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CASE REPORT: CLINICAL MANAGEMENT OF ALLERGIC RHINITIS IN A GERIATRIC CAT WITH A HISTORY OF CHRONIC BRONCHITIS

Laporan Kasus: Manajemen Klinis Rhinitis Alergi Pada Kucing Geriatri dengan Riwayat Bronkitis Kronis

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Abstract

Rhinitis is an inflammation of the nasal mucosa that can be caused by allergens, infectious agents, or environmental irritants. This case report aims to evaluate the clinical management of allergic rhinitis in a geriatric cat exacerbated by a history of chronic bronchitis. The case animal is a female cat aged approximately 10 years with symptoms of sneezing, nasal discharge, abnormal sounds during inspiration, and dyspnea. Physical examination revealed abdominal breathing, rhonchii sounds on lung auscultation, and crust formation around the nasal area. Hematology examination showed leukocytosis, lymphocytosis, and granulocytopenia, while nasal cytology revealed neutrophil and macrophage infiltration. A chest radiograph showed a bronchial pattern characterized by tram lines, indicating chronic bronchitis. Based on these results, the cat was diagnosed with allergic rhinitis with a history of chronic bronchitis with a dubious prognosis. Therapy provided included nebulized salbutamol sulfate, infrared therapy, amoxicillin-clavulanate antibiotic therapy, respiratory supplements, probiotics, and environmental management. Therapy involving a change from dry to wet feed is also recommended to minimize upper respiratory tract irritation. While clinical improvement is evident, long-term management is necessary to prevent relapse and maintain quality of life in geriatric patients.

Keywords: allergic rhinitis, chronic bronchitis, geriatric cat

Abstrak

Rhinitis merupakan peradangan pada mukosa hidung yang dapat disebabkan oleh adanya alergen, agen infeksius, maupun iritan lingkungan. Laporan kasus ini bertujuan untuk mengevaluasi manajemen klinis rhinitis alergi pada kucing geriatri yang diperburuk dengan riwayat bronkitis kronis. Hewan kasus adalah kucing betina berumur ±10 tahun dengan gejala

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bersin, mengeluarkan leleran hidung saat bersin, terdengar suara abnormal saat inspirasi dan dispnea. Pemeriksaan fisik menunjukkan adanya pernapasan menggunakan abdomen, suara ronchii saat auskultasi paru-paru, dan pembentukan kerak di sekitar area hidung. Pemeriksaan hematologi menunjukkan leukositosis, limfositosis, granulositopenia, sedangkan sitologi hidung memperlihatkan infiltrasi sel neutrofil dan makrofag. Radiografi thoraks menunjukkan bronchial pattern yang ditandai dengan tram lines, yang mengindikasikan bronkitis kronis. Berdasarkan hasil tersebut, kucing didiagnosis mengalami rhinitis alergi dengan riwayat bronkitis kronis dengan prognosis dubius. Terapi yang diberikan meliputi nebulisasi salbutamol sulfat, terapi infrared, terapi antibiotik amoksisilin-klavulanat, suplemen pernapasan, probiotik, dan manajemen lingkungan. Terapi dengan menggantikan pakan dari pakan kering ke pakan basah juga disarankan untuk meminimalkan iritasi saluran pernapasan atas. Hasil terapi menunjukkan perbaikan klinis, namun diperlukan manajemen jangka panjang untuk mencegah kekambuhan dan menjaga kualitas hidup pasien geriatri.

Kata kunci: bronkitis kronis, kucing geriatri, rhinitis alergi

INTRODUCTION

Rhinitis is an upper respiratory tract disease in cats characterized by inflammation of the nasal mucosa. This disease can be acute or chronic, and is categorized as chronic if it lasts for four weeks or longer, either continuously or intermittently (Reed, 2020). Causes of rhinitis include infectious and non-infectious factors. Infectious factors include viruses, bacteria, and fungi, while non-infectious factors include allergens, environmental irritants, congenital abnormalities, foreign bodies, and neoplasia (Perkins *et al.*, 2024; van Pelt *et al.*, 1994).

Viral agents commonly causing rhinitis in cats are Feline Herpesvirus (FHV) and Feline Calicivirus (FCV). In addition, fungi such as *Cryptococcus* spp. and *Aspergillus* spp. can also be causative agents. Bacterial infections are generally secondary following primary infections, although in some cases they can act as the primary cause. Bacteria reported to play a role in infectious rhinitis include *Mycoplasma* sp., *Chlamydophila felis*, *Pasteurella* sp., *Streptococcus* sp., *Staphylococcus* sp., and *Klebsiella* sp. (Kahn, 2011; Ramaditya *et al.*, 2018). Cats experiencing rhinitis generally show symptoms such as sneezing, coughing, fever, respiratory distress, nasal discharge, hypersalivation, and excessive tear production (Sykes, 2013).

