

A histopathological analysis of lung cancers. An 11-year retrospective study from Al-Madinah Al-Munawwarah, Saudi Arabia

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ABSTRACT

Objectives: To determine the histopathological pattern of lung cancers in Madinah, Saudi Arabia.

Methods: This retrospective histopathology-based study was conducted at the Department of Pathology, King Fahad Hospital, Madinah, Saudi Arabia and comprised cases of lung cancers for 11 years between January 2006 and December 2017. The data was obtained from histopathologic reports and evaluated for age, gender, site of tumor, and histopathological patterns with grade.

Results: A total of 138 patients with lung cancers were identified, 103 (74.6%) patients were males and 35 (25.4%) patients were females with a male to female ratio of 2.9:1. The ages ranged from 6 to 97 years with a mean age of 60.6 ± 14.7 years. Adenocarcinoma (AC) was the most common pathological type (47.8%), followed by squamous cell carcinoma (SCC) (25.3%), neuroendocrine tumor (8.7%) and metastatic carcinoma (8%). Both ACs and SCCs showed a male predominance with a ratio of 2.9:1 (male) and 4.8:1 (female). The majority of ACs (56.5%) and SCCs (65.7%) were moderately differentiated.

Conclusion: The study established a baseline of lung cancer pattern on the basis of histopathological experience in a tertiary referral hospital in Al-Madinah Al-Munawwarah, Saudi Arabia. The results obtained showed similarities with that in the world literature and Saudi national studies.

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Worldwide, lung cancer remains the most frequently diagnosed major cancer and the most common cause of cancer mortality.¹ In 2012, there were 1.8 million new cases of lung cancer diagnosed globally, accounting for 12.9% of all new cancer diagnoses and 20% of all cancer-related deaths.^{2,3} The number of new cases of lung cancer occurred in 2018 in the United States of America (USA) were estimated to be 234,030, accounting for approximately 13.5% of cancer diagnoses and 25.3% of cancer-related deaths.^{4,5}

Lung cancer is the third most common cancer in the United Kingdom (UK), accounting for 13% of all new cancer cases in 2015. There were approximately 46,700 new lung cancer cases diagnosed in UK every year.⁶ In the Kingdom of Saudi Arabia (KSA), lung cancer is still among the most frequently occurring cancers. The most recent Saudi Cancer Registry (SCR) report showed there were 452 new cases of lung cancer diagnosed in 2014, accounting for 3.9% of all cancer cases and making it the seventh most frequent cancer in the Saudi population.⁷ The 5 regions with the highest lung cancer age-standardized rate in the country were the Eastern region followed by the Tabuk, Riyadh, Makkah, and Northern regions.⁷

Reported cases of lung cancer have been published in many hospital-based studies from the country's large tertiary care centers.^{8,9} In this study, the author aimed to provide a detailed clinicopathological analysis of lung cancer as diagnosed in the Department of Pathology of King Fahad Hospital, Madinah, KSA, and comparing the findings with those reported in the literature.

Methods. This retrospective study was conducted at the Department of Pathology, King Fahad Hospital, Madinah, Saudi Arabia, and consisted of lung cancer cases during an 11-year period between January 2006 and December 2017. The diagnosis was confirmed pathologically by image-guidance cytology or biopsy, bronchoalveolar lavage or bronchoscopy-guided biopsy, and classified according to the World Health Organization (WHO) histological classification of lung cancer. The specimens were preserved in 10% buffered formalin as a fixative, and they were read by a consulting general pathologist after routine slide staining with hematoxylin and eosin stains. The data collected from the records of the Department of Pathology included age, gender, site of tumor, and histopathological patterns with grade. All records that did not include any of the above variables were excluded from the study. Non-neoplastic and inflammatory lesions of the lung were excluded. The statistical analysis was performed by the Statistical Package for Social Sciences, Version 21.0 (IBM Corp, Armonk, NY, USA).

Results. The study identified 138 patients with lung cancer were identified. Of the total patients, 103

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(74.6%) were male and 35 (25.4%) were female, with a ratio of 2.9:1 (male:female). The ages ranged from 6 years to 97 years, with a mean age of 60.6 ± 14.7 years. The predominant age group affected was between 60 years and 79 years (52.3%). The younger age group was composed of 4.6% (<20 years) and the elderly age group was 12.3% (>80 years). The right lung was involved in 53.9% of the cases, whereas the left lung was the most common site in 21.2% of the cases. In 24.9% of the cases, the side was not recorded.

Table 1 summarized the number, percentage, mean ages, and gender distribution of the patients with lung cancer. There were 66 (47.8%) cases of adenocarcinoma (AC), 35 (25.3%) cases of squamous cell carcinoma (SCC), 12 (8.7%) cases of neuroendocrine tumor (NET), 11 (8%) cases of metastatic carcinoma, 5 (3.6%) cases of lymphoma, 3 (2.2%) cases of sarcomatoid carcinoma, 3 (2.2%) cases of adenosquamous carcinoma, and 3 (2.2%) cases of large cell carcinoma.

