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Research Paper

Determining the Prevalence of Primary Lung Malignancies by Histopathological Types and Gender: A Five-year Study

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ABSTRACT

Objectives: The high incidence of lung cancer and its poor prognosis have led to significant health problems in recent decades. This research aimed to study the prevalence of histopathological types of primary lung malignancies, focusing on treatment plans and their effective causes.

Methods: This descriptive cross-sectional study employed a census method over 5 years (2016-2021). A total of 567 diagnosed cases of primary malignant tumors of the lung were extracted from the department's records. Then, their slides were reviewed according to WHO 2004 histological classification of lung tumors and entered into the checklist.

Results: In this study, there were 567 lung malignancies, of which 434(77.1%) affected male patients and 130(22.9%) female patients, with a mean age of 66.1±12.3 years. The most common tumors among men and women were adenocarcinoma and squamous cell carcinoma (25.6% and 9.3%, respectively). Among the clinical symptoms, shortness of breath was the most common (24.7%). Cough with shortness of breath (24.2%), hemoptysis (10.9%), and weight loss (6.5%) were other clinically common manifestations. Chemotherapy had the highest treatment frequency (63.3%). Moreover, 432 patients (79.2%) had a history of smoking, 143(25.2%) reported a history of drug use, and 30.7% died of the cancer, resulting in a survival rate of 69.3%.

Discussion: The results of the present study showed that the most common tumors were adenocarcinoma and squamous cell carcinoma, and their prevalence was higher in men than women during the study period. Furthermore, lung cancer treatment is usually not associated with the desired results, and the prognosis of lung cancer is still poor.

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Introduction

Pulmonary cancer has remained a severe public health issue, standing as one of the three prevalent illnesses and the leading cause of 1.76 million cancer-related deaths occurring yearly. Cigarette smoking is the primary cause of lung cancer [1]. Other risks include passive smoke inhalation, residential radon, occupational exposures, infection, and genetic susceptibility [2]. The proportions of men and women diagnosed with lung cancer have changed significantly over the past 20 years; the incidence of lung cancer has been declining in men while continuing to rise in women, even though historically, men have been more susceptible to the disease [3].

Lung cancer has been reported to occur most frequently in adults between the ages of 69 and 80, with only 2% of cases arising under 40 [4]. The 5-year survival rate for lung cancer increased from 14.5% to 23.7%, according to the 2021 State of Lung Cancer report, though it is still much lower in communities of color [5]. The American Lung Association's fourth annual report also analyzed key statistics nationwide, such as new cases, survival, early diagnosis, surgical treatment, lack of therapy, and screening rates, demonstrating how lung cancer costs vary state by state [6].

Accurate histological diagnosis is the first step in treating lung cancer since different forms of lung cancers (based on cell type) have distinct courses and responses to treatments. Squamous cell carcinoma, small cell carcinoma, adenocarcinoma, and large cell carcinoma collectively account for 88% of all primary lung malignancies [7]. According to available data, adenocarcinoma has replaced squamous cell cancer as the most frequent lung cancer in all races and both sexes over the past 20 years, and its prevalence is rising parallel to small cell cancer (especially in women) [8].

Lung cancer diagnostic biopsies are often tiny and taken via bronchoscopy, a percutaneous approach with imaging guidance, or from metastatic sites [9]. Cell block preparations from malignant pleural effusions are another option. It is difficult for a pathologist to identify and categorize lung cancer with tiny specimens effectively. The preparation of tissue samples and histopathology examination of the diseases aid in the final diagnosis, considering the high prevalence and similarity of clinical symptoms in lung diseases. In addition, inflammatory diseases such as soft tissue vasculitis, which causes chronic inflammation of the lungs, and involvement of blood vessels in various organs represent additional complexities within inflammatory conditions [10].

According to the previous investigations, complete and thorough information has not been gathered regarding the prevalence of lung cancer in Iran and the frequency of its histological types. Recognizing the significance of lung cancer and its prevalence in each region, as well as its treatment plans and effective causes in Iran, this study aims to determine the frequency of histopathological types of primary lung malignancies in patients referred to Urmia Imam Khomeini Hospital, Urmia City, Iran.

Materials and Methods

This descriptive cross-sectional study employed a census method and spanned five years (2016 to 2021). It was conducted in the Internal Medicine Department of Urmia Imam Khomeini Hospital. A total of 567 diagnosed cases of primary malignant tumors of the lung were extracted from the Department's records, and the patients' slides were reviewed according to World Health Organization (WHO) 2004 histological classification of lung tumors and entered into the checklist.

We excluded cases with metastatic lesions to the lung, those with incomplete information required to complete the questionnaire, and malignancies detected outside the specified time. The patients' particulars were recorded in detail on proformas, including age, sex, clinical findings, history of primary tumors anywhere else in the body, and investigations like CT scans, ultrasound, and other relevant information.