Rhinitis and bronchitis are interconnected because both involve inflammatory processes in the respiratory system. The nose and bronchi both serve as respiratory passages, giving rise to the "one airway, one disease" concept (Caimmi *et al.*, 2012). The nose plays a role in warming the air, filtering particles and gases, and performing mucociliary clearance before air enters the lower respiratory tract. Impairment of the protective function of the nose can affect the condition of the lower respiratory tract (Brozek *et al.*, 2017). In rhinitis, exposure to allergens can trigger the release of inflammatory mediators that spread to the lower respiratory tract and cause airway epithelial hyperresponsiveness (Cirillo *et al.*, 2007). Bergqvist *et al.* (2022) stated that chronic inflammation of the upper respiratory tract can reduce the protection of the lower respiratory tract, thereby increasing the risk of developing chronic bronchitis.

A diagnosis of rhinitis can be established based on anamnesis, physical examination, hematological examination, nasal discharge cytology, and radiographic examination (Grotheer and Schulz, 2019). Based on this description, this case article will discuss the management of allergic rhinitis in a geriatric cat with a history of chronic bronchitis.

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RESEARCH METHODS

Signalment and Anamnesis

The patient was a domestic cat aged ± 10 years, female, weighing 3 kg, with yellow and white hair coat. The chief complaints were visible abdominal breathing, snoring sounds during respiration, and bilateral nasal discharge. The snoring sounds during respiration had been present since the cat was rescued in 2021. According to the owner, there were no complaints of nasal discharge other than the snoring sound since the rescue; however, on November 2, 2025, a mucopurulent nasal discharge began to appear. The owner also reported that two other cats experienced similar discharge, although the onset of symptoms varied. The cat's appetite and drinking water intake were very good, and during examination, the cat remained active. The cat was housed semi-outdoors along with 17 other cats. The cat had previously been treated via nebulization with Salbutamol Sulfate (1 mg/mL) diluted to a total volume of 4 mL and 16 drops of Bromhexine for 5 days, followed by administration of Viamin 34 and the anti-inflammatory Methylprednisolone for 3 days; however, following therapy, the animal's condition returned to its pre-treatment state. The cat had received the F4 vaccine in 2021 and had been administered flea and deworming medications. The diet consisted of dry food provided every morning and evening with water *ad libitum*.

Physical Examination

The examination was conducted at the Laboratory of Veterinary Internal Medicine, Faculty of Veterinary Medicine, Udayana University, on January 20, 2026. Clinical examination included checking the patient's *status praesens*, which comprised heart rate, pulse rate, Capillary Refill Time (CRT), respiratory rate, body temperature, skin turgor, and general condition, as well as physical examinations performed on all body systems using inspection, palpation, auscultation, and percussion. In this case, physical examination of the respiratory system specifically involved inspection of the respiratory tract and the abdomen or thorax, palpation of lymph nodes, sinuses, and trachea, as well as auscultation of the lungs.

Hematological Examination

Hematological examination was performed as a supportive diagnostic tool to obtain an overview of the patient's physiological condition. Sample collection was carried out via the cephalic vein using a 3 mL syringe and alcohol swab, after which the blood was transferred into a vacuum tube containing EDTA (Ethylenediaminetetraacetic Acid). The collected sample was subsequently analyzed using a hematology analyzer (iCell 800Vet, ICUBIO).

Cytological Examination

Cytological examination was performed by collecting nasal discharge samples from the patient using a sterile cotton swab, preparing blood smears, and staining them with Diff-Quick stain—which involves the use of ethanol, eosin, and methylene blue solutions—to be examined under a microscope. The purpose of the cytological examination was to identify potential causative agents of the disease and to determine the predominant type of inflammatory cells.

Radiographic Examination

Thoracic radiographic examination was performed in December 2025 as an initial evaluation of the lower respiratory tract condition to obtain an imaging overview of the internal structures of the thoracic cavity. The examination was conducted in right lateral recumbency and ventrodorsal positions, and the results were subsequently correlated with the physical, hematological, and cytological examinations performed on January 20, 2026, to support the final diagnosis.

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RESULTS AND DISCUSSION

Results

The cat generally appeared calm with a Body Condition Score (BCS) of 5/9 (Royal Feline Body Condition Score Chart), exhibiting good body proportions, non-visible but palpable ribs, minimal abdominal fat, and a visible waist tuck. The patient's *status praesens* showed a heart rate of 136 beats per minute, a pulse rate of 140 beats per minute, Capillary Refill Time (CRT) of less than two seconds, a respiratory rate of 36 breaths per minute, a body temperature of 38°C, and skin turgor of less than two seconds.

On physical examination, inspection revealed that the cat exhibited abdominal breathing, along with dried discharge forming crusts around the nostrils, abnormal sounds during inspiration, and alopecia on the neck region. Palpation of the nasal area elicited no sneezing response, while pulmonary auscultation revealed ronchii.

Hematological Examination Results

The hematological results presented in Table 1 indicate that the patient experienced an elevated white blood cell count (leukocytosis) and elevated lymphocytes (lymphocytosis). In addition, alterations in RDW-CV and RDW-SD were observed, indicating non-significant variations in red blood cell size, as well as changes in PDW, which likewise reflected non-significant variations in platelet size.

