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Image of intestinal parasites on muscomorpha as mechanical vectors at Pasar Inpres Tanjung Morawa

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ABSTRACT

The morphology of flies is a hairy body with a pair of wings and three pairs of legs equipped with a pair of pulviculus. Pulviculus serves as a stick for flies on the surface of objects, so that microorganisms and parasites can stick or be carried by flies. *Muscomorpha* is the most common fly found in the community with the support of its morphology and ability to fly to help its role as a mechanical vector of various pathogens, one of which is intestinal parasites. This study is to determine the picture of intestinal parasites in Muscomorpha at the Tanjung Morawa Inpres Market in 2023. This study is a descriptive study with *a cross sectional* design and uses primary data obtained from fly catching with fly traps and examination of samples at the Parasitology Laboratory, Faculty of Medicine, University of North Sumatra. The sample used was *Muscomorpha* caught with a *fly trap* at the Inpres Market of Tanjung Morawa B Village, Tanjung Morawa District, Deli Serdang Regency. The results of this study were *Muscomorpha* found are *Musca domestica and* Chrysomya megacephala *and in Muscomorpha* found intestinal parasites in the form of *Ascaris lumbricoides* eggs 14 pieces (48.28%), Hookworm *eggs 8 pieces (27.59%) and* Trichuris trichiura eggs *7 pieces (24.13 %*). The conclusion of this study was that intestinal parasites were found in the form of 14 *Ascaris lumbricoides eggs (48.28%),* 8 Hookworm eggs (*27.59%) and 7* Trichuris trichiura eggs *(24.13%).*

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INTRODUCTION

Flies are nuisance animals and some of their members act as vectors of disease. The annoying fly belongs to the order *Diptera,* suborder *Brachycera and* infraorder *Muscomorpha*. There are 116,000 species of flies spread across the world with 60,000–100,000 of them being dangerous to human life due to spreading disease. *Muscomorpha* infraorder flies that are often found in the community include house flies *(Musca domestica*) and green flies (*Chrysomya megacephala*) (Masyhuda, 2017).

The existence of flies close to humans corresponds to the role as a vector of disease mechanically. With morphological support, flies are easily contaminated with pathogens and carry

various diseases. The morphology of flies is a hairy body with a pair of wings and three pairs of legs equipped with a pair of pulviculus. Pulviculus functions as a stick for flies on the surface of objects, so that microorganisms and parasites can stick or be carried away by flies (Husin, 2017)

Flies have the ability to fly, making it easier for them to make a constant back and forth movement between their breeding grounds and human habitation, leading to parasite transmission to humans. Flies also have the ability to adapt so that they coexist with humans (Andiarsa, 2018). Flies pick up various pathogenic organisms from garbage, waste and various other fecal sources, and then transfer them through their mouths, vomits, feces, and contaminated bodies to human and animal food (Onyenwe, 2016). This is proven by the discovery of various kinds of parasites, fungi, to viruses in the body of flies. These organisms include *Ascaris spp. Entamoeba sp., Trichuris sp., Penicillium sp., Aspergillus sp., and Candida sp.* (Khamesipour, 2018) House flies (*Musca domestica*) are common flies that live in poor environments and sanitation. The size of the house fly is about 6-7.5 mm with 4 stages in the life cycle. The life cycle starts from the egg-larva-pupa-fly (Afrilia, 2017).

The house fly (*Musca domestica*) is the most common fly worldwide. At least, more than 100 pathogens cause disease in humans and animals transmitted by house flies. Transmitted pathogens include bacteria that cause diarrhea, cholera, typhoid fever and tuberculosis. House flies also transmit worms such as *Enterobius vermicularis, Strongyloides stercoralis, Trichuris trichiura* in egg form and transmit cysts and protozoite trophozoites such as *Entamoeba histolytica* and *Giardia lamblia* (Adenusi, 2013).

Green flies (*Chrysomya megacephala*) act as mechanical vectors, transmission of pathogens, parasites and worm eggs through dirty fly legs and saliva that contaminates food and drinks (Masyhuda, 2017). Flies transmit various pathogens mechanically, the preferred place for flies is a place that provides flies food sources such as organic materials, and organic waste. Traditional markets are places that support the survival of flies because they provide both of these things, so that the market has the potential for the presence of flies (Masyhuda, 2017).

