Open Access e-ISSN 2549-75961

ORIGINAL ARTICLE

The Relationship Between Age and Sex with Tonsil Enlargement in Patients with Chronic Tonsillitis at Wangaya Hospital, Denpasar.

Cok Agung Reyjuna Dhanendra Pemayun[1], Ni Wayan Widhidewi[2*], Agus Santosa[3]

[1]Student of Faculty of Medicine and Health Sciences, Warmadewa University
[2]Department of Microbiology and Parasitology, Faculty of Medicine and Health Sciences, Warmadewa University
[3]Department of Clinical Medicine, Faculty of Medicine and Health Sciences, Warmadewa University

ARTICLE INFO

Correspondene:
Ni Wayan Widhidewi
Faculty of Medicine and Health Sciences, Warmadewa University

Email:
wayanwidhidewi@warmadewa.ac.id

Article history:
Received; March 03, 2025
Revised; February 24, 2026
Accepted; September 23, 2026

Keywords:
Chronic tonsillitis, age, Sex, tonsil enlargement

ABSTRACT

Background: Chronic tonsillitis is a recurrent inflammatory condition of the palatine tonsils that can affect individuals of all ages, particularly children. Tonsillar inflammation may be caused by infections involving various pathogens, including viruses, bacteria, and fungi. Clinical manifestations of chronic tonsillitis may include sore throat and varying degrees of tonsillar enlargement. The incidence of chronic tonsillitis in Bali, particularly in urban areas, is relatively high; however, recent epidemiological data on chronic tonsillitis in Denpasar remain limited. Therefore, this study aimed to determine the association between age and sex and the degree of tonsillar enlargement among patients with chronic tonsillitis at Wangaya Regional Hospital, Denpasar, in 2023.

Research Methods: This study employed an analytic observational design with a cross-sectional approach. The study included 46 patients with chronic tonsillitis who were treated at Wangaya Hospital, Denpasar, in 2023. Patients were selected using a total sampling technique. Data were obtained retrospectively from patients' medical records and analyzed using univariate and bivariate analyses. The Chi-square test was performed to determine the association of age and sex with the degree of tonsillar enlargement. Statistical significance was set at $\alpha = 0.05$ with a 95% confidence interval (CI). A p-value ≤ 0.05 was considered statistically significant, indicating a significant association between the variables under investigation.

Results: The results showed that the majority of patients with chronic tonsillitis were aged ≤15 years (57.7%), and more than half were male (57.7%). Most patients presented with tonsillar hypertrophy (67.3%), with the most common tonsillar size being T3–T3 (45.2%). **Conclusion:** Age and sex were not significantly associated with the degree of tonsillar enlargement among patients with chronic tonsillitis at Wangaya Hospital, Denpasar, in 2023 (p = 0.503 and p = 0.478, respectively).

Medical and Health Science Journal

https://doi.org/10.33086/mhsj.v9i2.7076

This is an open access article distributed under the Creative Commons Attribution-ShareAlike 4.0 International License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. ©2025The Author(s)

Introduction

Chronic tonsillitis is a recurrent inflammatory condition of the palatine tonsils that commonly affects children and represents an important otolaryngological health problem.[1,2] The condition may be caused by infections involving various pathogenic microorganisms, including viruses, bacteria, and fungi.[3,4]

Based on epidemiological data on ENT diseases from seven provinces in Indonesia, chronic tonsillitis had a prevalence of approximately 3.8%, following acute nasopharyngitis (4.6%).[5] In Bali, chronic tonsillitis has been reported predominantly among primary school-aged children. A study conducted in Denpasar and Karangasem found that chronic tonsillitis was most frequently observed among children aged 10–11 years, supporting the predominance of the condition among school-aged children.[6]

Recent evidence from Bali indicates that chronic tonsillitis predominantly affects children and adolescents. A study conducted at Sanjiwani Regional General Hospital, Gianyar, in 2023–2024 reported that 45.1% of patients were aged ≤16 years, with tonsillar enlargement frequently observed in this age group.[7] These findings support the importance of further investigating the association between age and tonsillar enlargement.

