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Demographics and Histopathological Characteristics of Lung Cancer Patients in Cirebon District, Indonesia (2021-2023)

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ABSTRACT

Background: Based on the Global Burden of Cancer Study (GLOBOCAN) in 2020, In the world, lung cancer is the first cause of death. In Indonesia, lung cancer is the third highest. Lung cancer is classified into two cell types: Small Cell Lung Cancer and Non-Small Cell Lung Cancer. There are two types of Non-Small Cell Lung Cancer: squamous cell carcinoma, adenocarcinoma, and large cell carcinoma.
Aims: To determine the demographics and histopathological characteristics of lung cancer patients in Cirebon District (2021-2023).
Methods: This research employed a descriptive observational method. The data were collected from general hospitals' medical records of lung cancer patients at RSUD Waled Cirebon and RSUD Arjawinangun in 2021-2023 using the total sampling technique. There were 69 respondents met the inclusion criteria for this recent study.
Results: In this study, there were 68.1% of patients aged from 46 to 70 years, and the majority were male (66.7%). The most common cancer cell type was adenocarcinoma (69.6%). Most patients did not have information regarding occupational data (68.1%), smoking history (98.6%), family history (98.6%), and staging (89.9%) included in their medical records.
Conclusion: The analysis showed that most lung cancer patients are aged 46-70 years and male incidences in lung cancer patients were higher. The most common type of histopathological is adenocarcinoma. Related to occupational data, smoking history, family history, and staging could not be concluded because they were not included in the medical record.

Keywords: *Lung cancer; Demographic; Histopathology; Staging.*
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1. Introduction

The World Health Organization, or WHO, defined cancer as a condition in which abnormal cells proliferate uncontrollably and spread to other organs. The most common cause of mortality from cancer is metastases to other organs. Cancer is a huge public-health issue around the world. Lung cancer is one of the most common malignancies in the world that comes from the lung parenchyma or bronchi (Nicholson et al. 2022).

According to Global Burden of Cancer Study (GLOBOCAN) in 2020, in the world, lung cancer is the first cause of deaths with 1.8 million deaths and the second highest of new cases after breast cancer. In Asia, the incidences of lung cancer were higher with an estimated number of 1.3 million new cases. In Indonesia, lung cancer is the third highest (8.8%) after breast cancer (16.6%) and cervical cancer (9.2%). In 2019, there were five provinces with the highest number of lung cancer patients, namely East Java, Jakarta, Central Java, West Java and South Sumatra (Ferlay, et. al., 2024).

Based on gender, lung cancer is mostly found in male with 25,943 (14.1%) new cases, while female has a lower incidence than male with 8,840 (4.1%) cases in 2020 (Ferlay, et. al., 2024). Smoking is a primary risk factor for lung cancer. The highest risk was found in male smokers. Passive smokers are 20-30% more susceptible to lung cancer. Riskesda in 2018 reported that around 34% of the Indonesian population is a smoker and the country with the most smokers in the entire globe (Kementrian Kesehatan Republik Indonesia, 2019). Another risk factor is exposure to asbestos and radon. Exposure to asbestos, especially in the workplace could increase the risk of lung cancer depending on how frequent the exposure is (Buana and Agustian Harahap, 2022).

The probability of lung cancer developed with age, as the disease progressed before symptoms manifested. In general, 83% of cases are diagnosed at age 70 or older. NSCLC occurs most frequently in male between the ages of 80-84 years, and in female between the ages of 75-79 years. SCLC occurs most commonly in male and female between the ages of 75-79 years. There are two categories of lung cancer: 14% are SCLC and 81% are NSCLC.(American Cancer Society 2023) There are various kinds of NSCLC, including adenocarcinoma, squamous cell carcinoma (SCC), and large cell carcinoma (LCC). Adenocarcinoma is a malignant tumor that has glandular differentiation. A malignant epithelial tumor that has keratinization from the bronchial epithelium is called squamous cell carcinoma. Undifferentiated carcinomas are large cell carcinomas (Travis, Brambilla, and Muller-Hermelink, 2005).

This research aimed to determine the demographics and histopathological characteristics of lung cancer in Cirebon District from 2021 to 2023.