The market is a meeting place for sellers and buyers directly, usually accompanied by bargaining activities. The market consists of simple buildings such as stalls, shops, posts and so on. In Tanjung Morawa District, there is Pasar Inpres, a city-scale market that sells various household commodities such as basic necessities, chicken meat, fish meat, vegetables and fruits. The market area selling beef, chicken meat and fish attract flies with a strong aroma. Then, scattered and rotting organic waste also invites the presence of flies.

The presence of flies in the Inpres market area can cause parasitic contamination carried by flies on foodstuffs. In relation to the background, the author is interested in conducting research on the description of intestinal parasites in *Muscomorpha as mechanical* vectors in the Tanjung Morawa Inpres Market in 2023.

The implication of this study is that this finding may indicate that the environment at the Tanjung Morawa Inpres Market may have certain sanitation or hygiene problems. The existence of muscomorpha carrying intestinal parasites could indicate the existence of conditions that allow these vectors to reproduce and interact with the human environment. The implication is the need for corrective action in waste management, sanitation and hygiene in markets. The results of this research can be the basis for developing more effective prevention and control measures. This may include vector eradication programmes, educating the public about the associated health risks, and promoting better hygiene measures among traders and market goers.

RESEARCH METHOD

The design of this study is descriptive observational with a *cross sectional approach* to determine the microscopic picture of intestinal parasites (soil *transmitted helminth eggs*) and intestinal protozoan

cysts in flies at Pasar Inpres Desa Tanjung Morawa B, Tanjung Morawa District, Deli Serdang Regency.

The data obtained from this study will be processed and analyzed using *the Statistical Package for Social Science* (SPSS) software. The data will be analyzed univariately to see the picture of intestinal parasites in *Musca domestica* and *Chrysomya megacephala* as mechanical vectors of intestinal parasites in Tanjung Morawa B Village Inpres Market.

The population used was all flies caught with *fly traps during the research period at Pasar Inpres Desa Tanjung Morawa B, Tanjung Morawa District, Deli Serdang Regency.* The sample used was *Muscomorpha* caught with a *fly trap* at the Inpres Market of Tanjung Morawa B Village, Tanjung Morawa District, Deli Serdang Regency. Samples were obtained using fly traps hung in the midpoint area of the main polling station of Pasar Inpres and the midpoint of the sales area of chicken meat, fish meat during 08.00 – 11.00 WIB on the day of fly catching. At the time of sampling using masks and *handscoons*. Flies that have entered the *fly trap are taken to the rash to be killed by being given cotton dripping with chloroform on plastic measuring 39 x 52 cm (*standard*) then all parts of the fly trap are inserted into the plastic while the* fly trap is hanging. After 3 hours, the dead flies are put into plastic size 30 by means of a circle or entry place of flies hanging on the roof of the *fly trap* removed and directed to the plastic bag at the same time as the movement pushes the flies towards the plastic. An identification key is used using the book Borror et al., (2005) for fly identification purposes. Identify *Muscomorpha* using a magnifying glass and store it in a place that has been labeled with the date and time of collection and then documentation is made. Flies that have died within 1x24 hours are taken to the Parasitology Laboratory of the Faculty of Medicine, University of North Sumatra. The identified flies are then put into NaOH 2% 3 cc then the tube is shaken vigorously for 30 seconds or can also be vortex for 1 minute. Then, the fly tube is allowed to stand for 1 hour to release the parasite attached to the fly's body. The fly is then removed from the tube. The tube is then centrifuged at a speed of 2000 *rpm* for 5 minutes. The solution from centrifugation is then taken using drip pipes, placed on *a glass object* covered with *deck glass,* then dripped with lugol, and identified the type of parasite encountered using a microscope. The measurements used in the study using primary data were obtained from the results of calculations and observations in the form of identification of trapped fly types, and types of intestinal parasites in the form of *Soil-Transmitted Helminth eggs* and intestinal protozoan cysts at the Inpres Market Tanjung Morawa B Village, Tanjung Morawa District, Deli Serdang Regency.