Table 2 shows the histological patterns of lung cancer and their distribution in the various age groups. Adenocarcinoma revealed a male predominance with a ration of 2.9:1 (male:female) and a mean age of 60.7 ± 14.8 . The right lung was involved in 69.5% of the cases. The majority of ACs (56.5%) were moderately

differentiated, whereas others were well differentiated (17.4%) or poorly differentiated (26.1%). Similarly, SCCs were more common in male than female with a ratio of 4.8:1. The mean age of the patients was 64.7 ± 15.1 years. The right lung was the most common site (56%). There were 23 (65.7%) cases of moderately differentiated SCCs, 9 (25.7%) cases of poorly differentiated SCCs, and 3 (8.6%) cases of well-differentiated SCCs. The third most common histological diagnosis involved NETs, of which 83.3% were carcinoid tumors. The mean age of the patients was 42.7 years, with more males than females affected (male:female ratio was 1.5:1). Other less frequent NETs were small cell carcinomas, accounting for 16.7% of the cases, where the mean age of the patients was 57 years. Of the 11 metastatic tumors, the most common histological type was AC, with 7 (63.6%) cases. There were 3 (27.3%) cases of renal cell carcinoma and one (9.1%) case of skin melanoma.

Discussion. Lung cancer continues to be a major health problem and is the leading cause of cancer morbidity and mortality throughout the world with an estimated 1.2 million deaths per year.⁵ It is not just a threat to human health, but also a reflection of disparities in the geographical variations, socioeconomic status, and other demographic indices such as age, gender, race, and ethnicity. Hence, an estimate of epidemiological data with clinicopathological correlation is essential for the disease prevention and control.

According to a recent cancer statistics in USA, a total of 234,030 new cases of lung cancer was diagnosed in USA.⁴ The incidence pattern of lung cancer has been previously reported from Jeddah and Eastern regions of KSA.^{8,9} Despite the growing burden of lung cancer in KSA and worldwide, a scant histopathological data is available from our region. Hence, in this baseline preliminary histopathological study, the author tried to highlight the frequency, demographic data, and

Table 1 - The histopathological diagnoses of patients with lung cancers. (N=138).

Histopathological diagnoses	n (%)	Mean age (years)	M/F
Adenocarcinoma	66 (47.8)	60.7	49/17
Squamous cell carcinoma	35 (25.3)	64.7	29/6
Neuroendocrine tumor	12 (8.7)	45.1	6/6
Metastatic carcinoma	11 (8.0)	66.8	8/3
Lymphoma	5 (3.6)	39.8	4/1
Sarcomatoid carcinoma	3 (2.2)	52.3	1/2
Adenosquamous carcinoma	3 (2.2)	71.3	3/0
Large cell carcinoma	3 (2.2)	70.0	3/0
Total	138 (100)		103/35

M/F - male / female

Table 2 - The age distribution of patients with lung cancers (N=138).

Diagnoses/Age	<40	40 - 49	50-59	60-69	70-79	≥80	Total
Adenocarcinoma	6	7	12	19	17	5	66
Squamous cell carcinoma	2	3	4	12	7	7	35
Neuroendocrine tumor	4	-	4	3	-	1	12
Metastatic carcinoma	-	-	2	5	3	1	11
Lymphoma	2	2	-	1	-	-	5
Sarcomatoid carcinoma	1	-	1	1	-	-	3
Adenosquamous carcinoma	-	-	-	1	2	-	3
Large cell carcinoma	-	-	-	2	-	1	3
Total	15	12	23	44	29	15	138

pathological features of lung cancer in a large cohort of 138 Saudi patients.

Gender distribution of lung cancer differs widely among various countries, with a consensus of male preponderance. Regarding the national cancer incidence rate, this study showed a higher incidence of lung cancer among males than females, with a male to female ratio of 2.9:1, which is higher than the male to female ratios of 2.5:1 and 1.7:1 reported by Alamoudi⁸ and Kaouri et al.¹⁰ A detailed study by Devasa et al¹¹ on international lung cancer trends reported a male to female ratio of less than 2 in USA, Canada, Iceland, Sweden, and Denmark; more than 6 in France, Italy, and Slovenia; and more than 10 in Spain.

Age is one of the most important determinants of lung cancer risk. In this study, the age ranged from 6 years to 97 years, with a mean age of 60.6 years. An almost similar average age at diagnosis was reported by Radzikowska et al¹² (61.94 years) and by Gonlugur et al¹³ (60 years).