2. Methods

Study design

This research employed a descriptive observational method. This research is a cross-sectional study conducted at RSUD Waled Cirebon and RSUD Arjawinangun. This research has been approved by the Health Research and Development Ethics Committee of RSUD Arjawinangun (Ethical Approval 427.9/KKEPK.24/VI/RSUD Awn/2024). Research license has also been obtained by RSUD Waled Cirebon (number: 800.2.2.1/1297-DIKLIT/2024) and RSUD Arjawinangun (number: 447.26/7506/RSUDAwn).

Population and Sample

The population in this study were all patients who diagnosed with lung cancer by cytology and/or histopathology in 2021 to 2023. Data were acquired from medical records of lung cancer patients at RSUD Waled Cirebon and RSUD Arjawinangun in 2021-2023 using the total sampling technique. Inclusion criteria; patients diagnosed with lung cancer by cytology and/or histopathology when admitted to RSUD Waled Cirebon and RSUD Arjawinangun in 2021-2023 and patient's medical records contained main data regarding age, gender and histopathological features as well as additional data such as smoking history, family history, occupational data and staging. Exclusion criteria, related to the main data including age, gender, and histopathological features are not

contained in the patient's medical record. This study had a total population of 121 patients, with 69 of them meeting the inclusion criteria. This research was conducted in May 2024 at RSUD Waled Cirebon and RSUD Arjawinangun.

Measurements

The research variables include lung cancer patients demographics, such as age, gender, occupation, smoking history and family history as well as histopathological characteristics, such small cell lung cancer, adenocarcinoma, squamous cell carcinoma (SCC), large cell carcinoma (LCC), and staging. TNM staging was used to identify the stage of lung cancer. Data were acquired from medical records of lung cancer patients at RSUD Waled Cirebon and RSUD Arjawinangun in 2021-2023.

Data Analysis

The collected data were analyzed using univariate analysis. Univariate analysis describes the characteristics of the demographics and histopathological using frequency distribution and percentage. Data were processed using SPSS 27 software.

3. Results

The data were acquired from medical records of lung cancer patients at RSUD Waled Cirebon and RSUD Arjawinangun in 2021-2023 using the total sampling technique, 69 patients who met the inclusion criteria and exclusion criteria were included in this study. Age, sex, occupation, smoking history, and family history were used to describe demographic characteristics. Histopathological findings and staging were used to describe the histopathological characteristics of lung cancer. As shown in Table 1, the majority of patients were aged 46-70 years (68.1%). There were more male patients than female patients, with 46 male patients (66.7%) and 23 female patients (33.3%). Adenocarcinoma was the most common histopathological finding (69.6%). Related to occupational data (69.6%), smoking history (98.6%), family history (98.6%), and staging (89.9%) the majority had no information on their medical reports

Table 2 shows the variation in the distribution of histopathological characteristics by age in lung cancer patients in Cirebon Districts in 2021 to 2023. Of the 69 lung cancer patients, 68.1% or 47 patients were aged 46-70 years with SCLC type and squamous cell carcinoma totalling 7 patients (10.1%), NSCLC totalling 1 patients (1.4%), and adenocarcinoma totalling 32 patients (46.3%). There were 2 (2.9%) patients <46 years old with squamous cell carcinoma and 7 (10.1%) with adenocarcinoma. There were 4 patients (5.8%) with squamous cell carcinoma and 9 patients (3%) with adenocarcinoma aged >70 years old.

As shown in Table 3, the histopathological characteristics of lung cancer patients in Cirebon District in 2021 to 2023 by gender. In male, 6 patients (8.7%) had SCLC, 11 patients (15.9%) had squamous cell carcinoma, and 29 patients (42%) had adenocarcinoma, while in female, 1 patient each (1.4%) had SCLC and NSCLC, 2 patients (2.9%) had squamous cell carcinoma, and 19 patients (27.5%) had adenocarcinoma. The ratio of adenocarcinoma to squamous cell carcinoma in males was 29:11 and 19:2 in females. In this study, adenocarcinoma was the most common type of cancer cell found in both males and females. The ratio of adenocarcinoma patients in males and females was 29:19. This means that in this study, adenocarcinoma was found more in male than female.

