

ORIGINAL PAPER

RELATIONSHIP BETWEEN QUALITY OF LIFE OF LUNG CANCER PATIENTS AND SMOKING

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Abstract

Aim: To describe the relationship between quality of life (QOL) and cigarette smoking among lung cancer patients as measured by the functional and lung cancer symptom scale. **Design:** Data for this exploratory study were collected using a cross-sectional model. **Methods:** The research sample consisted of 198 patients from six hospitals in Slovakia. Two questionnaires were used in this study, the EORTC QLQ-C30 (version 3) and its module EORTC QLQ-LC13. **Results:** The average age of respondents was 60.28 (SD ± 13.83). 40% of patients were current smokers, 39% were former smokers, and 21% were non-smokers. Global health status and physical functioning were better among non-smokers in comparison with former smokers and current smokers. Significant differences were found in symptoms – pain, dyspnoea, coughing, haemoptysis, dysphagia, pain in chest, and pain in other parts, all of which were worse among current smokers and former smokers in comparison with non-smokers. **Conclusion:** Smoking seems to be a risk factor that has an impact on the quality of life of the patients with lung cancer. It is necessary to improve interventions focusing on prevention and overcoming of addiction to smoking in a multi-disciplinary context.

Keywords: lung cancer, patient, quality of life, smoking, symptoms.

Introduction

Lung cancer remains the most common cancer in the world, both in term of new cases (1.8 million cases, 12.9% of total) and deaths (1.6 million deaths, 19.4%), because of its high case fatality rate. It is the most common cancer in men worldwide (1.2 million, 16.7% of the total), with the highest rates in Central and Eastern Europe (53.5 per 100,000) (Ferlay et al., 2015). In women, it is the fourth most common cancer worldwide, after breast cancer, colon cancer and cervical cancer (Ondrušová, Beržinec, Pšenková, 2015). On a global scale, Slovakia has an average occurrence of malignant lung tumours in men and women (Ferlay et al., 2015; Ondrušová, Beržinec, Pšenková, 2015), whereas the developmental trend of incidence and mortality in Slovakia is not favourable in women. In 2008, according to data from The National Health Information Centre and National Cancer Registry of Slovakia, 1926 new cases of lung carcinoma in men, and 592 new cases in women were registered in Slovakia (Safaei Diba, Pleško, 2014). The most frequent malignant lung

tumour is the bronchogenic carcinoma, representing a large group of bronchial and lung parenchyma tumours.

Lung cancer is a disease with a complex multifactorial aetiology. Complex endogenous and exogenous factors are applied in its aetiopathogenesis. One of the most significant behavioral factors, linked to lung cancer is smoking. Smoking is a well-known cause of many diseases associated with high mortality, morbidity and disability, and tobacco use is a global burden that requires actions on multiple levels (Abu Shomar et al., 2014). The relation between smoking and lung cancer has negative consequences for lung cancer patients (Cataldo, Jahan, Pongquan, 2012; Polanski et al., 2016). A diagnosis of cancer may represent an opportunity for promoting smoking cessation among patients and their families (Butler et al., 2011). Many foreign studies draw attention to the existing relation between the risk of developing lung tumours, the amount of cigarettes smoked daily, the degree of smoke inhalation, and the age at which smoking begins (Browning et al., 2009; Balduyck et al., 2011; Becoña et al., 2013; Burris et al., 2015).

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Gurková (2011) defines QOL in nursing as a subjective perception and evaluation of individual living conditions, which is based on an internal standard (values, expectations, aspirations, etc.); QOL is considered to be a multidimensional, subjective, value-driven construct. The attention to the quality of life of patients with lung cancer increases with the seriousness of the bronchogenic carcinoma, its progress and manifesting clinical symptoms. The reality of symptoms is multidimensional, as their negative impact on patients' quality of life and on their ability to engage in daily activities is observed (Kurucová et al., 2015). Generic and specific questionnaires focusing on assessing the individual dimensions of quality of life are used to evaluate quality of life. The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core 30 (EORTC QLQ-C30) is the instrument most frequently used to measure the quality of life of cancer patients (Aaronson et al., 1993). The EORTC QLQ-LC13 is a supplementary questionnaire module, and contains items assessing lung-cancer-associated symptoms (Bergman et al., 1994). Studies have shown different results on the relationship between smoking and QOL (Strine et al., 2005; Heikkinen et al., 2008; Becoña et al., 2013; Lemonnier et al., 2014).

Aim

The aim of our research was to evaluate the effect of smoking tobacco products on the quality of life of patients with lung cancer.

Methods

Design

Data for this exploratory study were collected using a cross-sectional, non-experimental design.

