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Original Article

The Epidemiology of Lung Cancer in Lebanon During 2014

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Abstract

Background and aims: Lung cancer is the leading cause of cancer death worldwide. There are no recent data on the lung cancer prevalence in Lebanon, and the available data are based on prediction. Thus, this study aimed to determine the incidence rate of lung cancer during 2014, among patients who were newly diagnosed at Lebanese teaching hospitals. In addition, the study attempted to identify the associated risk factors of lung cancer, the most common presenting symptoms at the diagnosis time, and the stage at which the majority of the patients were diagnosed at the targeted population.

Methods: A retrospective cross-sectional study was carried out in many teaching hospitals affiliated to the Lebanese University in Lebanon in 2016.

Results: The lung cancer incidence was 221.9 per 100 000 in 2014. Most patients aged 60 years and over and as regards gender distribution, the majority of them included men. Further, more than half of the patients had the (COPD) and 97% of patients had symptoms at their presentation. Based on the results, 57.9% of them had stage IV lung cancer, but only 12% were diagnosed at the stage IA. Furthermore, 80.6% and 16.4% of patients had non-small and small cell lung cancer, respectively. Finally, 75.4% and 12.1% of them were treated with chemotherapy and underwent surgery, respectively, while 5.2% of patients had radiotherapy.

Conclusion: The findings of our study showed a higher incidence rate of lung cancer since 2008 which was diagnosed more commonly in men and with the patient's history of COPD. Eventually, the diagnosis was mostly made at a later stage with non-small cell lung cancer that was the most common histology type.

Keywords: Lung cancer, Epidemiology, Lebanon

Introduction

Lung cancer is a malignant neoplasm of the unspecified part of unspecified bronchus or lung and is considered as the leading cause of cancer death worldwide.[1] With 224390 new cases diagnosed in 2016, lung cancer alone accounted for 158 080 estimated deaths (out of 595 690 deaths from all cancers) in the USA with an incidence and mortality rates of around 14% and 27%, respectively.[2] In Lebanon, lung cancer is estimated to be the most common cancer in men and the fourth most common cancer in women.[3] Moreover, 27% of male cancer deaths and 26% of all female cancer deaths are due to lung and bronchus cancer.[2] Consequently, the burden of lung cancer is heavy for most societies. Yet, lung cancer is one of the most preventable cancers.[4] The proportion of lung cancer deaths attributable to smoking in Asia was 62% according to 21 pooled Asian cohorts in 2014.[5] Studies have shown that trends in lung cancer mortality relied on the smoking patterns, separated by a lag of approximately 20 years. In other words, a smoking decrease caused a reduction in lung cancer death.[6] Second-hand smoking was also incriminated to contribute to lung cancer mortality.[7]

Cigarette smoking is by far the most important risk factor for lung cancer and this risk increases by the quantity and duration of smoking. Cigar and pipe smoking also increase the risk.[8] Additionally, exposure to radon gas released from the soil and building materials is estimated to be the second leading cause of lung cancer in the United States.[1] Other risk factors include age, gender, race, pre-existing lung disease, occupational or environmental exposure to second-hand smoke, asbestos (particularly among the smokers), certain metals (i.e., chromium, cadmium, and

arsenic), some organic chemicals, radiation, air pollution, and diesel exhaust.[9] Additional occupational exposures that increase this risk encompass rubber manufacturing, paving, roofing, painting, and chimney sweeping. Similarly, this risk probably increases among people with a medical history of tuberculosis.[1] Genetic susceptibility also contributes to the development of lung cancer, especially in those who develop the disease at a young age and the nonsmokers.[10]

