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Original article

Clinicopathological Features of Lung Cancer: A Retrospective Study

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A B S T R A C T

Lung cancer remains the leading cause of cancer-related mortality worldwide and represents a major health challenge in Libya. This retrospective study evaluated the clinicopathological features of lung cancer among 53 patients admitted to Benghazi Medical Center between 2016 and 2025. The median age was 60 years, with a predominance of males (79.2%). Adenocarcinoma was the most common histological subtype (45.3%), followed by squamous cell carcinoma (20.8%) and small cell carcinoma (7.5%). The main clinical presentations included cough (28.3%), pain (13.2%), and shortness of breath (13.2%). Gross findings revealed frequent vascular involvement (34%) and upper lobe lesions (47.2%). Chest wall invasion was observed across categories: limited (54.7%), severe (28.3%), extensive (15.1%), and minimal (1.9%). Notably, 81.1% of patients presented with stage IV disease at diagnosis. Statistical analysis demonstrated significant associations between vascular involvement and histological subtype (P=0.025), as well as between gender and smoking status (P=0.005). These findings highlight the aggressive nature of lung cancer in Benghazi and underscore the urgent need for improved prevention, early detection, and public health education, particularly targeting male smokers.

Introduction

Lung cancer is one of the most common malignancies worldwide and remains the leading cause of cancer-related mortality [1]. According to the American Cancer Society, it is the second most frequently diagnosed cancer in both sexes, accounting for 11% of male cancers and 12% of female cancers, yet it contributes to the highest proportion of cancer deaths—20% in men and 21% in women [2]. In Libya, lung cancer follows a similar trend, ranking as the third most common cancer (11.4%) but the deadliest, responsible for 16.4% of cancer-related deaths [1].

A striking feature in the Libyan context is the pronounced gender gap. Unlike global statistics, where females also show significant prevalence, lung cancer among Libyan women is not statistically significant [1]. This disparity is strongly linked to smoking habits, with 38.6% of Libyan males reporting tobacco use compared to only 1.5% of females [3]. Such differences are reflected in histological patterns: small cell carcinoma (SCLC) and squamous cell carcinoma (SQC) are strongly associated with smoking, while adenocarcinoma (AC) is more common among non-smokers [4]. A study from eastern Libya confirmed this pattern, showing higher rates of SQC and SCLC in males compared to females [5].

The World Health Organization (WHO), in collaboration with the International Association for the Study of Lung Cancer (IASLC), classifies lung tumors into major categories, including adenocarcinoma, squamous cell carcinoma, neuroendocrine tumors, large cell carcinoma, adenosquamous carcinoma, and sarcomatoid carcinoma [6]. Understanding the distribution of these subtypes in Libya is essential for improving diagnostic accuracy, guiding prevention strategies, and tailoring public health interventions.

This study was designed to evaluate the clinicopathological features of lung cancer in patients admitted to Benghazi Medical Center between 2016 and 2025, with the objectives of determining the clinical presentations and risk factors, and outlining the histopathological subtypes of lung cancer.

Methods

This retrospective study was conducted at Benghazi Medical Center and included cases diagnosed between January 2016 and June 2025. Medical records were reviewed, and those with incomplete information were excluded. A total of 53 eligible cases were identified (n = 53). Data were initially organized in Microsoft Excel under categories such as clinical presentation and microscopic diagnosis, and subsequently imported into the Statistical Package for Social Sciences (SPSS) version 28 for analysis.

Ethical approval was obtained from the Research Ethics Committee at the Libyan International Medical University and the Oncology Department of Benghazi Medical Center prior to data collection.

Descriptive statistics were used to summarize demographic and clinical features. Frequency distributions were calculated to identify common presentations and histopathological subtypes. Associations between

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variables were tested using the Chi-square test, with Phi-Cramer's nominal correlation applied where appropriate [7]. A p-value of ≤0.05 or standardized residuals outside the range of –2 to +2 were considered statistically significant. Staging was performed according to the proposed ninth edition TNM classification of lung cancer [8].

Results

Demography and Clinical Presentation

A total of 53 patients were included, of whom 42 (79.2%) were male and 11 (20.8%) female. The median age was 60 years (range 24–84). Age distribution peaked between 40–60 and 60–80 years. No significant association was found between sex and histological subtype (P = 0.4), but a strong correlation was observed between male gender and smoking status (P = 0.005). The most common presenting symptoms were cough (28.3%), pain (13.2%), and shortness of breath (13.2%), while weight loss was reported in 9.4% of cases. In 35.8% of records, presenting complaints were not documented (Figure 1, Figure 2).