In a cohort of 138 confirmed cases of lung cancer, AC accounted for the highest number of cases (47.8%), followed by SCC (25.3%), NET (8.7%), lymphoma (3.6%), adenosquamous carcinoma (2.2%), sarcomatoid carcinoma (2.2%), and large cell carcinoma (2.2%). There were cases of metastatic carcinoma (8%). In this study, AC surpassed SCC. This is similar to the observations of the SCR,⁷ which reported 41.9% AC versus 16.9% SCC, and a previous study in KSA by Alamoudi⁸ reported that 30% AC versus 25% SCC. In 2005, a study by Radzikowska et al¹² reported SCC in 52.1% of cases, followed by small cell carcinoma (20.8%) and AC (11.3%). During the same period, Shetty et al¹⁴ also reported a higher incidence of SCC (44.5%) than AC (18.5%). In the present study, the incidence of AC (47.8%) was higher than that observed in the 3 aforementioned studies.

Over the past several decades, AC has become more prevalent than SCC,¹⁵ which is hypothesized to be because of changes in cigarette composition and in smoking patterns (example is inhaling smoke more vigorously into the periphery of the lung, where the AC is present more often). Improved detection of peripheral pulmonary lesions, alteration of the WHO classification, and improved staining of mucin-producing cells have also resulted in noticing more cases of AC than SCC. Additional explanations for AC prevalence could include the effect of atmospheric air pollution, especially nitrogen oxides, which were suggested to increase the occurrence of AC.

Study limitations. The present study being a retrospective histopathology laboratory based

research, it has the limitation of dependence on the data collection efficacy and lack of a proper statistical analysis. However, it has served the purpose of providing basic demographic and clinic-pathological data and it can serve as a preliminary step for conducting further researches in the understanding of pathogenesis prognosis and management of lung cancer.

In conclusion, the study established a baseline of lung cancer pattern on the basis of histopathological experience in a tertiary referral hospital in the Al-Madinah Al-Munawwarah province of KSA and provides an excellent workup for future population-targeted studies on lung cancer. Upon histopathological examinations, the incidence of AC was more than that of SCC, indicating a global and regional concordance in the changing pattern.

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References

1. Kumar V, Abbas A, Aster J, editors. Robbins basic pathology. 10th ed. Philadelphia: Elsevier; 2017.
2. Wong MC, Lao XQ, Ho K, Goggins W, Tse S. Incidence and mortality of lung cancer: global trends and association with socioeconomic status. *Sci Rep* 2017; 7: 14300.
3. Cancer Research UK. Worldwide cancer statistics. [Updated 2018; cited 2018 November 1]. Available from: <https://www.cancerresearchuk.org/health-professional/cancer-statistics/worldwide-cancer#heading-One>.
4. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2018. *CA Cancer J Clin* 2018; 68: 7-30.
5. Gabrielle B, Cong W, and Jianrong Z. Updated statistics of lung and bronchus cancer in United States. *J Thorac Dis* 2018; 10: 1158-1161.
6. Cancer Research UK. Lung cancer statistics. [Updated 2018; Cited 2018 October 27]. Available from: <https://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/lung-cancer>.
7. Annual Cancer Incidence Report for Saudi Cancer Registry (SCR). [Updated 2014; cited on 2018 October 22]. Available from: <https://nhic.gov.sa/eServices/Documents/2014.pdf>.
8. Alamoudi OS. Lung cancer at a University Hospital in Saudi Arabia: A four-year prospective study of clinical, pathological, radiological, bronchoscopic, and biochemical parameters. *Ann Thorac Med* 2010; 5: 30-36.
9. Al Tamimi TM, Al-Bar A, Al-Suhaimi S, Ibrahim E, Ibrahim A, Wosornu L, et al. Lung Cancer in the Eastern Region of Saudi Arabia: A Population-Based Study. *Ann Saudi Med* 1996; 16: 3-11.

10. Kourie HR, Rassy M, Ghorra C, Naderi S, Kattan J. Histologic Distribution of Pulmonary Tumors in Lebanon: A 5-Year Single Institution Experience. *Asian Pac J Cancer Prev* 2015; 16: 5899-5902.
11. Devesa S, Bray F, Vizcaino AP, Parkin DM. International lung cancer trends by histologic type: male:female differences diminishing and adenocarcinoma rates rising diminishing and adenocarcinoma rates rising. *In J Cancer* 2005; 117: 294-299.
12. Radzikowska E, Glaz P, Roszkowski K. Lung cancer in women: age, smoking, histology, performance status, stage, initial treatment and survival. Population-based study of 20561 cases. *Ann Oncol* 2002; 13: 1087-1093.
13. Gonlugur U, Gonlugur TE, Kaptanoglu M, Nadir A, Cinar Z. The changing epidemiological trends for carcinoma of the lung in Turkey. *Saudi Med J* 2008; 29: 749-753.
14. Shetty CM, Lakhkar BV, Gangadhar VSS, Ramachandran VR. Changing pattern of bronchogenic carcinoma. *Indian J Radiol Imaging* 2005; 15: 233-238.
15. Houston KA, Henley SJ, Li J, White MC, Richards TB. Patterns in lung cancer incidence rates and trends by histologic type in the United States, 2004-2009. *Lung Cancer* 2014; 86: 22-28.