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Research Reports

Prevalence of Upper Respiratory Tract Infection in Cats at Satwagia Intensive Care Bogor

Prevalensi Infeksi Saluran Pernapasan Atas pada Kucing di Satwagia Intensive Care Bogor

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ABSTRACT

Background: Upper respiratory tract infections (URTI) are significant disorders affecting the respiratory system, including the sinuses, pharynx, trachea, bronchi, bronchioles, and lungs. Despite the clinical significance of URTI in feline populations, research on their prevalence in cats within Indonesia remains limited and underreported, highlighting the need for more comprehensive studies in this area. **Purpose:** This study aims to determine the prevalence of upper respiratory tract infections (URTI) in cats at Satwagia Intensive Care Bogor over a one-year period (August 2022 to August 2023). **Method:** Data for this study were collected from veterinary examinations of patients with confirmed URTI, sourced from the medical records of affected cats over the specified one-year period. A total of 124 confirmed cases of URTI were recorded. The data were analyzed descriptively, with results presented in tables, and compared against existing literature. Quantitative analysis included prevalence calculations, followed by ANOVA to assess the relationship between various subgroups, such as breed, gender, age, and monthly incidence and the occurrence of URTI. **Results:** The prevalence of URTI in cats at Satwagia Intensive Care Bogor was found to be 23.98%. Domestic breeds showed the highest prevalence at 58%, with male cats accounting for 66% of the cases. Kittens demonstrated the highest prevalence at 66%, with ANOVA revealing significant age-related differences in URTI incidence. The highest monthly prevalence was observed in November, at 12%. **Conclusion:** Significant age-related differences and a peak in November suggest seasonal and demographic factors. This study provides important baseline data for feline URTI in Indonesia and emphasizes the need for targeted prevention and further research.

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ABSTRAK

Latar Belakang: Infeksi saluran pernapasan atas (ISPA) adalah gangguan pada sistem pernapasan yang dapat terjadi pada sinus, faring, trakea, bronkus, bronkiolus, dan paru-paru. Penelitian mengenai prevalensi ISPA pada kucing di Indonesia masih sangat terbatas dan belum banyak dilaporkan. **Tujuan:** Penelitian ini bertujuan untuk mengetahui prevalensi infeksi saluran pernapasan atas (ISPA) pada kucing di Satwagia Intensive Care Bogor selama periode satu tahun (Agustus 2022 - Agustus 2023). **Metode:** Data yang digunakan adalah hasil pemeriksaan dokter hewan terhadap pasien yang terkonfirmasi ISPA dan data diambil dari rekam medis kucing yang terkena ISPA dalam kurun waktu satu tahun dari Agustus 2022 hingga Agustus 2023. Jumlah pasien ISPA yang terkonfirmasi dari bulan Agustus 2022 hingga Agustus 2023 adalah 124 pasien. Data yang telah terkumpul kemudian diolah secara deskriptif, disajikan dalam bentuk tabel, dianalisis, dan dibandingkan dengan literatur yang ada. Pengolahan data dilakukan secara kuantitatif dengan menghitung prevalensi, yang kemudian dianalisis menggunakan ANOVA untuk melihat hubungan masing-masing subkelompok dengan kejadian ISPA. **Hasil:** Prevalensi ISPA pada kucing di Satwagia Intensive Care Bogor adalah sebesar 23.98%. Kelompok ras kucing dengan prevalensi ISPA tertinggi adalah ras domestik dengan angka kejadian sebesar 58%. Kucing jantan memiliki prevalensi ISPA yang lebih besar yaitu 66%. Kejadian ISPA pada anak kucing dengan prevalensi tertinggi sebesar 66% dengan hasil uji ANOVA menunjukkan bahwa terdapat perbedaan yang signifikan antara umur terhadap kejadian ISPA pada kucing. Prevalensi ISPA tertinggi terjadi pada bulan November sebanyak 12%. **Kesimpulan:** Perbedaan signifikan berdasarkan usia serta puncak kasus pada bulan November menunjukkan adanya faktor musiman dan demografis. Studi ini memberikan data dasar penting mengenai URTI pada kucing di Indonesia dan menekankan perlunya pencegahan yang terarah serta penelitian lanjutan.