Previous studies have reported an association between age and tonsillar enlargement, particularly among individuals aged ≤15 years. However, the relationship between sex and tonsillar enlargement remains inconclusive.[5] Published studies have reported differences in the distribution of tonsillar hypertrophy according to sex, with some studies showing a male predominance, whereas others have found no significant sex-related differences. These inconsistencies suggest that sex may influence the clinical presentation of tonsillar disease, although the underlying mechanisms remain unclear.[8,9]

Although Denpasar has a relatively high burden of chronic tonsillitis, epidemiological data on the disease remain limited, particularly at local healthcare facilities such as Wangaya Hospital. This study addresses this knowledge gap by investigating the association between age and sex and the degree of tonsillar enlargement among patients with chronic tonsillitis. Further epidemiological studies are needed to provide more comprehensive evidence to support effective public health planning and policy development in the region. Therefore, this study aimed to determine the association between age and sex and the degree of tonsillar enlargement among patients with chronic tonsillitis at Wangaya Hospital, Denpasar, in 2023.

Methods

This study employed an analytic observational design with a cross-sectional approach. Secondary data were obtained from the medical records of patients who met the inclusion criteria: patients diagnosed with chronic tonsillitis at Wangaya Hospital, Denpasar, in 2023, with complete medical records containing data relevant to the study variables. A total of 46 patients were included in the study using a total sampling technique. Patients with tonsillar enlargement associated with malignant conditions and those with incomplete medical records were excluded from the study. The study was conducted at the Otorhinolaryngology–Head and Neck Surgery (ENT-HNS) outpatient clinic of Wangaya Hospital, Denpasar, a type B hospital in Denpasar, Bali.

Data collection was conducted from September to October 2024. Data were processed and analyzed using IBM SPSS Statistics version 26. Statistical analysis was performed in two stages: univariate and bivariate analyses. Bivariate analysis was conducted using the Chi-square test to assess the association of age and sex with the degree of tonsillar enlargement. Statistical significance was set at $p \leq 0.05$. A p-value ≤ 0.05 was considered indicative of a statistically significant association between the independent and dependent variables, whereas a p-value > 0.05 indicated no statistically significant association.

Results

Frequency Distribution of Patients with Chronic Tonsillitis by Age Group

The frequency distribution of patients with chronic tonsillitis according to age group is presented in Table 1. Patients aged ≤15 years accounted for the majority of cases (63%).

Table 1. Frequency Distribution of Patients with Chronic Tonsillitis by Age Group

Age Group	Number (n)	Percentage (%)
≤15 years	29	63
>15 years	17	37
Total	46	100

Frequency Distribution of Patients with Chronic Tonsilitis by Sex

The frequency distribution of patients with chronic tonsillitis according to sex is presented in Table 2. Male patients accounted for a slightly higher

proportion of cases (54.3%) than female.

Table 2. Frequency Distribution of Patients with Chronic Tonsillitis by Sex

Gender	Number (n)	Percentage (%)
Male	25	54.3
Female	21	45.7
Total	46	100

Frequency Distribution of Patients with Chronic Tonsillitis According to Tonsil Size

The frequency distribution of patients with chronic tonsillitis according to tonsil size is presented in Table 3. Among 46 patients included, the most common tonsil size was T3–T3, observed in 24 patients (52.2%).

Table 3. Frequency Distribution of Patients with Chronic Tonsillitis According to Tonsil Size

Tonsil Size	Number (n)	Percentage (%)
T1-T1	5	10,9
T2-T2	6	13
T3-T3	24	52.2
T3-T4	4	8.7
T4-T3	5	10.9
T4-T4	2	4.3
Total	46	100

Frequency Distribution of Patients with Chronic Tonsillitis According to the Degree of Tonsillar Enlargement

The frequency distribution of patients with chronic tonsillitis according to the degree of tonsillar enlargement is presented in Table 4. More than half of the patients with chronic tonsillitis had hypertrophic tonsils, with 35 patients (76.1%) classified as having tonsillar hypertrophy.

