







Prevalence of Cockroach Density, Gastrointestinal Disorders, and Identification of Parasites in Cockroaches in Helvetia Deli Serdang Village

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ABSTRACT

Background. Cockroaches are known to be vectors of various pathogens that can infect humans, one of which is intestinal parasites. Parasitic infectious diseases can cause symptoms of gastrointestinal disorders in sufferers, which can interfere with the sufferer's quality of life. This research aims to determine cockroach density, and gastrointestinal disorders in the community, and identify parasites in cockroaches.

Method. The research method used in this research is observational analytics. The population and sample for this study were the houses of the Helvetia Deli Serdang Village community which met the slum criteria of 100 houses. The caught cockroaches are then examined in the laboratory.

Results. The results obtained were that 96 houses (96%) were not infested with cockroaches, 4 houses (4%) had no cockroaches, and no houses were infested with cockroaches. The number of respondents who had experienced gastrointestinal disorders was 41 respondents (41%) and 59 respondents (59%) had never experienced them. Based on laboratory examination, 22 rhabditiform hookworm larvae (21.78%), 5 hookworm eggs (4.95%), and 1 *Oxyuris vermicularis* egg (0.99%) were found. *Toxocara* sp. as many as 1 piece (0.99%), and cysts *Entamoeba histolytica* as much as 1 piece (0.99%).

Conclusion. Based on these results, there was no high density of cockroaches found at the research location, the majority of respondents had never experienced gastrointestinal disorders in the past year, and parasites were found in cockroaches.

Keyword: Cockroach Density, Gastrointestinal Disorders, Vectors, Intestinal Parasites

ABSTRAK

Latar Belakang. Kecoa diketahui sebagai vektor berbagai patogen yang dapat menginfeksi manusia, salah satunya adalah parasit usus. Penyakit infeksi parasit dapat menyebabkan gejala gangguan pencernaan pada penderita, yang dapat mengganggu kualitas hidup. Penelitian ini bertujuan untuk mengetahui kepadatan kecoa, dan gangguan pencernaan pada masyarakat, serta mengidentifikasi parasit pada kecoa.

Metode. Metode penelitian yang digunakan dalam penelitian ini adalah analisis observasional. Populasi dan sampel penelitian ini adalah rumah masyarakat Desa Helvetia Deli Serdang yang memenuhi kriteria 100 rumah kumuh. Kecoa yang tertangkap kemudian diperiksa di laboratorium.

Hasil. Hasil yang diperoleh adalah 96 rumah (96%) tidak terserang kecoa, 4 (4%) rumah tanpa kecoa, dan tidak ada rumah yang terserang kecoa. Jumlah responden yang pernah mengalami gangguan pencernaan sebanyak 41 responden (41%) dan 59 responden (59%) belum pernah mengalaminya. Berdasarkan pemeriksaan laboratorium, ditemukan 22 larva cacing tambang rhabditiform (21,78%), 5 butir telur cacing tambang (4,95%), dan 1 butir telur *Oxyuris vermicularis* (0,99%).



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Toxocara sp. sebanyak 1 buah (0,99%), dan kista Entamoeba histolytica sebanyak 1 buah (0,99%).

Kesimpulan. Berdasarkan hasil tersebut, tidak ditemukan kepadatan tinggi kecoa di lokasi penelitian, mayoritas responden tidak pernah mengalami gangguan pencernaan dalam satu tahun terakhir, dan parasit ditemukan pada kecoa.

Kata kunci: Kepadatan Kecoa, Gangguan Pencernaan, Vektor, Parasit Usus

1. Introduction

Infections with intestinal parasites continue to be regarded as a public health concern in Indonesia. Because of the nature of the condition, parasitic infections are also categorized as neglected tropical diseases. This doesn't display any particular symptoms. Additionally, parasitic illnesses are still uncommon [1]. Infections with intestinal parasites continue to be regarded as a public health concern in Indonesia. Because of the nature of the condition, parasitic infections are also categorized as neglected tropical diseases. This doesn't display any particular symptoms. Additionally, parasitic illnesses are still uncommon [2]. Gastrointestinal problems are one sign of intestinal parasite infection. Patients with this illness may exhibit symptoms of gastrointestinal diseases, such as weight loss, diarrhea, constipation, nausea, vomiting, itching in the genitalia and anus, and finding worms in the anal or genital area [3].

