

Identification of Bat Types and Endoparasite Prevalence in Bats in Kedungpane Village, Mijen District, Semarang City

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Abstrak

Kedungpane merupakan salah satu kecamatan di Kota Semarang yang banyak dijumpai beberapa jenis kelelawar karena kondisi lingkungannya yang masih terjaga. Kelelawar merupakan mamalia kecil yang mempunyai peranan penting dalam ekosistem. Namun keberadaannya dan ektoparasit juga perlu diwaspadai karena berpotensi sebagai agen penularan penyakit zoonosis. Berdasarkan latar belakang tersebut maka tujuan penelitian ini adalah untuk menghitung prevalensi ektoparasit pada kelelawar di Desa Kedungpane. Metode penelitian ini adalah penelitian deskriptif kualitatif. Pengambilan sampel dilakukan dengan menggunakan mist net yang dipasang pada pukul 17.00-21.00 WIB. Hasil penelitian tersebut menyebutkan 49 ekor kelelawar telah ditangkap, 17 diantaranya terinfeksi ektoparasit. Prevalensi ektoparasit tertinggi terdapat pada kelelawar yang ditangkap di TPA Jatibarang sebesar 14,3% dari 49 ekor kelelawar yang diperiksa. Disimpulkan bahwa prevalensi ektoparasit tertinggi terdapat di TPA Jatibarang.

Kata kunci: kelelawar, ektoparasit, prevalensi

Abstract

Kedungpane is one of the sub-districts in the city of Semarang where several types of bats are often found because the environmental conditions are still maintained. Bats are small mammals that have an important role in the ecosystem. However, their presence and ectoparasites also need to be watched out for because they have the potential as agents of zoonotic disease transmission. Based on this background, the purpose of this study was to calculate the prevalence of ectoparasites in bats in Kedungpane Village. This research method is descriptive qualitative research. The samples were taken using mist net which was installed from 17.00-21.00 WIB. The results of this study stated that 49 bats had been caught, 17 of which were infected with ectoparasites. The highest prevalence of ectoparasites was shown in bats caught in the Jatibarang TPA with 14.3% of the 49 bats examined. It was concluded that the highest prevalence of ectoparasites was found in the Jatibarang landfill.

Keywords: *bats, ectoparasites, prevalence*

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INTRODUCTION

In Indonesia, bats are one of Indonesia's wealth with more than 200 species of bats, or about 20% of all known bat species in the world (Latifah, 2021; Suyanto, 2001). Bats are known as animals that play a very important role in pollination and dispersal of fruit seeds (Soegiharto *et al.*, 2010). This is because of its very wide cruising range (Soegiharto & Kartono, 2009). Based on this statement, the background of this research is the rise of cases of diseases spread by small mammals, one of which is bats. Kedungpane is one of the villages in Mijen, and has the potential to be a crossing path for bats when searching. This is due to the geographical location and environmental conditions that still follow the needs of bats, namely there are several types of fruits available in large quantities (Asrijaya, 2021).

The existence of bats has the potential to transmit disease because bats are one of the orders of small mammals that act as hosts for ectoparasites and endoparasites. Indonesia is a country with a tropical climate, with high temperature and humidity, this is one of the factors that can cause the development of ectoparasites. The existence of ectoparasites has become a problem that can be detrimental but has not received good attention (Putranto *et al.*, 2021). Ectoparasites are capable of transmitting germs to animals and humans such as protozoa, bacteria, viruses, cestodes, and nematodes. If the bat has been attacked by ectoparasites then other diseases will easily attack, such as fungi, viruses, and bacteria. Based on this, it is necessary to re-examine the increase in disease attacks. This study can determine the prevalence of ectoparasites in bats in Kedungpane Village (Maberuroh, 2022; Puspitarini *et al.*, 2018).