Table 4. Frequency Distribution of Patients with Chronic Tonsillitis According to the Degree of Tonsillar Enlargement

Tonsil Enlargement	Number (n)	Percentage (%)
Hypertrophic	35	76.1
Non-hypertrophic	11	23.9
Total	46	100

Association Between Age and Tonsillar Enlargement in Patients with Chronic Tonsillitis

The association between age and tonsillar enlargement among patients with chronic tonsillitis is presented in Table 5.

Of the 46 patients with chronic tonsillitis, the majority were aged ≤15 years and had hypertrophic tonsils, accounting for 23 patients (79.3%). The Chi-square test was performed to assess the association between age and tonsillar enlargement. The analysis yielded a p-value of 0.503, indicating that there was no statistically significant association between age and the degree of tonsillar enlargement among patients with chronic tonsillitis.

Table 5. Association Between Age and Tonsillar Enlargement

Age Group	Tonsil Enlargement				p-value
	Hypertrophic		Non-hypertrophic		
	N	%	N	%	
≤15 years	23	79.3	79.3	20.7	0.503
>15 years	12	70.6	70.6	29.4	
Total	35	76.1	11	23.9	

Association between Sex and Tonsil Enlargement in Patients with Chronic Tonsillitis

The association between sex and tonsillar enlargement among patients with chronic tonsillitis is presented in Table 6.

Table 6. Association between Sex and Tonsil Enlargement

Sex	Tonsil Enlargement				p-value
	Hypertrophic		Non-Hypertrophic		
	N	%	N	%	
Male	18	72	7	28	0.478
Female	17	81	4	19	
Total	35	76.1	11	23.9	

Table 6 shows that among patients with chronic tonsillitis, the majority of male patients had hypertrophic tonsils, accounting for 18 patients (72%). The Chi-square test was performed to assess the association between sex and tonsillar enlargement. The analysis showed no statistically significant association between sex and tonsillar enlargement among patients with chronic tonsillitis, with a p-value of 0.478.

Discussion

Frequency Distribution of Chronic Tonsillitis Patients by Age Group

An overview of patients with chronic tonsillitis at Wangaya Hospital, Denpasar, in 2023 showed that the majority were aged ≤15 years, accounting for 63% of all patients, while 37% were aged >15 years. These findings suggest that children may be more susceptible to chronic tonsillitis than adults. The predominance of chronic tonsillitis among children and adolescents may be related to the active immunological function and developmental changes of the tonsils during childhood. Tonsils serve as important mucosal immune organs that continuously encounter inhaled

and ingested antigens, undergo substantial lymphoid development during childhood, and subsequently experience age-related involution. These physiological changes may contribute to differences in the occurrence and clinical presentation of tonsillar disease across age groups.[10,11]

Another possible factor contributing to the higher proportion of patients aged ≤15 years may be dietary and environmental exposure, although these factors were not directly assessed in the present study. Nutritional status can influence immune development and host responses to pathogens, while repeated exposure to microorganisms during childhood may increase the likelihood of recurrent infections.[12] This is relevant to chronic tonsillitis, as polymicrobial flora have been demonstrated in the tonsillar tissue of children with recurrent or chronic tonsillitis.[13]

In addition, exposure to viral and bacterial pathogens in school environments and other public settings may increase the risk of respiratory infections among school-aged children. Children, particularly those of primary school age and early adolescence, frequently engage in close and prolonged interpersonal contact during daily activities, which may facilitate the transmission of respiratory pathogens. Recent evidence indicates that close-proximity interactions, shared classroom exposure, and indoor environmental conditions are associated with respiratory virus transmission in school settings. Furthermore, tonsillitis occurs frequently among children of school age, with recurrent tonsillitis representing an important clinical problem in this population. These factors may partly explain the higher occurrence of tonsillar disease among children.[14]

