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EPIDEMIOLOGICAL PATTERNS OF LUNG ADENOCARCINOMA WITH PLEURAL METASTASIS: LESSONS FROM RSUD AHMAD YANI METRO

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ABSTRAK : POLA EPIDEMIOLOGI ADENOKARSINOMA PARU DENGAN METASTASIS PLEURA: PEMBELAJARAN DARI RSUD AHMAD YANI METRO

Latar Belakang: Efusi pleura ganas (EPG) merupakan manifestasi stadium lanjut dari berbagai keganasan, paling sering kanker paru, dan berhubungan dengan morbiditas yang tinggi serta prognosis yang buruk. Data epidemiologi menunjukkan bahwa laki-laki dan perokok lebih banyak terdampak, kemungkinan akibat paparan karsinogen dan risiko pekerjaan yang lebih tinggi.

Tujuan: Mendeskripsikan karakteristik demografi, distribusi pekerjaan, dan kebiasaan merokok pada pasien dengan diagnosis EPG, serta membahas kemungkinan penyebab dominasi kasus pada laki-laki dan perokok.

Metode: Penelitian deskriptif potong lintang dilakukan pada 77 pasien dengan EPG terkonfirmasi secara sitologi atau histopatologi. Data usia, jenis kelamin, pekerjaan, dan riwayat merokok diperoleh dari rekam medis dan dianalisis menggunakan statistik deskriptif.

Hasil: Mayoritas pasien berjenis kelamin laki-laki (59,4%) dan berusia >40 tahun (96,9%). Pekerjaan terbanyak adalah petani (37,5%), diikuti oleh pekerja konstruksi (15,6%). Sebagian besar pasien (62,5%) adalah perokok, dengan proporsi perokok berat mencapai 43,8%. Dominasi laki-laki perokok mencerminkan paparan karsinogen terkait tembakau dan debu pekerjaan yang lebih tinggi.

Kesimpulan: EPG lebih banyak ditemukan pada laki-laki usia lanjut dengan riwayat merokok signifikan dan pekerjaan berisiko tinggi. Upaya pencegahan sebaiknya difokuskan pada program berhenti merokok dan pengurangan paparan risiko pekerjaan pada kelompok ini.

Saran: Untuk mengatasi meningkatnya beban kanker paru-paru, beberapa strategi kunci direkomendasikan. Memperkuat program skrining kanker paru-paru sangat penting, terutama bagi kelompok berisiko tinggi seperti pria di atas 40 tahun, perokok berat, dan individu dengan paparan karsinogen tinggi di tempat kerja.

Kata kunci: adenokarsinoma paru, efusi pleura ganas, sitologi cairan pleura, merokok, paparan pekerjaan, Indeks Brinkman.

ABSTRACT

Background: Malignant pleural effusion (MPE) is a late-stage manifestation of various malignancies, most commonly lung cancer, and is associated with significant morbidity and poor prognosis. Epidemiological data indicate that men and smokers are disproportionately affected, possibly due to higher exposure to carcinogens and occupational hazards.

Objective: To describe the demographic characteristics, occupational distribution, and smoking habits of patients diagnosed with MPE, and to discuss possible explanations for the predominance among men and smokers.

Methods: A descriptive cross-sectional study was conducted on 77 patients with confirmed MPE. Data on age, gender, occupation, and smoking history were obtained from medical records and analyzed using descriptive statistics.

Results: The majority of patients were male (59.4%) and aged >40 years (96.9%). Farming was the most common occupation (37.5%), followed by construction work (15.6%). Most patients (62.5%) were smokers, with heavy smokers accounting for 43.8%. The predominance of male smokers reflects higher exposure to tobacco-related carcinogens and occupational dusts.

Conclusion: MPE is more prevalent in older males with significant smoking history and high-risk occupations. Preventive measures should target smoking cessation and reduction of occupational exposures in these groups.

SuggeStion To address the rising burden of lung cancer, several key strategies are recommended. Strengthening lung cancer screening programs is crucial, particularly for high-risk groups such as men over 40 years old, heavy smokers, and individuals with high occupational exposure to carcinogens.

Keywords : lung adenocarcinoma, malignant pleural effusion, pleural fluid cytology, smoking, occupational exposure, Brinkman Index.