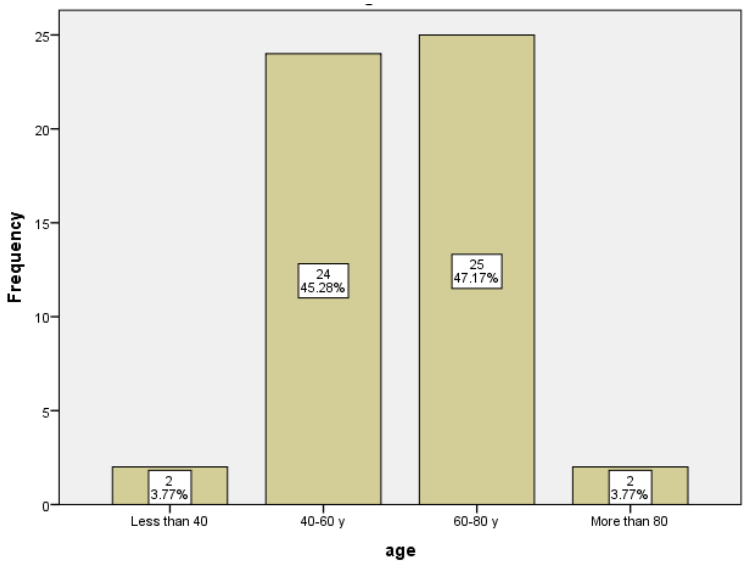

Figure 1. Age Distribution of Patients with Lung Cancer.

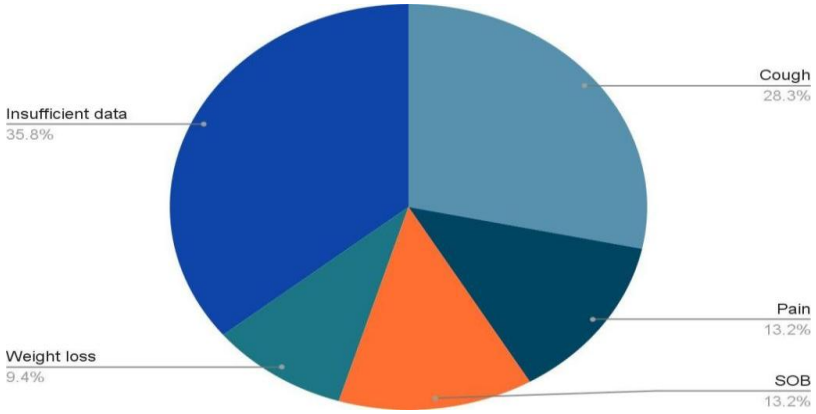

Figure 2. Clinical Presentations of Patients with Lung Cancer.

Gross Features

Vascular involvement was observed in 34% of cases, including invasion of the pulmonary artery (15.1%), diffuse hilar vessels (13.2%), bronchial artery (3.8%), and pulmonary/subclavian veins (1.9%) (Figure 3). Lesions were most frequently located in the upper lobe (47.2%), followed by the lower lobe (17.0%), middle lobe (13.2%), and diffuse bilateral involvement (Figure 4). Chest wall invasion was limited in 54.7% of cases, severe in 28.3%, extensive in 15.1%, and minimal in 1.9% (Figure 5). Lymph node metastasis was most commonly N2 (56.5%), followed by N1 (17.4%), N3 (17.4%), and N0 (8.7%) (Figure 6).

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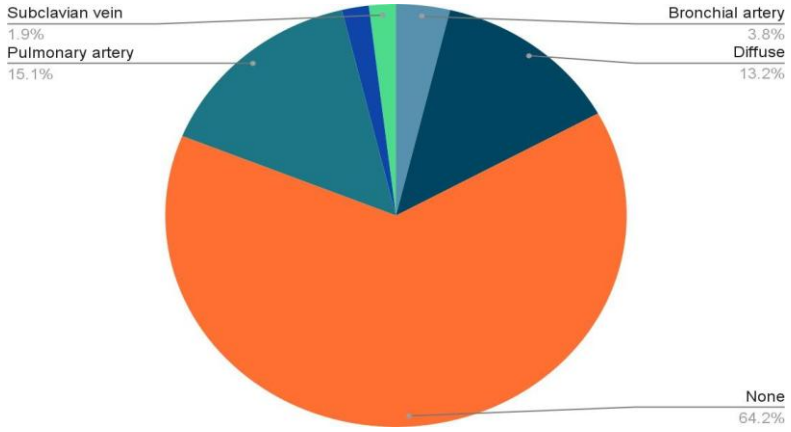

