

# Prevalence of diseases of the nose and paranasal sinuses in community-acquired pneumonia

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**Abstract:** In most cases, patients with community-acquired pneumonia have inflammatory diseases of the nose and paranasal sinuses, as well as in patients who have had a history of inflammatory diseases of the upper respiratory tract several weeks and months ago. When examining such patients with rhinosinusitis, the functions of the nose and paranasal sinuses are impaired, which in turn leads to the activation of opportunistic microflora, which increases the adhesion of pathogenic microorganisms to the mucous membrane of the upper respiratory tract and creates favorable conditions for microbial colonization. It is known that viruses have a bronchotropic effect, manifested by damage to the epithelium and a violation of the trophism of the bronchi due to damage to the nerve conductors. Under the influence of the general toxic effect of the virus, phagocytosis is inhibited, immunological protection is impaired, as a result, favorable conditions are created for the entry of pathogenic bacterial flora located in the upper respiratory tract into the bronchi and alveoli of the lungs, which to a large extent contributes to the development of diseases of the lower respiratory tract.

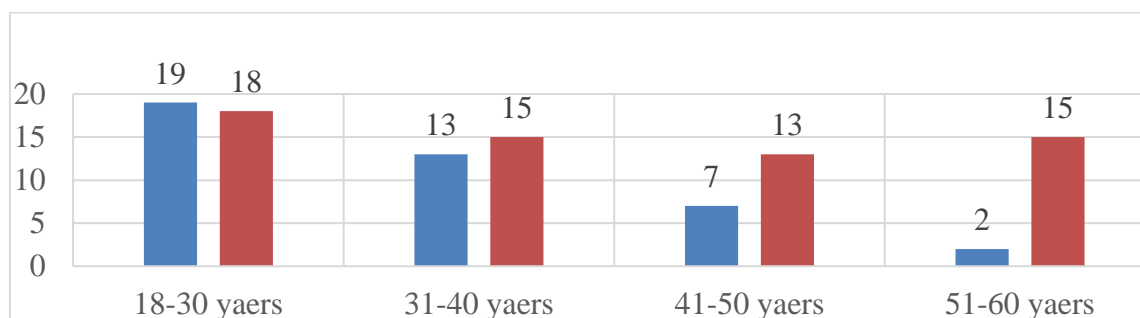
**Keywords:** Diseases of the nose and paranasal sinuses, community-acquired pneumonia, pathogenic microflora.

**Introduction:** From year to year, infectious diseases of the upper respiratory tract and upper respiratory tract occupy the 1st place in the structure of general morbidity not only in our country, but also in the world [1]. According to WHO, respiratory pathology is one of the top five causes of death in the world's population [2]. The incidence of pneumonia in Europe and North America is 5–10 cases per 1,000 population. Mortality from severe pneumonia reaches 10% and continues to grow [7]. The most common complication of influenza is pneumonia. It can develop at any period of the disease in case of accession of the bacterial flora (pneumococci, staphylococci, etc.). Most often, pneumonia occurs in children, in the elderly and in chronic diseases of the respiratory system. The second place in frequency is occupied by lesions of the ENT organs, with the occurrence of rhinitis, pharyngitis, laryngitis, tracheobronchitis, as well as lesions of the tonsils and paranasal sinuses [3]. Usually, acute rhinosinusitis develops against the background of SARS. It is believed that in almost any acute respiratory viral infection, the paranasal sinuses are involved in the process to one degree or another [11,12]. Acute rhinosinusitis in 95% of cases is caused by viruses, the

development of a bacterial process (usually 10-12 days after the onset of SARS) [8,9]. Under the influence of the virus on the ciliated epithelium of the nasal cavity and paranasal sinuses, epithelial cells lose cilia, the epithelium becomes loose, and mucosal edema develops. As a result of these processes, as well as the active release of pro-inflammatory mediators, an inflammatory reaction develops. The consequence of this is a violation of the aeration of the sinuses, inactivation of mucociliary clearance and the accumulation of serous exudate in the lumen of the sinuses. A decrease in the rate of mucociliary transport makes it possible to prolong the time of contact of pathogenic bacteria with the mucous membrane and promotes bacterial infection [10,13,14]. Rhinosinusitis in children leads to serious complications. Sinusitis in children under 3 years of age in 94.7% of cases occurs with complications, in almost half of cases acute rhinosinusitis is accompanied by pneumonia [4]. According to WHO (2019), pneumonia causes 15% of deaths in children under 5 years of age worldwide. Worldwide, about 17 million people a year fall ill with pneumonia, of which about 265,000 cases end in death [5]. The nasal cavity and paranasal sinuses are a highly

organized structure, with a subtle and complex regulatory mechanism, with many specific functions. Such a morphofunctional system provides the creation of the first barrier to the penetration of infection. The subtle functional connection of the nasal cavity and paranasal sinuses with other organs and systems, primarily with the bronchopulmonary system, is obvious [6]. The close anatomical and physiological relationships of the upper and lower respiratory tract are the reason that the increase in the number of rhinosinusitis keeps pace with the increase in the number of pulmonary diseases, in particular community-acquired pneumonia, and this trend has not yet been broken, despite the joint efforts of the leading experts of all peace. Therefore, it is necessary to study the state of the ENT organs in patients with pneumonia, since this is of great importance for treatment and prevention.

