Original Research Article

LUNG CANCER: EPIDEMIOLOGY AND TREATMENT PARADIGMS IN A SINGLE CENTER FROM PAKISTAN

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Abstract: *Lung cancer is the second most common cancer worldwide and the leading cancer in men, with women following closely behind as the second most affected group. In 2020, there were more than 2.2 million new reported cases of lung cancer. According to Globocan, it is the third most common cancer in Pakistan, with an incidence rate of 5.9% in 2018 and a mortality rate of 7.8%. This study aims to explore the epidemiology, risk factors, and outcomes associated with lung cancer in Pakistan. The study is a retrospective observational investigation conducted at Jinnah Hospital in Lahore. The data of 50 adult patients who were diagnosed with biopsy-proven lung carcinoma, aged 20 years or older, and had received at least four cycles of first-line therapy were collected from their files. Patients were enrolled at random, regardless of gender. The results showed that 80% of the patients were male, while only 20% were female. The majority of the patients, 58%, had a history of smoking, with males accounting for 50% of this group. At presentation, 78% of the patients had stage 4 disease, and 68% received platinum with paclitaxel upfront. Forty-eight percent of the patients were above 60 years of age. Squamous cell and adenocarcinoma lung were the most common types of lung cancer, accounting for 34% and 30% of cases, respectively. After four cycles of first-line therapy, 30% of patients showed a partial response, while 56% continued with second-line treatment. In conclusion, lung cancer is a significant health concern in Pakistan, and measures are needed to decrease its incidence. Further studies with larger sample sizes are required to understand better the prevalence and effectiveness of treatment paradigms for lung cancer in Pakistan.*

Keywords: Lung Cancer, Pakistan, Chemotherapy, Epidemiology

Introduction

Lung cancer is the 2nd most common cancer worldwide, being the most common cancer in men and the 2nd most common cancer in women. In 2020, the number of newly reported cases of lung cancer was more than 2.2 million. It is a significant global public health concern, with varying incidence rates across different regions (Wong et al., 2017). This study investigates the landscape of lung cancer in Pakistan, focusing on the epidemiology, risk factors, and outcomes associated with lung cancer. The research aims to identify demographic patterns and trends related to lung cancer, including age-specific incidence and gender distribution. The study also assesses the stage at which lung cancer is typically diagnosed, treatment modalities employed, and their impact on patient outcomes. It sheds light and potentially explores potential challenges in accessing healthcare (Thompson et al., 2015).

Understanding the demographical aspects of lung cancer in Pakistan is crucial for developing targeted prevention and intervention strategies. By pinpointing high-risk groups and regions, healthcare policymakers and practitioners can work to reduce the burden of lung cancer and improve the overall health outcomes of the Pakistani population (Ali et al., 2022).

This study aims to give an insight into lung cancer affliction, helping to provide a foundation for evidence-based healthcare policies and interventions tailored to the unique characteristics of lung cancer in Pakistan.

A study in Pakistan, showing data collected over five years from 6 cancer registries, demonstrated that of the approximately 270,000 cases, about 93% of malignancies were diagnosed in adults (individuals ≥20 years old), with adolescents (between 15-19 years old) being 2.3% and children 4.1% of the diagnosed population. Breast cancer was the most prevalent malignancy in women, with 38%, and in men, lip and oral cavity cancer was the most highly diagnosed malignancy, with 11.6%. Lung cancer demographics were as follows: In the overall adult population, lung and bronchial cancers were diagnosed in 3.9%, of which 2.9% were male and 1.0 were female. The epidemiology section will further explain this difference in incidence between the genders.

As per Globocan, Lung Cancer is the third most common cancer in the Pakistani population, with an incidence rate of 5.9% in 2018 and a mortality rate of 7.8% (Badar and Mahmood, 2022).

Unfortunately, due to the high incidence of smoking, a lack of lung cancer screening programs, and a lack of awareness in the general population about cancer, the majority of the patients have advanced-stage cancer at the time of presentation. Smoking is the leading cause of lung cancer in Pakistan. A significant percentage of the population, including both men and women, use tobacco products.