Figure 3. Vascular Involvement in Lung Cancer Patients

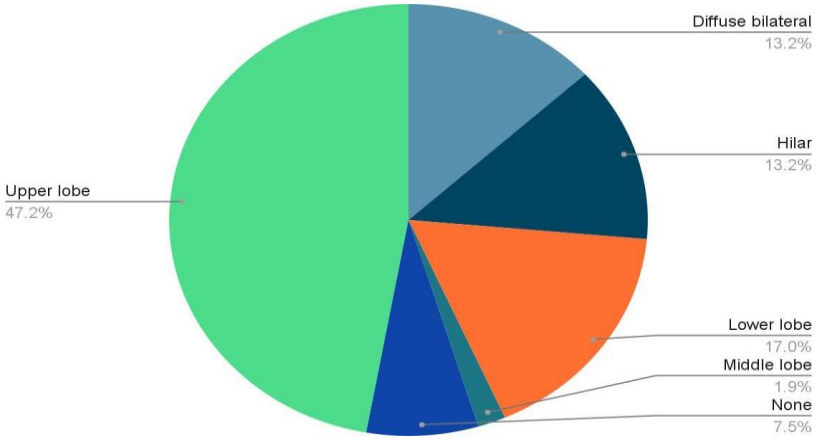

Figure 4. Anatomical Location of Lung Lesions

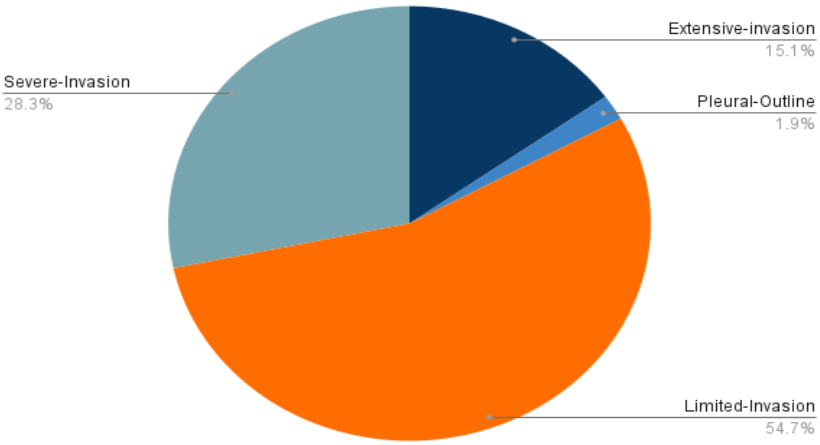

Figure 5. Degree of Chest Wall Invasion by Tumor

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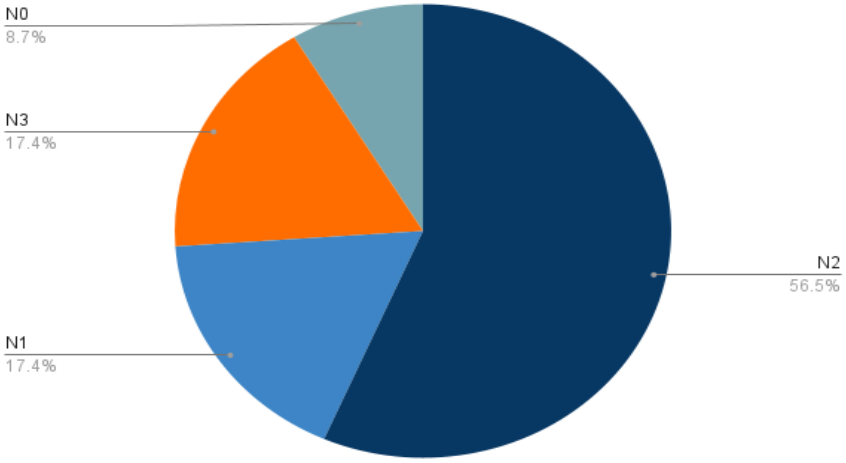

Figure 6. Lymph Node Metastasis According to TNM Classification.

Microscopic Features

Tumor grading revealed 30.2% well-differentiated, 28.3% moderately differentiated, 18.9% poorly differentiated, and 22.6% undifferentiated cases (Figure 7). Histological organization patterns included glandular (30.2%), sheet-like (28.3%), nested/clustered (18.9%), mixed (13.2%), and invasive/undifferentiated (7.5%) (Figure 8). Necrosis was present in 43.4% of cases, and inflammatory infiltrates in 39.6%. Grading criteria were consistent with established prognostic frameworks [10].