Before calculating prevalence values, it is necessary to identify ectoparasites and bats. In knowing the types of bats and their ectoparasites, identification is very important (Ransaleleh *et al.*, 2013). Identification can be done by knowing morphological and anatomical characteristics, both quantitative characteristics such as measurements of total length, leg length, patagium width, ear length, and body weight, as well as qualitative characteristics such as hair color, nipple formula, and so on (Manek *et al.*, 2020; Qaanitah *et al.*, 2018).

METHODS

This research was carried out in October- November 2021 by conducting direct exploration to the research location at the Jatibarang TPA and Jamal Sari Village, Kedungpane Village, Mijen District, as well as the Biology Laboratory of FMIPA UNNES to identify the types of ectoparasites obtained.

Astronomically, TPA Jatibarang is located at 702'27.9" South Latitude and 110021'6.8" East Longitude with an altitude of 253 meters above sea level. This area is an area of undulating hills with steep slopes greater than 24%. The height of the hill at the Jatibarang landfill varies from 63 m to 200 m above sea level. Jamalsari Village is located at 701'23.5" South Latitude and 110021'23.6" East Longitude (Figure 1). With an altitude of less than 200 meters above sea level, its location is close to the Jatibarang Reservoir which is surrounded by 1,000 banana trees, weeds and thousands of other fruit trees.

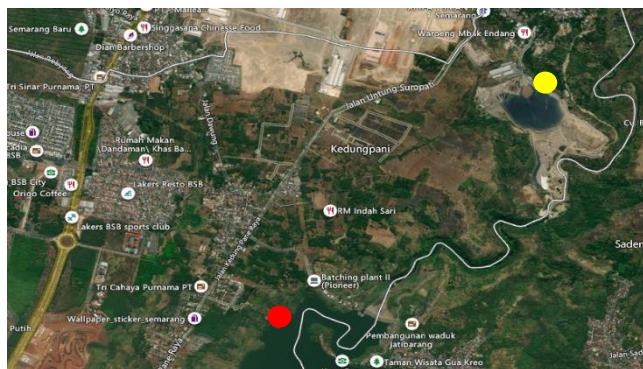


Figure 1. Sampling layout location map. ● TPA Jatibarang ● JamalSari Village

Each point in the sampling was fitted with 1 mist net which was carried out 2 times (Alimudin *et al.*, 2020). Catching bats is done using a mist net installed at 17.00-21.00 western Indonesian time and inspection every 1 hour, if any bats are entangled, the extraction process will immediately continue (Poerwanto *et al.*, 2020). Extraction was carried out by measuring body length, tail length, ears, observing ear shape, nose, and hair color. In addition, bat feathers are combed using a toothbrush to get ectoparasites that make bats their hosts (Iqbal, 2014). The ectoparasites found were put into a vial containing 70% alcohol (Poerwanto *et al.*, 2020). Furthermore, observations of ectoparasites were carried out at the Biology Laboratory of Universitas Negeri Semarang to be identified

RESULTS AND DISCUSSION

Bats

Jatibarang TPA and Jamalsari Village are areas with adequate vegetation for bats to inhabit. The research location is surrounded by the presence of abundant food resources. Temperature

conditions at the time of the study ranged from 25.15-27.10°C and with humidity of 76-84%. According to the results of research by Nurwidayati and Nurjana (2018), the temperature that can be tolerated by the presence of bats is at 24.25-28.02°C with humidity of 71.80-91.80%. The diversity factor of bat species can be caused by habitat type, geographical location, environmental conditions which are influenced by temperature and humidity. Bats are warm-blooded animals (homoiotherms) (Asrijaya, 2021; Hasibuan *et al.*, 2021). Bats have a tolerance limit for environmental temperature to their body temperature. Each type of bat has a different body resistance to habitat conditions (Asriadi, 2010). This is one of the reasons why only 3 species were caught in Kedungpane Village.

