ISSN: 2307-7689 Mediscope 2025;12(1): 18-22

Mediscope The Journal of GMC

ORIGINAL ARTICLE DOI: https://doi.org/10.3329/mediscope.v12i1.79890

Incidence of Different Cytological Cell Types of Lung Cancer Diagnosed Under CT-guided FNAC in a Tertiary Care Hospital in Khulna

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Abstract

Background: Lung cancer is the leading cause of cancer-related mortality worldwide, and its incidence is increasing in developing countries, including Bangladesh. CT-guided fine-needle aspiration cytology (FNAC) is a minimally invasive and reliable diagnostic modality for lung cancer diagnosis. This study aimed to investigate the incidence of different histopathological cell types of lung cancer diagnosed under CT-guided FNAC in a tertiary care hospital in Khulna. **Methods:** This is a hospital-based observational study carried out on 60 subjects in the Medicine Department of Gazi Medical College Hospital (GMCH), Khulna over 06 years, from March 2016 to March 2022 in collaboration with the Radiology and Imaging Department. A self-administered questionnaire containing different sets of questions regarding lung cancer was used for data collection. Detailed demographic data were collected from the patients and recorded in this study. Data were entered and analyzed using SPSS software. **Results:** The mean age of the patient was 53.72±9.78 years. The male and female ratio was 4:1. The commonest presentations were cough, weight loss, dyspnea, and chest pain (76.66%, 73.33%, 70.00%, and, 53.33% respectively). Smoking was a prime risk factor. Primary diagnosis of lung lesion was made by evaluation of history, and clinical examination and based on CXR finding and categorization was done based on FNAC under CT scan guide. Among the clinically suspicious lung cancer cases, 54 (90%) were diagnosed as bronchial carcinoma and the remaining 6 (10%) were non-specific infection. Non-small cell carcinoma was found to be the most prevalent in 42 patients (70%) according to CT-guided FNAC. The correlation of cytological examination with clinical and radiological findings revealed that cytological examination was more precise, and correlated with the suspected malignant lung cancer. **Conclusion:** CT-guided FNAC is a valuable and fairly accurate diagnostic aid for pulmonary mass lesions with a reasonable rate of complication in suspected cases. The Clinico-histopathological pattern of lung cancer has changed recently. The study emphasizes the early detection and diagnosis of lung cancer, particularly in high-risk populations such as smokers. The incidence of adenocarcinoma is increasing, and becoming the most common cause in both smokers and non-smokers.

Keywords: Bronchogenic carcinoma, Clinico-radiological profile, CT-guided FNAC

Introduction

The most prevalent and deadly neoplastic illness in the world today is thought to be lung cancer. It accounts for 28% of all cancer-related fatalities.[1] It is the most common cancer in men and rates rising in women. Tobacco smoking is the primary risk factor for lung cancer. One of the topics in biomedical research that has been studied the most is the connection between smoking and lung cancer. Smoking and lung cancer are rising in many low and middle-income countries although falling in some high-income countries. Other possible risk factors include air pollution, exposure to cigar smoke and exposure to carcinogens (e.g., asbestos, radiation, radon, arsenic).[2] Malignant epithelial non-small cell lung cancer (NSCLC) and small cell lung cancer (SCLC) are classified into six main categories by the World Health Organization (WHO) in 1999.[3]

The most common symptoms are cough, weight loss, dyspnea, chest pain, hemoptysis, fever, anorexia, etc.

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An early, accurate diagnosis is important for initiating specific therapy for malignant lesions and for avoiding unnecessary procedures for benign conditions. The diagnosis is typically made by chest x-ray or CT scan of the chest and confirmed by FNAC to differentiate between benign and malignant nature. Cytology is the method used to obtain cells or tissue for confirmation depending on the accessibility of tissue and the location of lesions.[4]

Fine Needle Aspiration Cytology (FNAC) is a procedure to obtain material from organs that do not shed cells spontaneously. This method is fairly accurate and has a high sensitivity for the detection of malignant lesions. Fine needle aspiration is more sensitive than bronchoscopy in patients with peripheral lung tumors.[5] FNAC provided at least 96% sensitivity and 100% specificity in diagnosing lung tumors. Among the benign lesions, specific diagnoses were obtained in 48.1% of cases.[6]

Materials and methods

This was a hospital-based observational study carried out on 60 subjects in the Medicine Department of Gazi Medical College Hospital (GMCH), Khulna, over 06 years, from March 2016 to March 2022 in collaboration with the Radiology and Imaging Department.

