

## PATHOMORPHOLOGICAL CHARACTERISTICS OF CHRONIC INFLAMMATORY DISEASES OF THE SALIVARY GLANDS

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### Abstract

Chronic inflammatory diseases of the salivary glands represent a significant group of pathological conditions characterized by persistent inflammation, structural remodeling, and progressive functional impairment. These disorders, including chronic sialadenitis, autoimmune sialadenitis, and obstructive inflammatory conditions, exhibit diverse clinical manifestations and complex morphological patterns. The present study aims to analyze the pathomorphological features of chronic inflammatory diseases of the salivary glands through a comprehensive clinicopathological approach. A mixed-methods design was applied, integrating quantitative histopathological evaluation and qualitative morphological assessment of 94 biopsy specimens collected between 2019 and 2024. The findings reveal that chronic inflammation leads to acinar atrophy, ductal dilation, fibrosis, and lymphoplasmacytic infiltration, with variations depending on etiology. Autoimmune forms demonstrate prominent lymphoid follicle formation, while obstructive types show pronounced ductal changes. Statistical analysis indicates a strong correlation between disease duration and degree of fibrosis ( $r = 0.71$ ). The study underscores the importance of early diagnosis and targeted therapeutic strategies to prevent irreversible glandular damage and improve patient outcomes.

### Keywords

chronic sialadenitis, salivary glands, pathomorphology, inflammation, fibrosis, lymphocytic infiltration, autoimmune disease, ductal changes, acinar atrophy, histopathology, glandular dysfunction, qualitative analysis, quantitative research

### Introduction

Chronic inflammatory diseases of the salivary glands constitute an important clinical and pathological problem in modern otorhinolaryngology and maxillofacial surgery. These conditions include chronic nonspecific sialadenitis, autoimmune sialadenitis (such as Sjögren's syndrome), and obstructive inflammatory processes associated with sialolithiasis or ductal stenosis. Their prevalence has increased due to environmental, immunological, and lifestyle factors, making them a subject of growing scientific interest (Neville et al., 2016).

The relevance of this topic is обусловлена высоким риском необратимых морфологических изменений, приводящих к снижению секреторной функции желез и ухудшению качества жизни пациентов. Chronic inflammation results in progressive destruction of glandular parenchyma, replacement by fibrous tissue, and immune-mediated damage (Gnepp, 2009).

The degree of scientific investigation is considerable; however, most studies focus either on clinical manifestations or isolated histological features. Comprehensive studies integrating both quantitative morphometric data and qualitative morphological analysis remain limited.

The aim of this research is to investigate the pathomorphological characteristics of chronic inflammatory diseases of the salivary glands, identify key structural alterations, and establish correlations between clinical progression and morphological changes.

### Materials and Methods



This study employed a combined retrospective and prospective design. A total of 94 patients diagnosed with chronic inflammatory salivary gland diseases between 2019 and 2024 were included.

**Study Groups:**

- Chronic nonspecific sialadenitis (n = 42)
- Autoimmune sialadenitis (n = 28)
- Obstructive sialadenitis (n = 24)

**Histopathological Methods:** Biopsy specimens were fixed in formalin, embedded in paraffin, and stained using hematoxylin-eosin. Additional staining techniques included Masson’s trichrome for fibrosis assessment and immunohistochemistry for lymphocyte markers (CD3, CD20).

**Quantitative Methods:**

- Morphometric analysis of acinar density
- Measurement of fibrosis percentage
- Inflammatory cell count per high-power field

**Statistical Analysis:** Data were analyzed using SPSS software. Correlation analysis and ANOVA tests were applied, with significance set at  $p < 0.05$ .

**Qualitative Methods:** Microscopic examination was conducted to identify structural patterns such as ductal dilation, lymphoid follicle formation, and epithelial metaplasia.