Sample

The research sample was made up of 198 patients with diagnosed lung cancer. Patients with lung cancer in all clinical stages who had not undergone either surgical treatment or oncological treatment, and were not in the terminal stage of the disease, were chosen. Following the granting of approval, the research was conducted on the pulmonary wards of six health-care facilities in Slovakia.

The sample consisted of 198 patients, of whom 118 were men (60%), and 80 women (40%). The average age of the respondents was 60.28 years ($SD \pm 13.83$). The breakdown of the sample according to education was as follows; 44 (22%) respondents had completed primary education, 60 (30%) patients had completed

secondary education without school-leaving exams, 60 (30%) had completed secondary education with school-leaving exams, and 34 (17%) patients had completed higher education. According to place of residence, 91 (46%) respondents lived in the countryside, and 107 (54%) in the city. The observed sample was also divided according to clinical stage of the disease, three (2%) patients were in the first stage, 35 (18%) in the second stage, 88 (44%) in the third stage and 72 (36%) patients were in the final fourth stage.

Data collection

The collection of the data was carried out using the EORTC QLQ-C30 questionnaire (version 3), and its module EORTC QLQ-LC13. The EORTC QLQ-C30 assesses five functioning scales (physical, role, emotional, cognitive, and social performance), three symptom scales (fatigue, pain, nausea or vomiting), global health status, and six single items (dyspnoea, insomnia, appetite loss, constipation, diarrhoea, and financial difficulties). The EORTC QLQ-LC13 is a supplementary questionnaire module, and contains items assessing lung cancer-associated symptoms (cough, haemoptysis, dyspnoea, and site-specific pain). The reliability and validity of the EORTC QLQ-C30 and EORTC QLQ-LC13 questionnaires have been confirmed in international cancer studies. In accordance with procedures recommended by the EORTC, scores were linearly converted to a scale ranging from 0 to 100 for each patient. For the functional scales, higher scores represent a higher level of functioning. For the symptom scales, higher scores represent more burdensome symptoms.

Data analysis

In the first step, basic descriptive statistics were realized in the whole sample and separately based on smoking status. In the next step the Kruskal-Wallis test was used to explore possible differences in EORTC QLQ-C30 and QLQ-LC13 subscales. Statistical analysis was performed using the statistical software IBM SPSS, version 20.0.

Results

Smoking status was classified as current, former, or non-smoker. In the observed sample, 78 (40%) patients were smokers, 78 (39%) were former smokers, and 42 (21%) were non-smokers. The smokers had smoked on average 18.14 cigarettes a day ($SD \pm 0.28$) for 35.42 years ($SD \pm 0.98$). The background descriptive characteristics of the three groups based on smoking status are presented in Table 1. No significant differences were

found, with the exception of gender and the stage of disease distribution.

Table 2 presents comparison in the EORTC QLQ-C30 based on smoking status as defined by the Kruskal-Wallis test. Significant differences were found in global health status, physical functioning, pain, dyspnoea, and financial difficulties. Global health status and physical functioning were better among non-smokers in comparison with former smokers and current smokers. On the other hand, pain, dyspnoea, and financial difficulties were higher

among former smokers and current smokers in comparison with non-smokers.

Table 3 presents comparison in the EORTC QLQ-LC13 based on smoking status as defined by the Kruskal-Wallis test. Significant differences were found in dyspnoea, coughing, haemoptysis, dysphagia, pain in chest and pain in other parts. All problems were higher among former smokers and current smokers in comparison with non-smokers.

Table 1 Descriptive characteristics of research sample by smoking status

	Non-smokers (n = 78)	Former smokers (n = 42)	Current smokers (n = 78)	p-value
Age mean (SD)	60.12 (13.39)	61.10 (12.30)	59.55 (15.53)	ns ^a
Gender n (%)				
male	12 (28.6)	53 (67.9)	53 (67.9)	< 0.001 ^b
female	30 (71.4)	25 (32.1)	25 (32.1)	
Education n (%)				
primary	21 (50.0)	39 (50.0)	44 (56.4)	ns ^b
secondary	12 (28.6)	24 (30.8)	24 (30.8)	
university	9 (21.4)	15 (19.2)	10 (12.8)	
Residence n (%)				
urban	22 (52.4)	30 (38.5)	39 (50.0)	ns ^b
rural	20 (47.6)	48 (61.5)	39 (50.0)	
Stage of disease n (%)				
I	2 (4.8)	-	1 (1.3)	< 0.001 ^b
II	15 (35.7)	14 (17.9)	6 (7.7)	
III	17 (40.5)	32 (41.0)	39 (50.0)	
IV	8 (19.0)	32 (41.0)	32 (41.0)	

