and resided in Attica. Regarding their occupational status, most were retired, with fewer employed. The majority had some form of insurance and a low income. As for the cost of living, due to the disease, it increased during the previous semester, with the main cause being the loss of work. Their quality of life was usually low, while a statistical relationship was observed between income, the total cost of living and their quality of life, especially regarding mental health. The research presents important results regarding the relationships between various factors and aspects of patient health and well-being. Regarding physical functioning, it is observed that those patients with a higher family income show better physical functioning.

In the research by Polanski et al.,[14] regarding the quality of life of patients with lung cancer, it is pointed out that the progress of the disease, the severity of the symptoms and the side effects negatively affect the quality of life of the patients. Self-assessment of the quality of life helps predict survival. Patients evaluate their functioning in five dimensions, while their quality of life is lower compared to healthy subjects and patients with other malignancies. Symptoms such as fatigue, loss of appetite and shortness of breath negatively affect quality of life, with symptom management being key to improving quality of life.

In our research, among others, it is found that the Cronbach's alpha internal consistency coefficients for the scales of the SF-36 questionnaire, which were used to assess patients' quality of life, gave the following results. The reported coefficients ranged from 0.75 to 0.90, thus indicating high reliability of the SF-36 questionnaire. Specifically, the reliability coefficient for physical functioning was 0.90, for physical role 0.77, for physical pain 0.75, for general health 0.84, for vitality 0.89, for social functioning 0.81, for emotional state 0.82, for mental health 0.82 and for the physical health summary scale 0.84.

Souliotis et al.,[15] after applying the selection criteria, selected the final study sample, which included 144 patients, of whom 87%

were men. Most patients (62%) were over 65 years of age. 78% were diagnosed with NSCLC, while 21% with SCLC. Only one case with a diagnosis of neuroendocrine tumor of the lung was reviewed. 72.4% of patients had concomitant diseases. The most frequent were cardiovascular disorders (71%), followed by metabolic disorders (40.2%) and other disorders (27.1%). Overall, 93% of patients were smokers.

According to Liu et al.,[16] out of the 347 included patients with lung cancer, the 187 were men and the 160 were women. The average age of the patients was 64.8 years, with an average duration since diagnosis of 27.3 months. Of these, 82.7% lived in urban areas, 63.7% were retired, and 98.8% had health insurance. Almost three in five patients (58.7%) reported annual family incomes of 50,000 to 149,999 Chinese yuan, while 18.5% reported lower incomes. In terms of cancer type, 79.5% had non-small cell lung cancer, while 7.5% had small cell cancer. Regarding cancer stages, 26.4%, 14.0%, 19.2% and 40.4% of patients had stages I to IV, respectively.

At this point, the results of research related to the quality of life versus the length of life in cancer patients are presented. It appeared that the elderly showed a preference for quality of life (QoL) over length of life (LoL). Younger patients, in contrast, seemed to prefer aggressive treatments in order to prolong their survival years. Patients in better health condition showed an underestimation towards LoL, while those in worse physical condition preferred QoL.[17]

Fragkiadakis & Spiliotopoulou18 investigating the quality of life of cancer patients and estimating the cost of immunotherapy in selected cases, found that based on the QLQ-C30 questionnaire, 73% of patients experienced almost no difficulty during strenuous work. Seventy-nine percent and 70% of patients stated that they did not feel any discomfort when walking for a long or short period of time respectively. Eighty-one percent of the respondents experienced almost no discomfort during immunotherapy treatment, while 93% were able to perform their personal hygiene. Immunotherapy does not limit daily activities, as emphasized by 73% of patients who did not experience any restrictions in their work. Accordingly, 81% had no restrictions on their hobbies. Overall, patients receiving immunotherapy do not experience significant health problems.