The three types of bats consist of *Cynopterus horsfieldii*, *Cynopterus brachyotis* and *Macroglossus sobrinus* (Figure 2). Each type of bat has its own characteristics that can be used as a basis for distinguishing its types. As in *Cynopterus horsfieldii* has relatively large eyes, gray hair, but as an adult it will look yellowish in the neck area. Then in the species *Cynopterus brachyotis*, the eyes are dark and large. There is a white line on the edge of the ear (Hanadhita *et al.*, 2018). The hair on the body is short, brown with lighter chest hair and striking. The patagium in this species has dark spots (Rahma *et al.*, 2018). The latter is the species *Macroglossus sobrinus*. This species has striking characteristics in its long snout and is accompanied by a tongue that is twice as long as the snout. His hair is light brown (Mulyono *et al.*, 2018). This species is often found in locations where there are many banana trees, because it is a source of food for them (Suyanto, 2001).

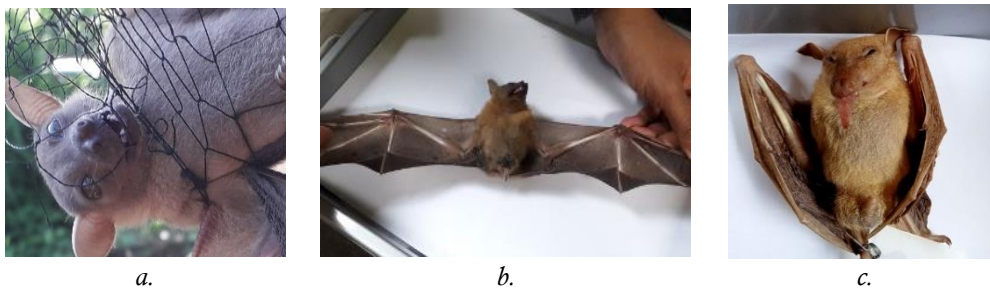


Figure 2. a. *Cynopterus horsfieldii*, b. *Cynopterus brachyotis*, c. *Macroglossus sobrinus*

In addition, the location of the height of a place for trapping also affects the number of bats obtained. The acquisition of bats caught in the Jatibarang TPA was more than the acquisition of bats from Jamalsari Village (Table 1). The geographical location of the Jatibarang TPA is at 253 masl and Jamalsari Village is located less than 200 masl. Not only that, but there are also more allegations of predators such as large lizards, snakes, and other reptiles in Jamalsari Village because the habitat is quite ideal for various types of reptiles.

Table 1. Bat data by research location.

Lokasi	Day	<i>Cynopterus horsfieldii</i>	<i>Cynopterus brachyotis</i>	<i>Macroglossus sobrinus</i>
TPA Jatibarang	1	7	10	7
	3	6	2	1
Jamalsari Village	4	1	4	5
	6	1	1	4
Total		15	17	17

Ectoparasite

Of 49 bats examined, 13 bats were found that carried 17 individual ectoparasites consisting of *Leptocyclopeda ferrari* and *Stylidia cf. caudata* (Fajri *et al.*, 2018). *Stylidia cf. caudata* (Figure 3A) has a genital covering that is shaped like a basal ellipse and protrudes outward. There is hair on the tibia and genitals. The mouth is in the shape of a proboscis to suck blood from its host. *Leptocyclopeda ferrari* (Figure 3B) is an ectoparasite that has white rings on its limbs, a segmented body, large eyes and long, slender claspers (Sembel, 2009).

Table 2. Ectoparasit of bat.

Ectoparasites	Species of bats			Totals
	<i>Cynopterus horsfieldii</i>	<i>Cynopterus brachyotis</i>	<i>Macroglossus sobrinus</i>	
<i>Leptocyclopedia Ferrari</i>	2	1	3	6
<i>Stylidia cf. caudate</i>	4	5	2	11

All types of ectoparasites found in this study belong to the Nycteribiidae (Dick, 2016; Sembel, 2009). Nycteribiidae is a class of obligate fly lice (Whitten *et al.*, 2000). This ectoparasite will use claws on the tips of the feet and ctenidia to attach itself to the hair of its host (Hadi *et al.*, 2011). Both can turn their heads up to 180° towards the thorax (Fauzi & Rahayuningsih, 2022). This movement will facilitate the ectoparasites in sucking blood on the skin of the host. This parasite is capable of being a vector of disease in humans and other animals (Azhar *et al.*, 2015).