Table 1. Patient's Characteristics

Variables	Frequency (n)	Percentage (%)
Age		
<46 years	9	13
46-70 years	47	68.1
>70 years	13	18.8
Gender		
Male	46	66.7
Female	23	33.3
Occupation		
Labor	2	2.9
Housewife	6	8.7
Farmer	1	1.4
Entrepreneur	6	8.7
Not Working	7	10.1
No Information	47	68.1
Smoking History		
Smoking	0	0
No Smoking	1	1.4
No Information	68	98.6
Family History		
Yes	0	0
No	1	1.4
No Information	68	98.6
Histopathology		
SCLC	7	10.1
NSCLC	1	1.4
Squamous cell carcinoma (SCC)	13	18.8
Adenocarcinoma	48	69.6
Large cell carcinoma (LCC)	0	0
Lung Cancer Staging		
IA	0	0
IB	0	0
IIA	0	0
IIB	0	0
IIIA	0	0
IIIB	1	1.4
IIIC	0	0
IV	4	5.8
IVA	1	1.4
IVB	1	1.4
No Information	62	89.9

Table 2. Histopathological Characteristics by Age

Histopathology	Age			Total
	<46 years	46-70 years	>70 years	
SCLC	0 (0%)	7 (10.1%)	0 (0%)	7 (10.1%)
NSCLC	0 (0%)	1 (1.4%)	0 (0%)	1 (1.4%)
Squamous cell carcinoma	2 (2.9%)	7 (10.1%)	4 (5.8%)	13 (18.8%)
Adenocarcinoma	7 (10.1%)	32 (46.3%)	9 (3%)	48 (69.5%)
Large cell carcinoma	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Total	**9** (13%)	**47** (68.1%)	**13** (18.8%)	**69 (100%)**

Table 3. Histopathological Characteristics by Gender

Histopathology	Gender		Total
	Male	Female	
SCLC	6 (8.7%)	1 (1.4%)	7 (10.1%)
NSCLC	0 (0%)	1 (1.4%)	1 (1.4%)
Squamous cell carcinoma	11 (15.9%)	2 (2.9%)	13 (18.8%)
Adenocarcinoma	29 (42%)	19 (27.5%)	48 (69.5%)
Large cell carcinoma	0 (0%)	0 (0%)	0 (0%)
Total	**46** (66.7%)	**23** (33.3%)	**69 (100%)**

4. Discussion

The findings in this study show that lung cancer patients in Cirebon District in 2021 to 2023 are mostly aged 46-70 years (68.1%) and based on the type of cancer cells, adenocarcinoma is the most common (46.3%). The findings of this study is in line with those of study by Aini et al. (2019) where 78.3% of patients were aged 46-70 years and the most common type of cancer cell found was adenocarcinoma (75%). This happened because the risk of lung cancer tends to increase at the age of over 40 years and over 50 years. According to Balzer et al. (2018), adenocarcinoma typically develops between the ages of 26 and 40, whereas squamous cell carcinoma develops after the age of 50. This is in line with this study, which showed adenocarcinoma among patients under the age of 46 (10.1%) and squamous cell carcinoma was more common among patients aged 46-70 (10.1%) (Aini, Wulandari, and Andajani 2019; Balzer et al. 2018).

As we age, we are more exposed to hormones, degenerative disease, a reduce ability of cells to repair themselves, and decreasing lung function. The slowing of cilia movement is one of the explanations for a decrease in lung function. Cilia cleanse the lungs from particles and bacteria. If the movement of cilia decreases, the lungs become susceptible to infection. The buildup of unrepaired damage caused by carcinogen exposure, such as nicotine, the age related deterioration in the immune system, and increased risk of lung cancer as people age. The phrase “lung age” (calculated from age, body height, and the first second of forced expiration) has demonstrated to be a predictor of pulmonary obstructive impairment and substantially linked with post-operative breathing issues and survival in patients with lung cancer (Ma et al. 2023; Pritami et al. 2022).

The outcomes of this study showed that lung cancer patients in the Cirebon District are more likely to be male (66.7%) than female (33.3%). Adenocarcinoma is more common in male (42%), based on the type of cancer cells. This is because estrogen regulates the secretion of inflammatory cytokines by macrophages and neutrophils, lowering the risk of cancer in female. According to WHO, squamous cell carcinoma is more common in male because it is associated with smoking behaviors, which are more often practiced by male than female, while adenocarcinoma is more common in female. This is in line with this study where squamous cell carcinoma was found more in male (15.9%) than female (2.9%), and in female patients with adenocarcinoma were more numerous than other types of cancer cells (27.5%). These findings are align with those of the research conducted by Putri et al. (2023) which was conducted at Dr Soedarso Hospital Pontianak, with 82.7 % of patients were male and 17.3% were female (Putri, Pratiwi, and Musawaris 2023; Travis et al. 2005; Vavalà et al. 2021).

