

## Original Research Article

# A COMPARATIVE CYTO AND HISTOPATHOLOGICAL STUDY OF BRONCHOALVEOLAR LAVAGE, BRONCHIAL BRUSHINGS AND BIOPSY, IN LUNG LESIONS

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## ABSTRACT

**Background:** Lung carcinoma is one of the most common malignancies in the industrialized countries and now a leading cause of death in developing countries like India. There are different methods to diagnose lung carcinoma. Broncho-alveolar lavage cytology, bronchial brush cytology and bronchial biopsy are three important techniques which are becoming more popular. **Aim & Objectives:** 1. To assess diagnostic utility of BAL, bronchial brushings cytology and lung biopsy in diagnosing various pulmonary lesions. 2. To compare the bronchoalveolar lavage and brush cytology with biopsy in patients with lung diseases.

**Materials and Methods:** This is a Hospital based observational study carried out tertiary care centre in known patients with lung cancer, during a period of 18 months from January 2023 and June 2024. The materials obtained from Broncho-alveolar lavage, bronchial brushings and bronchial lung biopsy are studied and their efficacy in diagnosing lung malignancy is compared.

**Results:** The present study showed that sensitivity of Broncho-alveolar lavage and Bronchial brushings are 65.4%, 80.2% respectively. Whereas specificity are 83% and 91.4% respectively.

**Conclusion:** This study suggests that the biopsy along with bronchial brush gives better cellularity and yield when compared to BAL. The probability of finding the histological sub types is higher in biopsy when compared with brushings and BAL samples.

**Keywords:** Lung cancer, BAL, bronchial brushings cytology, Sensitivity, Specificity, Biopsy.

## INTRODUCTION

Lung malignancy is the commonest malignancy worldwide and the commonest cause of malignancy associated deaths worldwide.<sup>[1]</sup> Lung malignancy contributes 17% to the total incidence of malignancy in males and 23% of total malignancy related deaths are due to lung malignancy.<sup>[2]</sup> Now a days, the incidence of lung malignancy is increasing drastically in females also and has kept the breast malignancy behind. Increase in number of lung malignancy related deaths can be due to late

presentation of the patient to the clinician as such patients remain asymptomatic until advanced.

Respiratory tract cytology has been well established worldwide as a diagnostic procedure for evaluating suspected lung disease patterns. BAL, bronchial brushings and bronchial biopsy became more easy, accessible and popular.<sup>[3]</sup> Though histopathological diagnosis of bronchial biopsy is considered the gold standard for diagnosis of lung lesions, it has certain draw backs. Bronchial biopsies cannot be performed in more peripheral sites or patients at risk of hemorrhage. BAL and brushings- not only

complement tissue biopsies in the diagnosis of lung diseases but are also comparable.

BAL is easy to perform with good patient tolerance and it is used as a routine procedure for assessment of suspicious lung cancer. So, present study was aimed to compare the result of BAL cytology with bronchial biopsy histopathological examination and to correlate the above findings and ultimately to ascertain the role and diagnostic utility of BAL cytology and biopsy in diagnosing and further management of patient of lung malignancy

#### Aims and Objectives

1. To assess diagnostic utility of BAL, bronchial brushings cytology and lung biopsy in diagnosing various pulmonary lesions.
2. To compare the bronchoalveolar lavage and brush cytology with biopsy in patients with lung diseases.

## MATERIALS AND METHODS

**Type of study:** Hospital based observational study

**Place of study:** Tertiary care center

**Duration of study:** January 2023 and June 2024.

**Number of samples analysed:**26

**Inclusion Criteria:** All the patients who underwent fiberoptic bronchoscopy for suspected lung lesions on chest radiograph and came to pathology department for BAL, brush cytology were included in the study along with biopsy

**Exclusion Criteria:** Samples sent with only BAL or brushings or biopsy are excluded. Inadequate or unsatisfactory smears are excluded.

**Methodology:** Sediment smears of BAL, cytosmears of brushings were fixed in 90 % Isopropyl alcohol and stained with H&E. Lung biopsies were fixed in 10% Formalin routinely processed and stained with H&E.