It is believed that the prevalence of tobacco users has increased in Lebanon during the last years due to the use of narghile. It is presumed that the lung cancer prevalence shall increase as well. However, no recent data are present regarding the lung cancer prevalence in Lebanon, and the available data are based on prediction.[3] Accordingly, evaluating lung cancer incidence, as well as the risk factors associated with the disease, is beneficial compared with previous years. According to the results, it is probably recommended that screening be conducted for lung cancer in Lebanese high-risk population in order to decrease mortality rate, increase life expectancy, and decrease the economic impact covered by the Lebanese Ministry of Public Health. Consequently, this study mainly aimed to determine the incidence rate of lung cancer during 2014, among newly diagnosed patients at teaching hospitals affiliated to the Lebanese University in Lebanon. The risk factors, symptoms, and cancer staging were also assessed by this research. Then, the results were compared with previous local results on the Lebanese population. The study further sought to identify the associated risk factors of lung cancer, the most common presenting symptoms at the diagnosis time, and the stage at which most patients were diagnosed in the targeted population.

Methods

The study population consisted of all patients who were referred to teaching hospitals affiliated to the Lebanese University in Lebanon and were newly diagnosed with lung cancer in 2014. The sample was collected from 8 teaching hospitals. Patients admitted to these hospitals with known lung cancer, as well as those admitted for any other medical or surgical reasons (except for the new diagnosis of lung cancer), were excluded from our study.
No written consent was necessary neither from the patients in our study nor from their physicians because it was leaded using the medical records from hospital archives.
To achieve our objectives, a retrospective cross-sectional study was conducted during 2016.

Data were collected from the archived medical records of the hospitals obtained from 2014. A modified version of a standardized checklist was filled to collect data from the medical records.

The checklist had several interest variables. Socio-demographic data were assessed, including the hospital of admission, age, gender, and smoking habits. Patients' previous medical history, especially for chronic obstructive pulmonary disease (COPD), asthma, coronary artery disease, and interstitial lung disease was checked as well. Data concerning the risk factors of lung cancer were collected, encompassing the history of chest radiation, familial or personal history of lung cancer, personal history of other cancers, and human immunodeficiency virus infection. The presence and duration of symptoms at the presentation and their type (i.e., cough, dyspnea, hemoptysis, and chest pain) in addition to their constitutional symptoms (i.e., weight loss, fatigue, and anorexia) were checked as well. Finally, the initial radiographic test and diagnostic method were evaluated and the histological type of lung cancer, its stage at the time of diagnosis, and the applied treatment were included in our study.

Statistical Analysis

In this study, Excel software was used for data entry and the tables and graphs were used for representing the study results. A descriptive analysis was first done with all the included subjects in order to assess the risk factors, symptoms, stage, and treatment of cancer and all related variables. Then, the differences between men and women regarding all variables were assessed using Pearson's chi-square test. The significance level of the test was admitted as $P<0.05$. Then, a comparative analysis was done, describing the differences found between men and women in terms of related variables. The following formula was used for incidence calculation.

Incidence = (The number of newly diagnosed cases in a given year * 100000) / Total population

The calculated incidence was a specific one because the population considered in this study included patients who were admitted to university hospitals affiliated to the Lebanese University.

Results

Totally, 233 patients were recruited from the hospitals in Lebanon in 2014. The total number of admitted patients in 2014 in the eight visited hospitals was 105 000 cases. It should be mentioned that lung cancer incidence was 221.9 per 100 000 in 2014. Table 1 shows the demographic characteristics.

Table 2 presents the reported patients' qualitative variables including previous medical history, smoking

Table 1. Demographic Characteristics (%)

	40-50 Years Old	50-60 Years Old	60 Years Old and Above
Age	9	14.6	76.4
Gender	71% men and 29% women		

Table 2. Patients' Medical History (%)