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Kata kunci: Infeksi; Kucing; Pernafasan; Prevalesi;

INTRODUCTION

Prevalence is the number of cases in the population suffering from a certain condition in a certain area (point prevalence) or in a certain period of time (period prevalence) (Tirtasari, *et al.,* 2019). The prevalence of upper respiratory tract infections (URTI) in cats based on research conducted in Wuhan, China from April 2019 to April 2022 was 64.3% (Gao, *et al.,* 2023). The sample population in the study was 1,158 cats affected by URTI from 20 veterinary hospitals in Wuhan, China. Epidemiological studies conducted in Australia in 2019 estimated the prevalence of URTI in cats caused by Feline Herpesvirus ranged from 3-38% (Nguyen, *et al.,* 2019). The prevalence rate of URTI in cats has different numbers in each region or country (Putri, *et al.,* 2020). Studies on the prevalence of URTI in cats in Indonesia are still very few and have not been widely reported.

Upper respiratory tract infections (URTI) in cats can be caused by several viruses, including Feline herpes virus, Feline calicivirus (FCV), Retrovirus, and Feline parvovirus (Al Hafid, *et al.,* 2022). URTI in cats can also be caused by bacterial infection, such as *Bordetella bronchiseptica*. Upper respiratory tract infections in adult cats is rarely fatal, but can be fatal in kittens (Lobova, *et al.,* 2019). Upper respiratory tract infections are common in cats that have not been vaccinated and are easily transmitted to other cats. The environment is one of the factors that influence the incidence of viral diseases in cats. Climate change that occurs in the environment is a condition of changing climate variability, including temperature, rainfall, and humidity (Lewin, 2018). Cats affected by URTI will show symptoms such as fever, sneezing, coughing, nasal discharge, shortness of breath, lethargy, and decreased appetite (Frymus, *et al.,* 2021).

Intensive Care Bogor is one of the inpatient veterinary clinics that focuses on the treatment and care of cats infected with viral diseases of the respiratory tract and viral infections of the gastrointestinal tract. The clinic was chosen as a research site because it has a population of cats covering a wide range of health conditions, including intensive cases susceptible to URTI in cats that are infectious in nature. The cats affected by URTI that came and were treated at Satwagia Intensive Care Bogor Veterinary Clinic were of different breeds, ages and genders. The writing of this final report is expected to provide information on the prevalence and percentage of the highest incidence of URTI in cats based on breed, age, sex, and the highest incidence rate in each month with various causative factors. Data of cats affected by URTI at Satwagia Intensive Care Bogor in the span of one year from August 2022-August 2023 were analyzed and the prevalence of incidence was calculated. Calculation of the prevalence of URTI incidence in cats is important to do, to obtain data on the prevalence of URTI incidence at Satwagia Intensive Care Bogor.

MATERIAL and METHOD

Collecting Data

The data collected for this study comprise primary data, secondary data, and supporting data. Primary data were gathered directly from the field through veterinary examinations of patients with upper respiratory infections (URTI). Secondary data consist of documentation from URTI patient records spanning the past year, from August 2022 to August 2023. Supporting data were obtained from relevant literature reviews. Between August 2022 and August 2023, the number of confirmed URTI patients was 124, according to clinical records. The total number of patients used in the prevalence calculation was derived from those treated in both the respiratory tract infection ward and the gastrointestinal infection ward, totaling 517 patients, which reflects the overall patient count for the year. The procedures used in preparing this report involved field observation, data collection, and data processing. Data collection consisted of primary and secondary data. Primary data were obtained directly from the field, while secondary data were derived from the medical records of cats affected by URTI within a one-year period from August 2022 to August 2023.