Cytological Examination Results

Cytological examination results demonstrated inflammatory infiltration composed of neutrophils and macrophages (Figure 2).

Radiographic Examination Results

Radiographic examination revealed a bronchial pattern characterized by parallel line opacities ("tram lines") within the lung lobes (Figure 3).

Diagnosis and Prognosis

Based on the history, physical examination, and ancillary diagnostics, the patient was diagnosed with allergic rhinitis with a history of chronic bronchitis, carrying a dubious prognosis.

Therapy

Therapy was administered using the bronchodilator Salbutamol Sulfate (Lasal salbu® 2.5 mg, PT Lapi Laboratories, Indonesia) at a dosage of 0.1 mg/cat (0.1 mL + 4.9 mL 0.9% NaCl) via nebulization for 10–15 minutes twice daily (q12h) for 30 days. Concurrently with the nebulization protocol, the patient received infrared light therapy for 10–15 minutes over the 30-day period. Clapet 50® (Amoxicillin and Clavulanate Potassium 40/10 mg) was prescribed twice daily at ½ tablet for 7 days. Flumax® (VetPlus, United Kingdom) was administered at two pumps twice daily for 14 days. During treatment, the cat's stool consistency became slightly soft, prompting the addition of a probiotic (Lacto-B®, PT Murni Air Sukses, Indonesia) at ½ tsp mixed with food for 7 days. On the final day of therapy, the patient received an intramuscular injection of Vitamin B Complex (1 mL). Throughout the treatment period, the patient was housed in a clean cage with daily environmental sanitation.

Discussion

Based on the anamnesis, clinical findings, and supportive diagnostic examinations—including routine hematology, cytology, and radiography—the patient was diagnosed with allergic

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rhinitis with a history of chronic bronchitis. Rhinitis can occur due to exposure to allergens such as dust, smoke, and chemical irritants that irritate the respiratory mucosa (Perkins *et al.*, 2024). In cats, rhinitis is also often associated with bacterial infections, although primary bacterial infections are rare because they generally develop secondarily following primary viral infections, particularly Feline Herpesvirus (FHV) and Feline Calicivirus (FCV), which cause damage to the respiratory mucosal epithelium (Reed, 2020). FHV infection is typically characterized by ulcerative keratitis and dendritic ulcers, whereas FCV is characterized by oral cavity ulcerations (El-Zaky *et al.*, 2025). In this patient, these pathognomonic symptoms were not found, and the cat appeared active with good appetite and water intake, allowing viral infection to be ruled out. However, the presence of mucopurulent discharge indicates the possibility of a secondary bacterial infection. This condition is suspected to be related to the cat's age, having entered the geriatric phase, resulting in a decline in immune system function and increased susceptibility to bacterial infections (McKenzie, 2025).

In addition to the rhinitis, the patient had a history of chronic bronchitis since being rescued. Chronic bronchitis is a long-standing inflammation initiated by infections, allergies, or inhaled irritants/toxins, which can be exacerbated by changes in weather, temperature, or humidity. Its presenting symptoms include coughing, excessive expiration, and abnormal inspiratory sounds (Johnson *et al.*, 2016). Auscultation of the lungs revealed rhonchi, which are low-pitched breath sounds that occur as airflow passes through narrowed airways or accumulated mucus (Dünser *et al.*, 2018). These findings supported lower respiratory tract involvement, leading to thoracic radiographic examination in ventrodorsal (Figure 3A) and right lateral (Figure 3B) projections. The radiographic results demonstrated a bronchial pattern characterized by bronchial wall thickening visible as parallel lines ("tram lines") in the left cranial and right caudal lobes. This finding is consistent with chronic bronchitis, which on radiographic examination typically presents with increased bronchial visualization due to wall thickening and/or luminal accumulation of material (Grotheer and Schulz, 2019; Srinivasan *et al.*, 2019). Chronic bronchial inflammation can trigger inflammatory cell infiltration and recurrent tissue repair processes, ultimately leading to bronchial wall fibrosis. These changes cause the bronchi to appear more prominent on radiographs compared to normal conditions (Park *et al.*, 2005).

The patient had a prior treatment history but showed no significant clinical improvement, prompting further evaluation to identify contributing factors. During evaluation, it was observed that feeding dry food was followed by sneezing and nasal discharge. Despite switching food brands, clinical signs persisted. These findings point toward upper respiratory tract involvement in the form of rhinitis. According to Westerfeld *et al.* (2023), dry food contains fine particles that can increase upper respiratory tract reactivity. These particles are suspected to irritate the nasal mucosa and trigger an inflammatory response, which, upon repeated exposure, can lead to increased mucus production, impairment of mucociliary clearance mechanisms, and a heightened risk of secondary infections (Lin *et al.*, 2018; Scadding *et al.*, 2015; Sturgess, 2013).