#### Data Analysis

Data recorded in MS Excel sheet taking Histopathology as gold standard sensitivity, specificity and diagnostic accuracy was calculated.

## RESULTS

In this present study, out of 26 cases,18 (70%) were male and8(30%)were females with male to female ratio of 2.25:1. The age of patients ranged from20-86years, with mean age of 54 years. Correlation of cases on BAL and Bronchial brushing in both Non neoplastic and Neoplastic lesions of lung.

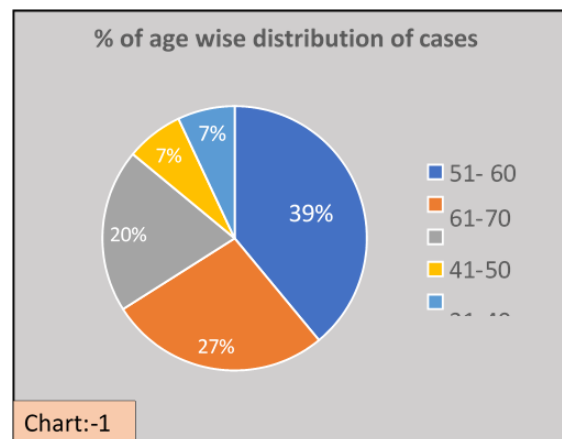


Figure 1: % of age wise distribution of cases

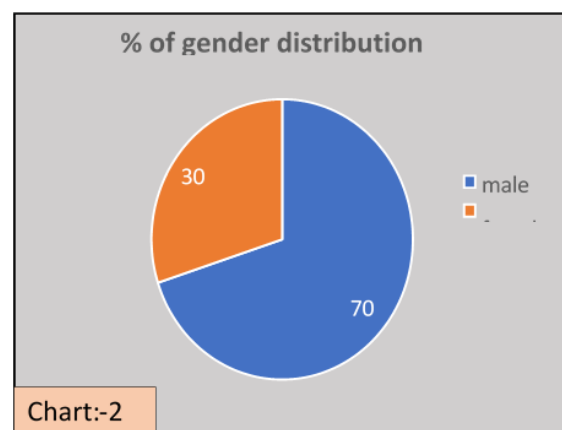


Figure 2: % of Gender distribution of cases

Table 1: Distribution of Non Neoplastic lesions of lung on Histopathology

Diagnosis	Cases	Percentage
Non-Specific Inflammation	9	75%
Tuberculosis	3	25%
Total	12	100%

Table 2: Distribution of Neoplastic lesions of lung on Histopathology

Diagnosis	Cases	Percentage
Squamous cell Carcinoma	9	64.29%
Small cell Carcinoma	1	7.14%
Adenocarcinoma	4	28.5%
Total	14	100%

#### BAL

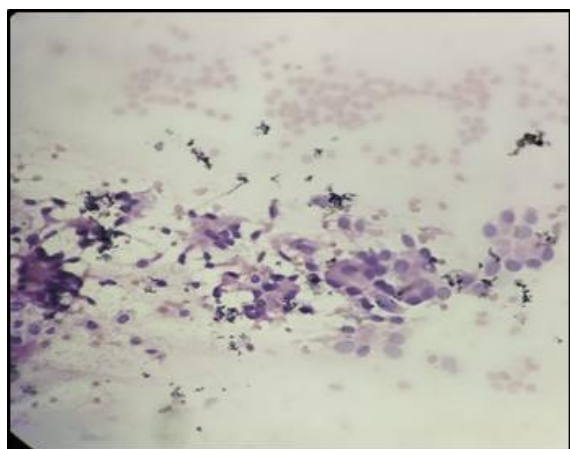
- Cases correlated were 20 (76.92%)
- Non correlated cases were: 6(23.07%)