Data Analysis

The collected data were then used to calculate prevalence, percentage calculations by breed, gender, age, and incidence based on periods (months). Subsequently, these data were analyzed using ANOVA tests. The prevalence calculations were presented in tabular form and compared with existing literature studies, resulting in a final report detailing the prevalence of URTI incidence in cats at Satwagia Intensive Care Bogor . The primary and secondary data obtained were processed descriptively, presented in table form, analyzed, and compared with existing literature. Data processing was conducted quantitatively by calculating prevalence, which was then analyzed using ANOVA to examine the relationship of each subgroup with the occurrence of URTI. Percentage calculations included race, gender, age, and occurrence percentage based on time periods (months), which are presented in tabular form. The highest percentages in each occurrence category were analyzed and linked to several internal and external factors influencing them. Internal factors such as the physical condition, behavior, and immune system of the cats were considered, while external factors such as climate changes (temperature and weather) were also taken into account.

RESULTS

Clinical Signs and Prevalence

The clinical symptoms most commonly observed in cats with upper respiratory tract infections (URTI) at Satwagia Intensive Care Bogor include nasal discharge, sneezing, and dehydration (Table 1). Prevalence of URTI in cats at Satwagia Intensive Care Bogor in the period August 2022-August 2023:

$$\text{Prevalence}=\frac{(\text{Number of confirmed URI})}{(\text{Total number of patients})} \times 100 = \frac{124}{517} \times 100 = 23{,}98\%$$

The results showed a URTI prevalence of 23.98%. Disease prevalence rates are divided into four general categories, namely, high prevalence if most individuals in the population have the disease, moderate prevalence if some but not all

Table 1. Clinical Symptoms in Cats with URTI.

Clinical Signs	Number (Cats)	Percentage (%)
Discharge Mukopurulent	48	39%
Dirty Breath Sounds	22	18%
Sneezing	28	23%
Dehydration	26	20%
Total	**124**	**100**

Tabel 2. Data on URTI Incidence by Breed.

Clinical Signs	Number (Cats)	Percentage (%)
Domestic	72	58
Mix	30	24,1
Persian	9	7,2
Anggora	7	5,7
Himalayan	3	2,4
British Short Hair	1	1
Maine coon	2	1,6
Total	**124**	**100**

Tabel 3. Data on URTI incidence based on age

Category	Age (Month)	Total (Cats)	Percentage (%)
Kitten	0-12	82	66
Young adult	13-72	39	31,4
Mature adult	73-120	2	1,6
Senior	>120	1	1
Total		**124**	**100**

individuals in the population have the disease,, low prevalence if only a small proportion of individuals in the population experience the disease, and very low prevalence if individuals in the population very rarely or not at all experience the disease (Dimi, *et al.*, 2015). In this study, prevalence was categorized as low because only a quarter of the observed cat population was infected with URTI during that time period.

Percentage of URTI Incidence by Race

Data on cat breeds affected by URTI are domestic breeds 72 patients (Table 2). The racial group with the highest percentage of URTI was the domestic race at 58%. The ANOVA test showed no significant difference between races in the incidence of ARTI in cats, because it had a significance value of more than 0.05 (p>0.05).

Percentage of URTI Incidence by Gender

The number of male cats with ARTI was 82 and the number of female cats was 42. Male cats had a higher proportion of URTI at 66%, while female cats had a lower proportion of ARTI at 34%. ANOVA test showed no significant difference between sexes in the incidence of URTI in cats, because it has a significance value of more than 0.05 (p>0.05).

Percentage of URTI Incidence by Age

The incidence of URTI in kittens with the highest percentage was 66% (Table 3). ANOVA test showed a significant difference between ages on the incidence of URTI in cats, because it has a significance value less than 0.05 (p<0.05).

