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Risk factors of inability to live independently in the course of lung cancer

Original Study

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Abstract

Introduction. A number of articles focus on functioning with lung cancer. However, there are no articles on factors which result in the inability to live independently in the course of this disease. This study assesses risk factors regarding the inability to live independently among individuals with lung cancer.
Materials and Methods. This study included 134 patients who displayed interest in obtaining a certificate of the inability to live independently.
Results. Over the study period, 75% of the patients obtained the certificate of inability to live independently (group A) and 25% of them did not obtain the certificate (group B). In group A, 56.4% of individuals were men, and in group B, 42.4% of them were men. In group A, 11.8% of patients were diagnosed with small cell lung cancer; no such case was found in group B. Metastases were revealed in 83.2% of patients from group A and in 57.6% from group B. Patients from group A had a significantly lower score in the Barthel Index for Activities of Daily Living and lower body mass index compared with those from group B.
Conclusions. Information on body mass index, histopathological diagnosis, and the presence of metastases is useful in assessing the risk of being unable to live independently in patients with lung cancer. The Barthel Index for Activities of Daily Living is helpful in assessing the inability to live independently.

Keywords

lung • cancer • disability • epidemiology • palliative

1. Introduction

Lung cancer is a malignant tumor leading to many deaths around the world. In fact, it is the main cause of cancer-related mortality worldwide [1, 2, 3]. In the literature we can find a variety of works that focus on preventing lung cancer [4, 5, 6, 7] and on implications for early detection [8, 9] but no articles about factors leading to the inability to live independently. It is a cancer that causes significant suffering among patients, both physical [10, 11, 12, 13] and mental [14, 15, 16, 17].

There is a number of articles that focus on functioning with lung cancer, including studies on factors which are responsible for prolonging life [18, 19, 20] and improving quality of life [21, 22, 23, 24]. However, there are no publications on factors leading to inability to live independently in the course of lung cancer. This cancer can cause a damage to the organism's ability to function to a degree that results in patients requiring permanent or long-term care and assistance on the part of another person to satisfy basic life needs [25, 26, 27]. This is a group of patients who are very susceptible and require a holistic approach to care. Therefore, one should become aware of the elements that influence patients' life in such a harmful way and help them by responding to their growing needs, including financial ones, quicker. That is why the first aim of this study is to focus on factors which result in the inability to live independently in the course of lung cancer. Researchers indicate that financially strained patients with lung cancer experience worse emotional and physical quality of life. Other researchers also indicate the importance of interventions to reduce the financial burden of lung cancer [28]. If a patient is found unable to exist independently, he might be entitled to obtain financial help in the form of a nursing supplement or supplementary benefit. Social support should be valued as an important component of sensitive healthcare for the improvement of

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resilience and life quality among patients with lung cancer [16]. It is worth remembering that all lung cancer survivors are in need of social support. Given these risk factors, attention should be drawn to individuals who may need fast and solid social support because of their fragility. Therefore, the second aim of this study is to make physicians more aware of the problem. They often are the first healthcare professionals who can recognize the problem. They can quickly refer patients and their families to relevant institutions which can eventually help individuals who are unable to live independently.

2. Patients and methods

2.1. Participants and procedures

In this study, all participants had lung cancer. We followed the methods of Tradecki et al [29]. A total of 134 final decisions issued by the Social Insurance Institution in Wrocław, Poland, in 2016 were analyzed (all decisions were made at that time). All patients were interested in obtaining a certificate of the inability to live independently, which is a document for social insurance support signifying that the patients are unable to care for themselves. Patients' medical records were carefully assessed in 2019. Data on age, education, and sex were collected. Moreover, the type of cancer was defined and distant metastases were determined. The functional status of every patient was described based on the Barthel Index for Activities of Daily Living (BI) [30], a validated questionnaire, with a maximum score of 100 points and a minimum of 0. The Body Mass Index (BMI) was calculated based on the available information on weight and height. The study protocol was approved by the Commission of Bioethics at Wrocław Medical University (approval KB-331/2019).