Female patients are more likely than male patients to be diagnosed with adenocarcinoma at a younger age, inherit cancer from their families, and have had less exposure to tobacco. Smoking has been identified as one of the causes of lung cancer in both male and female. Polypeptide 1, family 1, polymorphisms of cytochrome P450, subfamily A that can impair DNA repair, X-linked gastrin-releasing peptide receptor overexpression, and p53 mutations are among the genetic variants associated with lung cancer in the non-smoking population. Most of the potential carcinogens present in cigarette smoke are polycyclic hydrocarbons, amino aromatics and heavy metals such as nickel. Cigarette smoking causes cilia to disappear and progression to carcinoma in situ. A study accomplished by Salsabila et al. (2023) found that patients who smoked (74%) were more than patients who did not smoke (9.4%). However, this study discovered that 98.6% of patients did not have information about their smoking history (Kementrian Kesehatan Republik Indonesia 2018; Kusumawardani et al. 2022; Salsabila, Intan, and Fitrina 2023).

According to data from the Central Statistics Agency of West Java Province in 2023, the percentage of the population aged 15 and up who smoke in Cirebon District in 15.34% in the age group, 24.80% in the age 25-34 age group, 17.76% in the 45-54% age group, 12.37% in the 55-64 age group, and 6.67% in those over 65 age group. The large number of smokers in Cirebon District may be a risk factor for lung cancer diagnoses, although the majority of the diagnosed patients in this study did not provide smoking history information. Risk factors are not restricted to active smokers. Other risk factors, such as second-hand smoke, radon exposure, environmental exposure to industrial carcinogens and air pollution. The most well-known occupational lung carcinogen is asbestos, which is frequently found in building materials and vehicles. Smoking after asbestos exposure raises the risk of lung cancer. Air pollution is defined as air that has been contaminated with chemical, physical, or biological elements that, when placed in the lungs, might initiate the carcinogenesis process (Balzer et al. 2018; Buana and Agustian Harahap 2022).

Adenocarcinoma was the most often diagnosed cancer in this study (69.6%), followed by squamous cell carcinoma (18.8%). These findings align with the study accomplished by Salsabila et al. (2023), who found that 60.4% of patients had adenocarcinoma and 34.9% had squamous cell carcinoma. Adenocarcinoma spreads mainly through lymphatic and hematogenous pathways. Adenocarcinoma is a type of cancer cell that is common in female and often occurs in patients who are non-smokers. Whereas, squamous cell carcinoma occurs in 90% of patients who are smokers. Squamous cell carcinoma patients typically have poor prognosis because the cancer is most common in smokers with concurrent diseases such cerebral infraction, chronic obstructive pulmonary disease, and cardiovascular atherosclerosis. Based on lung cancer staging, most lung cancer patients did not have information related to staging (89.9%). However, according to the study's findings, there are 4 patients with stage 4 lung cancer. The therapy of choice in patients with staging 4 is chemotherapy palliative, radiotherapy palliative, targeted therapy, immunotherapy, interdisciplinary team, and comprehensive palliative care (Asmara et al. 2023; Kawase et al. 2012; Salsabila et al. 2023; Travis et al. 2005).

This research has several limitations such as limitations in research time and many of the data needed by researchers are incomplete in medical records, such as occupation, smoking history, family history, and staging. Further research is expected to fill inadequacies in smoking and family history data, as well as research specific lung cancer risk factors and analyze lung cancer progression and outcomes based on histopathological types and stages.

5. Conclusion

In conclusion, most lung cancer patients were age 46-70 years. The analysis showed that male incidence in lung cancer patients were higher. Based on histopathological, adenocarcinoma was the most prevalent cancer cell type. Related to occupational data, smoking history, family history, and staging could not be concluded because they were not included in the medical record. Further research is expected to fill inadequacies in smoking and family history data, as well as research specific lung cancer risk factors and analyze lung cancer progression and outcomes based on histopathological types and stages.

Conflict of Interest

There is no potential conflict of interest.

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