In a single-center study, it was found that amongst males diagnosed with lung cancer, 58% were active smokers, 18%

were ex-smokers, and only 9% of diagnosed females were smokers (Muscat and Wynder, 1995).

Pakistan faces air pollution challenges in several urban areas, with larger cities, including Karachi and Lahore, having the worst air quality index, contributing to the risk of lung cancer (Aslam et al., 2023).

Other well-known risk factors for lung cancer include occupational exposures (manufacturing, packing industries), genetic factors, pesticide and diesel exhaust exposure, welding fumes, wood dust, alcoholism, asbestos exposure, and a sedentary lifestyle.

The usual detection and treatment paradigm internationally includes the following components: Early detection through regular screenings can significantly improve the prognosis of lung cancer. Diagnostic methods like low-dose CT scans and chest X-rays are valuable in identifying tumors at an early stage. Surgical resection is a standard treatment for early-stage lung cancer. However, since the majority are present at a late stage in Pakistan, upfront surgery is usually not an option for the majority of patients.

For some advanced cases, chemotherapy and radiation therapy may be employed.

Currently, the approved chemotherapy agents for lung cancer include platinum-based drugs (Carboplatin, Cisplatin), Taxanes (Paclitaxel, Docetaxel), Pemetrexed, Etoposide, Gemcitabine, Irinotecan, Vinorelbine (Aslam et al., 2023). These drugs have shown promise in treating lung cancer and are increasingly used. Tumors with specific mutations (EGFR, ALK, ROS1) are amenable to immunotherapy and targeted therapies treatment. However, due to high costs and sometimes lack of availability, their use is limited in Pakistan.

As a definitive or palliative treatment, radiation therapy is being used in patients with lung cancer. The centers offering radiation therapy in Pakistan are limited; this facility is usually available in large cities only.

Treatment decisions are typically made by a multidisciplinary team of oncologists, surgeons, radiation oncologists, and pathologists who consider the patient's specific case. This approach ensures that the most appropriate treatment plan is tailored to each individual.

Methodology

The study was conducted at Jinnah Hospital in Lahore and collected data from 50 adult patients. It was a retrospective observational study, meaning the data was collected from the patients' files after receiving treatment. Although informed consent was lacking due to the study's retrospective nature, patients had previously given consent for treatment and were informed about the available treatment options and their potential side effects. To be enrolled in the study, patients had to be diagnosed with biopsy-proven lung carcinoma at least 20 years of age. They had to have received a minimum of four cycles of first-line chemotherapy or three months of any other treatment modality. Both male and female patients were enrolled, and file selection was done randomly from the database vault.

Results

Patients enrolled were 80 percent males and 20 percent females. Of all the patients, 42% were aged between 40-60

years, whereas those above 60 years were 48 percent. 58 % were smokers, irrespective of sex, whereas 50 % were males. Occurrence of Squamous cell and adenocarcinoma of lungs were 34 and 30 percent, respectively. (Table 1)
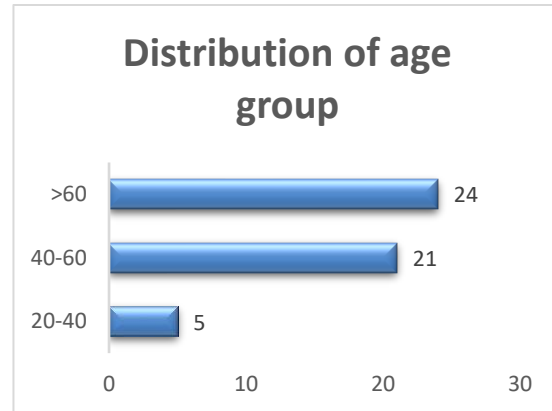

Figure 1: Distribution of age groups

Table 1: Histopathological diagnosis of samples:

Histopathology	Frequency	Percent
small cell CA	9	18.0
Squamous Cell CA	17	34.0
Adeno CA	15	30.0
Large Cell CA	2	4.0
NSCL(unspecified)	7	14.0
Total	50	100.0