During evaluation, dyspnea was observed and suspected to be related to the patient's history of chronic bronchitis. Furthermore, sneezing and nasal discharge were suspected to be triggered by nasal mucosal irritation from fine particles in dry food. Westerfeld *et al.* (2023) stated that food containing fine particles can increase upper respiratory tract reactivity, while Lin *et al.* (2018) reported that fine particles contribute to respiratory distress. Repeated particle exposure can trigger mucosal inflammation, increased mucus production, and disruption of mucociliary clearance (Scadding *et al.*, 2015), subsequently increasing the risk of secondary infections (Sturgess, 2013). Pre-existing chronic bronchitis causes airway narrowing, increased mucus secretion, mucociliary dysfunction, and airflow limitation (Nelson *et al.*, 2014). This condition

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can be exacerbated by environmental fluctuations in weather, temperature, and humidity, which trigger bronchial hypersensitivity and respiratory tract inflammatory responses (Gu *et al.*, 2024). Airflow obstruction increases respiratory effort, leading to dyspnea (Davis *et al.*, 2002). In addition, Jammes *et al.* (2002) reported that cold air exposure can impair respiratory function. Studies by Sue-Chu *et al.* (2012) and Koskela *et al.* (2007) also demonstrated that repeated exposure to cold air can cause airway epithelial damage and structural and functional changes in the airway walls.

Complete Blood Count (CBC) testing aims to evaluate physiological condition and general health status in animals (Gundaliya *et al.*, 2025). The hematology results showed elevated White Blood Cells (WBC), with lymphocytosis. Lymphocytosis can occur due to acute stress responses (physiological lymphocytosis), chronic inflammation, neoplasia, and hypoadrenocorticism (Kristepi and Oikonomidis, 2016). Lymphocytosis in this case is suspected to be related to a chronic inflammatory process and an acute stress response to the environment and repeated allergen/irritant exposure, such as dust, which stimulates the immune system (Johnson *et al.*, 2005; Miller, 2014).

Cytological examination performed on nasal discharge samples revealed infiltration of neutrophils and macrophages. This finding indicates an active inflammatory process in the nasal mucosa. Fine particles from dry food are suspected to act as irritants or allergens that trigger an immune response. Allergen exposure stimulates IgE antibody production; upon re-exposure, inflammatory mediators such as histamine are released, causing sneezing, rhinorrhea, and nasal congestion (Eifan *et al.*, 2016). This inflammatory cascade leads to inflammatory cell infiltration, including neutrophils and macrophages, into the nasal mucosa (Liva *et al.*, 2021). Macrophages function as antigen-presenting cells (APCs) that help activate the immune response and perpetuate tissue inflammation in the nasal passages (Abbas *et al.*, 2016; Bousquet *et al.*, 2008).

Nevertheless, the diagnosis of allergic rhinitis in this patient has limitations, as specific diagnostic tests to confirm allergic etiology—such as an allergen challenge test, hypersensitivity testing, or serum IgE level measurement—were not performed (Yilmaz *et al.*, 2023). Therefore, diagnosis and management in this case remain based on history, clinical signs, and ancillary diagnostic results pointing toward environmental irritants or dry food particles as triggering factors for respiratory tract inflammation.

Therapy was designed taking into account the patient's geriatric status, focusing management on alleviating clinical signs, preventing relapse, and maintaining quality of life. The suspected involvement of fine dry food particles as nasal mucosa irritants formed the basis for switching the diet to wet food to minimize particle exposure that could trigger upper respiratory inflammation. Environmental factors such as weather, temperature, and humidity changes—which can potentially exacerbate chronic bronchitis—are difficult to control completely. Therefore, environmental management was implemented, including restricting outdoor activity, maintaining cleanliness in the housing area, and creating a comfortable, low-stress environment. These measures included providing a quiet, easily accessible resting area and separating feeding, drinking, and litter box locations to reduce competition with other cats (Hirschberger *et al.*, 2022).

The patient was also treated with the bronchodilator Salbutamol Sulfate (Lasal salbu® 2.5 mg, PT Lapi Laboratories, Indonesia) at a dosage of 0.1 mL + 4.9 mL 0.9% NaCl via nebulization. Administering the bronchodilator twice daily aimed to manage airway constriction (Hawkins *et al.*, 2008). The bronchodilator acts on the smooth muscles within narrowed airway walls responding to allergens, thereby reducing airway hyperresponsiveness. The benefit of

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inhalation therapy is higher localized drug delivery with fewer systemic endocrine and immune side effects, making it safe for geriatric cats (Lappin *et al.*, 2017). Alongside the bronchodilator, infrared therapy was administered to generate a thermal effect that stimulates vasodilation, improves blood circulation, and aids in the relaxation of respiratory muscles (Maesaroh and Nahdhliyyah, 2023). The combination of bronchodilator and infrared therapy represents an appropriate therapeutic choice to manage chronic bronchitis accompanied by clinical dyspnea.