Data were analyzed using descriptive statistics (frequency, percentage, mean, etc.) and inferential statistics (the paired t and chi-square tests). Quantitative variables were reported as Mean±SD and qualitative variables as numbers (percentages). SPSS software, version 17 was used, and $P<0.05$ were considered significant.

Results

A total of 567 lung malignancies were studied. Of these, 434 cases (77.1%) belonged to male patients and 130(22.9%) to female patients. The patients' ages ranged from 39 to 95 years, with a mean of 66.1±12.3 years. The mean age in the male group was significantly higher than the female group, and the highest incidence was detected in the seventh decade of life (Figure 1).

According to Table 1, the most common tumors among men and women were adenocarcinoma and squamous cell carcinoma (25.6% and 9.3%, respectively); furthermore, the least common tumor was carcinoid (1.5% and 1.1%, respectively).

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Table 1. Histological distribution of lung cancer cases over 5 years

Tumor	No. (%)		
	Male	Female	Total
Small cell	112(19.9)	8(1.3)	120(21.2)
Squamous cell carcinoma	115(18.9)	22(5.3)	137(24.2)
Adenocarcinoma	145(25.6)	53(9.3)	198(34.9)
Carcinoid Tumor	9(1.5)	6(1.1)	15(2.6)
Leiomyosarcoma	22(4.2)	21(3.4)	43(7.6)
Large cell carcinoma	31(7.4)	23(2.1)	54(9.5)
Total	434(77.5)	133 (22.5)	567 (100)

The frequency rates of symptoms in lung cancers are summarized in Table 2. Among the clinical symptoms, the most common one was shortness of breath. Cough with shortness of breath, hemoptysis, and weight loss were other clinically common manifestations.

Regarding treatment, 63.3% of patients received chemotherapy, 15.5% radiotherapy and chemotherapy, 3.7% chemotherapy and surgery, 2.6% surgery, and 14.8% no therapy (Table 3). Moreover, 432 patients (79.2%) had a history of smoking, 14(25.2%) had a history of drug use,

Table 2. Frequency of clinical symptoms among patients with lung malignancies

Clinical Symptom	No. (%)
Hemoptysis+shortness of breath	15(2.6)
Shortness of breath+cough+chest pain	15(2.6)
Chest pain	15(2.6)
Weight lost	37(6.5)
Shortness of breath	140(24.7)
Cough+shortness of breath	137(24.2)
Shortness of breath+weight loss	15(2.6)
Hemoptysis	62(10.9)
Shortness of breath+hemoptysis+cough	28(4.9)
Cough+chest pain	14(2.5)
Neck and face swelling	14(2.5)
Decreased consciousness	13(2.3)
Distress+Cough	13(2.3)
Cough	26(4.6)
Shortness of breath+dysphagia	13(2.3)
Cough+weight loss	10(1.8)
Total	567(100)

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Table 3. Treatment frequency of patients with lung malignancies

Treatment	No. (%)
Chemotherapy	359(63.3)
Surgery	15(2.6)
Chemotherapy+surgery	21(3.7)
None	84(14.8)
Chemotherapy+radiology	88(15.5)
Total	567(100)

Table 4. Number of patients with smoking and drug use history (n=567)

Case	No. (%)
Smoking	432(79.2)
Not smoking	135(23.8)
Drug use	143(25.2)
Not drug use	424(74.8)
Survival rate	393(69.3)
Mortality rate	174(30.7)

and 30.7 % died of cancer, resulting in a survival rate of 69.3% (Table 4).

Discussion

Lung cancer incidence rises along with civilization; hence, it is more common in industrialized nations than less developed countries [11]. Our research on 567 lung cancer patients diagnosed over 5 years gives us a glimpse of the disease's prevalence in the North-West region of Iran.

The mean age at the diagnosis was 66.1 years, a figure significantly higher than other Iranian studies, with a median or mean age between 47.4 and 56 years [12, 13]. In this study, male patients had a higher mean age than females. Males have always had a higher prevalence of lung cancer [14]. In developed nations, the incidence rates for men and women have begun to converge, partially related to altering smoking habits [15].

According to epidemiological studies, smoking, air pollution, genetics, and other factors affect the histological subtypes of lung cancer over time [16, 17]. Among these variables, smoking emerges as the primary contributor [18, 19]. In our study, the frequency of smoking was 76.2%, and drug use was 25.2%, which seems to increase the risk of adenocarcinoma in men. Therefore, the high rate of smoking, the higher average age of this group, and the increase in smoking with age are all presented in this research that corresponds with the study by Barrington-Trimis et al. [20]. Exposure to a pathogenic environment may be a significant contributor to the development of lung cancer in non-smokers. Numerous studies have demonstrated specific pathogenic environments, including indoor (e.g. indoor cigarette smoking) and outdoor air pollution [17].

In recent years, there has been a progressive rise in lung cancer in women, and the male-to-female ratio is slowly dropping worldwide, notably in North America, Europe, and other developed nations [21]. In contrast, our results showed increased lung cancer incidence among male patients. However, women were less likely than men to develop lung cancer in European countries. The social norms that control the culture can lower women's smoking rate [22].