Inclusion criteria

- Clinically suspicious and radiologically diagnosed pulmonary mass lesions with sputum negative for AFB on 3 consecutive days.

Exclusion criteria

- Severe infection
- Terminally ill patients with respiratory disease
- Patient with pulmonary hypertension
- Patient with pre-existing bleeding disorders
- Patient with pre-existing coagulation disorders

The Data were collected from both the patients using a questionnaire by asking questions. Patients were informed about the objectives of the study, risks and benefits, freedom to participate in the study, rights to refuse and confidentiality. The informed written consent was taken from patients before including them in the study. FNAC under CT scan guide was performed in the presence of a Pathologist, Radiologist and Clinician using a 22-gauge disposable lumbar puncture needle with a needle length of 90 mm directing the tip of the needle towards the lesion. The aspirate was obtained by forward and backward, and rotating movements of the needle within the lesions by the Pathologist using aspiration with a 10 ml disposable syringe. The aspirate was smeared on 5-6 slides and half of the slides were fixed. The patients were kept in the radiology department for follow-up for 2 hours after fine needle aspiration to keep track of any complication and a chest X-ray was carried out after 24 hours to rule out any subsequent development of pneumothorax. All information and findings are recorded in the data collection sheet.

SPSS (version 21 for Microsoft Windows) was used as the tool for data analysis. Frequency tables and pie charts were employed for the descriptive statistics. For categorical variables, the proportion was shown in the tables, whereas for continuous variables, the mean±SD was presented. For conducting the study, formal ethical approval was obtained from the Institutional Review Board (IRB) of Gazi Medical College, Khulna to review the scientific and ethical issues related to the research. Privacy and confidentially were maintained strictly and study subjects were interviewed in a separate place with care. They were told once again that the information gathered during the study would not be shared with anyone other than the research team and would be used in such a way that the participant's name or identity would not be revealed.

Results

Age and sex of the respondents

Males made up 48 (80.00%) of the 60 cases, while females made up 12 (20.00%). Male: Female ratio 4:1. Maximum numbers of patients were between 61-70 years age groups (46.66%). The mean age of the patient was 53.72 ± SD 9.78 years [Table 01].

Table 01: Age & Sex distribution of suspected lung cancer (n=60)

Age (years)	Frequency (Male)	Frequency (Female)	Male and Female ratio	Percentage	Mean age (years)	Total
30-40	04	01	4:1	8.33%	53.72±9.78	05
41-50	08	02		16.66%		10
51-60	08	03		18.33%		11
61-70	24	04		46.66%		28
>70	04	02		10.00%		06
Total	48	12		99.98%=100%		60

Residents of the respondents

Urban areas accounted for 57% of the 60 cases, followed by rural areas (30%) and sub-urban/slum areas (13%) [Figure 01].

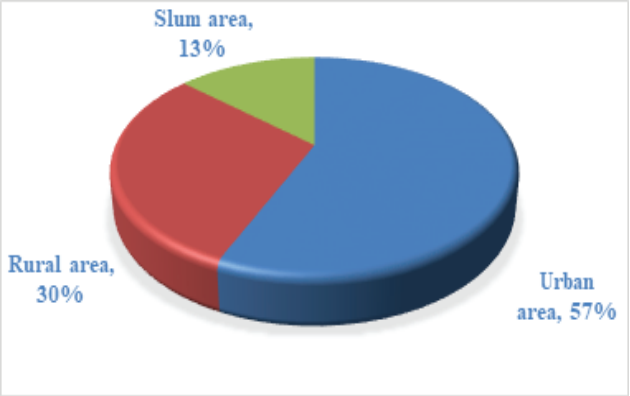

Figure 01: Areas of distribution of suspected lung cancer (n=60)

Smoking history

The majority of the males were smokers 44 (91.66%), whereas only 8.33% were non-smokers. Conversely, only 8.33% of females smoked, whereas the majority of females (91.66%) did not smoke [Table 02].

