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RADIOLOGIC CHARACTERISTICS OF SINUSITIS ON NON-CONTRAST PARANASAL SINUS CT AT DR. CHASBULLAH ABDULMADJID GENERAL HOSPITAL

Monica Cherlady Anastasia *, Nicole Evangeline
Department of Radiology, Faculty of Medicine and Health Sciences, Universitas Kristen Krida Wacana
Jl. Tanjung Duren Raya No 4, Kec. Kembangan, Kota Adm. Jakarta Barat, Prov. D.K.I. Jakarta, Indonesia
Email: *monica.cherlady@ukrida.ac.id*

Abstract

Background: Sinusitis is one of the most frequently encountered diseases in hospital clinical practice. Non-contrast computed tomography (CT) of the paranasal sinuses is considered the gold standard imaging modality for evaluating inflammation, obstruction, and anatomical changes of the sinuses. Objective: This study aimed to describe the radiologic characteristics of sinusitis on non-contrast paranasal sinus CT at Dr. Chasbullah Abdulmadjid General Hospital, Bekasi City, during the period of January 2024 to August 2025. Methods: This was a quantitative descriptive study using a retrospective design. Secondary data were obtained from medical records of patients diagnosed with sinusitis who underwent non-contrast paranasal sinus CT. Variables included patient characteristics (age and sex) and radiologic findings such as sinus involvement, type of sinusitis, anatomical variations, and dominant CT features. Data were analyzed descriptively using frequency distributions and percentages. Results: Among the included cases, most patients were adults aged 19–59 years (45 patients; 75%), and 33 patients (55%) were female. The maxillary sinus was the most frequently involved site (45 patients; 75%). Single-sinus involvement was the most common type (33 patients; 55%). The most common CT finding was mucosal thickening (35 patients; 58.33%). Septal deviation was the most common anatomical variation (29 patients; 48.33%). Conclusion: This study provides an overview of the dominant radiologic characteristics of sinusitis in patients at Dr. Chasbullah Abdulmadjid General Hospital and may serve as a clinical reference for management and referral decisions.

Keywords: Sinusitis, Radiology, Paranasal Sinus CT, Non-Contrast, Radiologic Characteristics

Introduction

Sinusitis is an inflammation of the paranasal sinus mucosa caused by bacterial or viral infection, as well as anatomical structural abnormalities of the nasal cavity such as septal deviation and nasal polyps. Sinusitis may involve any of the four paranasal sinuses, which are classified by their bony location: frontal, ethmoid, maxillary, and sphenoid sinuses. This condition commonly presents with facial pain, nasal obstruction, nasal discharge, and decreased olfactory function.[1]

Sinusitis is one of the most prevalent diseases in the United States, with an incidence of approximately 14.7%. The highest incidence is reported among children younger than 15 years and adults aged 25–64 years.[2] Based on the 2022 Indonesian National Basic Health Research Report (Riskesdas), sinusitis is among the 10 most common ear, nose, and throat (ENT) diseases found in hospitals. The increasing incidence of sinusitis in Indonesia has been attributed to high-risk factors such as air pollution and smoking habits.

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The diagnosis of sinusitis is established through history taking, physical examination, and radiologic evaluation. When clinical symptoms and physical findings are unclear, imaging studies are required as supporting examinations. Plain radiography is often used as the initial imaging modality because it is fast, inexpensive, and widely available. Although plain radiographs have relatively high specificity (approximately 96%) for evaluating the sinuses, sensitivity is only about 70% for the maxillary sinus and is even lower for the ethmoid, sphenoid, and frontal sinuses.[3]

Therefore, a more specific diagnostic imaging modality is required, namely computed tomography (CT) of the paranasal sinuses. Paranasal sinus CT is considered the gold standard because it has been reported to have a sensitivity of up to 92% and specificity of 94%. CT is indicated in patients prior to medical therapy and before surgical management in order to provide detailed visualization of sinonasal anatomy, including septal deviation, osteomeatal complex obstruction, mucosal thickening, and sinus fluid levels.[4]

The data above indicate that various anatomical variations of the paranasal sinuses can be identified in patients with sinusitis on non-contrast CT. Recognizing radiologic features of sinusitis plays an important role in determining subsequent management, selecting surgical approaches, guiding surgery, preventing complications, assessing recurrence risk, and supporting follow-up after medical or surgical treatment.