Past medical history	History of chest radiation	2
	Family history of lung cancer	20
	Personal history of lung cancer	0
	Personal history of other primary cancer	5
	Human immunodeficiency virus infection	0
	Chronic obstructive pulmonary disease	66
	Coronary artery disease	29
	Interstitial lung disease	15
	Asthma	0.4
Smoking habits	Actual smoker	83
	Non-smoker	13
	Ex-smoker	4
Symptoms at presentation	Cough	72
	Dyspnea	85
	Hemoptysis	8
	Chest pain	62
	None	3
Symptoms duration	Less than one month	17
	1 to 6 months	50
	6 months to 1 year	29
	More than one year	4
Constitutional symptoms	Weight loss	41
	Fatigue	61
	Anorexia	41
	None	28
Diagnostic methods	Bronchoscopy with biopsy	66
	Transcranial needle aspiration	29
	Open lung biopsy	5
Histology type of lung cancer	Non-small cell lung cancer	81
	Small cell lung cancer	16
	Other	3
Stage of lung cancer	I	18
	II and III	24
	IV	58
Treatment	Chemotherapy	75
	Radiotherapy	5
	Surgery	12
	Chemotherapy and surgery	2
	Chemotherapy and radiotherapy	3
	Neo-adjuvant chemotherapy	2

exposure, symptom type at presentation, constitutional symptoms in addition to the histology type of lung cancer, and the lung cancer stage at the time of diagnosis and treatment. Note that only 23 patients had no medical history in their hospital records while most of the patients (73%) had a chest CT as the initial radiographic test.

Table 3 provides the variables that demonstrated statistically significant differences between genders using the chi-square test. These variables included smoking habits, personal history of lung cancer, the presence of symptoms at the presentation and their duration, the diagnostic method, the histological type of cancer, cancer stage at the time of diagnosis and treatment, and previous medical history that may be different across genders. The variables were separately analyzed by gender in the following section.

Table 3. Gender Differences

Variable	Confidence Interval	P Value
Smoking habits	1.17-1.35	<0.001
Personal history of other primary cancer	0.02-0.07	0.003
Symptoms at presentation	0.95-0.99	<0.001
Diagnostic method	1.29-1.51	<0.001
Histological type of cancer	1.31-1.44	0.005
Cancer stage at the time of diagnosis	5.29-5.85	0.002
Treatment	1.51-2.1	<0.001
COPD	0.6-0.73	<0.001
CAD	0.23-0.35	<0.001
Hemoptysis	0.05-0.12	0.004
Fatigue	0.55-0.68	0.018

Note. COPD: chronic obstructive pulmonary disease; CAD: coronary artery disease.

Table 4 shows the differences in the past medical history in terms of gender, the personal history of other primary cancer, smoking habits, symptoms at presentation, symptom duration, diagnostic methods, histological types and staging of the lung cancer, and treatment.

Discussion

A retrospective cross-sectional study was conducted to determine the incidence rate of lung cancer during 2014, among patients newly diagnosed at the teaching hospitals affiliated to the Lebanese University in Lebanon in 2016. Then, the risk factors, symptoms, staging, and treatment of cancer were identified as well.

The lung cancer incidence in 2014 was 221.9 per 100 000 in our study. This is by far higher than the rates reported in a Lebanese study in 2008, where lung cancer was the third most common cancer and its incidence was 31.8 per 100 000 among men versus 13.7 per 100 000 in women.[3] This huge difference is explained by the fact that our target population included hospitalized patients instead of the entire Lebanese population thus the calculated incidence rate belonged to patients admitted to the hospitals included in our study. This justifies the significantly higher rate compared to the rate found in population-based studies that include all the citizens[4] rather than the ones admitted to the hospitals whose health status is mainly worse than that of the majority of people. Another reason for this difference could be the use of the convenience sampling method since applying the

Table 4. Differences Based on Gender (%)

Variable		Men	Women
Past medical history	COPD	75	46
	CAD	21	49
Smoking	Actual smoker	87	48
	Non-smoker	7	52
	Ex-smoker	6	0
Personal history of other primary cancer		2 (colon cancer)	12 (breast and ovarian cancer)
Symptoms at presentation		100	90
Duration of symptoms	1-6 month(s)	44	56
	More than one year	6	0
Diagnostic methods	Bronchoscopy with biopsy	58	88
	Transcranial biopsy	36	12
Lung cancer histology	NSCLC	82	78
	SCLC	14	22
	Other	4	0
Stage IV lung cancer		52	72
Treatment	Chemotherapy	76	74
	Radiotherapy	7	0
	Neoadjuvant chemotherapy	0	4