2.2. Statistical analysis

The results were subject to a statistical analysis, which was performed using the IBM SPSS Statistics 26 program (Armonk, New York, United States). Variables with a skewed distribution were expressed as medians with interquartile ranges (IQR). Categorical variables were expressed as numbers with percentages. In order to assess the significance of the differences among the groups, the Mann-Whitney test and $\chi 2$ test were performed. Statistical significance was set at p value of less than 0.05.

3. Results

Among the 134 final decisions that were analyzed, 101 patients (75%) obtained a certificate of the inability to live independently (they were included in group A) and 33 individuals (25%) failed to get the certificate (they were included in group B). The groups did not differ statistically in terms of sex ($p = 0.161$). However, it should be noted that in group A there were slightly more men and in group B women slightly dominated men (Table 1). The groups did not differ statistically in terms of education ($p = 0.376$). The groups differed statistically in terms of histopathological diagnosis ($p = 0.045$). All individuals in group B had non-small cell lung cancer (NSCLC), and among those in group A, NSCLC was predominant, but 11.8% of patients had a diagnosis of small cell lung cancer (SCLC, Table 1). We are aware of the fact that 11.8% of patients is not a huge number, but it must be emphasized that there were no SCLC cases in group B. The groups differed statistically in terms of the presence of metastases ($p = 0.003$). They were much more common among patients in group A (Table 1).

Groups A and B did not differ statistically in terms of age ($p = 0.961$). However, there was the statistical difference in BMI between the groups ($p = 0.011$), patients from group A had lower BMI (Table 2). Also, there was the statistical difference in BMI between the groups ($p < 0.001$), lower overall score on the BI was recorded in group A (Table 2).

Additionally, group A was analyzed in terms of sex. There was no statistical difference between men and women in this group (Table 3) in terms of age ($p = 0.400$), BMI ($p = 0.645$) and BI ($p = 0.122$).

4. Discussion

As far as we know, this is the first report on risk factors pertaining to the inability to live independently in the course of lung cancer. Our research has shown that patients who were unable to live independently in the course of this cancer had a lower BMI compared to other individuals suffering from lung cancer. The available studies have shown that significant weight loss may impair wound healing and reduce the strength of the immune system, tolerance of treatment, and quality of life [5], which may cause a great impairment of the functional state of the human body and lead to inability to live independently. We have also already known that metastases in the course of lung cancer have been an important factor influencing the survival time [18]. During our study, in patients with the inability to live independently, distant metastases were more frequently diagnosed. Additionally, our study strongly suggests that small cell lung cancer (SCLC) may cause greater functional devastation of patients' bodies than NSCLC and may be a strong indicator of inability to live independently. That's why SCLC is far more aggressive and lethal [31]. All patients diagnosed with this form of lung cancer were considered as unable to live independently in our study. In comparison to other malignant tumours, lung cancer causes greater unmet needs, but these needs have never been fully described [21, 28]. Identifying those needs that affect daily functioning could facilitate interventions to improve the quality of life of patients with lung cancer [12], also in group of individuals with inability to live independently. Our research shows that the BI is a proper tool to assess functional capacity in the context of inability to exist independently. Significantly lower overall score on the BI was recorded in group A. This questionnaire can be filled in quickly and can assess basic activities such as feeding, bathing, groom-

Table 1. Information on sex, education, histopathology, and metastases in group A and group B