Symptoms caused when attacked by this parasite are scabs, alopecia, papules, hyperemia, and anxiety which can be a stressor. These ectoparasites are often found on the neck and body of bats. Moreover, when the environmental conditions are favorable, the number of ectoparasites will be more. Bat hair that tends to be thick is a favorable habitat for ectoparasites. These conditions can provide good protection for ectoparasites (Kasso & Balakrishnan, 2013). The transfer of ectoparasites from one host to another does not occur directly between hosts. This migration occurs when several types of bats visit the same feeding area (Olival, 2013).

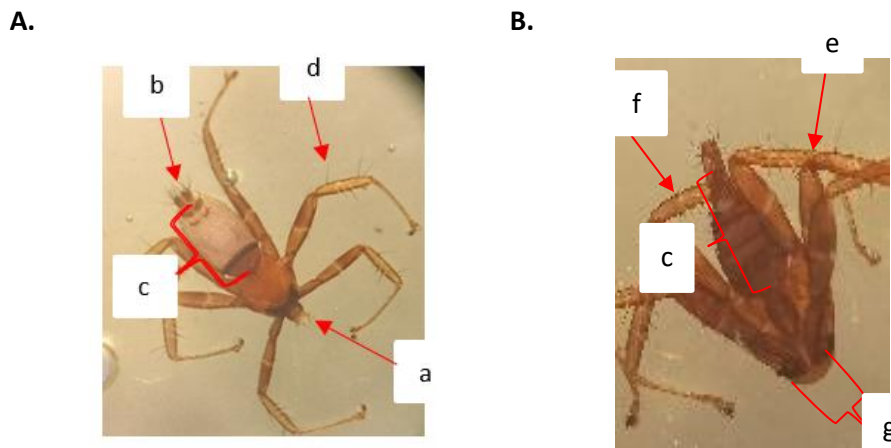


Figure 3. A. *Stylidia cf. caudate*; B. *Leptocyclopedia Ferrari*. a. mouth, b. genitalia, c. clasper, d. hairs, e. segmented leg, f. ring white, g. eyes

The prevalence value shows that Jamalsari Village gets the highest score (31.50%) (Table 3). These results can be interpreted into the general category or common infection. The infection is still in a fairly safe condition, but it still needs to be monitored. Because, if the value increases, the condition will be more dangerous (Hakim & Irawan, 2019).

Tabel 3. Ectoparasite prevalence values in bats

Location	Infected bat	Totals of bats examined	Prevalence (%)
TPA Jatibarang	7	33	21,21
Jamalsari Village	6	16	31,50
Totals	13	49	26,53

The number of ectoparasites obtained is also influenced by the sex of the host (Hadi & Soviana, 2017). It will be rare to find ectoparasites on the bodies of male bats and are often found in female bats. This can happen because male bats groom more frequently (Czenze & Broders, 2011). This behavior is rarely done in female bats, because the caloric energy they have is used to care for and feed their children. If the energy possessed by female bats is used for grooming, female hair loss will occur (Piksa *et al.*, 2011).

CONCLUSION

There have been 49 bats consisting of 3 species, namely *Cynopterus horsfieldii*, *Cynopterus brachyotis*, and *Macroglossus sobrinus*. 13 bats of which have carried 17 ectoparasites consisting of species *Leptocyclopodia ferrari* and *Stylidia cf. caudata*. The prevalence value of ectoparasites in Jamalsari Village reached (31.50%) and the prevalence value of ectoparasites in Jatibarang landfill (21.21%). The prevalence percentage figures fall into the general category or common infections.

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