To date, 4500 different species of cockroaches have been recognized [4]. In Indonesia, cockroach species such as *Periplaneta americana*, *Blatta orientalis*, and *Blattella germanica* are frequently encountered, particularly in and around residential areas [4, 5]. Cockroaches are regarded as one of the insects that pose a threat to humans because they can serve as carriers of several infectious parasitic diseases, particularly those involving the intestines [6]. It is known that *Entamoeba histolytica*, *Cryptosporidium*, and *Balantidium coli* parasites are transmitted by cockroaches [7]. According to another study, the surface of cockroaches is home to a variety of worm parasites, including *Strongyloides stercoralis*, *Ascaris lumbricoides*, *Trichuris trichiura*, and hookworm [8].

Cockroaches are insects that are frequently found in human habitats, particularly those with inadequate sanitation, and are typically associated with slum areas. Helvetia Deli Serdang Village has a slum area as one of its neighborhoods (Deli Serdang Regency). Most of the inhabitants in this setting are employed as animal breeders, raising pigs and poultry, or as scavengers.

To regulate the number of disease-carrying insects like cockroaches, the government follows The Ministry of Health in Indonesia has established uniform guidelines for controlling vectors.[9] Density is the metric used to characterize the cockroach population. The spread of bacterial and parasitic illnesses transmitted by cockroaches is facilitated by high cockroach densities [10]. This research aims to determine cockroach density, and gastrointestinal disorders in the community, and identify parasites in cockroaches.

2. Method

The design of this research is an observational analytical study with research methods cross-sectional. The research time starts from August to November 2022 after receiving the letter of ethical clearance from the USU Health Research Ethics Commission with number 723/KEPK/USU/2022.

The samples in this study were community houses that met the slum criteria by UN-Habitat and householders [11]. Samples were taken using the technique of probability sampling with type simple random sampling. This technique was used because the characteristics of the population at this research location were homogeneous. The sample must meet the inclusion criteria to participate in this research. The inclusion criteria in this study were community houses that met the slum criteria UN-Habitat, the residents of the houses interviewed had lived for at least one year at the research location, signed a letter of consent, and were willing to have cockroach traps placed in their homes. The exclusion criteria in this study were cockroach traps that were damaged and not returned to the researchers.

Cockroach density assessment is carried out by leaving traps and sticky traps in the bathroom and kitchen of the house for one night, and then the density of cockroaches is calculated. Cockroach density is calculated by dividing the number of cockroaches caught by the number of traps installed. A house is said to be cockroach-infested if it has a cockroach density value ≥ 29 .

Data was collected on the history of gastrointestinal disorders in the community by distributing questionnaires that had been tested for validity and reliability. Respondents were considered to have experienced gastrointestinal disorders if they had experienced any of the symptoms of abdominal pain, diarrhea,

constipation, bloody stools, found worms in the anus or genitals, pruritus in the anal or genital area, and lost excessive weight over the past year.

The cockroaches that are caught are then put into a container to be checked for the presence of parasites. This examination was carried out at the USU FK Parasitology Laboratory. The internal and external parts of the cockroach were then separated and shaken with NaCl solution, then put into a centrifuge machine to examine the sediment with Lugol's staining under a light microscope.

3. Result

A total of research has been carried out against 100 houses and house occupants on Prasejahtera 1, Prasejahtera 2, Prasejahtera 3, and Prasejahtera 7 road located in Helvetia Village, Deli Serdang Regency, North Sumatra Province. The majority of respondents in this study were women (98%) and the age range was mostly between 36-45 years (46%) (Table 1).

Table 1. Characteristic of Respondents

Characteristic	Frequency	Percentage(%)
Sex		
Male		
Female	2	2
	98	98
Age (yr)		
17-25		
26-35	2	2
36-45	26	26
46-55	46	46
56-65	20	20
> 65	5	5
	1	1
Total	100	100,0

Based on Table 2, an assessment of cockroach density in research location, it was found that 94 houses (94%) were not infested with cockroaches, 6 houses (6%) had no cockroaches found in them, and none of the houses were infested with cockroaches.