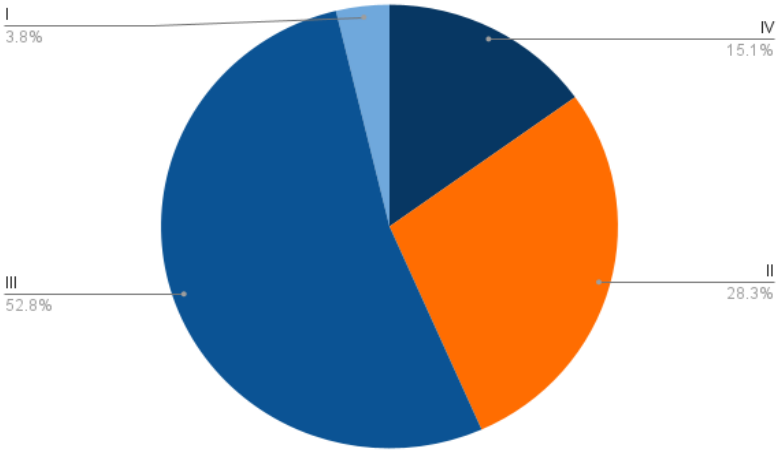

Figure 7. Histological Grades of Lung Tumors

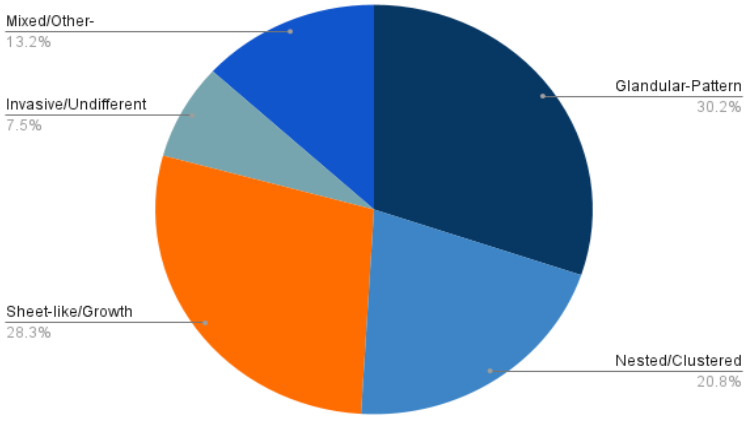

Figure 8. Patterns of Tumor Cell Organization

Histological Subtypes and Associations

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Adenocarcinoma was the most common subtype (45.3%), followed by squamous cell carcinoma (20.8%), small cell carcinoma (7.5%), and other rare types grouped (26.4%) (Figure 9). Significant associations were found between vascular involvement and histological subtype (P = 0.025), and between architectural pattern and subtype (P = 0.020). No significant correlations were observed between histological subtype and clinical symptoms, including cough, pain, shortness of breath, or weight loss. These findings align with prior reports on vascular invasion in lung cancer [11].

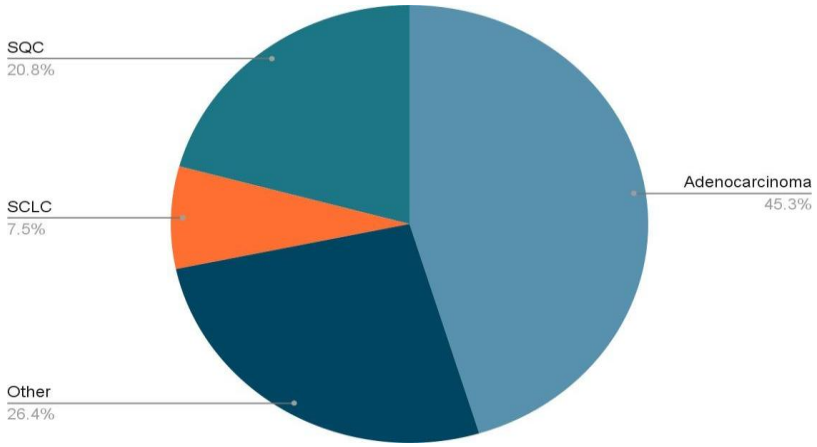

Figure 9. Histological Subtypes of Lung Cancer Patients

Staging

According to IASLC criteria, the majority of patients (81.1%) presented with stage IV disease, while earlier stages were less frequently observed (Figure 10). Staging was performed according to the ninth edition TNM classification [9].

