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BRONCHOALVEOLAR LAVAGE FLUID STUDY FOR THE PRESENCE OF MALIGNANT CELLS IN PATIENTS WITH SUSPECTED LUNG CANCER IN MANIPUR

Pulmonary Medicine

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ABSTRACT

Introduction- Lung cancer is one of the common malignant neoplasms in the world. Although histopathology remains the gold standard for diagnosis, it is not possible to perform bronchial biopsies in all patients with suspicion of cancer. Cytological studies with bronchoalveolar lavage (BAL) fluid serves as a safe, economical and a quick diagnostic method of lung lesions[1]. **Objectives-** To examine BAL fluid for the presence of malignant cells in patients with suspected lung cancer. **Methodology-** This was a cross sectional study performed on 118 cases of suspected lung cancer who attended Respiratory Medicine, Out Patient Department (OPD), Regional Institute of Medical Sciences (RIMS), Imphal, Manipur from September 2019 to August 2021. **Results-** This study determined the presence of malignant cells in 17.8% of the samples of BAL fluid. **Conclusion-** Our study is one of the few studies that are available on utility of BAL fluid analysis in detection of lung cancers. Among the malignant lesions diagnosed, squamous cell carcinoma was the most common cytological type and it was found to be significantly more common among smokers when compared to non-smokers.

KEYWORDS

Bronchoalveolar lavage, Malignancies, Lung

INTRODUCTION

Lung cancer is one of the common malignant neoplasms in the world. The diagnosis is usually made by chest x-ray or CT and confirmed by biopsy[2]. Considering the 5 years survival rate of 65% to 70% applies only to those patients diagnosed and treated at the earliest stages of lung cancer, new diagnostic techniques should be developed or the yield of current ones should be increased[3].

Bronchoalveolar lavage (BAL) is the saline lavage of a portion of lower respiratory tract which explores large areas of the alveolar compartment providing cellular and non-cellular constituents from the lower respiratory tract[4]. BAL, which was originally developed as a therapeutic tool for pulmonary conditions like pulmonary alveolar proteinosis, cystic fibrosis and intractable asthma, also gained acceptance as a tool for diagnosing lung cancer and other inflammatory disorders. With the development of flexible fibreoptic bronchoscope, respiratory cytology has newer approach as samples like bronchial washings, bronchial brushings, bronchoalveolar lavage and trans-bronchial needle aspirations could be collected from the respiratory tract, yielding significant amount of cytological material[5]. A long-standing goal of cancer researchers has been to develop techniques that would facilitate an early diagnosis and treatment of lung cancer and thereby decrease its mortality.

Although histopathology remains the gold standard, but it is not possible to perform bronchial biopsies in all patients with suspected cancer. Cytological techniques are safer, economical, and provide faster results. Bronchoscopic washing, brushing and fine needle aspirations not only complement tissue biopsies in the diagnosis of lung cancer but are also comparable[1].

This study is done to determine bronchoalveolar lavage fluid for malignant cells in patients suspected of lung cancer attending Respiratory Medicine Department. Besides contributing to the literature, the proposed research will provide information regarding BAL has a relevant role in detecting neoplastic cells which will ultimately impact the treatment outcome.

AIMS AND OBJECTIVES

To examine BAL fluid for the presence of malignant cells in patients with suspected lung cancer.

MATERIALS AND METHODS

This study was a hospital based cross sectional study conducted from September 2019 to August 2021. 118 patients with clinical features and radiological evidence of lung mass (chest x ray and CT thorax findings) attending at Respiratory Medicine department, RIMS, were included.

Ethical approval from the Institution and valid informed consent from the patient were taken. Detailed histories of all the patients who participated in the study were recorded. They were subjected to thorough general, physical and clinical examination followed by bronchoscopy using Olympus BF-1T 190 Fibreoptic bronchoscope and BAL sample collected. Patient was observed for a minimum of 1 hour after the procedure, with continued monitoring. Sample collected in coded collection vial and was sent to Department of Pathology for further cytological examination. Data was analysed using SPSS V21 for windows. A p-value of less than 0.05 was considered statistically significant.