54 % of the patients had Eastern Cooperative Oncology Group (ECOG) 2 at the start of treatment, while 8% had stage 4 disease at presentation. (Table-2)

Table 2: ECOG stages of the study population

ECOG- Stages	Frequency	Percent
0	6	12.0
1	13	26.0
2	27	54.0
3	4	8.0
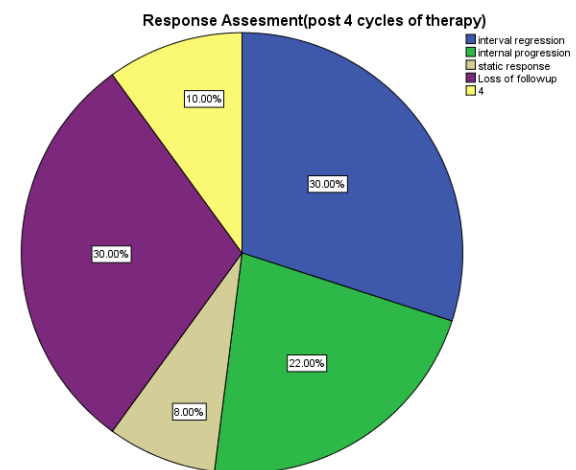
Figure 2:Assessmnent of post four cycle therapy response

The patients in this study showed a partial response of 30 %, whereas 8% showed stable disease after four cycles of first-line therapy.

Those receiving platinum with paclitaxel upfront were 68 %, whereas the total percentage of those receiving platinum as the initial drug combination was 86 %. Second-line therapy was continued in 56 % of patients, whereas the rest were either lost to follow-up or were shifted to best supportive care.(Figure 2-5)
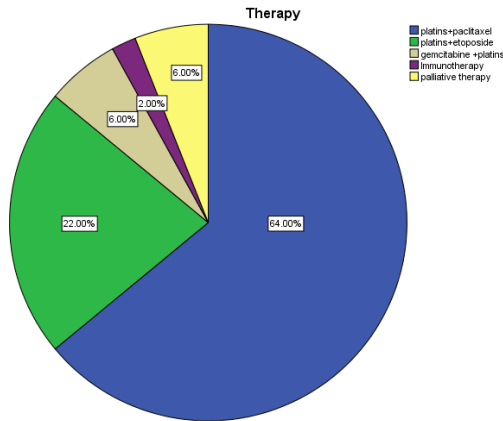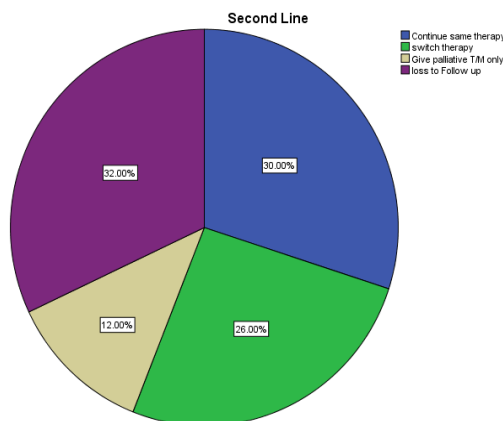

Figure 3

Figure 4:

Discussion

Lung cancer in Pakistan is a significant health concern, and efforts to reduce its prevalence involve addressing risk factors, implementing preventive measures, and improving access to early detection (Sheikh et al., 2022). From the above results and data accrued, several things can be highlighted. They start with the fact that most patients are not detected early or don't come for treatment early, usually presenting in the advanced stage (3 or 4) when, in most cases, a cure is impossible (Back et al., 2005). This can be due to the progressive nature of the disease and the poor performance status they present, allowing only limited doses of therapies to be administered (Noordijk et al., 1994). Then, being lost to follow-up is a significant problem, with high numbers not showing after the first line of therapy or sometimes during the first line of treatment administration. Although not mentioned in this study, socio-economic factors' influence on survival rates goes without saying in a resource-limited country like ours. Being resource-limited

is highlighted by the fact that the majority of patients were given chemotherapy despite a significant number of them being ECOG 2, in which case targeted immunotherapies play a pivotal role (Casan et al., 2018). Only one was given immunotherapy as part of first-line therapy, which number and percentage-wise is relatively low compared to international standards (Lee, 2022). Abridged doses and lack of targeted therapies may contribute to showing less than optimal responses.