Antibiotic therapy used in this case was Clapet 50® (Amoxicillin and Clavulanate Potassium 40/10 mg). AmoxiClav is a first-line antimicrobial commonly used to treat respiratory and urinary tract infections (Sparkes *et al.*, 2016). Antibiotic administration was based on the finding of leukocytosis, indicating a systemic inflammatory response, and cytological evidence of neutrophilic infiltration in the nasal discharge, pointing toward secondary bacterial involvement in the respiratory tract even though a specific bacterial agent was not isolated. The patient was also given Flumax® (VetPlus, United Kingdom), which contains L-lysine (500 mg/cat), Vitamin B_3 (5 mg/cat), Vitamin B_6 (5 mg/cat), and Zinc (1 mg/cat). Flumax is a supplement used to support the resolution of respiratory issues. L-lysine is an essential amino acid in cats and humans that aids in repairing lung tissue damaged by chronic inflammation or infection (Zhang *et al.*, 2019). In addition to tissue regeneration, L-lysine supplementation in cats has been reported to help reduce the severity of clinical signs such as sneezing, nasal secretion, and conjunctivitis (Stiles *et al.*, 2002).

Prior to therapy, the cat's fecal score was 2 (very moist but not liquid) according to the Royal Canin Fecal Score System for Cats, leading to the administration of a probiotic (Lacto-B®, PT Murni Air Sukses, Indonesia). Probiotics are thought to alter the intestinal environment by lowering pH and affecting oxygen levels, creating conditions unfavorable for bacterial proliferation. In the gut, probiotics compete with pathogenic bacteria for nutrients and binding sites on the intestinal wall, inhibiting bacterial growth (Fukuda, 2017). Following probiotic administration, the fecal score improved to 3 (moist and formed), indicating an improvement in stool consistency.

After 30 days of treatment, the patient showed clinical improvement, evidenced by cytological re-examination showing no further neutrophilic or macrophage infiltration, and radiographic re-examination demonstrating improvement compared to baseline. However, housing and management practices must be maintained continuously, including restricting outdoor access, maintaining cleanliness around the living area, feeding wet food or dry food mixed with wet food to reduce fine particles, providing dedicated food and water bowls, and administering immune-supportive vitamins.

CONCLUSION AND SUGGESTIONS

Conclusion

Based on anamnesis, clinical examination, hematological profiling, cytological evaluation, and diagnostic imaging, the patient was diagnosed with allergic rhinitis secondary to dietary/environmental particulate irritation, complicated by chronic bronchitis, carrying a guarded prognosis (*prognosis dubius*). Clinical remission achieved over a 30-day treatment period highlights the necessity of lifelong environmental management, dietary modification (transitioning to canned wet food or moistened kibble to eliminate particulate inhalation), and maintenance of systemic immune function via targeted nutritional supplementation.

Suggestions

In feline patients presenting with chronic bronchitis and upper airway hyperresponsiveness, environmental control strategies must prioritize the elimination of airborne particulate irritants,

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including dry food dust and environmental toxins. Complete dietary conversion to wet food formats is strongly advised to preserve upper respiratory mucosal integrity. Long-term supportive care utilizing immunomodulatory nutraceuticals should be maintained to preserve physiological reserves in geriatric felines. Serial clinical and radiographic monitoring is essential to detect early disease relapses and prevent irreversible lower airway remodeling.

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REFERENCES

Abbas, A. K., Lichtman, A. H., & Pillai, S. (2016). Basic Immunology: Functions and Disorders of the Immune System. 7th ed. Philadeplhia: Elsevier.

Bergqvist, J., Bove, M., Andersson, A., Schiöler, L., Klepaker, G., Abrahamsen, R., Fell, A. K. M., & Hellgren, J. (2022). Chronic rhinosinusitis associated with chronic bronchitis in a five-year follow-up: the Telemark study. *BMC Pulmonary Medicine*, *22*(1). https://doi.org/10.1186/s12890-022-02203-8

Brożek, J. L., Bousquet, J., Agache, I., Agarwal, A., Bachert, C., Bosnic-Anticevich, S., Brignardello-Petersen, R., Canonica, G. W., Casale, T., Chavannes, N. H., Correia de Sousa, J., Cruz, A. A., Cuello-Garcia, C. A., Demoly, P., Dykewicz, M., Etxeandia-Ikobaltzeta, I., Florez, I. D., Fokkens, W., Fonseca, J., … Schünemann, H. J. (2017). Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines—2016 revision. *Journal of Allergy and Clinical Immunology*, *140*(4), 950–958. https://doi.org/10.1016/j.jaci.2017.03.050

Caimmi, D., Marseglia, A., Pieri, G., Benzo, S., Bosa, L., & Caimmi, S. (2012). *Nose and lungs: one way, one disease*. http://www.ijponline.net/content/38/1/60

Cirillo, I., Marseglia, G., Klersy, C., & Ciprandi, G. (2007). Allergic patients have more numerous and prolonged respiratory infections than nonallergic subjects. *Allergy: European Journal of Allergy and Clinical Immunology*, *62*(9), 1087–1090. https://doi.org/10.1111/j.1398-9995.2007.01401.x