Table 4. URTI incidence data by time period

Month (Year)	Total (cats)	Percentage (%)
August (2022)	7	5.7
September (2022)	7	5.7
October (2022)	7	5.7
November(2022)	15	12
December (2022)	12	9.7
January (2023)	7	5.7
February (2023)	11	8.9
March (2023)	10	8
April (2023)	12	9.6
May (2023)	13	10.5
June (2023)	11	8.9
July (2023)	6	4.8
August (2023)	6	4.8
Total	**124**	**100**

Percentage of URTI Incidence by Time Period (Month)

Data on the incidence of URTI in cats were taken over a one-year period from August 2022-August 2023. ANOVA test showed no significant difference between time periods on the incidence of ARTI in cats, because it had a significance value of more than 0.05 (p>0.05). According to the data collected, the month of November had the highest number of cases and July and August had the lowest number of cases (Table 4). Meteorology Agency Climatology and Geophysics (BMKG) explained that the peak of the dry season in 2023 in most parts of Indonesia occurred in July and August, indicating that the peak of the dry season in 2023 will be in July and August. August, indicating that the dry season has the lowest number of cases. The highest number of cases occurs in November, which is the rainy season month in Indonesia.

DISCUSSION

According to Boldan (2022), URTI symptoms in cats encompass sneezing, watery eyes, conjunctivitis, nasal discharge, nasal congestion, reduced appetite, coughing, lethargy, fever, swollen lymph nodes, and difficulty breathing. The predominant clinical symptom in cats with URTI is nasal discharge from the nasal cavity. This discharge is often triggered by viral or bacterial infections of the upper respiratory tract, which cause inflammation of the nasal lining, leading to excessive fluid and heightened mucus production. Conditions such as sinusitis and rhinitis in cats can further increase mucus production in the upper respiratory tract, which is subsequently expelled through the nose. Additionally, cats may develop allergic rhinitis, resulting in inflammation of the upper respiratory tract and excess mucus production as a response to specific allergens (McManus, *et al.*, 2014).

Discharge or excess fluid in the upper respiratory tract due to viral or bacterial infections can cause obstruction, inflammation, and irritation, leading to shortness of breath and abnormal breathing sounds in affected cats. Inflammation of the upper respiratory tract may also narrow the airway, impeding airflow and producing irregular breathing sounds. Infections in the cat's respiratory tract can cause irritation to the tissues

within the nose, throat and bronchi. The cat's immune system immune system will respond to the infection by stimulating cytokine production and an inflammatory response. Cytokines are proteins produced by cells of the immune system in response to infection, inflammation, or system cells in response to infection, inflammation, or injury (Duque and Descoteaux, 2014). Cytokine production and inflammation in the cat's body can cause sneezing symptoms in cats as an attempt by the body to clear the the airway of irritants and mucus that irritate the cat's airway. Coughing and sneezing are the body's natural defense mechanisms to expel pathogens or foreign or foreign bodies from the cat's respiratory tract. URTI cats can become dehydrated as they excrete more fluid from their body through breathing, due to the coughing and sneezing experienced by the cat (Mulyani, *et al.,* 2021). The increase in body temperature in cats causes an increase in fluid needs in the body, high body temperature causes cats to lose more fluid through sweating and faster breathing. URTI cats that experience a decrease in appetite will result in a lack of fluid intake and nutrients necessary to maintain body fluid balance. Vomiting and diarrhea that occur in URTI cats can cause them to lose significant body fluids, leading to dehydration. Dehydration in cats can cause the cat's mucosa to turn pale due to the lack of fluid intake in the cat's body.

Domestic cats are one of the most widely kept cat breeds in Indonesia (Astika, 2023) and are usually allowed to roam freely in their environment and interact a lot with other cats (Fitriani, *et al.,* 2016). The high population and density of domestic cats in Indonesia that are kept outdoors increases the risk of contracting viral and bacterial infections through direct contact between infected cats (Danielle, 2021). Frequent interactions with outdoor cats can cause stress in domestic cats. Stress is one of the factors that can affect and reduce the immune system of domestic cats so that they have a higher risk of infection (Danielle, 2021). The maintenance of some domestic cats is done by placing the cat in a cage. Cage sanitation and cleanliness is also one of the factors that can affect the incidence of viral infections in pet cats. Poor hygiene can lead to an increased prevalence of viruses and bacteria that cause infections in cats. Cats kept in cages with poor air quality and air contamination can affect the cat's respiratory system. Poor air contamination occurs when the air around the cat contains particles or substances that are potentially harmful to the cat's health. Cats housed in closed cages without adequate ventilation will have poor air quality and this should be avoided, and they should be preferably kept in a double-sided open cage for better air circulation. Disinfection of cages, cat beds, feed and water dishes, and litter boxes should be done regularly (Danielle, 2021).