Table 2. Distribution of Cockroach Density

Cockroach Density	Frequency	%
Cockroach Not Found	6	6
Low density	94	94
High Density	0	0
Total	100	100

Based on Table 3, it was found that 41 percent of respondents had experienced gastrointestinal disorders in the past year and 59 percent of respondents had never experienced it

Table 3. Distribution of Gastrointestinal Disorder History

Gastrointestinal Disorder	Frequency	Percentage (%)
Experienced	41	41
Never Experienced	59	59
Total	100	100

Based on Table 4, it was found that in 22 external samples (22.0%) parasites were found, in 72 samples (72.0%) no parasites were found, and 6 samples (6.0%) were not examined because there were no cockroaches caught

in the respondent's house. Laboratory examination of NaCl results from internal tube centrifugation did not find parasites in the cockroach's internal parts.

Table 4. Distribution of the Laboratory Examination

Presence of Parasite	Frequency	Percentage (%)
Parasite Found	22	22
Parasite Not Found	72	72
Not Tested	6	6
Total	100	100

The types of parasites identified in this study were 22 rhabditiform hookworm larvae (73.34%), 5 hookworm eggs (16.68%), 5 hookworm eggs (16.68%), *Oxyuris vermicularis* amount of 1 egg (3.33%), egg *Toxocara* sp. number of 1 egg (3.33%), *cystEntamoeba histolytica* as much as 1 piece (3.33%)

4. Discussion

According to the study's findings on cockroach density, there were no cockroaches in 6 houses, 94 buildings had low cockroach densities, and no houses had high cockroach densities. Because the American cockroach (*Periplaneta americana*) is the most prevalent species in Indonesia, it was the only kind of cockroach that was captured for this study. The world over is home to this species as well [12]. For cockroach density to be considered dense, it must have a value of ≥ 2 .

Since cockroaches require organic food sources to mature and complete their life cycle, the research location lacks the food elements necessary for cockroach reproduction, which explains why cockroach density is low in this habitat [13]. Research demonstrates that areas with a high concentration of food sources and inadequate sanitation also have large densities of cockroaches [14]. The majority of residents work as scavengers who collect rubbish for recycling every day which is placed in the yard of the house. The cockroach traps in this study were placed inside the house so that there was relatively less waste compared to the yard. This is supported by research at the same location but the vectors studied were different, namely research by Napitupulu (2021) which placed fly traps on the outside of the house and found a high density of fly vectors [15].

Cockroach density findings in this study are different from the research carried out in different environments, for example at ports, food stalls, and markets. In research carried out by Kusumaningrum et al (2018) at the Mataram Class II KKP Selamat Harbor, where the research found a high density of cockroaches. The research also concluded that there was a relationship between environmental sanitation and cockroach density. In other research carried out by Tanjung et al (2020) at food stalls in the Dumai Harbor canteen area, it was found that the density of cockroaches was high in the toilets, kitchens, and trash cans [16].

Upon microscopic analysis of the NaCl obtained from centrifuging the external parts of cockroaches, it was discovered that parasites were detected in 22 samples, absent in 72 samples, six samples were not investigated because no cockroaches were caught in the respondent's residence, and no parasites were discovered in the NaCl resulting from internal deposits of cockroach bodies. The parasites that were identified in the external tube samples were hookworm eggs, rhabditiform hookworm larvae, eggs *Oxyuris vermicularis*, egg *Toxocara* sp, and parasites *Entamoeba histolytica*. This is in line with research carried out by Nababan (2004) who discovered eggs of *Oxyuris vermicularis* and hookworm larvae in cockroaches found at a food stall in Tembalang. [17] The findings of other parasites in this study are also in line with the findings in research carried out by Adenusi et al (2018) and Patelet al (2022), who discovered the hookworm parasite, and *Entamoeba histolytic* cockroach [18-20].

5. Conclusion

Based on the description of the data analysis above, the results obtained were that 96 houses (96%) were not infested with cockroaches, 4 houses (4%) had no cockroaches, and no houses were infested with

cockroaches. The number of respondents who had experienced gastrointestinal disorders was 41 respondents (41%) and 59 respondents (59%) had never experienced them. Based on inspection laboratory, found 22 rhabditiform hookworm larvae parasites (21.78%), 5 hookworm eggs (4.95%), 1 *Oxyuris vermicularis* egg (0.99%), *Toxocara* sp. as many as 1 piece (0.99%), and cysts *Entamoeba histolytica* as much as 1 piece (0.99%).

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