	Groups				
	A (n=101)		B (n=33)		
SEX	N	%	N	%	$\chi^2 = 1.960$ $p = 0.161$
women	44	43.6	19	57.6	
men	57	56.4	14	42.4	
EDUCATION[a]	N	%	N	%	$\chi^2 = 3.107$ $p = 0.376$
primary	33	37.5	7	21.2	
basic vocational	33	37.5	16	48.5	
secondary	17	19.3	7	21.2	
higher	5	5.7	3	9.1	
HISTOPATHOLOGY[b]	N	%	N	%	$\chi^2 = 4.024$ $p = 0.045$
small cell lung cancer	11	11.8	0	0	
non-small cell lung cancer	82	88.2	31	100	
METASTASES[c]	N	%	N	%	$\chi^2 = 8.933$ $p = 0.003$
no	16	16.8	14	42.4	
yes	79	83.2	19	57.6	

[a] *no information on 13 patients from group A*
[b] *no information on 8 patients from group A and 2 patients from group B*
[c] *no information on 6 patients from group A*

Table 2. Information on age, BMI (body mass index), and BI (The Barthel Index for Activities of Daily Living) in group A and group B (y: years; IQR: interquartile range)

Parameter	Group A (n = 101)	Group B (n = 33)	Statistic	p value
Age, y, median (IQR)	66 (63–70)	65 (63–68)	Z = -0.049	0.961
BMI[a], median (IQR)	23.99 (20.81–26.64)	27.69 (22.31–29.41)	Z = -2.527	0.011
BI[a], median (IQR)	60 (50–65)	90 (85–95)	Z = -8.302	< 0.001

[a] *No information on 16 patients from group A*

Table 3. Information on age, BMI (body mass index) and BI (The Barthel Index for Activities of Daily Living) in group A in terms of sex (y: years; IQR: interquartile range)

Parameter	Women (N = 44)	Men (N = 57)	Statistic	p value
Age, y, median (IQR)	66 (64–68)	65 (60–70)	Z = -0.841	0.400
BMI[a], median (IQR)	24.61 (19.33–26.77)	23.67 (21.45–26.64)	Z = -0.461	0.645
BI[b], median (IQR)	60 (55–65)	55 (50–65)	Z = -1.546	0.122

[a] *No information on 11 women and 5 men*
[b] *No information on 7 women and 9 men*

ing, dressing, mobility, and controlling of sphincters. This also confirms that functional performance is an important factor in influencing everyday of life of patients with lung cancer [10]. It should also be remembered that despite the advancement in the detection of lung cancer, the possibility of an accurate histopathological diagnosis, and access to a wide range of treatments for this cancer, many patients still develop advanced, incurable forms that ultimately lead to death [32], and along the way, at some stage of the disease, patients often develop an inability to exist independently.

Potential limitations of this study include lack of information on treatment of lung cancer in both groups. Our study is also based on the data from only one centre (Wrocław, Poland) and from patients who applied for the certificate of the inability to live independently. During the stage of data collection, we found it difficult to obtain information regarding all patients (for instance, we had no information on metastases of six patients in group A). The reasons are as follows: certification in absentia, patients' reluctance to provide information, as well as undisputed inability to lead an independent life with no necessity to gain additional information.

5. Conclusions

The presence of metastases and BMI are crucial in assessing the risk of inability to live independently among patients with lung cancer. Histopathological diagnosis may be a strong predictor of inability to live independently in the course of this cancer. Age, education, and sex are not proper predictors of this inability. The BI proves to be helpful in assessing the inability to live independently. However, further research including larger samples and information on treatment is still required.

Authors' Contribution

M.T.: study design, data collection, statistical analysis, data interpretation, literature review, writing - original draft preparation, writing - review and editing, final proofreading and approval of the version for publication; **J.Z.:** study design, data collection, data interpretation; **R.R.S.:** statistical analysis, literature review; **G.M.:** study design, data interpretation; **A.B.:** study design, data interpretation, writing - original draft preparation

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Conflict of Interest

The authors have no potential conflicts of interest to declare.

Ethics Approval

The study protocol was approved by the Commission of Bioethics at Wrocław Medical University (approval KB-331/2019).

Additional Information

A preprint of this work has previously been published (https://www.researchsquare.com/article/rs-98060/v1).

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