In the study by Kokkotou et al.,[19] included a total of 122 patients. The mean age at diagnosis was 67.8 years, with a standard deviation of 8.9 years. Most of patients (78.7%) were men and 55.0% were diagnosed with stage IV disease. About 52.5% had been diagnosed with adenocarcinoma, 28.7% with non-small cell carcinoma, and 18.9% with small cell lung carcinoma. Median survival was 10.8 months. During the end-of-life phase, the mean costs per patient for the last 6, 3 and 1 months were respectively €7665, €3351 and €1009. Pharmaceutical costs were the main driver of total costs (75% of total costs for the last 6 months), while radiotherapy costs accounted for 16.2%. The mean value of end-of-life costs for the last 6 months was partially statistically significantly higher for patients with adenocarcinoma (€9031) than for patients with squamous cell carcinoma (€6606) and patients with small cell lung carcinoma (€5474).

In summary, from the studies cited significant results emerge, such as that late diagnosis and advanced disease, negatively affect the quality of life of lung cancer patients. There is high financial cost of lung cancer treatment in Greece, mainly due to pharmaceutical costs and it is often observed during the final stage of the disease. Moreover, most lung cancer patients are smokers and often have comorbidities. Finaly, younger patients seek aggressive treatments for survival, while older patients prefer quality of life.

Strengths and Limitations

The present research has some strengths and limitations. The fact that the questionnaire was distributed in person by the first author who was available for explanations and clarifications increases the reliability and therefore the strength of our survey.

The first limitation of our study was the small sample size which possibly influenced the results obtained. The second limitation was that the sample was drawn from a single hospital. That is why the generalization of the findings is restricted to a national level.

CONCLUSIONS

Patients' quality of life was usually low, while a statistical relationship was observed between income, the total cost of living and their living conditions, especially regarding mental health.

The present research presents important results regarding the relationships between various factors and aspects of patient health and well-being. Regarding physical functioning, it is observed that those patients with a higher family income show better physical functioning. The therapeutic approach has as its main goal the quality of life of cancer patients alongside the effectiveness of the treatment. Determining the factors affecting means of living that the patient considers important is crucial, and cost of living is present as one of these factors. Strategies for reducing the cost of living for cancer patients should be considered.

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ANNEX

TABLE 1. Baseline Sociodemographic Characteristics (N=170)

Baseline characteristics	**Mean (±S.D.)***	**n (%)**
Gender		
Men		123 (72.4)
Women		47 (27.6)
Residence		
Outside of Attica		35 (22)
Attica		124 (78)
Marital status		
Single		10 (5.9)
Married		136 (80)
Divorced		13 (7.6)
Widowers		11 (6.5)
Number of children		
0		13 (8)
1		25 (15.3)
2		84 (51.5)
3		29 (17.8)
4		7 (4.3)
5		5 (3.1)
Number of people living together		
0		0
1		84 (56)
2		38 (25.3)
3		19 (12.7)
>3		9 (5.8)
Educational level		
Illeterate		2 (1.2)
Primary School graduate		65 (38.2)
Junior high school graduate		30 (17.6)
High school graduate		43 (25.3)
Institute of Vocational Training graduate		11 (6.5)
Technological institure graduate		17 (10)
MSc/PhD		2 (1.2)
Age	67.4± 8.7	
*S.D.: Standard Deviation		

TABLE 2. Occupational characteristics of the patients. (N=170)

Characteristics	n	%
Employment		
Complete	21	12.4
Partial	2	1.2
Unemployed	26	15.3
Pensioners	121	71.2
Working hours per week		
≤40	13	61.9
>40	8	38.1
Work area		
Public	6	26.1
Private	17	73.9
Insurance coverage		
Ika	114	67.1
Public	30	17.6
TEVE	8	4.7
OGA	10	5.9
Other	8	4.7
Monthly family income (€)		
0-500	41	24.1
501-1000	73	42.9
1001-1500	45	26.5
1501-2000	4	2.4
2001-2500	7	4.1
Days of the patient's absence from work during the previous semester[α]	134	68
Days of absence of family members from work during the previous semester[α]	25	27

[α]S.D.: Standard Deviation

TABLE 3. Cost of living (€) of the patients due to the disease during the previous semester.