Previous studies have reported that tonsillar hypertrophy is particularly common during childhood, when the tonsils exhibit active lymphoid and immune responses to inhaled and ingested antigens. Age-related changes in tonsillar immune activity, including a decline in germinal-center B-cell populations and proliferative immune cells with increasing age, may partly explain the greater prominence of tonsillar tissue in younger individuals.[10] Repeated exposure to infectious agents may further stimulate local immune responses and contribute to recurrent tonsillar inflammation, although the mechanisms underlying the progression from recurrent infection to chronic tonsillitis remain complex. In addition, oral health may influence susceptibility to respiratory infections in children, as the oral cavity can serve as a potential reservoir for respiratory pathogens.[15]

Overview of Patients with Chronic Tonsillitis by Sex

The distribution of patients with chronic tonsillitis by sex at Wangaya Hospital, Denpasar, in 2023 showed a slightly higher proportion of males (54.3%) than females (45.7%). This finding is consistent with previous research reporting an association between male sex and tonsillar hypertrophy in children.[16] Other studies have reported contrasting findings, with some suggesting a higher proportion of chronic tonsillitis among females.[17] Sex-related differences in immune responses may partly contribute to differences in susceptibility to infectious and inflammatory diseases, as sex chromosomes and gonadal hormones, including estrogens and androgens, can modulate both innate and adaptive immune responses.[18] However, the specific mechanisms underlying sex differences in tonsillar disease remain incompletely understood. Differences in immunoglobulin responses have also been reported between males and females, although these patterns vary according to the immunoglobulin class and population studied.[19]

Characteristics of Patients with Chronic Tonsillitis According to Tonsil Size and Degree of Tonsillar Enlargement

An overview of tonsil size among patients with chronic tonsillitis at Wangaya Hospital, Denpasar, in 2023 showed that the T3–T3 category was the most prevalent, accounting for 52.2% of the 46 patients. According to the Brodsky grading system, T3 tonsils occupy approximately 50–75% of the oropharyngeal airway, indicating moderate to marked tonsillar enlargement. This finding is consistent with a study conducted at Dr. M. Djamil Hospital, Padang, which reported T3–T3 as the most common tonsil size among patients with chronic tonsillitis (55%).[20] Regarding the degree of tonsillar enlargement, the majority of patients in the present study had tonsillar hypertrophy (76.1%). Tonsillar hypertrophy, generally defined as Brodsky grade 3 or 4, may contribute to oropharyngeal crowding and upper airway obstruction and is associated with symptoms such as snoring and sleep-disordered breathing.[21] The predominance of tonsillar hypertrophy among patients with chronic tonsillitis may be related to recurrent or persistent inflammation, which can stimulate lymphoid tissue activity and contribute to enlargement of the tonsils.[20]

Tonsillar hypertrophy in patients with chronic tonsillitis may have clinically relevant implications for quality of life. Significant tonsillar enlargement can contribute to oropharyngeal crowding and upper airway obstruction, potentially resulting in dysphagia, snoring, and sleep-disordered breathing, including obstructive sleep apnea.[21] Recent evidence also indicates that children with tonsillar hypertrophy and sleep-disordered breathing may experience impaired swallowing-related quality of life, which can improve following surgical treatment.[22]

In patients with recurrent or chronic tonsillitis, persistent or recurrent throat pain and discomfort may further contribute to disease burden and impaired quality of life. Quality-of-life assessment is therefore an important component of evaluating patients with recurrent tonsillar disease, particularly when symptoms interfere with daily functioning.[22] Management should be individualized according to symptom severity, disease frequency, functional impairment, and clinical indications, and may include conservative medical treatment or surgical intervention such as tonsillectomy.[21]

Association Between Age and Tonsillar Enlargement Among Patients with Chronic Tonsillitis

The association between age and tonsillar enlargement among patients with chronic tonsillitis at Wangaya Hospital, Denpasar, in 2023 showed that the majority of patients were aged ≤15 years, accounting for 63% of the study population. Among patients in this age group, 79.3% had hypertrophic tonsils (tonsil size ≥T3). These findings indicate a higher proportion of tonsillar hypertrophy among patients aged ≤15 years than among adults. However, the Chi-square analysis showed no statistically significant association between age and tonsillar enlargement ($p = 0.503$). Thus, although tonsillar hypertrophy was more frequently observed among younger patients, age was not significantly associated with the degree of tonsillar enlargement in the study population.

