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**BRONCHOECTASIS DISEASE IS ASSOCIATED WITH NEUTROPHIL
GELATINASE AND LIPOCALIN-2**

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Abstract: This article provides information about the negative effects that bronchoectasis disease and its causes can have on human health. Based on practical experiences, various processes are presented in tabular form, and the information collected by the author serves as a practical guide for specialists in the field and individuals with a high interest in the subject.

Keywords: bronchoectasis disease, neutrophils, symptoms, lipocalin-2, gelatinase, argument.

Introduction

Today, significant changes are being implemented in the field of medicine, just as in all other areas of our country. Decisions and decrees are being adopted by our state leader to prevent human health issues and various infectious and chronic diseases. The decree of the President of the Republic of Uzbekistan dated July 28, 2021, PQ-5199, "Measures to further improve the system of specialized medical care in the healthcare sector," indicates the responsibility each individual has for their health. This, in turn, motivates us to acquire new knowledge in the field of medicine. Currently, one of the diseases that can quickly debilitate not only young children but also adults is bronchoectasis. Bronchoectasis is a disease associated with the dilation and inflammation of the airways, which often occurs spontaneously or as a result of other respiratory diseases. Identifying systemic inflammation markers in this disease is crucial, as these inflammatory processes determine the severity of bronchoectasis and its treatment.

1. Inflammation Markers: Identified through blood tests, such as C-reactive protein (CRP) and other inflammation markers.
2. Neutrophils: These are one of the main cells of the immune system and play an active role in the inflammatory process. Their levels may be elevated in bronchoectasis.
3. Symptoms: Clinical signs such as bleeding, fever, cough, and difficulty breathing.

Neutrophil Gelatinase and Lipocalin-2 are enzymes produced by neutrophils that play a crucial role in the inflammatory process. They participate in the breakdown of tissues between cells and in the inflammatory process. Lipocalin-2 is another protein produced by

neutrophils that is significant in the inflammatory process. It regulates interactions between cells and tissues during inflammation. In bronchoectasis, as a result of systemic inflammatory processes, neutrophils increase, and the production of gelatinase and lipocalin-2 rises. These processes lead to an intensification of inflammation, as the substances produced by neutrophils enhance the inflammatory process. The systemic effect is reflected in the levels of neutrophil gelatinase and lipocalin-2, indicating systemic inflammation markers and determining the severity of the disease.

Materials and Methods

Bronchoectasis arises from recurrent or chronic infections. Chronic, persistent dilation of the airways leads to an inflammatory disease that triggers neutrophilic inflammation in the infectious or inflammatory airways, resulting in the release of proteolytic enzymes from neutrophils, which in turn causes damage to the airway matrix. Damage to the epithelial mucosa and decreased efficiency of mucosal clearance lead to reduced air quality and bacterial colonization. Further intensification of inflammation and damage to the airways contribute to the exacerbation of the disease. The most common causes include pneumonia or lung infections, tuberculosis, primary and secondary immunodeficiency, abnormal ciliary function, allergic bronchopulmonary aspergillosis (ABPA), and connective tissue diseases. Today, in developed countries, effective use of antibiotics and immunization has led to a decrease in the incidence of bronchoectasis. However, in developing countries, the high prevalence of pulmonary tuberculosis, inability to carry out effective vaccinations, and recurrent and inadequately treated lower respiratory tract infections still make it a widespread disease. Neutrophilic bronchial inflammation is a primary cause of bronchoectasis. There is an increase in neutrophilia in the blood and certain cytokines associated with neutrophils. Neutrophil gelatinase-associated lipocalin (NGAL) is a small, stable protein synthesized by neutrophils and various epithelial cells, including renal proximal tubules, whose physiological functions are not yet fully understood.

According to the materials and methods, patients who sought medical attention and were diagnosed with acute infections were included in the study. Fifty stable patients with bronchoectasis who exhibited no symptoms or signs were included. A control group consisting of 30 healthy individuals of the same age and gender was created. The age, gender, HRCT results, spirometric data recorded at the time of admission, and serum NGAL levels of all patients were noted.

1. A confirmed diagnosis of bronchoectasis was made using high-resolution computed tomography (HRCT).
2. Stable disease (without exacerbation and antibiotic use for 4 weeks prior) was assessed as stable disease. Acute exacerbation was defined by the absence of increased dyspnea, sputum volume, and purulence criteria.
3. Participants must adhere to criteria of not smoking for at least 1 year and limiting smoking



Figure 1

The diagnosis of bronchiectasis was carried out in all patients using HRCT. Typically, any lesions in the lung parenchyma visible within the airways and bronchi should not be closer than 1 cm from the costal pleura. In adults, a bronchus/artery diameter ratio greater than 1 is considered abnormal. The accepted and peripheral airways are located 1 cm below the costal pleura. If visible in bronchiectasis, it is assessed in favor. The presence and degree of bronchiectasis were determined by HRCT in patients. Findings were reviewed by a radiologist, and each process was evaluated separately according to a scoring system. According to this classification, the degree of bronchiectasis is rated as 0 = absent, 1 = less than 25% of lobar volume, 2 = 25% to 50% of lobar volume, and 3 = more than 50% of lobar volume. The overall score for each patient is calculated as a bronchiectatic severity index. Additionally, based on HRCT results, wall thickness was assessed as 0 = no thickening, 1 = wall thickness less than 25-50%, 2 = wall thickness greater than 50%, and 3 = completely obliterated. Furthermore, findings such as peribronchial thickening, loss of mosaic perfusion volume in adjacent lung tissue, and fibrosis were evaluated and recorded alongside HRCT.

Table 1. Demographic Characteristics of Bronchiectasis and Healthy Control Groups and Serum NGAL Levels

No	Age	Gender	NGAL (ng/ml)
1	57,68±13,04	Ayol, n, %) 43, 54% 16, 53,3% 1,00	74,18±24,54 53,33±14,87 <0,001

Argument

In our study, the average age was 57.68±13.04, and the average NGAL value in the bronchiectasis group was 74.18±24.54 ng/ml, while in the control group it was 53.33±14.87

ng/ml. It was found that NGAL was significantly higher in patients with bronchiectasis. This indicates that inflammation remains active even during stable periods in these patients, revealing markers of systemic inflammation. No significant correlation was found between NGAL and other variables. A statistically significant relationship was identified between total small airway disease, bronchiectatic score, total wall disease thickness, and overall mosaic perfusion. The studies showed that exacerbations occur in patients suffering from bronchiectasis. Furthermore, even during the stable phase of the disease, signs of systemic inflammation were also examined, as our research indicated that concentrations in serum increased during stable periods in patients with bronchiectasis. Previous studies have shown that NGAL expression increases in various malignancies such as breast, lung, prostate, and colorectal cancers, and this is considered a prognostic factor for cancer treatment.

Conclusion

In conclusion, it can be stated that the level of inflammation in the blood of patients with bronchiectasis indicates that mediators are systematically increasing. Inflammation plays a significant role in the pathogenesis. This is concerning. The aim of our study is to investigate the relationship between neutrophil gelatinase, NGAL as an inflammatory marker, and inflammation in patients with bronchiectasis.

Materials and Methods: The study included 50 patients diagnosed with bronchiectasis who did not have a history of bronchiectatic disease and exhibited symptoms of acute infection. A healthy control group matched for age and gender was created with 30 participants. Peripheral venous blood samples were taken from both the bronchiectasis patients and the control group, and NGAL levels were measured.

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