Davis, M. S., Lockard, A. J., Marlin, D. J., & Freed, A. N. (2002). Airway cooling and mucosal injury during cold weather exercise. *Equine Veterinary Journal. Supplement*, (34), 413–416. https://doi.org/10.1111/j.2042-3306.2002.tb05458.x

Dünser, M. W., Dankl, D., Petros, S., & Mer, M. (2018). The Airway and Lungs. *Clinical Examination Skills in the Adult Critically Ill Patient*, 21–49. https://doi.org/10.1007/978-3-319-77365-0_5

Eifan AO, Durham SR. (2016). Pathogenesis of allergic rhinitis. *Clinical & Experimental Allergy*, 46(9), 1139–1151.

El-Zaky, N., Orieby, A., Tahoun, A., Khalifa, H. O., Al-Gaabary, M. H., & Osman, S. A. (2025). A study on Feline Upper Respiratory Tract Disease with Clinico-molecular Profiling of the associated Feline Herpesvirus and Calicivirus Infections in Domestic Cats. *Egyptian Journal of Veterinary Science*, *0*(0), 1–11.

Fukuda, K. (2017). Is it feasible to control pathogen infection by competitive binding of probiotics to the host. *Virulence*, 8(8), 1502–1505. https://doi.org/10.1080/21505594.2017.1382798

Grotheer, M., & Schulz, B. (2019). Feline asthma and chronic bronchitis - an overview of diagnostics and therapy. Tierarztliche Praxis Ausgabe K: Kleintiere - Heimtiere, 47(3), 175–186.

Gu, W., Xie, D., Li, Q. Y., Feng, H., Xue, Y., Chen, Y., Tang, J., Zhou, Y., Wang, D., Tong, S., & Liu, S. (2024). Association of humidity and precipitation with asthma: a systematic review and meta-analysis. Frontiers in Allergy, 5.

Gundaliya, K. D., Fefar, D. T., Parasana, D. K., Bhadania, A. R., & Kalaria, V. A. (2025). Evaluation of haematological and biochemical parameters in different pathological conditions in dog. *International Journal of Advanced Biochemistry Research*, *9*(10), 93–98. https://doi.org/10.33545/26174693.2025.v9.i10b.5875.

Hawkins, E.C. (2008). How I Treat Feline Bronchitis. NAVC Conference. Raleigh, North Carolina. pp: 1440-1442.

Hirschberger, J., Palić, J., Hartmann, H., Castelletti, N., & Schulz, B. (2022). Evaluation of long-term therapy in cats with feline asthma and chronic bronchitis. *Tieraerztliche Praxis Ausgabe Kleintiere Heimtiere*, *51*(02), 73–81. https://doi.org/10.1055/a-2031-2731

Jammes, Y., Delvolgo-Gori, M. J., Badier, M., Guillot, C., Gazazian, G., & Parlenti, L. (2002). One-year occupational exposure to a cold environment alters lung function. *Archives of Environmental Health*, *57*(4), 360–365. https://doi.org/10.1080/00039890209601422

Johnson, L. R., De Cock, H. E. V., Sykes, J. E., Kass, P. H., Maggs, D. J., & Leutenegger, C.M. (2005). Cytokine gene transcription in feline nasal tissue with histologic evidence of inflammation. *American Journal of Veterinary Research*, 66(6), 996–1001.

Johnson, L.R., Johnson, E.G., Vernau, W., Kass, P.H., Byrne, B.A. (2016). Bronchoscopy, Imaging, and Concurrent Diseases in Dogs with Bronchiectasis. *Journal of Veterinary Internal Medicine*, 30(1), 247-254.

Kahn, C.M. (2011). The Merck Veterinary Manual. 9th Edition. USA: Merck and Co. 1167-1240.

Koskela, H.O. (2007). Cold air provoked respiratory symptoms: The mechanism and management. *International Journal of Circumpolar Health*, 66.

Kristepi, M., & Oikonomidis, I. (2016). Lymphocytosis in veterinary patients. *Veterinary Hematology Review.*

Lappin MR, Blondeau J, Boothe D, Breitschwerdt EB, Guardabassi L, Lloyd DH, Papich MG, Rankin SC, Sykes JE, Turnidge J, Weese JS. (2017). Antimicrobial use Guidelines for Treatment of Respiratory Tract Disease in Dogs and Cats: Antimicrobial Guidelines Working Group of the International Society for Companion Animal Infectious Diseases. Journal of Veterinary Internal Medicine 31(2): 279-294.