#### BRONCHIAL BRUSHINGS

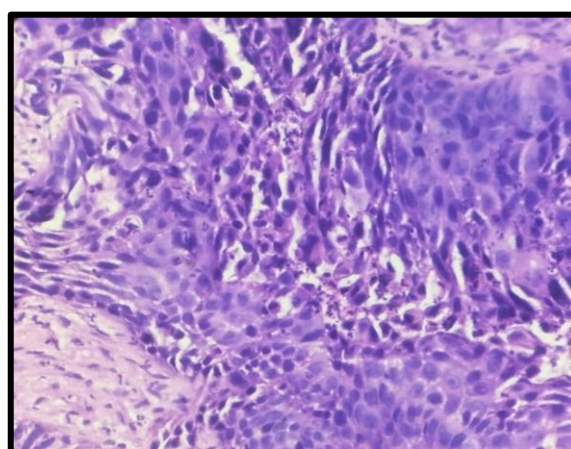
- Cases correlated were 22(84.61%)
- Non correlated cases were: 4(15.38%)

**Table 3: Comparative analysis of sensitivity and specificity of BAL and Bronchial brushings**

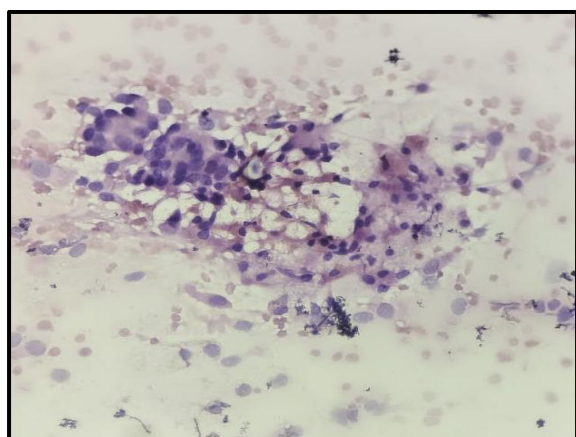
Indices	Bronchoalveolar Lavage	Bronchial brushings
Sensitivity	65.4%	80.2%
Specificity	83%	91.4%
Positive predictive value	85.6%	94.2%
Negative Predictive value	61.3%	78.6%
Diagnostic accuracy	70.1%	83.2%



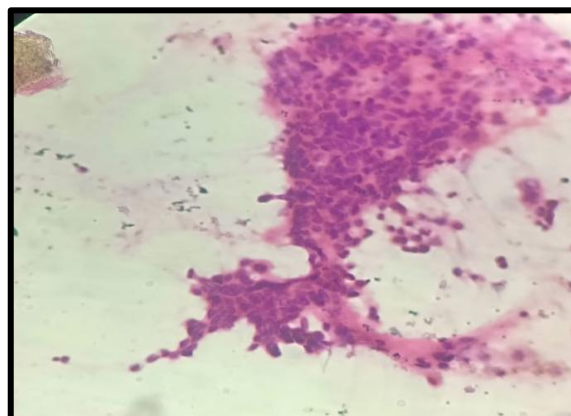
**Figure 1: Pleomorphic epithelial cells arranged in sheets and clusters. Individual cells show show high N/C ratio, hyperchromatic nuclei with moderate amount of cytoplasm against hemorrhagic background**



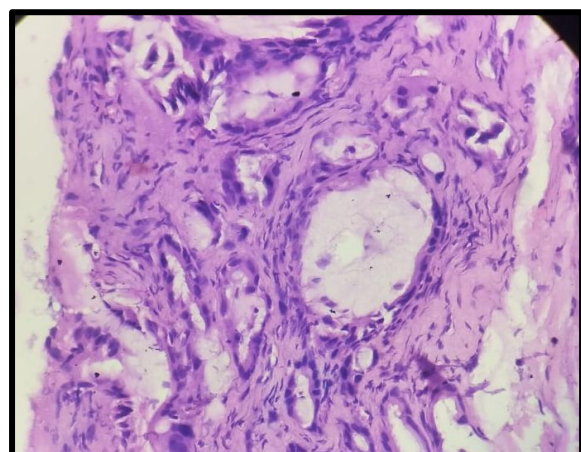
**Figure 4: Biopsy-Squamous cell carcinoma of lung-nests and sheets of pleomorphic epithelial cells; occasional inter cellular bridges**



