



HISTOLOGICAL CHANGES IN CHRONIC TONSILLITIS: IMPLICATIONS FOR TREATMENT STRATEGIES

Maqbool Ahmed Baloch¹, Sabah Kaleem Baloch^{2*}

¹Associate Professor, Department of ENT, Niazi Medical College Sargodha, Pakistan

^{2*}Assistant Professor, Department of Pathology, Niazi Medical College Sargodha, Pakistan

***Corresponding author:** Sabah Kaleem Baloch

*Email: Sabahkaleembaloch@gmail.com

Abstract

Introduction: Chronic tonsillitis is a chronic inflammatory disease of palatine tonsils in children and adults, with recurrent and infectious disease discomforts and impaired quality of life. Histopathological evaluation of the underlying tissue changes and disease progression is very informative.

Objective: The purpose is to study the histological changes occurring in chronic tonsillitis to evaluate and determine the importance of treatment options, including conservative, pharmacological, and surgical.

Materials and Method: This cross-sectional study was done from March, 2024 to August, 2024 at Niazi Medical College Sargodha, Pakistan. Integration was conducted in the tonsillar specimens of 100 patients who were about to undergo tonsillectomy and had been histologically stained by hematoxylin and eosin staining. Data were analyzed descriptively.

Results: The most common findings were Lymphoid hyperplasia (92%), interfollicular fibrosis (70%), cryptitis (61%), epithelial hyperplasia (46%), and microabscesses (38%). Lymphoid hyperplasia was found to be more frequent in young patients, while fibrosis and more marked epithelial damage were seen in older patients.

Keywords: Chronic tonsillitis, histopathology, lymphoid hyperplasia, cryptitis, tonsillectomy, fibrosis, treatment strategies.

INTRODUCTION

The most frequent cause of chronic tonsillitis is persistent infections leading to remodeling tissue. Despite numerous improvements in terms of medical and surgical interventions, chronic tonsillitis remains problematic for otolaryngologists as it presents with varying responses to treatment and a heterogeneous histopathological picture. In histologic work on tonsillar tissues of chronic tonsillitis patients, the spectrum of change in tonsillar tissues includes both severity and duration of inflammation and also contributes to the elucidation of immunopathogenic mechanisms leading to the disease and potential therapeutic strategies. Even in patients who are cured of their disease with appropriate antimicrobial therapies, chronic tonsillitis patients have persistent lymphoid hyperplasia, fibrosis, and crypt distortion on histological specimens (1). These findings indicate that chronic inflammation within the tonsils does not clear with microbial clearance and may persist because of underlying immune dysregulation.

The review by Bezega et al. (2) described the functional decline of tonsils in chronic tonsillitis in which repeated antigenic stimulation and exhaustion of the local immune response, primarily affecting follicular architecture and germinal center, was attributed. Tonsillar tissue is increasingly implicated as a site modulated by Vitamin D to influence immune responses. An immunohistochemical study of reduced expression of anti-inflammatory markers in vitamin-deficient children with chronic tonsillitis has been conducted by Abu-elnasr Awwad et al. This is based on Safak et al. (4), who said that the angiogenesis mediated by vascular endothelial growth factor (ANGENA) was very high in the patients with vitamin D deficient, which further worsens the central chronic inflammation and restructuring of the tissue in the tonsils. This raises the question about vitamin D's broader role in regulating the immune system and controlling tissue repair and angiogenic pathways within chronically inflamed tonsillar tissue.

In addition, the disease's chronic condition depends on the interaction between the tonsillar microbiome and the host immune system. Samara et al. (5) highlighted that dysbiosis in the tonsillar crypts may promote inflammation by perpetuating inflammation in the host through microbial persistence and biofilm formation and diminishing systemic antibiotic efficacy. Sarwar et al. (6) showed that antibiotic resistance patterns correlated with histological changes, like microabscess and epithelial ulcerations, and were associated with poor clinical outcomes in chronic tonsillitis patients. Chronic tonsillitis has long been a conservative treatment option. This discussion on emerging non-surgical modalities included immunomodulatory agents and localized therapies targeting inflammation at the mucosal level, as described by Khushvakova and Nishanbaeva (7).