Several studies have reported that tonsillar enlargement is more prominent during childhood and adolescence, which may be related to the active immunological function and age-related development of the tonsillar lymphoid tissue. During childhood, the palatine tonsils serve as important mucosal immune organs that respond to inhaled and ingested antigens. Tonsillar immune activity changes with age, with studies demonstrating age-related alterations in germinal-center B-cell populations and IgA-producing cells, followed by progressive involution during adolescence and adulthood.[16]

These developmental changes may partly explain the greater frequency of tonsillar enlargement observed in younger individuals. Consistent with this pattern, Indonesian studies have reported a higher frequency of tonsillar enlargement among children with chronic tonsillitis, including significant associations between younger age and larger tonsil size.[23] However, in the present study at Wangaya Hospital, although tonsillar enlargement was descriptively more frequent among patients aged ≤15 years, the difference between the two age groups was not statistically significant. Therefore, age was not significantly associated with tonsillar enlargement in this study population.

The findings of the present study at Wangaya Hospital suggest that age alone may not adequately explain variations in tonsillar enlargement. Although children showed a higher frequency of tonsillar enlargement descriptively, the association between age and tonsillar enlargement was not statistically significant. Previous studies have similarly indicated that tonsillar size may be influenced by multiple factors, including recurrent infection, oral hygiene, and chronic inflammatory stimulation. Poor oral hygiene has been reported as a potential factor associated with chronic tonsillitis, while recurrent tonsillar infection and persistent antigenic stimulation may contribute to lymphoid tissue enlargement.[15] Other factors, including allergic inflammation and environmental exposures, may also influence tonsillar hypertrophy, although their effects may vary across populations.[24]

These findings highlight the importance of considering factors beyond age when evaluating tonsillar enlargement in patients with chronic tonsillitis. Although the higher frequency of tonsillar enlargement among children in the present study supports the importance of clinical evaluation in this age group, the absence of a statistically significant association indicates that age alone does not sufficiently explain tonsillar enlargement in the Wangaya Hospital population.

Association Between Sex and Tonsillar Enlargement Among Patients with Chronic Tonsillitis

Among the 46 patients with chronic tonsillitis at Wangaya Hospital, tonsillar hypertrophy (≥T3) was observed in 72% of males and 81% of females. Although the proportion was slightly higher among females, the difference was not statistically significant (χ^2 test, $p = 0.478$), indicating that sex was not significantly associated with tonsillar enlargement in the present study. This finding is consistent with previous research showing that the relationship between sex and tonsillar enlargement is not consistent across populations.[20,25]

Sex-related differences in immune responses may provide a possible biological explanation for variations in tonsillar disease, as sex chromosomes and sex hormones, including estrogen and testosterone, can modulate innate and adaptive immunity.[18] However, these mechanisms should not be interpreted as direct determinants of tonsillar enlargement. Differences among studies may reflect variations in age distribution, sample size, clinical characteristics, and environmental or behavioral exposures. Therefore, factors such as recurrent infection and oral hygiene may warrant further investigation as potential contributors to tonsillar enlargement. Given the absence of a statistically

significant association in the present study, sex alone does not appear to adequately explain differences in tonsillar enlargement among patients with chronic tonsillitis at Wangaya Hospital.

This study has several limitations. First, the relatively small sample size and single-center setting may limit the generalizability of the findings to other populations. Second, the retrospective use of medical records limited the availability of potentially relevant variables, such as dietary habits, oral hygiene, environmental exposures, and history of recurrent infections, which may influence tonsillar enlargement. In addition, the cross-sectional design precludes establishing temporal or causal relationships between the variables examined. Future multicenter studies with larger sample sizes and more comprehensive clinical and environmental variables are warranted to further clarify the factors associated with tonsillar enlargement.