RESULTS AND DISCUSSIONS

The results of observations at the Parasitology Laboratory of the Faculty of Medicine, University of North Sumatra on flies caught at the Tanjung Morawa Inpres Market identified Muscomorpha types Musca domesctica and Chrysomya megacephala. Fly catching is carried out for 3 days on June 2, 2023, June 4, 2023 and June 11, 2023 at 08.00-11.00 WIB using fly traps with shrimp head bait. In the study with the condition that each tube was filled with at least 10 heads, a total of 56 sample tubes were obtained equivalent to 583 Muscomorpha with details of 51 Musca domestica into 5 sample tubes and 11 Chrysomya megacephala into 1 sample tube captured at the polling station on June 2, 2023. Then, on June 4, 2023, 34 Musca domestica were identified into 3 sample tubes and 202 Chrysomya megacephala into 20 sample tubes were captured in the meat sales area, 31 Musca domestica became 3 tube samples and 115 Chrysomya megacephala became 11 tube samples were captured in the polling station area at Tanjung Morawa Inpres Market. The last fly catch was on June 11, 2023, where 13 Musca domestica were identified into 1 sample tube and 126 Crysomya megacephala into 12 sample tubes were captured in the polling station area. The observations are shown in tables 1 and 2 below.

Table 1. Types of muscomorpha in Tanjung Morawa Inpres Market

Time of Arrest	Fishing Area	Types of *Muscomorpha*	Sum
Friday/June 2, 2023	TPS	*Domestic fly*	51
		Chrysomya megacephala	11
			62
Sunday/June 4, 2023	Meat Sales Area	*Domestic fly*	34
		Chrysomya megacephala	202
	TPS	*Domestic fly*	31
		Chrysomya megacephala	115
			382
Sunday / June 11, 2023	TPS	*Domestic fly*	13
		Chrysomya megacephala	126
			139
Domestic fly			129
Chrysomya megacephala			454
Total			583

From table 1, it can be seen that Musca domestica was caught as many as 129 and Chrysomya megacephala was caught as many as 454 individuals.

Table 2. Types of muscomorpha in Tanjung Morawa Inpres Market based on sample tubes

Time of Arrest	Fishing Area	Types of *Muscomorpha*	Sum
Friday/June 2, 2023	TPS	*Domestic fly*	5
		Chrysomya megacephala	1
			6
Sunday/June 4, 2023	Meat Sales Area	*Domestic fly*	3
		Chrysomya megacephala	20
	TPS	*Domestic fly*	3
		Chrysomya megacephala	11
			36
Sunday / June 11, 2023	TPS	*Domestic fly*	1
		Chrysomya megacephala	12
			13
Domestic fly			12
Chrysomya megacephala			44
Total			56

From table 2, provided that 1 sample tube is filled with at least 10 flies, a total of 56 sample tubes are obtained with details of Musca domestica in 12 sample tubes and Chrysomya megacephala in 44 sample tubes.

Details of Muscomorpha species in Tanjung Morawa Inpres Market by fishing area can be seen in table 3.

Table 3. Frequency distribution of muscomorpha types by catchment area

Types of *Muscomorpha*	TPS		Meat Sales Area		Total Sample	
	N	%	N	%	N	%
Domestic fly	95	16,3	34	5,83	129	22,1 3
Chrysomya megacephala	252	43,22	202	34,65	454	77,8 7
Total	347	59,52	236	40,48	583	100

Table 3 shows the frequency distribution of Muscomorpha species based on fly fishing area in Tanjung Morawa Inpres Market. The most common type of Muscomorpha found was Chrysomya megacephala in polling stations as much as 43.22%.

The details of Muscomorpha types in Tanjung Morawa Inpres Market based on the number of tubes can be seen in table 4.