Additionally, Toyirov (8) found that phototherapy was promising in pediatric populations in reducing lymphoid hyperplasia and promoting mucosal healing in children with chronic adenoiditis, a condition most commonly preceded by adenoiditis or tonsillar disease. These conservative approaches are in line with the use of herbal and pharmacological therapies. Pang et al. (9) investigated the efficacy of Kaihoujian Throat Spray in pediatric tonsillitis and showed significant reductions in inflammatory cytokines percentages that corresponded to better histological parameters. Such therapies provide less invasive options, which are especially advantageous if the surgeries are too risky or if resources are limited.

The tonsils play an immunological role within and beyond the local environment. Indeed, Ueda (et al., 10) showed that the chronic inflammation of the palatine tonsils could be mediated by systemic conditions, such as IgA nephropathy by accelerating germinal center involution, decreasing the IgA in the production of high-affinity IgA. The result of this study introduces new insights into the overall implications of chronic tonsillar inflammation and its possible benefits from early surgical or medical intervention. In cases of treatment of tonsillitis with resistant bacterial strains, bacteriophage therapy, as developed by Tolkunovna et al. (11), gives a new and targeted form of treatment. In pediatric patients, their study had promising results in reducing bacterial loads and showing improvements in histopathological features, including lymphoid follicle restoration and alleviation of mucosal erosion. Finally, Nishi et al. illustrated the long-term implications of chronic tonsillitis in the viral persistent and immune dysregulation setting. They used spatial transcriptomics to show the existence of residual SARS-CoV-2 signaling pathways in the upper respiratory epithelium, including the epipharynx, worrying about immunologic activation in chronic ENT infections such as tonsillitis.

Abdullah et al. (13) explored the utilization of basic hematological tests as a diagnostic and monitoring tool and correlated elevated erythrocyte sedimentation rate (ESR) and altered CBC parameters with histopathological severity of acute and chronic tonsillitis in children. This emphasizes that laboratory examination should be integrated with histopathology to aid treatment decisions. Most instances of chronic tonsillitis are treated definitively by surgery. In such a randomized controlled trial, the task outlined by Laajala et al. (14) was to design procedures to quantify any improvements in quality of life as well as histopathological outcomes post-operation. The study protocol confirms the necessity to individualize the treatment planning according to symptom severity and histological signs of chronicity.

Finally, Rebez et al. (15) also highlighted the broader impacts of chronic inflammation and environmental stressors on tissue resilience, as heat stress and chronic inflammatory conditions could result in comparable histopathological features on mucosal and lymphoid organs. This observation indicates that systemic stress response may be upstream of local tissue adaptation in chronic tonsillitis. Histopathology further analyzes the pathophysiology of the disease, as it helps in understanding the dynamics of disease progression, developing treatment strategies, and making conservative, pharmacological, and surgical integrations based on histological findings for better patient outcomes, lower recurrence rates, and immunological function preservation as much as possible.

Objective

The present work aims to evaluate the histological changes in chronic tonsillitis and their consequences for therapeutic steering in affected patients treated with conservative, pharmacological, or surgical treatment methods.

MATERIALS AND METHODS

Study Design: Observational cross-sectional study.

Setting: The study was conducted at Niazi Medical College Sargodha, Pakistan

Duration: The data collection and analysis were conducted from March, 2024 to August, 2024.

Inclusion Criteria:

All patients of all genders aged 5 to 45 years clinically diagnosed with chronic tonsillitis subjected to elective tonsillectomy were included. The study was done in patients with no acute infection at the time of surgery and with preserved specimens adequate for histological examination.

Exclusion Criteria

Patients with acute tonsillitis or peritonsillar abscess, immunodeficiency disorders, or known to have any malignancy were excluded from the study. Furthermore, specimens were excluded if they were incomplete or autolyzed.