INTRODUCTION

Lung cancer remains the leading cause of cancer-related mortality worldwide, with an estimated 2.5 million new cases diagnosed in 2022. Adenocarcinoma is now recognized as the most common histological subtype in both men and women. In Asia, lung cancer accounts for more than 1.3 million new cases annually, with a higher incidence in men.[1]

In Indonesia, lung cancer poses a significant health burden, with an incidence rate of 13.4 per 100,000 population and a mortality rate of 11.9 per 100,000. Among men, the incidence reaches 21.3 per 100,000, compared to 6.4 per 100,000 in women. The high disparity between genders is largely attributed to smoking habits—over 65–70% of Indonesian men are active smokers, compared to only 3–4% of women.[1]

Smoking remains the primary risk factor, responsible for more than 90% of lung cancer deaths in men and 70% in women in high-income countries, and approximately 65% and 25%, respectively, in low- and middle-income countries. Biologically, men may have increased susceptibility due to smoking-induced loss of the Y chromosome, which impairs tumor-suppressor functions, increasing cancer risk. In addition, occupational exposures to asbestos, silica, diesel exhaust, and pesticides—common in male-dominated jobs—further contribute to the higher incidence.[1,2]

Malignant pleural effusion (MPE) is a common complication of advanced lung adenocarcinoma, often detected via cytology of pleural fluid. Understanding patient characteristics in confirmed MPE cases is crucial for improving early diagnosis and management strategies.[2]

RESEARCH METHODS

This descriptive cross-sectional study involved 77 patients, all of whom had cytologically or histologically confirmed malignant pleural effusion, admitted to RSUD Ahmad Yani Metro during 2023–2024. Data were obtained through a review of medical records, including patient age, gender, occupation, and smoking history. Smoking status was classified as non-smoker, low, mild, or heavy smoker according to the smoking index (number of cigarettes per day multiplied by the number of years smoked).

Inclusion criteria consisted of patients with cytologically or histologically confirmed malignant pleural effusion, complete medical records, and age above 18 years. Exclusion criteria included patients with incomplete data, pleural effusion of non malignant etiology, or those who had started chemotherapy before pleural fluid sampling.

Data analysis was performed using descriptive statistics to summarize patient characteristics, including frequencies and percentages for categorical data such as age, gender, occupation, and smoking status.

In view of the well-established epidemiological trend that lung cancer incidence is higher among men and individuals with a history of smoking, particular emphasis was placed on analyzing these variables to determine their prevalence within the study population, as well as to assess the potential influence of occupational and lifestyle factors on the distribution of malignant pleural effusion cases.

RESEARCH RESULTS

During the study period, a total of 77 patients were clinically suspected of having malignant pleural effusion (MPE). Cytological examination of pleural fluid confirmed the diagnosis of lung adenocarcinoma metastatic to the pleura in 32 patients (41.6%) of all suspected cases.

RESEARCH RESULT

This study analyzed 32 patients diagnosed with malignant pleural effusion. The distribution of cases based on age, gender, occupation, and smoking status is summarized in Table 1.

Among these 32 confirmed cases, the majority of patients (96.9%, n=31) were aged over 40 years, while only one patient (3.1%) was younger than 40 years. Males accounted for a slightly higher proportion than females, with 19 patients (59.4%) being male and 13 patients (40.6%)

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female. In terms of occupation, farmers constituted the largest group (37.5%, n=12), followed by construction workers and housewives (each 15.6%, n=5), mechanics (9.4%, n=3), and smaller proportions of teachers, grocery sellers, and drivers (each 6.3%, n=2), as well as one civil servant (3.1%).

Table 1
Distribution of Malignant Pleural effusion

Variable	Category	Total
Age	< 40 years	1
	>40 years	31
Gender	Female	13
	Male	19
	Contruction Worker	5
	Teacher	2
Occupation	Houswife	5
	Farmer	12
	Mechanic	3
	Grocery Trader	2
	Civil Servant	1
	Driver	2
Merokok	Non-Smoker	12
	IB Low	2
	IB Mild	4
	IB Heavy	14

Regarding smoking status based on the Brinkman Index, nearly half of the patients (43.8%, n=14) were classified as heavy smokers, while 12 patients (37.5%) were non-smokers. Light smokers comprised 6.3% (n=2), and moderate smokers 12.5% (n=4) of the cohort.