RESULTS

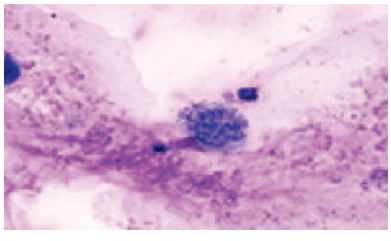

Figure 1: BAL smear showing malignant cell

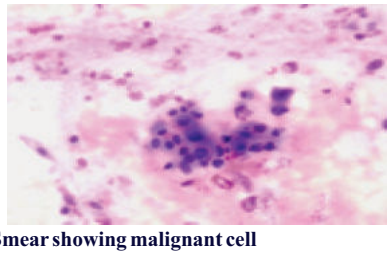

Figure 2: Smear showing malignant cell

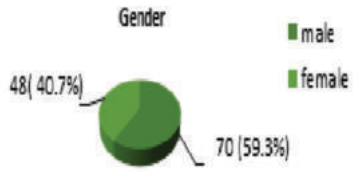

Figure 3: Showing the distribution of participants according to gender (N=118)

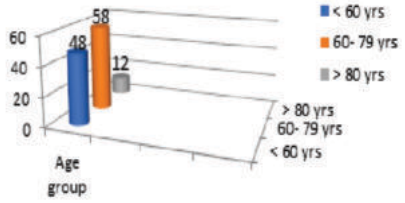

Figure 4: Distribution of the study participants according to age-group (N=118)

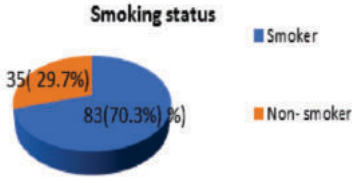

Figure 5: Fig showing the distribution of participants according to smoking status (N=118).

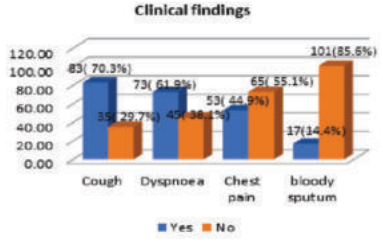

Figure 6: Distribution of participants according to clinical signs (N=118)

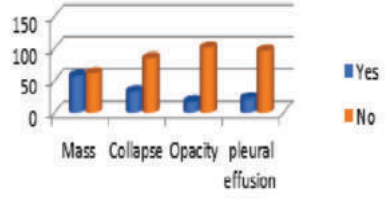

Figure 7: Distribution of participants according to radiological findings (N=118)

Table 1: Table showing the presence or absence of malignant cell isolated (N=118)

Types of cells	n (%)
Malignant	21(17.8)
Suspicious	4(3.4)
Atypical	1(0.8)
Malignant cell negative	92(78)

17.8% (21 participants) showed positive malignant cells in this study.

Table 2: Table showing the distribution of participants according to the type of cells (N=118)

HPE findings	n (%)
Squamous cell carcinoma	12(10.2)
Adenocarcinoma	7(5.9)
Small cell carcinoma	2(1.7)
Others (Malignant cell negative, suspicious and atypical cell)	97(82.2)

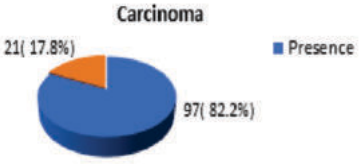

Figure 8: showing the distribution of participants according to the presence of carcinoma (N=118)

Table 3: This table shows that there is an association between age-group with lung cancer.

Variables		Lung cancer Yes n(%)	Lung cancer No (n(%)	p- value
Gender	Female	6(12.5)	42(87.9)	0.213
	Male	5(21.4)	55(78.6)	
Age group	< 60	4(8.3)	44(91.7)	.003
(in years)	< 60- 79	11(19)	47(81)	
	> 80	6(50)	6(50)	
Smoking	Non smoker	4(11.4)	31(88.6)	0.24
status	Smoker	17(20.5)	66(79.5)	

Higher the age-group, higher is the chance of developing lung cancer and this was found to be statistically significant. However, no association was found between gender and smoking status with lung cancer.