Table 4. Frequency distribution of muscomorpha types by number of sample tubes

Types of *Muscomorpha*	Tube	
	N	%
Domestic fly	12	21,43
Chrysomya megacephala	44	78,57
Total	56	100

Intestinal Parasites in Muscomorpha

The results of the examination of Muscomorpha samples at the Parasitology Laboratory of the Faculty of Medicine USU are summarized in table 5.

Table 5 Frequency distribution of sample tubes found intestinal parasites and no intestinal parasites found

Intestinal parasites	Tube	
	N	%
Intestinal Parasites Found	17	30,36
No Intestinal Parasites Found	39	69,64
Total	56	100

In 56 tubes of Muscomorpha samples examined, 17 tubes found intestinal parasites and 39 tubes found no intestinal parasites. Intestinal parasites were found in 17 Muscomorpha sample tubes divided into 15 Chrysomya megacephala sample tubes and 2 Musca domestica tubes. The parasites found in 17 sample tubes were 29 worm eggs consisting of, Ascaris lumbricoides eggs, hookworm eggs and Trichuris trichiura eggs. Details of the intestinal parasites found are summarized in the table below.

Table 6 Frequency distribution of intestinal parasite types in muscomorpha

Types of intestinal parasites	Tube	
	N	%
Eggs *of Ascaris lumbricoides*	14	48,28
Hookworm Eggs	8	27,59
Telur *Trichuris trichiura*	7	24,13
Total	29	100

Table 6 shows that the samples found intestinal parasites in the form of 14 eggs of Ascaris lumbricoides, 8 eggs of Hookworm and 7 eggs of Trichuris trichiura. Then, based on table 7 on Musca domestica samples, 3 eggs of Ascaris lumbricoides, 1 egg of Hookworm and 1 egg of Trichuris trichiura were found. In samples of Chrysomya megacephala found 11 eggs of Ascaris lumbricoides, 7 eggs of Hookworm and 6 eggs of Trichuris trichiura. The most common type of parasite found is the eggs of Ascaris lumbricoides on Chrysomya megacephala. No intestinal parasites in the form of cysts were found in samples of Musca domestica and Chrysomya megacephala.

Table 7. Frequency distribution of intestinal parasite types by muscomorpha type

Intestinal parasites	*Domestic fly*		*Chrysomya megacephala*		Total Sample	
	N	%	N	%	N	%
Eggs *of Ascaris lumbricoides*	3	10,34	11	37,93	14	48,27
Hookworm Eggs	1	3,45	7	24,14	8	27,59
Trichuris Trichiura Eggs	1	3,45	6	20,69	7	24,14
Total	5	17,24	24	82,75	29	100

Based on table 7, the most common intestinal parasites found in Chrysomya megacephala are 24 worm eggs (82.75%) out of a total of 29 eggs with the most types of intestinal parasites, namely Ascaris lumbricoides eggs as many as 11 eggs (37.93%)

Table 8. Frequency distribution of intestinal parasite types by area of capture and types of muscomorpha

Parasite	*Domestic fly*				*Crysomya megacephala*				Total	
	Meat Selling Area		TPS		Meat Selling Area		TPS			
	N	%	N	%	N	%	N	%	N	%
Eggs of Ascaris lumbricoides	2	6,9			2	6,9	10	34,48	14	48,28
Trichuris trichiura Eggs	1	3,45	5	17,23	1	3,45			7	24,14
Hookworm Eggs							8	27,59	8	27,59
Total	6	10,35	5	17,23	3	10,35	18	62,07	29	100

Table 8 presents detailed data on intestinal parasites found based on Muscomorpha species and area of capture. The most common intestinal parasite found was Ascaris lumbricoides eggs on Crysomya megacephala at the polling station, which was 10 pieces (34.48%).

Discussion

Types of Muscomorpha in Tanjung Morawa Inpres Market

Based on research data, there were a total of 583 Muscomorpha caught during 3 days of arrest at Tanjung Morawa Inpres Market. Muscomorpha is divided into 2 types, namely, Crysomya megacephala 454 heads (77.87%) is the most species caught in the region with Musca domestica as many as 129 heads (22.13%).