Table 02: Frequency and percentage of smokers & non-smokers in Lung cancer (n=60)

Gender	Total	Smoker	Non-smoker
Male	48	44 (91.66%)	04 (8.33%)
Female	12	01 (8.33%)	11 (91.66%)
Total	60	45 (75.00%)	15 (25.00%)

Presenting symptoms

Study shows cough, weight loss, dyspnea and chest pain were the most common presentations (76.66%, 73.33%, 70.00% and 53.33% respectively) of suspected lung cancer [Table 03].

Table 03: Commonest symptoms of the suspected lung cancer (n=60)

Symptoms	Frequency	Percentage (%)
Cough	46	76.66%
Weight loss	44	73.33%
Dyspnoea	42	70.00%
Chest pain	35	58.33%
Haemoptysis	28	46.66%
Anorexia	18	36.66%
Fever	22	30.00%

Radiological diagnosis

According to the study, 54 patients (90%) had a suspicion of bronchial carcinoma, of whom 43 (79.63%) were male and 11 (20.37%) were female. The remaining 06 patients (10%) had non-specific infections, where 05 (83.33%) were male and 01 (16.6%) were female. Compared to other lesion types, solitary mass lesion 34 (56.66%) is more common [Table 04].

Table 04: Radiological (Chest X-ray) diagnosis of suspected lung cancer(n=60)

Radiological findings	Total	Male (48)	Female (12)	Percentage
Suspected malignant lesion	54 (90%)	43	11	
• Solitary mass lesion	34	27	07	56.66%
• Consolidation	15	12	03	25.00%
• Collapse	05	04	01	8.33%
Non-specific infection	06 (10%)	05	01	10.00%
	60	48	12	

CT-guided FNAC findings

42 (70.00%) of the patients had non-small cell lung cancer, which was the most common type. The frequency was higher for male patients than female ones. Squamous cell carcinoma and adenocarcinoma were found in 18 (30.00%) and 24 (40.00%) cases, respectively. Only 10% of cases were identified as non-specific infections [Table 05, Figure 02].

Table 05: Frequency & pattern of CT-guided FNAC findings of suspected lung cancer (n=60)

Age group	Male	Female	Squamous cell carcinoma	Adenocarcinoma	Small cell carcinoma	Metastatic /Undifferentiated carcinoma	Non-specific infection	Total
30-40	4	1	1(80.00%)	2(40.00%)	1(80.00%	00(00.00%)	1(80.00%)	5
41-50	8	2	2(20.00%)	3(30.00%)	2(20.00%)	1(10.00%)	2(20.00%)	10
1-60	8	3	4(36.36%)	5(45.45%)	1(09.09%)	00(00.00%)	1(09.09%)	11
61-70	24	4	9(32.14%)	12(42.85%)	3(10.71%)	2(07.14%)	2(07.14%)	28
>70	04	2	2(33.33%)	2(33.33%)	2(33.33%)	00(00.00%)	0(00.00%)	06
Total	48	12	18(30.00%)	24(40.00%)	9(15.00%)	3(05.00%)	6(10.00%)	60

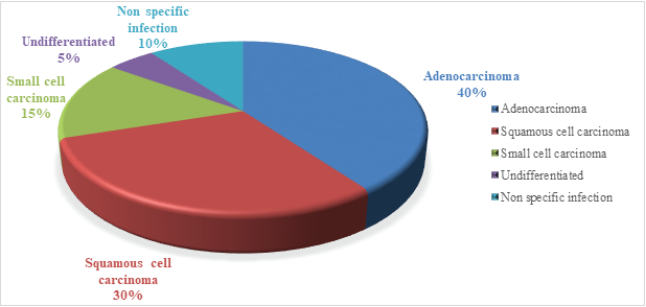

Figure 02: CT-guided FNAC findings of suspected lung cancer (n=60)

Discussion

Lung carcinoma is the leading cause of cancer-related death worldwide. The diagnosis is typically made by a chest x-ray or CT scan of the chest and confirmed by FNAC.[4]