Conclusion

Age and sex were not significantly associated with tonsillar enlargement among patients with chronic tonsillitis at Wangaya Hospital, Denpasar, in 2023 ($p = 0.503$ and $p = 0.478$, respectively). Although tonsillar hypertrophy was more frequently observed among younger patients and females, these differences were not statistically significant. These findings suggest that age and sex alone may not adequately explain variations in tonsillar enlargement in this study population. Further studies incorporating clinical, behavioral, and environmental factors are warranted to identify other determinants of tonsillar enlargement in patients with chronic tonsillitis.

Conflict of Interest

No conflict of interest in this study

References

1. Rahayu RD, Arief T, Anggraeni S. Karakteristik Pasien Tonsilitis pada Anak Usia 5-12 Tahun di RSPBA Bandar Lampung Tahun 2020. *ARTERI: Jurnal Ilmu Kesehatan*. 2020; 2(1): 30–5. https://doi.org/10.37148/arteri.v2i1.143.
2. Bakar MA, Mckimm J, Haque SZ, Haque M. Chronic Tonsillitis and Biofilms : A Brief Overview of Treatment Modalities. *Journal of Inflammation Research*. 2018; 329–37. https://doi.org/10.2147/JIR.S162486.
3. Mustofa FL, Susanti F. Hubungan Tonsilektomi dengan Umur Keluhan Utama dan Ukuran Tonsil pada Pasien Tonsilitis Kronik. *ARTERI: Jurnal Ilmu Kesehatan*. 2020; 1(3): 241–7. https://doi.org/10.37148/arteri.v1i3.80.
4. Kostic M, Ivanov M, Babic S, Tepavcevic Z, Radanovic O, Sokovic M. Analysis of Tonsil Tissues from Patients Diagnosed with Chronic Tonsillitis-Microbiological Profile, Biofilm-Forming Capacity and Histology. *Antibiotics*. 2022; 11(1747). https://doi.org/10.3390/antibiotics11121747.
5. Triola S, Zuhdi M, Vani AT. Hubungan antara Usia dengan Ukuran Tonsil pada Tonsilitis Kronis di Rumah Sakit Islam Siti Rahmah Padang Sumatera Barat pada Tahun 2017-2018. *Heal Med J*. 2020; 2(2). https://doi.org/10.33854/heme.v2i1.299.
6. Ngurah IG, Harrypana G, Gede D, Eka A. Distribusi Tonsilitis Kronis pada Siswa di SD 1 Ubung Denpasar dan SD 2 Abang Karangasem. 2019; 50(2): 281-6.
7. Bramastya M, Teja N, Mulyawan K, Widhidewi NW, Agung A. Characteristics of Outpatients with Chronic Tonsillitis at the ENT Clinic of Sanjiwani Regional General Hospital, Gianyar, in 2023-2024. 2026; 6(2): 27-35. https://doi.org/10.23887/gm.v6i2.112526.
8. Triswanti N, Sudiadnyani NP, Kasim M, Waldan reta A. Hubungan Umur & Jenis Kelamin dengan Pembesaran Tonsil pada Penderita Tonsilitis Kronis di RSUD Abdul Moeloek Prov. Lampung Tahun 2021. *J Ilmu Kedokt dan Kesehat*. 2023; 10(4): 1855-62.
9. Han CJ, Harley EH, Bergman M, Bs RJH. The Pediatric Indications for Tonsillectomy and Adenotonsillectomy: Race/ethnicity, Age, and Gender. *Laryngoscope Investig Otolaryngol*. 2023; 577–83. https://doi.org/10.1002/lio2.1017.
10. Talks BJ, Mather MW, Chahal M, Coates M, Clatworthy MR, Haniffa M. Mapping Human Immunity and the Education of Waldeyer's Ring. *Annu Rev Genomics Hum Genet*. 2024; 161–82. https://doi.org/10.1146/annurev-genom-120522-012938.
11. Mangunkusumo E, Balfas HA, Hermani B. Buku Teks Komprehensif Ilmu THT-KL: Telinga, Hidung, Tenggorok, Kepala-Leher. Jakarta: Penerbit Buku Kedokteran EGC; 2019.
12. Palmer AC, Bedsaul-fryer JR, Stephensen CB. Interactions of Nutrition and Infection: The Role of Micronutrient Deficiencies in the Immune Response to Pathogens and Implications for Child Health. *Annu Rev Nutr*. 2024; 99-124. https://doi.org/10.1146/annurev-nutr-062122-014910.
13. Kalaiarasi R, Subramanian KS, Vijayakumar C. Microbiological Profile of Chronic Tonsillitis in the Pediatric Age Group. *Cureus*. 2018; 10(9). https://doi.org/10.7759/cureus.3343.
14. Banholzer N, Munday JD, Jent P, Bittel P, Amico