Lin, C.-H., Lo, P.-Y., Wu, H.-D., Chang, C., & Wang, L.-C. (2018). Association between indoor air pollution and respiratory disease in companion dogs and cats. *Journal of Veterinary Internal Medicine*, *32*(3), 1259–1267. https://doi.org/10.1111/JVIM.15143

Liva, G. A., Karatzanis, A. D., & Prokopakis, E. P. (2021). Review of Rhinitis: Classification, Types, Pathophysiology. *Journal of Clinical Medicine*, *10*(14), 3183. https://doi.org/10.3390/jcm10143183

Maesaroh, S., & Nahdhliyyah, A. I. (2023). Management Of Physiotherapy In Bronchial Asthma With Modality Infra-Red, Chest Therapy,And Respiratory Muscle Stretch Gymnastic. Pena Medika: Jurnal Kesehatan, 13(2), 380-389.

McKenzie, B. (2025). Immunosenescence and Inflammaging in Dogs and Cats: A Narrative Review. *Journal of Veterinary Internal Medicine*, *39*(4). https://doi.org/10.1111/jvim.70159

Miller, C. J. (2014). Allergic airway disease in dogs and cats and feline bronchopulmonary disease. In *Small Animal Critical Care Medicine, Second Edition* (pp. 111–115). Elsevier Health Sciences. https://doi.org/10.1016/B978-1-4557-0306-7.00020-9

Nelson, R. W., & Couto, C. G. (2014). Small Animal Internal Medicine. Elsevier.

Park, J. S., & Paik, S. H. (2005). Radiologic Findings of Bronchial Asthma. *Tuberculosis and Respiratory Diseases*, *59*(6), 591–599. https://doi.org/10.4046/TRD.2005.59.6.591

Perkins, V., Barnes, M., & Gardiner, Q. (2024). *Allergic rhinitis*. 76–85. https://doi.org/10.1201/9780429430268-9

Ramaditya NA, Tono PG, Suarjana IGK, Besung INK. (2018). Isolasi klebsiella sp. berdasarkan tingkat kedewasaan dan lokasi pemeliharaan serta pola kepekaan terhadap antibakteri. Buletin Vet. Udayana 10(1): 26-32.

Reed, N. (2020). Chronic Rhinitis in the Cat: An Update. In *Veterinary Clinics of North America - Small Animal Practice* (Vol. 50, Issue 2, pp. 311–329). W.B. Saunders. https://doi.org/10.1016/j.cvsm.2019.10.005

Scadding, G. W., Eifan, A. O., Penagos, M., Dumitru, A., Switzer, A., McMahon, O., Phippard, D., Togias, A., Durham, S. R., & Shamji, M. H. (2015). Local and systemic effects of cat allergen nasal provocation. *Clinical & Experimental Allergy*, *45*(3), 613–623. https://doi.org/10.1111/CEA.12434

Sparkes, A. H., Caney, S., Chalhoub, S., Elliott, J., Finch, N., Gajanayake, I., Langston, C., Lefebvre, H. P., White, J., & Quimby, J. (2016). ISFM Consensus Guidelines on the Diagnosis and Management of Feline Chronic Kidney Disease. *Journal of Feline Medicine and Surgery*, 18(3), 219–239.

Srinivasan, S., & Chawla, A. (2019). *Patterns and Signs in Thoracic Imaging*. 1–29. https://doi.org/10.1007/978-981-13-2544-1_1

Stiles, J., Townsend, W. M., Rogers, Q. R., & Krohne, S. G. (2002). Effect of oral administration of L-lysine on conjunctivitis caused by feline herpesvirus in cats. *American Journal of Veterinary Research*, 63, 99–103.

Sturgess, K. (2013). Chronic nasal discharge and sneezing in cats. *In Practice*, *35*(2), 67–76. https://doi.org/10.1136/INP.F633

Sue-Chu M. (2012). Winter sports athletes: long-term effects of cold air exposure. Br J Sports Med. 2012;46:397–401.

Sykes, J. E. (2014). Pediatric feline upper respiratory disease. In *Veterinary Clinics of North America - Small Animal Practice* (Vol. 44, Issue 2, pp. 331–342). https://doi.org/10.1016/j.cvsm.2013.10.005

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https://doi.org/10.24843/bulvet.2026.v18.i04.p24

van Pelt, D. R., & Lappin, M. R. (1994). Pathogenesis and treatment of feline rhinitis. In *Veterinary Clinics of North America - Small Animal Practice* (Vol. 24, Issue 5, pp. 807–823). W.B. Saunders. https://doi.org/10.1016/S0195-5616(94)50102-5

Westerfeld, R., Payette, F., Dubuc, V., Manguin, E., Picotte, K., Beauchamp, G., Bédard, C., & Leclere, M. (2023). Effects of soaked hay on lung function and airway inflammation in horses with severe asthma. *Journal of Veterinary Internal Medicine.*

Yılmaz, A., Yılmaz, H., Turan, S., Çelik, A., Nadeem, M. A., Demirel, F., Demirel, S., Eren, B., Emiralioğlu, O., & Arslan, M. (2022). Biotechnological Advancements in Coriander (Coriandrum sativum L.). *Avrupa Bilim Ve Teknoloji Dergisi*, 35, 203-220. https://doi.org/10.31590/ejosat.1072325