## METHODS

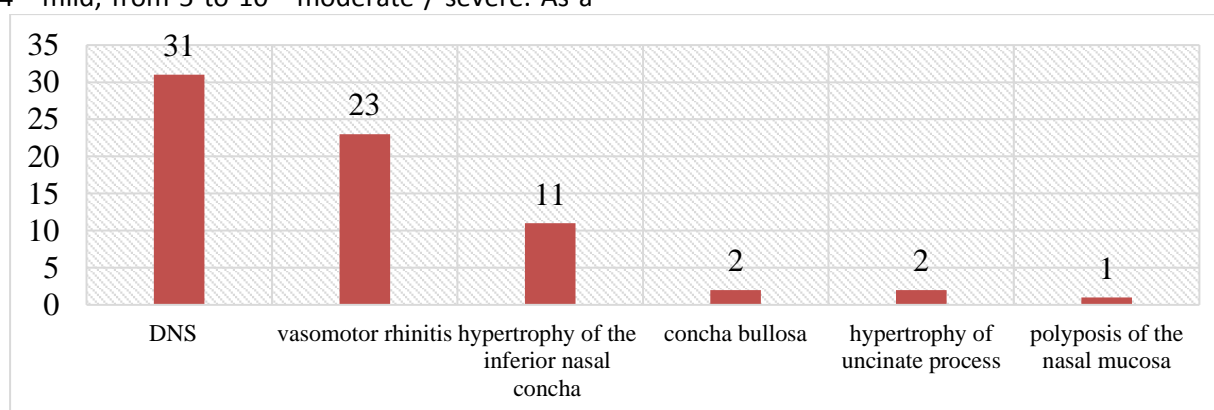


**Table 1. Distribution of patients with CAP by sex (male/female) and age (n=102)**

## DISCUSSION AND RESULTS

Assessment of the clinical course of chronic rhinosinusitis in patients used a visual analogue scale (VAS), which divides the course of the disease into mild, moderate and severe. On a conditionally 10-point scale, the patient must independently assess how much he is concerned about the symptoms of CRS, while from 0 to 4 - mild, from 5 to 10 - moderate / severe. As a

result of nasal endoscopy, 31 patients (30.4%) were found to have deviated nasal septum (DNS); 23 (22.5%) patients had vasomotor rhinitis; in 10.8% of cases (11 patients) - hypertrophy of the inferior nasal concha; 2 patients revealed (1.9% of cases) hypertrophy of concha bullosa and uncinate process; also polyposis of the nasal mucosa was observed in 1 (0.9%) patient (table 2).



**Table 2. Results of nasal endoscopy**

Of the total number of patients (102 patients), 62 patients underwent 3D radiography (CBCT) of the

paranasal sinuses.

X-ray changes in the paranasal sinuses showed

the presence of an increase in the thickness of the mucous membrane by more than 5 mm. Explicit radiographic changes were detected in 32 (51.6%) patients. In 2 patients, a subtotal and total decrease in pneumatization of all paranasal sinuses was observed, i.e. a clear picture of pansinusitis, 3 patients had right-



Figure 1. Patient D., 31 years old. 3D radiography of the paranasal sinuses. Identification of subtotal and total areas of blackouts in the left maxillary sinus and ethmoid cells

sided and left-sided hemisinusitis, 4 patients had right-sided sinusitis, 7 patients had left-sided sinusitis, 2 patients had bilateral sinusitis, 10 patients showed signs of etmoiditis and ethmoidosphenoiditis, respectively, 4 patients had sphenoiditis.

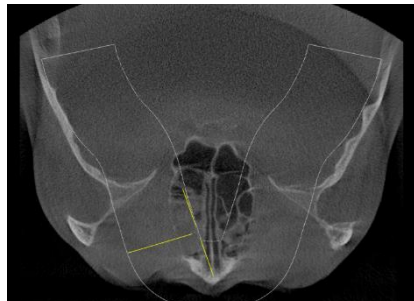


Figure 2. Patient G., 27 years old. 3D radiography of the paranasal sinuses subtotal and total areas of eclipse of the anterior and middle groups of cribriform cells.

## CONCLUSION

Thus, based on the data obtained, it can be concluded that patients suffering from community-acquired pneumonia often have inflammatory diseases of the nose and paranasal sinuses. In 60.8% of patients with community-acquired pneumonia (CAP) inflammatory diseases of the nasal cavity and paranasal sinuses were identified. 3D radiography (CBCT) of patients with chronic rhinosinusitis (CRS) revealed darkening of the paranasal sinuses in 51.6% of cases. In particular, in the cells of the ethmoid bone - 45.0%, in the maxillary sinus - 25.3%, in the sphenoid sinus - 22.0%.

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