Note. COPD: chronic obstructive pulmonary disease; CAD: coronary artery disease; NSCLC: non-small cell lung cancer; SCLC: small cell lung cancer.

random sampling method was impossible due to the lack of funding and because not all Lebanese hospitals were affiliated to the Lebanese University in 2014. The majority of our sample patients aged 60 years and over. This finding matches the proven fact that the higher age is a risk factor for lung cancer.[8,9] As for gender distribution, most patients were men, as found in other studies.[1,8] This is due to the oriental culture where smoking is more accepted for men than women. Yet, these rates are believed to change because of the increase in smoking rates in women.[3] Lung cancer patients were mainly actual smokers, corroborating the studies that claim smoking is the first risk factor for developing lung cancer.[8-10]

More than half of the patients (n = 155) had COPD in our study, which corroborates the findings of another study demonstrating a relationship between lung cancer and COPD.[11] A study showed that the prevalence of COPD among newly diagnosed patients with lung cancer exceeds 50%[12] while another research found that it was six-fold greater compared to matched smokers,[13] and both concluded that COPD was a risk factor for lung cancer.[14] In our study, 75.2% and 45.6% of men and women had COPD, respectively. Loganathan et al found similar rates (72.8% and 52.5%, respectively).[15] In addition, 97% of the patients had symptoms at their presentation, indicating that the symptoms could be the leading cause behind consultation. Further, almost half of the patients had presentation symptoms during one to six month(s), and around 25% of them had symptoms for six months to one year. This explains advanced cancer stages at the time of diagnosis. More precisely, more than half of the patients (135 or 57.9%) had stage IV lung cancer, but only 28 of them (12%) were diagnosed at stage IA. Furthermore, 80.6% of patients had non-small cell lung cancer and only 16.4% of them suffered from small cell lung cancer. The treatment methods were also related to the staging and the histological type of cancer. Most patients (75.4% or 175 patients) were treated by chemotherapy and 28 patients (12.1%) underwent surgery while 12 (5.2%) of them had radiotherapy. All men had symptoms at their presentation to the hospital while 10.3% of women had no symptoms at their presentation. Men were also more prone to have a longer duration of symptoms before consulting and investigation (6.1% of men had the symptoms during more than one year before their presentation, unlike women who did not have symptoms lasting for more than a year). This difference could be explained by the oriental culture that supposes men should be tough and only visit the doctor if there is a strong need. It also could be because women in our study were more likely to have other primary cancers and then be subject to regular investigation and better medical follow-up compared to others who have no personal history of cancer, knowing that in our study, 98.2% of men had no personal history of other primary cancer, unlike 11.8% of women who had a personal history of other primary cancers.

This study included patients' data collected from hospitals in different regions of the Lebanon, making

it more reliable and better reflecting the reality of all Lebanese areas. It also included teaching hospitals, where diagnosis and treatment procedures, as well as follow-ups, are evidence-based, and these institutions are considered as the referral ones in Lebanon and the region thus patients tended to visit these medical centers from nearly all the country. Yet, some limitations are to be mentioned. First, the incidence calculation using the patients admitted to these teaching hospitals as the study population limited the generalizability of our findings and gave a higher incidence rate compared to the obtained one while accounting for the whole population. Besides, no data are available in the national registry for 2014 in order to compare with our data. Finally, data collection from patients' medical records was limiting because the files were incomplete thus we could not collect information for all risk factors and variables affecting lung cancer.

In conclusion, this study calculated the lung cancer incidence rate in 2014 and evaluated the risk factors, symptoms, staging, histological type, and treatment procedures in teaching hospitals affiliated to the Lebanese University in 2016. Future research may be done using a prospective approach to account for all necessary information and better target the factors associated with lung cancer in order to target screening and prevention in a specific design made to fit Lebanese population characteristics.

Ethical Approval

A signed letter from the Lebanese University was presented to the ethical committee of the concerned hospitals in order to access the patients' medical records from their archives.

Conflict of Interest Disclosures

None.

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