Zhang, Y., Yu, W., Han, D., Meng, J., Wang, H., & Cao, G. (2019). L-lysine ameliorates sepsis-induced acute lung injury in a lipopolysaccharide-induced mouse model. *Biomedicine & Pharmacotherapy*, *118*, 109307–109307. https://doi.org/10.1016/J.BIOPHA.2019.109307

Tables

Tabel 1. *Complete Blood Count* (CBC) result

Parameter	Result	Reference Interval	Interpretation
WBC (10^3/uL)	22.71	5.5 – 19.5	High
LYM#	17.47	0.8 – 7	High
MID#	1.64	0 – 1,9	Normal
GRA#	3.6	2.1 – 15	Normal
LYM (%)	76.9	12 – 45	High
MID (%)	7.2	2 – 9	Normal
GRA (%)	15.9	35 – 85	Low
RBC (10^6/uL)	6.95	4.6 – 10	Normal
HGB (g/dL)	10.9	9.3 – 15.3	Normal
MCHC (g/dL)	32.4	30 – 38	Normal
MCH (pg)	15.7	13 – 21	Normal
MCV (fL)	48.4	39 – 52	Normal
RDW-CV (%)	12.8	14 – 18	Low
RDW-SD (fL)	29.4	35 – 56	Low
HCT (%)	33.6	28 – 49	Normal
PLT (10^9/L)	156	100 – 514	Normal
MPV (fL)	8	5 – 11.8	Normal
PDW (fL)	10.5	13.3 – 18.5	Low
PCT (%)	0.124	0.1 – 0.5	Normal
P-LCR (%)	18.7	13 – 43	Normal

Abbreviations: WBC: White Blood Cell; Lym: Lymphocyte; Mid: Mid Size Cell; Gra: Granulosit; RBC: Red Blood Cell; HGB: Hemoglobin; MCV: Mean Corpuscular Volume; MCH: Mean Corpuscular Hemoglobin; MCHC: Mean Corpusculan Hemoglobin Concentration; RDW-CV: Red Cell Distribution Width Coefficient Variation; RDW-SD: Red Cell Distribution Width Standard Deviation; HCT: Hematocrit; PLT: Platelet; MPV: Mean Platelet Volume; PDW: Platelet Distribution Width; PCT: Plateletcrit. *Analyzed using iCell-800Vet, ICUBIO.

Terakreditasi Nasional Sinta 4, berdasarkan Keputusan Direktur Jenderal
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Figures

Figure 1. Patient condition, generally appeared calm

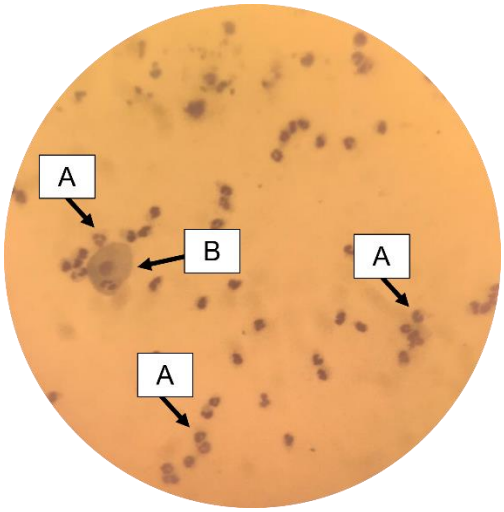

Figure 2. Nasal cytology of the patient. (A) Neutrophilic inflammatory cells, (B) Macrophages. This finding indicates an active inflammatory process within the nasal mucosa.

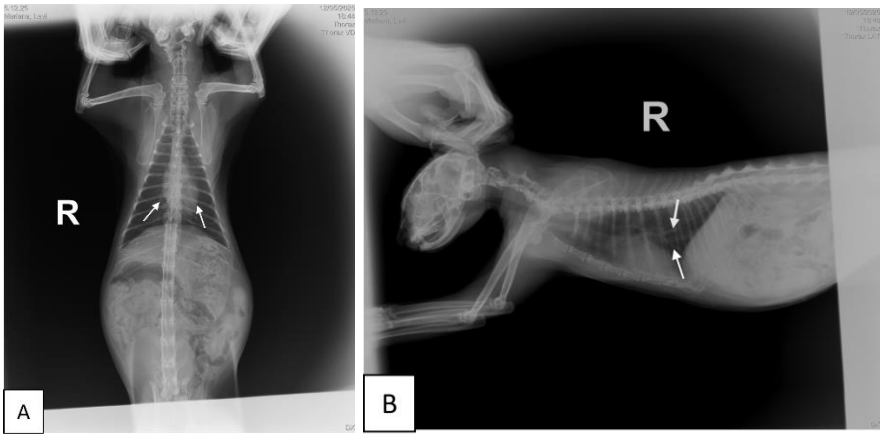

Figure 3. Thoracic radiographic examination of the patient in (A) Ventrodorsal recumbency, and (B) Right lateral recumbency. Noticeable parallel line opacities ("tram lines") are observed (white arrows).