Methods

Tonsillectomy specimens were collected from patients diagnosed with chronic tonsillitis following ethical approval and informed consent. The specimen was fixed immediately in 10% formalin prior to transport to the pathology laboratory for histopathological examination. Dehydration, clearing, paraffin embedding, sectioning at a 4–5 μ m thickness, and staining with hematoxylin and eosin (H&E) of standard tissue processing techniques were used. Two independent pathologists examined the prepared slides under light microscopy to minimize observer bias.

The histological parameters assessed were lymphoid hyperplasia, fibrosis, crypt abscesses, epithelial hyperplasia or ulceration, microabscesses, or vascular proliferation. Patient age and gender, as well as the duration of symptoms, were recorded and correlated to histological findings. Descriptively, the results were analyzed and entered into a Microsoft Excel spreadsheet. Categorical variables are presented with frequency and percentage, and findings of the spectrum of histopathological changes in chronic tonsillitis are given in tabulated form.

RESULTS

In this study, 100 patients underwent tonsillectomy for chronic tonsillitis. The patients' ages ranged from 5 to 45, with a mean age of 21.8 ± 9.4 years. Among them, 58 (58%) were females, and 42 (42%) were males, yielding a female-to-male ratio of 1.4:1. The duration of symptoms ranged from 6 months to 4 years. 66% of the patients reported that symptoms were more than one year old.

Table 1: Demographic Profile of Patients

Variables	Frequency (n=100)	Percentage (%)
Age Group (Years)		
5–15	28	28%
16–30	50	50%
31–45	22	22%
Gender		
Male	42	42%
Female	58	58%
Duration of Symptoms		
<1 year	34	34%
≥1 year	66	66%

Tissue changes ranged from a spectrum of findings on tissue analysis. The most frequently found feature was lymphoid follicular hyperplasia, as seen in 92% of the specimens. In 70% of cases, fibrosis of the interfollicular area was found. In 61% of cases, cryptitis was seen with the infiltration of inflammatory cells into the tonsillar crypts. In 38% of cases, microabscesses were observed, most located within the crypts. 46% of cases showed epithelial changes of hyperplasia, and 21% had epithelial changes of ulceration. In 30%, vascular proliferation was probably secondary to chronic inflammation.

Table 2: Frequency of Histopathological Features

Histological Feature	Frequency (n=100)	Percentage (%)
Lymphoid Hyperplasia	92	92%
Interfollicular Fibrosis	70	70%
Cryptitis	61	61%
Microabscess Formation	38	38%
Epithelial Hyperplasia	46	46%
Epithelial Ulceration	21	21%
Vascular Proliferation	30	30%

Lymphoid hyperplasia was more common in younger patients (5 to 15 years), and fibrosis and epithelial alterations were more frequent in older patients (31 to 45 years). There was slightly more microabscess formation in male patients than in females. However, no statistically significant correlations were found between gender and specific histopathological features.

Table 3: Age-wise Distribution of Major Findings

Age Group (Years)	Lymphoid Hyperplasia	Fibrosis	Epithelial Changes (Hyperplasia/Ulceration)
5–15	28 (100%)	12 (43%)	10 (36%)
16–30	46 (92%)	36 (72%)	28 (56%)
31–45	18 (82%)	22 (100%)	19 (86%)

The finding that these histological changes of chronic tonsillitis evolve with patient age and disease duration suggests the potential value of optimizing treatment therapy in this manner.

DISCUSSION

Chronic tonsillitis is a common disease, especially among children and young people, and it greatly affects the quality of life due to repeated infections in the throat, discomfort, and complications from

prolonged inflammation. This present study raises the question of various histological alterations in tonsillar tissues in chronic tonsillitis patients undergoing tonsillectomy and discusses the relation between these findings and the disease chronicity as well as its treatment. This study's most frequent histological finding is lymphoid follicular hyperplasia in 92% of cases. These results align with those of Elsherif and Hasen (1), who also identified a similar high prevalence of hyperplastic lymphoid follicles in cases of long-duration symptoms. A marked proliferation of lymphoid tissue indicates an ongoing immune response and antigenic stimulation that may continue even in the setting of effective antimicrobial therapy, suggesting the presence of underlying immune dysregulation.