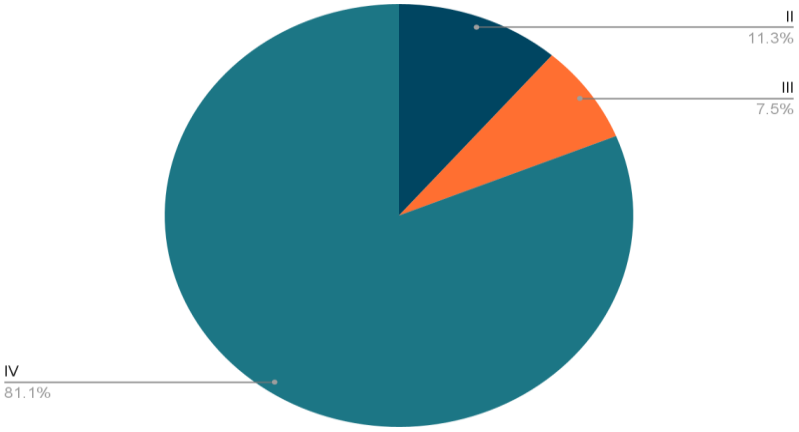

Figure 10. Stage of Lung Cancer at Diagnosis

Discussion

The most frequent presenting symptoms in this cohort were cough (28.3%), shortness of breath (13.2%), and pain localized to the chest or shoulder (13.2%), with weight loss reported in 9.4% of cases. These findings are consistent with international reports [11,12], although the proportions differ, likely reflecting variability in documentation and patient reporting.

A marked gender imbalance was observed, with 79.2% of cases occurring in males. While sex was not significantly associated with histological subtype (P = 0.4), smoking status was strongly correlated with male gender (P = 0.005). This aligns with national surveys showing far higher smoking prevalence among Libyan men compared to women [7,13]. The predominance of late-stage disease was striking, with 81.1% of patients diagnosed at stage IV, underscoring the aggressive nature of lung cancer in this population and highlighting the urgent need for earlier detection strategies [1,2,14].

Gross pathology revealed frequent vascular involvement (34%) and upper lobe predominance (47.2%). Advanced invasion patterns were common, with 28.3% showing severe invasion and 15.1% extensive chest wall involvement. These features reflect the aggressive progression of lung cancer in Libya and mirror findings from global literature that associate upper lobe lesions and vascular spread with poor prognosis [8,10,15].

Histological grading showed most tumors were poorly differentiated or undifferentiated, consistent with

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advanced disease. Architectural patterns such as sheet-like and solid growth were predominant, both of which are associated with worse outcomes [9,16]. Necrosis (43.4%) and inflammation (39.6%) were frequent, while hemorrhage was rarely documented, which may reflect limitations in record-keeping rather than true absence. Pleural involvement was also notable, with effusion in 26.4% and direct invasion in 20.8%, further emphasizing the aggressive biology of these tumors [4,5].

Significant correlations were identified between vascular involvement and histological subtype (P = 0.025), with small cell carcinoma showing the strongest association. This finding is supported by multicenter studies reporting high rates of vascular invasion in resected adenocarcinomas [10,13]. Recognition of vascular spread has important prognostic and therapeutic implications; as surgical approaches such as pulmonary artery reconstruction have demonstrated improved survival in selected non-small cell lung cancer patients [6,15].

Histological architecture also showed significant associations (P = 0.020), particularly between adenocarcinoma and glandular growth patterns. Given adenocarcinoma is the most common subtype globally [17], understanding its morphological features is critical for timely diagnosis and management. The predominance of advanced stage disease and poor differentiation in this cohort highlights the need for improved screening and preventive measures in Libya [1,2,14].

Conclusion

This retrospective study demonstrated that lung cancer in Benghazi Medical Center is characterized by late presentation, with the majority of patients (81.1%) diagnosed at stage IV, reflecting poor prognosis and limited treatment options. The most common presenting complaints were cough, shortness of breath, and referred pain, while a significant gender disparity was observed, with males comprising 79.2% of cases, strongly linked to smoking prevalence. Histopathological analysis revealed that most tumors were poorly differentiated, frequently located in the upper lobe, and often associated with vascular and pleural involvement. Statistically significant correlations were identified between vascular invasion, histological architecture, and tumor subtype, underscoring the aggressive nature of the disease. These findings highlight the urgent need for enhanced public health interventions, smoking cessation programs, and early detection strategies to improve lung cancer outcomes in Libya.

Acknowledgments

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Conflicts of Interest

The authors declare no conflicts of interest.

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