Dr. Chasbullah Abdulmadjid General Hospital in Bekasi City is a government hospital classified as a type B referral hospital for patients from primary healthcare facilities. The hospital provides comprehensive specialist services, including subspecialty care, and has adequate diagnostic radiology equipment such as conventional radiography, ultrasonography, CT, and MRI. These factors motivated the authors to conduct this study to describe sinusitis cases at Dr. Chasbullah Abdulmadjid General Hospital during 2024–2025.

Methods

This was a quantitative descriptive study with a retrospective design. Secondary data were obtained from medical records of patients with sinusitis who underwent non-contrast paranasal sinus CT at Dr. Chasbullah Abdulmadjid General Hospital, Bekasi City, from January 2024 to August 2025.

Results

The tables below summarize the characteristics of sinusitis patients who underwent non-contrast paranasal sinus CT during January 2024–August 2025.

Table 1. Distribution by Age Group

Age Group	n	Percentage
Infants and toddlers (<5 years)	0	0%
Children (5–9 years)	0	0%
Adolescents (10–18 years)	7	11.67%
Adults (19–59 years)	45	75%
Older adults (>60 years)	8	13.33%
Total	60	100%

Table 2. Distribution by Sex

Sex	n	Percentage
Male	27	45%
Female	33	55%
Total	60	100%

Table 3. Distribution by Sinus Involvement

Sinus	Yes (n)	Yes (%)	No (n)	No (%)
Frontal	18	30%	42	70%
Ethmoid	30	50%	30	50%
Maxillary	45	75%	15	25%
Sphenoid	14	23.33%	46	76.67%

Table 4. Distribution by Type of Sinusitis

Type	n	Percentage
Single-sinus involvement	33	55%
Bilateral	15	25%
Multisinus involvement	4	6.67%
Pansinusitis	8	13.33%
Total	60	100%

Table 5. Dominant Non-Contrast CT Findings

CT Finding	n	Percentage
Opacification	7	11.67%
Mucosal thickening	35	58.33%
Air–fluid level	2	3.33%
Bubbly secretions	0	0%
Total	60	100%

Table 6. Anatomical Variations

Anatomical variation	Yes (n)	Yes (%)	No (n)	No (%)
Septal deviation	29	48.33%	31	51.67%
Concha bullosa	6	10%	54	90%

Discussion

A total of 82 medical records were identified during the study period. Twenty-two records met the exclusion criteria and were not included. Therefore, the final sample consisted of 60 medical records that met the inclusion criteria.

Sinusitis was most frequently observed among adults aged 19–59 years (75%). This finding is consistent with Husni et al., who reported the highest frequency in the 20–59-year age group.[3] Sinusitis was more common in females than males (55%). This result is consistent with Swari et al., who suggested that hormonal influences—particularly estrogen and progesterone—may affect respiratory mucosal function and the immune system. Hormonal changes during the menstrual cycle may also cause nasal mucosal edema, increasing the risk of osteomeatal obstruction and sinus infection. In contrast, testosterone in males may have anti-inflammatory effects.[3],[19]

The maxillary sinus was the most frequently involved site (75%). This finding is consistent with Teuku Husni T.R. et al. The predominance of maxillary sinus involvement is often explained by

the anatomy and physiology of the maxillary sinus, as its ostium is located superior to the sinus floor, and mucociliary clearance is essential for secretion drainage. During inflammation, impaired ciliary function may obstruct mucus flow, leading to retained secretions and sinusitis.[6],[17]

The most common type of sinusitis was single-sinus involvement (55%). Single-sinusitis may remain localized when ostial obstruction traps mucus and promotes inflammation. Anatomical variations such as septal deviation may predispose to localized osteomeatal complex dysfunction and impaired mucociliary clearance.[3]

The most common CT finding was mucosal thickening (58.33%). This feature reflects inflammatory processes that cause mucosal edema and hypertrophy, with infiltration by inflammatory cells and fluid accumulation along the sinus walls.[8] The anatomical variations identified in this study were septal deviation (48.33%) and concha bullosa (10%). Septal deviation may alter airflow dynamics and disrupt mucociliary clearance in the osteomeatal region. Concha bullosa may narrow the infundibulum and impair sinus drainage.[19]

Conclusion

Among 60 sinusitis patients who underwent non-contrast paranasal sinus CT at Dr. Chasbullah Abdulmadjid General Hospital, Bekasi City (January 2024–August 2025), most patients were adults aged 19–59 years (75%) and female (55%). The maxillary sinus was the most frequently involved site (75%), and single-sinus involvement was the most common type (55%). The dominant non-contrast CT feature was mucosal thickening (58.33%), and the most common anatomical variation was septal deviation (48.33%). These findings may serve as a reference for clinical management and referral decisions.

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