Table 4: Table showing the association of symptoms with lung cancer

Symptoms		Lung cancer Present- n(%)	Lung cancer absent- n(%)	p-value
Presence of cough	No	2(5.7)	33(94.3)	0.026
	Yes	19(22.9)	64(77.1)	
Presence of Dyspnoea	No	5(11.1)	40(88.9)	0.136
	Yes	16(21.9)	57(78.1)	
Presence of chest pain	No	7(10.8)	58(89.2)	0.027
	Yes	14(26.4)	39(73.60	
Presence of bloody sputum	No	11(10.90	90(89.1)	< 0.0001)
	Yes	10(58.8)	7(41.2)	

There is a significant association between the symptoms of cough, chest pain and presence of blood in the sputum with lung cancer. However, there was no association between dyspnoea and lung cancer.

Table 5: Table showing the association of radiological signs with lung cancer.

Radiological signs		Lung cancer + n(%)	Lung cancer – n(%)	p-value
Presence of mass	No	7(11 5)	54(88 5)	0.046
	Yes	14(24.6)	43(75.4)	
Presence of collapse	No	16(18.8)	69(81.2)	0.64
	Yes	5(15.2)	28(84.8)	
Presence of opacity	No	15(14.9)	86(85.1)	0.041
	Yes	6(35.3)	11(64.7)	
Presence of pleural effusion	No	16(16.7)	80(83.3)	0.54
	Yes	5(22.7)	17(77.3)	

There was a significant association between presence of mass and opacity with the lung cancer. However, there was no association between the radiological signs of presence of collapse or pleural effusion with lung cancer.

DISCUSSION

This study was conducted with the aim to determine bronchoalveolar fluid for malignant cells in patients suspected of lung cancer. There were a total of 118 participants who were suspects of lung cancer with an average age of 62.74±12.02 years and 59.3% of them being males. Most of the participants belong to the age group of 60-79 years (49.2%) while an overwhelming 70.3% of them were smokers.

The prevalence of lung cancer in this study was found to be 17.8% with a male prevalence of 21.4% and a female prevalence of 12.5%. In a report5 on cancer burden in the north-eastern states in 2017, prevalence of lung cancer was 15.55% (males17.2% and female - 13.9%) in Manipur. This study showed a 2.25% increase in overall prevalence while the prevalence among males was much higher. The most common type of lung cancer was found to be Squamous cell carcinoma (10.2%). In the Western countries and most of the Asian countries, adenocarcinoma has surpassed squamous cell carcinoma as the most common histological type of lung cancer. This shift seems to be attributable to the changed smoking pattern and increasing incidence of lung cancer in women and non-smokers. However, most of the previous and some recent Indian studies still report that squamous cell carcinoma is the most common histology7. This study also showed the same.

Lung cancer is primarily a disease of older populations. Less than 0.5% of lung cancer related deaths occur at an age younger than 40 years and the highest incidence rates being in older people8. The incidence rates rise around age 45–49 and peak in the 85–89 age group for males and in the 80–84 age group for females9. This study also detected the presence of an increasing trend in the age group of 40 where there is a greater chance of developing lung cancer as the age increases. There is a greater risk seen in those individuals who are more than 80 years old than the lower age-groups.

Lung cancer often presents with symptoms that are very commonly encountered in primary care, making early diagnosis difficult10. In a study conducted by Buccheri et al11, the commonest presenting symptoms were bloody sputum and cough, found as the first symptom of disease in >30% of the patients. Similarly in this study, it was found that cough and bloody sputum was significantly associated with lung cancer. In addition to these, it was observed that pain in the chest was also an important symptom.

Bronchoalveolar lavage (BAL) is a very useful method of respiratory tract investigation. BAL fluid (BALF) contains immune cells: macrophages, lymphocytes, neutrophils and eosinophils, the count of which is altered in different lung diseases12. Due to its minimal invasiveness and vicinity to tumour cells, BAL fluid (BALF) can be used as an alternative source of more sensitive lung cancer biomarkers13. This study determined the presence of malignant cells in 17.8% of the samples of bronchoalveolar fluid. Suspicious cells and atypical cells comprised of 3.4% and 0.8% of the samples respectively.

CONCLUSION

Malignancies showed low sensitivity for BAL due to relatively less cell retrieval and decreased cell viability in the bronchial pathway. Histopathology remains the gold standard for diagnosis but one can rely on cytology techniques for quick reporting of lung lesions. BAL fluid analysis provides a rapid, reliable process to detect subtype malignancies of the lower respiratory tract in both bronchoscopically visible and invisible tumours.

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