In the end, it would suffice to say that a holistic approach, including but not limited to reducing the risk factors, cancer screening, and early diagnosis, may help significantly in tackling the insurmountable burden of lung cancer. The treatment in early-stage disease may lead to better outcomes, whereas the availability of modern targeted drugs may increase survival in those presenting with advanced lung cancer. However, further studies with a more significant number of patients are required to map the landscape of lung cancer in the Pakistani population and the effectiveness of available treatment paradigms.

Conclusion

In conclusion, lung cancer is a significant health concern in Pakistan, and measures are needed to decrease its incidence. Further studies with larger sample sizes are required to understand better the prevalence and effectiveness of treatment paradigms for lung cancer in Pakistan.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department Concerned.
Consent for publication
Approved
Funding
Not applicable

Conflict of interest

The authors declared absence of conflict of interest.

References

Ali, A., Manzoor, M. F., Ahmad, N., Aadil, R. M., Qin, H., Siddique, R., Riaz, S., Ahmad, A., Korma, S. A., and Khalid, W. (2022). The burden of cancer, government strategic policies, and challenges in Pakistan: A comprehensive review. *Frontiers in nutrition* **9**, 940514.

Aslam, R., Sharif, F., Baqar, M., Nizami, A.-S., and Ashraf, U. (2023). Role of ambient air pollution in asthma spread among various population groups of Lahore City: a case study. *Environmental Science and Pollution Research* **30**, 8682-8697.

Back, A. L., Arnold, R. M., Baile, W. F., Tulsky, J. A., and Fryer-Edwards, K. (2005). Approaching difficult communication tasks in oncology 1. *CA: a cancer journal for clinicians* **55**, 164-177.

Badar, F., and Mahmood, S. (2022). Cancer in Lahore, Pakistan, 2010–2019: an incidence study. *BMJ open* **11**, e047049.

Casan, J., Wong, J., Northcott, M., and Opat, S. (2018). Anti-CD20 monoclonal antibodies: reviewing a revolution. *Human vaccines & immunotherapeutics* **14**, 2820-2841.

Lee, S. (2022). Real-World Treatment Patterns and Outcomes for Patients with Advanced Melanoma: Immunotherapy Versus Targeted Therapy, The University of North Carolina at Chapel Hill.

Muscat, J. E., and Wynder, E. L. (1995). Lung cancer pathology in smokers, ex-smokers and never smokers. *Cancer letters* **88**, 1-5.

Noordijk, E. M., Vecht, C. J., Haaxma-Reiche, H., Padberg, G. W., Voormolen, J. H., Hoekstra, F. H., Tans, J. T. J., Lambooij, N., Metsaars, J. A., and Wattendorff, A. R. (1994). The choice of treatment of single brain metastasis should be based on extracranial tumor activity and age. *International Journal of Radiation Oncology* Biology* Physics* **29**, 711-717.

Sheikh, H. S., Munawar, K., Sheikh, F., and Qamar, M. F. U. (2022). Lung cancer in Pakistan. *Journal of Thoracic Oncology* **17**, 602-607.

Thompson, S. C., Haynes, E., Shahid, S., Woods, J. A., Teng, T.-H. K., Davidson, P. M., and Katzenellenbogen, J. M. (2015). Shedding light or fanning flames?: a consideration of the challenges in exploring the relative effectiveness of Aboriginal Community Controlled Health Services. *Quality in Primary Care* **23**.

Wong, M. C., Lao, X. Q., Ho, K.-F., Goggins, W. B., and Tse, S. L. (2017). Incidence and mortality of lung cancer: global trends and association with socioeconomic status. *Scientific reports* **7**, 14300.