DISCUSSION

The predominance of MPE among men in this study (59.7%) aligns with global and regional data showing a higher incidence of lung cancer and pleural complications in males.[1,4,7] This disparity is strongly linked to behavioral and occupational factors.[3,5] In Indonesia, for example, the prevalence of smoking among men exceeds 70%, compared to less than 5% in women.[9,23,27] Tobacco smoke, which contains more than 60 carcinogens such as polycyclic aromatic hydrocarbons and nitrosamines, induces genetic mutations in respiratory epithelial cells, fostering malignant transformation and subsequent pleural dissemination.[2,13]

Heavy smokers—comprising 42.9% of the participants in this study—are at particularly high risk, as cumulative carcinogen exposure has been shown to drive more aggressive tumor biology and accelerate pleural involvement.[6,15,30] Occupational exposures also play a pivotal role. Farming and construction workers, for instance, often experience chronic inhalation of pesticides, silica, and asbestos, which are well-documented occupational carcinogens.[8,25] These environmental and occupational factors, when combined with smoking, may synergistically increase the risk and severity of malignant pleural disease.[21]

It is also noteworthy that all 77 cases in this cohort were confirmed malignant effusions, likely reflecting a tertiary referral bias wherein patients with a strong clinical suspicion of malignancy are more frequently subjected to thoracentesis and cytological evaluation.[20] Nevertheless, these findings are consistent with international epidemiological patterns, reinforcing the importance of early screening and preventive strategies. Researchers such as Bibby et al. (2018) and Porcel (2016) emphasize that addressing modifiable risk factors, particularly smoking cessation and occupational safety, remains critical to reducing both the incidence of lung cancer and the burden of malignant pleural effusion worldwide.[28]

CONCLUSION

The majority of patients with lung adenocarcinoma metastatic to the pleura at RSUD Ahmad Yani Metro were male, aged over 40 years, employed in occupations with potential exposure to carcinogens such as dust, fumes, and industrial chemicals, and had a history of heavy smoking. This pattern is consistent with both global and Indonesian epidemiological trends. According to GLOBOCAN 2022, lung cancer ranks as the second most common cancer worldwide and remains the leading cause of cancer-related mortality, with a higher prevalence among men (1.37 million new cases) compared to women (0.73 million cases). In Indonesia, the 2020 Global Cancer Observatory report similarly highlighted lung cancer as the second most common malignancy in men, accounting for 14.2% of all male cancer cases.[1,3]

The predominance in men is largely attributed to higher smoking prevalence—national health survey data indicate that over 60% of Indonesian men are current smokers compared to less than 5% of women—as well as greater occupational exposure to hazardous agents in sectors such as farming, construction, and mechanical work. Cigarette smoke contains more than 60 known carcinogens, including polycyclic aromatic hydrocarbons and nitrosamines, which induce DNA damage and contribute to malignant transformation of lung epithelial cells. Prolonged exposure to occupational carcinogens, such as

asbestos, silica, and diesel exhaust, further amplifies the risk, particularly when combined with smoking, as supported by synergistic effects demonstrated in multiple cohort studies.[4,5,6]

Biological factors may also contribute to sex differences. Estrogen receptor expression in lung tissue and variations in DNA repair capacity between sexes have been proposed as partial explanations for differential susceptibility. However, the overwhelming influence of modifiable risk factors—particularly tobacco use—underscores the critical importance of smoking cessation and occupational hazard control in lung cancer prevention.[7]

SUGGESTION

To address the rising burden of lung cancer, several key strategies are recommended. Strengthening lung cancer screening programs is crucial, particularly for high-risk groups such as men over 40 years old, heavy smokers, and individuals with high occupational exposure to carcinogens. In parallel, implementing intensive smoking cessation programs targeted at male populations can significantly reduce preventable cases. Moreover, improving occupational health and safety regulations is essential to minimize exposure to harmful substances in the workplace. Finally, enhancing public health education will help raise awareness about the risks, early symptoms, and the importance of early detection of lung cancer, empowering individuals to seek timely medical attention.

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