LD. The Relative Contribution of Close-Proximity Contacts, Shared Classroom Exposure and Indoor Air Quality to Respiratory Virus Transmission in Schools. *Nat Commun*. 2025; 4-37. https://doi.org/10.1038/s41467-025-66719-3.

15. Zhou Y, Jiang S, Li KY, Chin E, Lo M, Gao X. Association between Oral Health and Upper Respiratory Tract Infection among Children. *Int Dent J*. 2018; 68(2): 122-8. https://doi.org/10.1111/idj.12335.
16. Akcay A, Kara OC, Dagderiven E, Zencir M. Variation in Tonsil Size in 4- to 17-year-old schoolchildren. *J Otolaryngol*. 2006; 35(4): 270-4. https://doi.org/10.2310/7070.2005.0118.
17. Naufal MR, Fitri F, Ilmiawati C. Karakteristik Tonsilitis Kronis Di RSUP Dr. M. Djamil Padang Selama Pandemi. *J Ilmu Kesehat Indones*. 2022; 3(1): 42–8.
18. Wilkinson NM, Chen H, Lechner MG, Su MA. Sex Differences in Immunity. *Annu Rev Immunol*. 2022; 2: 75-94. https://doi.org/10.1146/annurev-immunol-101320-125133.
19. Khan SR, Burgh AC Van Der, Peeters RP, Hagen PM Van, Dalm VASH, Chaker L. Determinants of Serum Immunoglobulin Levels: A Systematic Review and Meta-Analysis. *Front Immunol*. 2021; 12: 1-15. https://doi.org/10.3389/fimmu.2021.664526.
20. Shalihat AO, Novialdi N, Irawati L. Hubungan Jenis Kelamin dan Perlakuan Penatalaksanaan dengan Ukuran Tonsil pada Penderita Tonsilitis Kronis di Bagian THT-KL RSUP DR. M. Djamil. *Jurnal Kesehatan Andalas*. 2013; 4(3): 786-94. https://doi.org/10.25077/jka.v4i3.365.
21. Mitchell RB, Archer SM, Ishman SL, Rosenfeld RM, Coles S, Finestone SA, et al. Clinical Practice Guideline: Tonsillectomy in Children (Update). *Am Acad Otolaryngol Neck Surg*. 2019; 160(4). https://doi.org/10.1177/0194599818807917.
22. Ayu S, Novi P, Dewi K, Andi K, Saputra D, Asthuta AR, et al. Kualitas Hidup Anak Usia 12-15 Tahun yang Menderita Tonsilitis Kronis. *Intisari Sains Medis*. 2020; 11(2): 523–7. https://doi.org/10.15562/ism.v11i2.650.
23. Nurfadila DW, Kasim M, Alfarisi R, Arief T. Hubungan Usia dengan Ukuran Tonsil pada Pasien Tonsilitis Kronis di RS Bintang Amin Bandar Lampung (2022–2024). *J Med Malhayati*. 2026; 10(1): 37–43.
24. Cho K-S, Kim SH, Kim H-Y. Local Atopy in Childhood Adenotonsillar Hypertrophy. *Am J Rhinol Allergy*. 2018; 32(3). https://doi.org/10.1177/1945892418765003.
25. Tamara N, Triansyah I, Amelia R. Hubungan Umur dan Jenis Kelamin dengan Pembesaran Tonsil pada Penderita Tonsilitis Kronis di RSUD dr. Rasidin Tahun 2018. *Heal Med J*. 2021; 3(1): 29–37.