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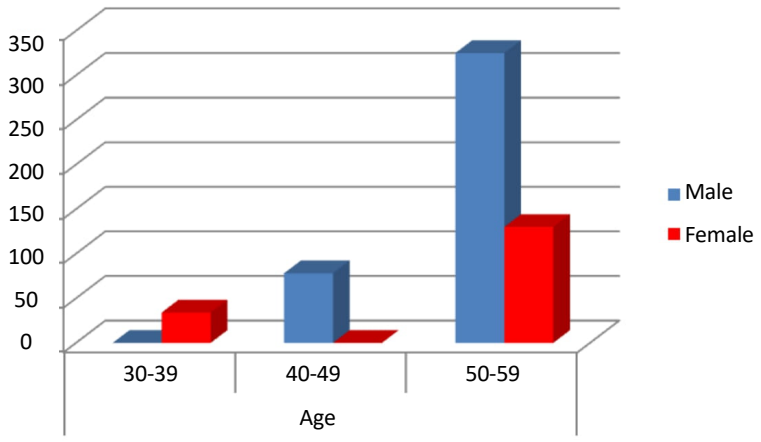

Figure 1. Frequency of different age groups patients with lung cancer by gender

According to the latest available reports, adenocarcinoma (32%), which has substantially increased in recent years, is the most frequent type of lung malignancy, especially in non-smokers [23]. This outcome may be related to estrogen levels, cooking odors, passive smoking, poorly ventilated coal fuel stoves, and indoor air pollution [24]. Numerous studies have revealed a decline in the average age of lung cancer diagnoses in wealthy nations [17]. According to a University of California study, lung cancer diagnoses in individuals between 50 and 80 have increased over the 30 years in industrialized countries due to the aging population and a two-fold spike in the smoking rate among youths [8].

In the present study, the most prevalent tumor among men and women was adenocarcinoma, followed by squamous cell carcinoma. Adenocarcinoma has exceeded squamous cell carcinoma as the most frequent histologic lung cancer in Western and Asian nations [25]. The survival rate improves when the localized tumor is removed early in lung adenocarcinoma patients [26]. In agreement with these results, adenocarcinoma accounts for 44% of newly diagnosed lung malignancies in the North American population. In comparison, squamous cell carcinoma accounts for 26% of diagnoses and is most frequently linked to smoking and the male sex [27].

According to our study, the most common presenting symptom of lung cancer was shortness of breath. Furthermore, most patients who had persistent breathlessness received chemotherapy. In this line, a study by Wang et al. showed that advanced lung cancer patients are primarily treated with systemic chemotherapy [28]. New alternative medicines that successfully treat lung cancer with less associated toxicity than chemotherapy remain a crucial need to address unmet medical needs [29]. Early detection and timely treatment of non-small cell lung cancer will lower mortality. Compared to chest x-rays, low-dose CT scans can reduce lung cancer death risk by 20% in heavy smokers [1]. Furthermore, after a 3-year screening period, CT screening only has a 61% specificity.

In our study, only 30.7% of the patients died. Recent studies show the likelihood of lung cancer dying is rising [30, 31]. In contrast with these results, we showed that the survival rate was 69.3%. The 1-year survival rates for individuals with lung cancer have increased due to advances in medical technology, but the overall 5-year survival rate is still low [32]. The stage of the diagnosis has a considerable impact on this rate. Unfortunately, only 15% of lung cancers are found in the early localized stage, which accounts for 52.2% of lung cancers, 25% of regional diseases, and 4% of distant diseases [33]. Despite the poor general prognosis for lung cancer, regardless of histologic subtype, women consistently surpass men in all age groups. According to data from 1999 to 2006, the 5-year survival for women with lung malignancy is 19%, higher than for men with a 14% rate [33]. Although the exact cause of this gender difference is unknown, it is plausible to postulate that men and women do not experience lung cancer in biologically equivalent ways [34].

Using a large sample is the merit of this study. Our findings, however, highlight the necessity for more research to compare clinicopathological characteristics based on histology. The major limitation of this study was a possible selection bias because the institution was the only reference hospital for cancer tumors.

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Conclusion

This study showed that during a 5-year study of the most frequent histological type of lung cancer in Urmia Imam Khomeini Hospital, the most prevalent tumors among men and women were adenocarcinoma and squamous cell carcinoma and the least common tumor was carcinoid tumor. Tumor prevalence in men is higher than in women. Although lung cancer treatment is usually not associated with the desired results and the prognosis of lung cancer is still poor, emphasizing lung cancer prevention through recognizing underlying factors and preventive planning are effective and affordable.

Ethical Considerations

Compliance with ethical guidelines

The study protocol was approved by the Research Ethics Committee of the Urmia University of Medical Sciences (Code: IR.UMSU.REC.1399.209).

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Authors' contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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