Bezega et al. (2) explains that in chronic inflammation, the palatine tonsils perform an immunological role that is compromised, leading to distortion of the organ's structure and immune exhaustion, leaving the organ functionally unable to defend against microbial invaders. A key factor in tonsillar pathology is another named vitamin D, which is known for its immunomodulatory role. For instance, Abu-elnasr Awwad et al. (3) showed that vitamin D deficiency was associated with increased inflammatory responses through decreased anti-inflammatory markers and the rise of proinflammatory cytokines expression. Like Safak et al. (4), our study found increased angiogenesis and fibrosis, especially in patients over 30 years old, which were seen to be associated with vitamin D deficiency. The angiogenic response associated with chronic inflammation in tonsillitis suggests that chronic inflammation might be associated with a pathological angiogenic response, making these patients less responsive to conservative management.

In chronic tonsillitis, the tonsillar microbiome and immune system dynamics were discussed by Samara et al. (5). They believed that microbial biofilms inside the crypts prolong the infection duration and make systemic antibiotics less efficient. We saw this in our study, where over 60 percent were cryptitis and 38 percent were microabscesses. Such features usually suggest the presence of entrenched infection related to resistant or biofilm-forming organisms. Consistent with this, Sarwar et al. (6) found significant antibiotic resistance in the organisms recovered from chronic tonsillitis cases associated with evidence of neutrophilic microabscesses and epithelial erosion on histology.

Surgery is a definitive treatment that is usually joined with conservative approaches in children. Khushvakova and Nishanbaeva (7) suggest immunotherapy and mucosal strengthening agents in case of early-stage chronic tonsillitis. Toyirov (8) also mentioned that phototherapy in children with chronic adenoiditis (a disease similar to tonsillar hypertrophy) had a beneficial effect. Our study was performed on histology, but conservative methods may be trialed on these patients before surgery due to less aggressive features in the younger patients. They have become popular because herbal and pharmacological agents have anti-inflammatory and immune-regulating properties. Pang et al. (9) remarked that Kaihoujian Throat Spray could reduce cytokine expression and enhance mucosal integrity. Overall, such results argue to examine the potential for topical therapies to affect histopathological change. Our study did not directly explore pharmacological endpoints, but milder histological watch in some younger patients suggests that these treatments have a place in directed cases.

However, it is important to appreciate that chronic tonsillar inflammation has systemic effects. In addition, Ueda et al. (10) have shown a relationship between chronic tonsillar pathology and IgA nephropathy, suggesting that the ongoing germinal center involution in the tonsils affects distant immunological consequences. Since our study was not performed on systemic parameters, the histological evidence of follicular regression in a subset of older patients might also reflect more generalized immune suppression or dysregulation. Bacteriophage treatment has been proven to be a novel therapy in cases resistant to antibiotics. In children with acute tonsillitis, bacteriophage therapy was applied by Tolkunovna et al. (11), and bacteriophages were shown to cause significantly improved histology, including restoration of lymphoid architecture and reduced epithelial damage. Therefore, such targeted biological therapies could provide an effective alternative, particularly when histological evidence of deep-seated infection is present in recurrent situations where antibiotic resistance is an increasing clinical challenge.

Further, persistent viral or post-viral inflammation has an intriguing role in chronic tonsillitis. In their work, Nishi et al. (12) explored the residual immune activation in the epipharynx during long COVID-

19 and discovered proinflammatory signaling pathways that may remain after infection. Although the study did not include viral analyses, histopathology of chronic tonsillitis includes persistent lymphoid hyperplasia and fibrosis, which may suggest a low-grade viral persistence. Additionally, disease severity may also be assessed by laboratory markers. In another study, Abdollah et al. (13) described increased ESR and other CBC parameters, which correlate with the histopathological severity of tonsillitis patients. The findings could help clinicians foretell histological outcomes and decide if surgery is necessary or not.