Cost (€)	Mean value	Standard deviation	Median value	Interquartile range	Minimum value	Maximum value
Medical visits	323	331	245	250	0	2000
Nurse visits	7.2	44.4	0	0	0	500
Physiotherapy	81	144	0	200	0	600
Psychologist visits	71	128	0	100	0	800
Social worker visits	6.9	12.2	6	0	0	150
Buying medication	276	255	240	193	0	2500
Purchase of special pharmaceutical material	74	164	0	90	0	1500
Carer services	146	436	0	133	0	3600
Gym visits	1.5	19.2	0	0	0	250
Buying cosmetics	17	122	0	0	0	1500
Mobilization due to the condition	486	516	300	355	0	3000
Visiting friends	21	27	20	30	0	200
Phone calls	2.2	23.6	0	0	0	300
Expenses of another illness	355	862	180	220	0	8000
Hospitalization	52	412	0	0	0	5000
Special diet or nutritional supplements	355	381	250	600	0	2000
Conversion at home	33	161	0	0	0	1500
Other expenses (due to the condition)	768	1290	300	400	0	8000
Due to absence from work	3420	4195	2500	4800	0	18.000
Due to absence of family members from work	461	601	300	650	0	3.600
Total cost	4518	4122	3351	3188	140	23.632

TABLE 4. Number of uses of health services by patients during the previous semester.

	Mean value	Standard deviation	Median value	Interquartile range	Minimum value	Maximum value
Medical visits	3.8	3.9	3	3	0	30
Nurse visits	2.2	2.8	1	1	1	10
Physiotherapy	11.5	4.5	10	5	2	30
Psychologist visits	2.1	2.8	1	0	1	15
Social worker visits	1.1	0.3	1	0	1	3
Buying medication	33.3	113	1	2	0	800
Purchase of special pharmaceutical material	10.8	48.5	2	4	0	400
Carer services	30	95	0	0	0	300
Gym visits	-	-	-	-	-	-
Buying cosmetics	5.3	3.1	6	5	1	10
Movements due to the condition	14.5	12.5	12	4	0	120
Visiting friends	1.7	0.8	2	1	1	5
Phone calls	-	-	-	-	-	-
Expenses of another illness	1.6	1.2	1	1	1	6

TABLE 5. Cronbach's alpha internal consistency coefficients for the SF-36 scales.

Scale	Cronbach's alpha
Physical functionality	0.90
Physical role	0.77
Physical pain	0.75
General health	0.84
Vitality	0.89
Social functionality	0.81
Emotional state	0.82
Mental health	0.82
Summary scale of physical health	0.84
Brief Mental Health Scale	0.87

TABLE 6. Descriptive results for the SF-36 scales.

Scale	Mean value	Standard deviation	Median value	Interquartile range	Minimum value	Maximum value
Physical functionality	21.4	17.3	20	20	0	70
Physical role	32.8	18.4	25	0	25	100
Physical pain	50.3	30.5	52	43	0	100
General health	27.5	13	27	15	0	82
Vitality	29.7	20.7	25	31	0	81
Social functionality	18.6	22.2	12.5	25	0	100
Emotional role	36.7	21.4	25	25	25	100
Mental health	45.2	16.3	45	20	5	90
Summary scale of physical health	30.4	6.6	29.8	10	17	54
Brief Mental Health Scale	34.3	7.6	33.4	8.4	18	63

TABLE 7. Multivariate linear regression analysis

	Factor b	95% Confidence Interval for b	p-value
Dependent variable: mental health			
Independent variable			
Monthly family income	1.5	0.3 έως 2.8	0.016
Number of people living together	1.4	0.2 έως 2.6	0.027
Total cost of living	-0.0003	-0.001 έως -0.00001	0.043
Dependent variable: physical functioning			
Independent variable			
Monthly family income	2.8	0.1 έως 5.5	0.04
Dependent variable: physical role			
Independent variable			
Age	-0.4	-0.7 έως -0.1	0.016
Dependent variable: general health			
Independent variable			
Total cost of living	-0.001	-0.0011 έως -0.0002	0.006
Dependent variable: social role			
Independent variable			
Number of people living together	3.4	0.2 έως 6.6	0.037
Total cost of living	-0.001	-0.002 έως -0.0005	0.001
Dependent variable: emotional role			
Independent variable			
Age	-0.5	-0.8 έως -0.1	0.015
Dependent variable: mental health			
Independent variable			
Monthly family income	2.9	9.3 έως 5.4	0.027