Concerning the management of patients with primary lung cancer, the most important consideration is to discriminate between small cell and non-small cell carcinoma of the lung, which is possible in more than 95% of cases diagnosed by FNAC.[5] FNAC is of greatest benefit to patients for whom it spares a more invasive surgical procedure. Surgical intervention can be avoided in up to 50% of patients with clinically suspected lung cancer.[6]

In this study, out of 60 cases, males were 48 (80.00%) and females were 12 (20.00%) and Male: Female ratio was 4:1. In another study, it consisted of 181 male patients (89.16%) and 22 female patients (10.84%) in the series with Male: Female ratio 8.2:1.[7] Maximum numbers of patients of current study were between 61-70 years age groups (46.66%). The mean age of the patient was 53.72 ± 9.78 years. This shows the similarity of a previous cohort study of 20,561 patients of lung cancer who had the highest incidence between the ages of 60 and 69.[8]

In our study, the highest incidence of malignant lesions 28 (46.6%) was in the sixth and seventh (61 -70 years) decades of life and declined before the age of 40 years and after the age of 70 years and most were males (80%). Lung cancer MRs have been falling for males under 65 and have either plateaued or begun to decline among older males, according to age-period-cohort modeling utilizing lung cancer mortality data from North America and European Union countries.[9]

Non-small cell carcinoma was more than small cell carcinoma and adenocarcinoma was relatively more in females. Smoking, particularly cigarettes, is by far the main contributor to lung cancer.[10] Across the developed world, almost 90% of lung cancer deaths are caused by smoking.[11] Smoking is the principal risk factor in the pathogenesis of bronchogenic carcinoma. In our study, the percentage of smokers' male was 44 (91.66%) and the percentage of non-smokers male was 04 (08.33%). Previous research suggests smoking time has a greater impact on histological cancer types than cigarette counts.[12]

In our study of 12 females with bronchogenic carcinoma, the percentage of non-smoking females was 11 (91.66%) versus only 1(08.33%) of smoking females, so other risk factors other than smoking should be considered that include exposure to environmental tobacco smoke, fumes and smoke from certain cooking fuels and environmental pollution.[13]

The present study showed that cough, weight loss, dyspnea and chest pain were the commonest presentations (76.66%, 73.33%, 70.00% and 53.33%) respectively of the lung cancer patients. This is similar to the investigation's findings from various parts of India.[14]

In our study the most common histopathological cell type was squamous cell carcinoma 18 (30.00%) adenocarcinoma 24 (40.00%) Small cell carcinoma 9 (15.00%) and undifferentiated carcinoma 3 (05.00%). In the cell type distribution reported by Radzikowska, squamous cell carcinoma had the highest cell type incidence (52.1%) followed by small cell carcinoma (20.8%) while adenocarcinoma represented only 11.3% of the cases.[8] According to Shetty et al study, squamous cell carcinoma also presented (44.5%) of cases followed by adenocarcinoma (18.5%) and small cell carcinoma (17.2%).[15]

There was a shift in the incidence of squamous cell carcinoma and adenocarcinoma, up to the late 1980s, squamous cell carcinoma was the most common subtype, which was then surpassed by adenocarcinoma. The shift in the incidence of squamous cell carcinoma and adenocarcinoma may be associated with the switch from non-filtered to filtered cigarettes.[8]

Conclusion

Lung carcinoma is the leading cause of cancer-related death worldwide. The highest incidence was in the sixth and seventh decades of life and declined before the age of 40 years and after the age of 70 years. Smoking is the principal risk factor in the pathogenesis of bronchogenic carcinoma. Non-small cell carcinoma was more than small cell carcinoma. CT-guided FNAC is a less invasive and reliable procedure with good diagnostic accuracy.

Limitations

1) Limited Generalizability: Conducting the study at a single center with a small sample size restricts the ability to generalize findings to broader populations or different settings, as the results may reflect local or site-specific factors rather than universal trends.

2) Lack of Diagnostic Certainty: The absence of biopsy as a confirmatory diagnostic tool raises concerns about the accuracy of the diagnoses. Without histopathological confirmation, the study might rely on less definitive diagnostic criteria.

3) Expertise Gaps: The lack of collaboration with pathologists limits the study's diagnostic rigor and interdisciplinary insights.

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