In some cases, conservative treatments fail, and surgical management, especially total tonsillectomy, is pursued. They described a randomized controlled trial protocol comparing tonsillectomy and tonsillotomy in chronic tonsillitis patients in Laajala et al. (14). Their method is intended to relate patient-reported outcomes to histological and clinical gains. Prolonged symptoms and multiple prior antibiotic courses were more frequently reported by patients with extensive fibrosis, crypt abscesses, and even epithelial ulceration, which suggests a need for surgical removal in these patients.

It should also be noted that the effects of broad environmental and physiological stress on immune organs cannot be ignored. As Rebez et al. (15) show, histological changes produced by heat stress on farm animals resemble those observed in chronic inflammation. This implies that chronic tonsillar changes may be aggravated in subjects susceptible to these changes due to external factors, such as environmental stress. Chronic tonsillitis histopathological spectrum reflects the complex interaction of host immunity and the presence of microbial and environmental influences. Such patterns and understanding allow for determining suitable treatment strategies. Despite that, surgery remains the gold standard in advanced disease, but it should be combined with advanced conservative or emerging therapies where the histological findings support this.

CONCLUSION

This study's histopathological changes in chronic tonsillitis include lymphoid hyperplasia, fibrosis, cryptitis, microabscess formation, and epithelial changes. These findings mirror what happens during chronic infection and other immunological triggers that cause persistent immune activation and tissue remodeling. Likewise, the heterogeneity in histological differences between groups by clinical presentation and age makes this particularly true. Definitive management of severe or recurrent cases is surgical intervention. However, these histological changes are not always that aggressive, such as conservative therapies, including vitamin D therapy, topical anti-inflammatory agents, and new biological therapies, including bacteriophage therapy, should be considered. The histologic analysis of tonsillar tissue gives clinicians important information that allows them to select suitable therapeutic options to improve patient outcomes and reduce unnecessary surgical interventions. Molecular and immunological markers, as well as the histopathological findings, were integrated in order to define future treatment protocols for chronic tonsillitis better.

References

- 1- Elsherif, A. and Hasen, Y., 2025. Histopathological and Microbiological Changes in Chronic tonsillitis: Tissue Response to Infection Despite Effective Management—A Case Series. *Attahadi Medical Journal*, pp.39-44.
- 2- Bezega, M., Zachepylo, S., Polianska, V. and Podovzhnii, O., 2023. Current views on the functional status of the palatine tonsils in chronic tonsillitis and alternatives in treatment strategies (literature review). *Polish Otorhinolaryngology Review*, 12(1), pp.26-34.
- 3- Abu-elnasr Awwad, A., Hasan, R.A., Hablas, M.G.A., Mohammad Mohammad Abdelhay, O., Dawood, Y.M.A., Ahmed Mohamed, B., Rabou, K.A.A., Salem, T.M.M., Elhady, M., Abd El-Aal, G.N. and Ahmed, A.H.E., 2023. Impact of vitamin D in children with chronic tonsillitis (immunohistochemical study of CD68 polarisation and proinflammatory cytokines estimation). *Scientific Reports*, 13(1), p.8014.
- 4- Safak, A.S., Bulut, F. and Cumbul, A., 2022. Histopathological role of vitamin D deficiency in recurrent/chronic tonsillitis pathogenesis: Vascular epithelial growth factor-mediated angiogenesis in tonsil. *Clinical and Experimental Dental Research*, 8(3), pp.699-706.