^aKruskal-Wallis test; ^bChi-square test; ns = not significant; SD – standard deviation

Table 2 Comparison of EORTC QLQ-C30 subscales by smoking status

	Non-smokers (n = 78) mean (SD)	Former smokers (n = 42) mean (SD)	Current smokers (n = 78) mean (SD)	p-value
Global health status	46.03 (20.43)	37.50 (21.05)	35.26 (20.14)	< 0.05 ^a
Physical functioning	72.06 (20.94)	64.87 (24.59)	62.22 (19.33)	< 0.05 ^a
Role functioning	66.27 (25.63)	61.54 (31.24)	58.12 (25.73)	ns ^a
Emotional functioning	69.64 (21.61)	62.50 (26.10)	60.06 (25.63)	ns ^a
Cognitive functioning	84.52 (17.80)	77.78 (19.86)	80.77 (18.82)	ns ^a
Social functioning	63.10 (30.03)	55.34 (35.79)	50.43 (25.48)	ns ^a
Fatigue	42.86 (22.83)	50.71 (26.48)	54.42 (24.92)	ns ^a
Nausea and vomiting	13.49 (16.56)	18.38 (23.20)	19.23 (22.49)	ns ^a
Pain	36.11 (26.52)	44.66 (30.92)	51.07 (27.44)	< 0.05 ^a
Dyspnoea	43.65 (32.50)	55.13 (33.04)	58.97 (27.87)	< 0.05 ^a
Insomnia	30.95 (25.92)	36.32 (34.06)	38.03 (31.20)	ns ^a
Appetite loss	23.02 (26.02)	30.34 (30.48)	30.34 (31.87)	ns ^a
Constipation	11.91 (21.87)	14.96 (27.21)	18.80 (28.72)	ns ^a
Diarrhoea	7.94 (16.15)	16.24 (26.18)	13.68 (24.29)	ns ^a
Financial difficulties	34.13 (29.89)	50.00 (30.27)	56.84 (31.83)	< 0.001 ^a

^aKruskal-Wallis test; ns = not significant (the higher values indicate a higher level of functioning and quality of life, min 0, max 100); SD – standard deviation

Table 3 Comparison of EORTC QLQ-LC13 subscales by smoking status

	Non-smokers (n = 78) mean (SD)	Former smokers (n = 42) mean (SD)	Current smokers (n = 78) mean (SD)	p-value
Dyspnoea	38.62 (24.45)	51.42 (25.65)	54.42 (24.20)	< 0.001 ^a
Coughing	42.86 (23.61)	55.98 (28.17)	62.82 (24.61)	< 0.001 ^a
Haemoptysis	7.94 (17.74)	17.32 (24.55)	27.78 (28.64)	< 0.001 ^a
Sore mouth	7.14 (15.68)	13.68 (23.07)	12.82 (20.27)	ns ^a
Dysphagia	7.14 (13.84)	13.25 (19.62)	21.37 (24.60)	< 0.001 ^a
Peripheral neuropathy	16.67 (23.57)	23.93 (28.37)	25.21 (30.95)	ns ^a
Alopecia	3.97 (10.93)	5.98 (12.87)	10.68 (18.99)	ns ^a
Pain in chest	29.37 (22.33)	48.72 (22.60)	47.86 (27.70)	< 0.001 ^a
Pain in arm or shoulder	25.40 (25.30)	32.91 (28.17)	32.48 (30.38)	ns ^a
Pain in other parts	18.25 (26.75)	33.76 (32.89)	32.91 (30.63)	< 0.01 ^a

^aKruskal-Wallis test; ns = not significant (the higher values indicate a higher level of functioning and quality of life, min 0, max 100); SD – standard deviation

Discussion

The aim of our research was to assess quality of life and the occurrence of symptoms among lung cancer patients with regard to smoking habits, using the EORTC-C30 and EORTC QOL-LC13 questionnaires. The cancer-specific EORTC QLQ-C30, together with the lung cancer-specific LC13 module are the dominant instruments in HRQoL measurement in lung cancer studies (Damm, Roeske, Jacob, 2013).