The higher incidence of URTI in male cats is due to the fact that male cats spend more time outdoors and are therefore more likely to come into contact with infectious pathogens (Gao, *et al.,* 2023). Male cats in heat tend to go outdoors in search of females to mate with, male cats are also more aggressive when in heat. Male cats can exhibit more dominant behaviors such as fighting with other male cats to gain dominance, so this can increase the chances of male cats being infected by other male cats that are already infected with viruses or bacteria (Slater, *et al.,* 2019). The incidence of URTI in kittens was significantly higher compared to adult cats. The susceptibility of kittens to infection by viruses and bacteria is due to their immune status which is still vulnerable and still in the process of growth (Gao, *et al.,* 2023). Past research has shown that kittens and young cats suffering from respiratory tract infections commonly develop multiple infections simultaneously (Vekšins, 2022). Kittens with low maternal immunity will become infected after exposure to a sick cat or a carrier cat. The main role of the immune system is to defend the body against invading abnormal cells. Kittens are more susceptible to disease due to reduced maternal immunity and they suffer more severe clinical symptoms compared to adult cats (Monteiro and Steagall, 2019). The innate immune system in cats that is present from birth (non-specific immunity) and acquired from their mothers is not yet optimally formed, making kittens susceptible to disease. Antigens are substances that stimulate an immune response in the body to protect the body from invading microorganisms such as viruses. A normal immune response consists of recognition of foreign antigens and mobilization of forces to defend against microorganisms that enter and attack it (Vreman, *et al.,* 2011). Kittens with an immature immunity not yet fully formed cannot protect themselves optimally from the attack of microorganisms that enter so that they are susceptible to disease.

Environmental and weather influences are the main factors that can affect respiratory viral infections. Respiratory viral infections follow a seasonal pattern such as winter in temperate climates and the rainy season in tropical climates (Price, *et al.,* 2019). Research conducted in Australia in 2018, showed that URTI in cats occur more frequently during the winter months (Nguyen, *et al.,* 2019). The virus will survive longer on objects that are in cool, moist conditions, consequently indirect transmission is more likely in winter. Other disease contributions may include latent stress and reactivation due to colder temperatures in winter. The humid air of the rainy season facilitates the growth and spread of respiratory pathogens (Danielle, 2021). High humidity increases virus transmission indirectly by increasing the stability of viral particles allowing them to remain protected outside the body for a longer period of time. Upper respiratory tract infections caused by viruses in the tropics occur in the rainy season when humidity is high (Danielle, 2021). The rainy season in November in Indonesia causes an increase in humidity that can affect the outer layer of the virus thus increasing its survival rate. Cat body immunity also tends to decrease in the rainy season so this can affect the disease susceptibility and spread.

CONCLUSION

This study recorded a 23.98% prevalence of upper respiratory tract infections (URTI) in cats treated at Satwagia Intensive Care Bogor over a one-year period. The highest incidence was observed among domestic breeds, male cats, and kittens. Statistical analysis revealed a significant association between age and URTI occurrence, with the peak incidence noted in November. These findings provide essential baseline data to

support the development of targeted preventive strategies and highlight the need for further research into the epidemiological patterns and risk factors of URTI in the Indonesian feline population.

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CONFLICT of INTEREST

The authors declare no conflict of interest

FUNDING INFORMATION

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ETHICAL APPROVAL

This study utilized retrospective data from clinical records. Since no identifiable patient information was collected and no direct intervention was performed, ethical clearance was not required.

AUTHORS' CONTRIBUTIONS

RP was responsible for data recording, data processing, and article writing. HEA provided input on data processing and article writing.

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