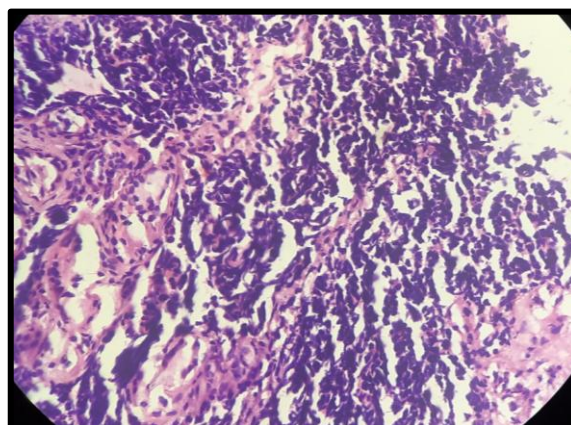
**Figure 2: Pleomorphic epithelial cells arranged in sheets and clusters. Individual cells show show high N/C ratio, hyperchromatic nuclei with moderate amount of cytoplasm against hemorrhagic background**



**Figure 5: Bronchial Brushings- Small round blue cells arranged in clusters, Individual cells show show high N/C ratio, hyperchromatic nuclei with moderate amount of cytoplasm against hemorrhagic background**



**Figure 3: Biopsy- Adenocarcinoma of lung- round to oval glands lined by pleomorphic epithelial cells**



**Figure 6: Biopsy- Small cell carcinoma of lung-small blue round to oval cells arranged in ribbons, with hyperchromatic nuclei, scant cytoplasm and delicate stroma.**



## DISCUSSION

After the advent of flexible fibre-optic bronchoscope, cytology techniques including bronchial washings and bronchial brushings are now used and samples are collected from respiratory tract lesions yielding significant amount of material.

To obtain a bronchial wash specimen, 3 to 5 ml of isotonic saline is introduced through bronchoscope and samples collected. Fluid containing cells, micro-organisms or other material from upper respiratory airways- trachea, bronchi and bronchioles is aspirated into the trap. The material is centrifuged to concentrate the cells, stained and examined by light microscopy or culture if infection is suspected.

A pivotal improvement in sampling cells from the lower respiratory tract occurred with the development of the flexible bronchoscope in the late 1960's. Now using this device, any part of the

respiratory tract can be sampled, yielding significant amount of cytological material.

With this, the emphasis shifted from biopsy to the use of cytology as a first line diagnostic and management tool in patients with advanced or inoperable malignancy. The age group of the patients included in this study ranged from 20-86 years with male predominance. Similar age group with male predominance was also observed in studies done by Mrudula et al,<sup>[4]</sup> Thomar et al,<sup>[5]</sup> and Choudhury et al.<sup>[6]</sup>

In our study, in comparison to bronchoalveolar lavage, bronchial brush gave higher number of true positive and true negative cases, and lesser number of false positive and false negative cases, showing its superiority over bronchoalveolar lavage in diagnosing lung lesions. Similar findings were seen in studies done by Reddy et al,<sup>[7]</sup> Khandelwal et al,<sup>[8]</sup> and Garg et al.<sup>[9]</sup>

**Table 4: Sensitivity, Specificity and Diagnostic accuracy of Bronchial brushings compared with previous studies**

Author	Sensitivity	Specificity	Accuracy
Kotadia TP et al.	88.46%	66.67%	82.5%
Gaur DS et al	87.30%	97.60%	93.90%
Mufti ST et al.	82.1%	72.7%	80%
Present study	80.2%	91.4%	83.2%

## CONCLUSION

This study suggests that the biopsy along with bronchial brushings gives better cellularity and yield when compared to BAL. The probability of finding the histological sub types is higher in biopsy when compared with brush cytology and BAL samples.

**Conflict of Interest:** None

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