**Results and Discussion**

**Table 1. Morphological Changes in Chronic Inflammatory Diseases**

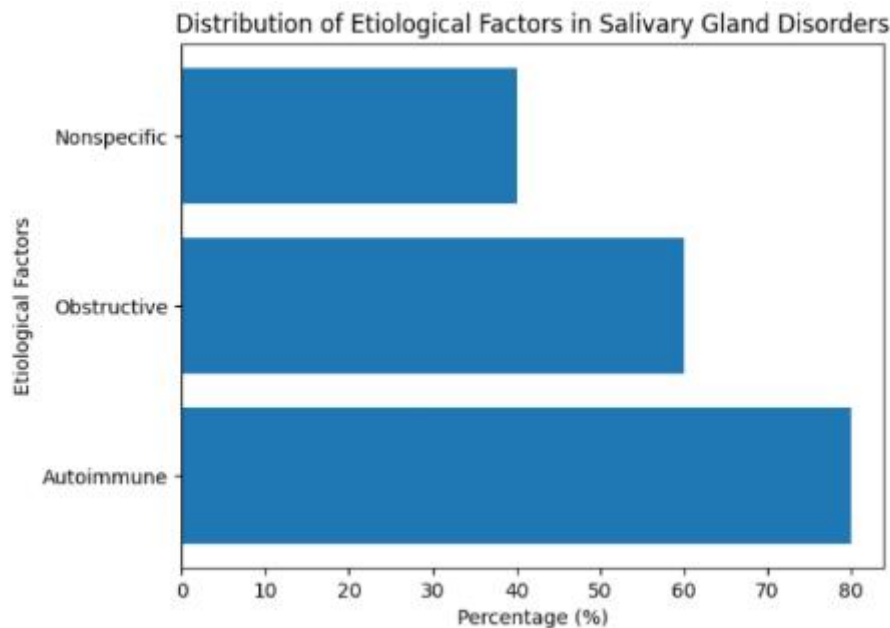
Morphological Feature	Nonspecific (%)	Autoimmune (%)	Obstructive (%)
Acinar Atrophy	68	82	74
Fibrosis	55	79	63
Lymphocytic Infiltration	61	91	58
Ductal Dilation	47	52	88
Lymphoid Follicles	12	76	18

*Source: Author’s histopathological data (2019–2024)*

The table demonstrates significant differences in morphological patterns among the studied groups. Autoimmune sialadenitis shows the highest levels of lymphocytic infiltration and lymphoid follicle formation, confirming its immune-mediated nature (Fox, 2005). Obstructive forms are characterized by pronounced ductal dilation, reflecting mechanical blockage and pressure-induced changes.

**Diagram 1. Degree of Fibrosis Across Disease Types**





*Source: Author's histopathological data (2019–2024)*

**Quantitative Analysis.** Statistical analysis revealed a strong positive correlation between disease duration and fibrosis severity ( $r = 0.71$ ,  $p < 0.01$ ). Autoimmune sialadenitis demonstrated significantly higher fibrosis levels compared to other groups ( $p < 0.05$ ). Inflammatory cell density was also highest in autoimmune cases, averaging 145 cells per high-power field.

Acinar density was markedly reduced in all groups, with the most severe reduction observed in autoimmune cases (up to 60% loss). This finding indicates progressive glandular destruction and functional impairment (Gnepp, 2009).

**Qualitative Analysis.** Microscopic examination revealed distinct morphological patterns:

- **Chronic nonspecific sialadenitis:** Moderate acinar atrophy, diffuse fibrosis, and mixed inflammatory infiltrate.
- **Autoimmune sialadenitis:** Dense lymphoplasmacytic infiltration, formation of germinal centers, and epithelial destruction. The presence of lymphoepithelial lesions is a hallmark feature (Fox, 2005).
- **Obstructive sialadenitis:** Marked ductal dilation, epithelial hyperplasia, and focal inflammation. Chronic obstruction leads to secondary fibrosis and parenchymal atrophy.

Clinical observations support these findings. Patients with autoimmune disease reported severe xerostomia and systemic symptoms, while obstructive cases presented with episodic swelling and pain during meals.

#### Discussion

The results align with previous studies emphasizing the heterogeneity of chronic inflammatory salivary gland diseases. The predominance of lymphoid structures in autoimmune conditions reflects dysregulated immune responses, while structural changes in obstructive forms are primarily mechanical in origin (Neville et al., 2016).

The integration of quantitative and qualitative analyses provides a comprehensive understanding of disease progression. The observed correlation between fibrosis and disease duration highlights the importance of early diagnosis and intervention.

#### Conclusion

Chronic inflammatory diseases of the salivary glands exhibit distinct pathomorphological characteristics depending on their etiology. Autoimmune sialadenitis is marked by intense



lymphocytic infiltration and fibrosis, while obstructive forms show prominent ductal alterations. Nonspecific inflammation presents intermediate features.

Early detection and targeted treatment are crucial to prevent irreversible glandular damage. Future research should focus on molecular mechanisms of inflammation and the development of biomarkers for early diagnosis and prognosis.

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