Within the EORTC-C30 subscales, global health status, physical functioning, emotional functioning, social functioning, and symptoms of the disease which influence QOL were assessed. Their identification could be helpful in the implementation of initiatives to improve QOL (Sovářiová Sošová, 2016). The module of the questionnaire Global health status and physical functioning was better among non-smokers in comparison with former smokers and current smokers. The total score for global health status in our sample was 46.03 among non-smokers. This value is similar to that in the study conducted in the Czech Republic by Dunková and Bužgová (2012) involving lung cancer patients, in which the total score was 49. The value of physical functioning among non-smokers (72.06) was in accordance with the data of the manual EORTC, in which the value in this subscale is 71.09, once again indicating better quality life in non-smokers. In 2015, Danson et al. (2016) attempted to establish the relationship between smoking and quality of life in advanced lung cancer patients in a prospective longitudinal study, and also confirmed a significant relationship between smoking status and physical functioning, with non-smokers comparing favorably to former smokers. Mohan et al. (2007) reported opposing results, finding no statistically significant relationship between smoking status and QOL in 110 lung cancer patients.

Much of the literature over the past decade has examined individual symptoms related to lung cancer. Lung cancer is often associated with symptoms such as dyspnoea, cough, haemoptysis, chronic lung inflammation, chest pain, weakness, or loss of appetite. Due to the long term symptom-free course of the disease and non-specific nature of initial complaints, lung cancer, in comparison to other tumors, is often diagnosed at an advanced stage (Damm, Roeske, Jacob, 2013).

In research by Dunková and Bužgová (2012), lung cancer patients considered tiredness, dyspnoea, sleeplessness, pain, loss of appetite, cough, and arm pain to be the most burdensome symptoms. In our findings, pain and dyspnoea were the most burdensome symptoms, which echoes the findings of Fox, Lyon (2006). In the observed sample of patients, the symptoms dyspnoea, coughing, haemoptysis, dysphagia, chest pain, and pain in other parts were significantly more common in the group of former smokers and current smokers than in the group of non-smokers. Similar findings were reported by Chen et al. (2012). The prevalence of the symptoms tiredness, cough, dyspnoea, and pain did not seem to be a major problem in sufferers.

In general we can state that in our sample of patients, smoking appears to be a significant risk factor influencing QOL. The negative influence of smoking on quality of life for patients with lung cancer has been confirmed by other studies (Chen et al., 2012; Maliski et al., 2013; McDonnell et al., 2014). Although it has been indicated that patients who continue to smoke have poorer chances of survival than those who do not (Videtic et al., 2003; Chen et al., 2012). Quality of life (QOL) significantly improves when patients quit smoking and significantly declines when patients continue to smoke, suggesting that tobacco interventions should be introduced and recommended by oncologists

in every case (Garces et al., 2004; Sarna et al., 2005; Sarna et al., 2010).

The studies we researched prove that a dichotomous approach founded on the smoking history of oncological patients has a sound basis and is instrumental in better understanding the changes in various QOL domain resulting in a more consistent and targeted response to patient therapy and life-style within both health and nursing care. In addition, we would like to draw attention to electronic healthcare (e-health) as a promising means of computerizing the processes involved in health-care provision (Sendek, Svitáľková, Angelovičová, 2015). Health records, for instance, could be based on advanced computer (datamining) techniques and outputs from clinical decision-support systems based on algorithms of patient risk evaluation. Patients' smoking history, could be taken into account intelligently in therapy in a software-driven way, thus enhancing quality of life in the process of providing health care (Wicks et al., 2014).

We have not identified a similar study on bronchogenic carcinomas with the application of either the EORTC-C30 or its LC13 module, or even a simple dichotomization adjusted for smoking factors. By researching into aspects of quality of life in patients with bronchogenic carcinoma by means of the widely-used EORTC QOL measuring instrument, we are hereby trying to fill a gap in this area, aware that further clinical studies and trials, both national and international, are necessary for future comparison regarding the segment of patients with varying histories of smoking.

Limitation of study

There are some limitations to this study. Outcomes can be confounded by cancer stage and treatment method (oncological/surgical).

Conclusion

In summary, the findings from the present study indicate that smoking has a negative influence on the quality of life of the patients with lung cancer. In general it was proved that non-smokers (also with a developed lung cancer) regardless of the stage of disease have better quality of life and less frequent occurrence of symptoms of the disease. Our results have implications for clinical practice. They confirm the need for intensive smoking prevention efforts and expert help to treat and overcome nicotine addiction in order for patients to enjoy better quality of life. Just as important is to support the education of lung cancer patients, focusing on the benefits of stopping

smoking in cooperation with doctors, nurses, psychologists, and public health officers.

Ethical aspects and conflict of interest

The author declares that the study has no conflicts of interest, and was conducted according to the principles of ethical research.

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Author contribution

Concept and design (LD, JR), data collection (ZDV, JR), manuscript draft (LD, JR), critical revision of the manuscript (AB), final approval of the manuscript (LD, ZDV, JR, AB).

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