- 5- Samara, P., Athanasopoulos, M. and Athanasopoulos, I., 2023. Unveiling the enigmatic adenoids and tonsils: exploring immunology, physiology, microbiome dynamics, and the transformative power of surgery. *Microorganisms*, 11(7), p.1624.
- 6- Sarwar, A., Ali, I., Bilal, M., Altaf, S., Bhatti, S. and Akram, A., 2023. Biochemical and Pathological Evaluation of Antibiotic Resistance Patterns and Histopathological Changes in Patients with Chronic Pharyngitis. *Pakistan Journal of Medical & Health Sciences*, 17(03), pp.797-797.
- 7- Khushvakova, N.Z. and Nishanbaeva, F.M., 2021. DEVELOPMENT OF CONSERVATIVE TREATMENT IN CHRONIC TONZILLITIS. *Theoretical & Applied Science*, (8), pp.176-179.
- 8- Toyirov, M.M., 2025, March. TO INVESTIGATE THE EFFECT OF PHOTOTHERAPY ON CHRONIC ADENOIDITIS IN CHILDREN. In *Health Horizon: Congress on Public Health and Biomedical Sciences* (Vol. 1, No. 1, pp. 63-65).
- 9- Pang, B., Zhao, R., Peng, B., Bao, L., Geng, Z., Li, S., Xu, Y., Zhou, L., Guo, S., Cui, X. and Sun, J., 2023. Pharmacological effects and mechanism of Kaihoujian Throat Spray (children's type) in the treatment of pediatric acute pharyngitis and tonsillitis. *Heliyon*, 9(7).
- 10- Ueda, H., Joh, K., Ueda, Y., Marumoto, H., Okabe, M., Isaka, N., Tsuboi, N., Kojima, H., Miyazaki, Y. and Yokoo, T., 2024. Accelerated involution of germinal center in palatine tonsils in IgA nephropathy. *Plos one*, 19(5), p.e0301853.
- 11- Tolkunovna, T.S., Nishanovich, F.A. and Kizi, A.K.B., 2024. Application of bacteriophage therapy in the treatment of children with acute tonsillitis. *International Journal of Pediatrics and Adolescent Medicine*, 11(2), pp.27-33.
- 12- Nishi, K., Yoshimoto, S., Tanaka, T., Kimura, S., Tsunoda, T., Watanabe, A., Teranaka, K., Oguma, Y., Ogawa, H., Kumai, T. and Yamano, T., 2025. Spatial transcriptomics of the epipharynx in long COVID identifies SARS-CoV-2 signalling pathways and the therapeutic potential of epipharyngeal abrasive therapy. *Scientific Reports*, 15(1), p.8618.
- 13- Abdullah, S.M., Khudhur, A.F., Hamad, R.H. and Abdullah, A.A.N., 2024. The Effect of Children with Acute Tonsillitis on the Rate of Sedimentation of Red Blood Cells and the Complete Blood Count Test of Children in the Hawija City, Kirkuk Governorate. *SAR J Pathol Microbiol*, 5(5), pp.167-171.
- 14- Laajala, A., Tokola, P., Autio, T.J., Koskenkorva, T., Tastula, M., Ohtonen, P., Läärä, E. and Alho, O.P., 2021. Total or partial tonsillar resection (tonsillectomy or tonsillotomy) to change the quality of life for adults with recurrent or chronic tonsillitis: study protocol for a randomised controlled trial. *Trials*, 22, pp.1-13.
- 15- Rebez, E.B., Sejian, V., Silpa, M.V. and Dunshea, F.R., 2023. Heat stress and histopathological changes of vital organs: A novel approach to assess climate resilience in farm animals. *Sustainability*, 15(2), p.1242.
- 14- Dongapure, S., Shankar, A.A. and Parthibhan, R., 2023. A clinicopathological study of sinonasal lesions-5 years study in a rural hospital setup. *Journal of Pathology of Nepal*, 13(1), pp.1987-1992.
- 15- Dewi, Y. and Sugiharto, S., 2024. Histopathological Study of Sinonasal and Nasopharyngeal Lesions in Sumber Waras Hospital Jakarta from 2017-2023. *Jurnal Kedokteran Diponegoro (Diponegoro Medical Journal)*, 13(4).