Based on research conducted by Ryani et.al (2017) in Johar Market and Semarang Peterongan Market. In both markets, Chrysomya megacephala was caught more at 123 (73%) compared to Musca domestica at 45 (27%) in Johar Market, while in Pasar Peterongan, Chrysomya megacephala was also the most caught at 127 (75%) followed by Musca domestica at 43 (25%).

Based on research by Laili (2017), a total of 875 flies were found in the Pasar Rentang TPS area. The most flies found were Chrysomya megacephala 398 heads (45.49%) followed by Musca domestica as many as 323 heads (36.91%), Sarchopaga sp 70 heads (8%), Fannia sp. A total of 84 heads (9.6%).

In line with the research conducted by Ryani and Laili above, in the Inpres Market the most flies caught were Muscomorpha type Chrysomya megacephala at TPS, which was 252 heads (43.22%). This relates to Chrysomya sp. has the habit of gathering and crowding around food, garbage, rotting waste, carrion and feces, so that the fly is known as an insect whose presence is considered synonymous with dirty, dirty, and unhealthy conditions (Djaenuddin, 2009)

Research conducted by Muthmainah et. al (2021) in KM 5 Market, Palembang found that the flies caught were Muscomorpha, specifically the most Muscomorpha types were Chrysomya megacephala 183 (43.7%), then Musca domestica 136 heads (32.4%) and Lucilla sp 100 heads (23.9%). The most caught fly was Crysomya megacephala in the meat sales area at 145 (34.6%). Unlike the results of the author's research, Crysmoya megacephala is indeed the most

Muscomorpha species caught in the Market but, the location of the most arrest at the polling station. Research that is in line with the author is research by Masyuhada et al. (2017) where it was found that Crysomya megacephala was the most Muscomorpha caught at polling stations, namely 76 heads (74.5%) followed by Musca domestica as many as 26 heads (25.5%). This is related to the substrate needed by the type of Muscomorpha, namely, Chrysomya megacephala lays eggs in garbage cans, carrion, decaying organic matter, and soil contaminated with animal and human waste (Khamesipour, 2018)

Types of intestinal parasites found in mucomorpha

Based on data from research conducted by the author, intestinal parasites found in Muscomorpha samples were intestinal nematode eggs with details of 14 Ascaris lumbricoides eggs (48.27%), 8 Hookworm eggs (27.59%) and 7 Trichuris trichiura eggs (24.14%). The most contaminated muscomorpha was Chrysomya megacephala at the polling station with 10 Ascaris lumbricoides eggs found (34.48%). Chrysomya megacephala is the type of fly most contaminated with intestinal parasites with 24 intestinal nematode eggs (82.75%) found in the sample. Intestinal nematode eggs were divided into Ascaris lumbricoides 11 eggs (37.93%), Hookworm 7 eggs (24.14%) and Trichuris trichiura 6 eggs (20.69%). The most common type of intestinal parasite found in Chrysomya megacephala samples was 10 Ascaris lumbricoides eggs (34.48%) with the location of sample capture at the polling station in Tanjung Morawa Inpres Market

The type of intestinal parasite found has similarities with research conducted by Arif (2018) on fly samples at the Talang Gulo landfill that found Ascaris lumbricoides eggs. Research by Saputri (2018), from 60 Muscomoprha found 11 Hookworm eggs 18.25%. The results of research by Ryani et al. (2018) found intestinal parasites in Chrysomya megacephala (12.5%) and Musca domestica (6.25%) intestinal parasites found in the form of Hookworm eggs, Capillaria sp. and Trichuris trichiura at Pasar Johar and Peterongan polling stations. Chrysomya megacephala is the most contaminated fly sample, this is because Chrysomya megacephala has a lot of feathers and has a large size. Musca domestica and Chrysomya megacephala are closely related to the source of protein and substrates needed for its development, namely feces, meat and fish. Crysomya megacephala is the most widely identified sample of parasites due to its larger size. With a larger body surface area, more bristles lead to an increase in the potential of flies as mechanical vectors

In Iraq on Musca domestica also found eggs of Ascaris lumbricoides, Trichuris trichiura, Hymenolepis nana, Enterobius vermicularis (Al-Redhi, 2017). Other studies have shown that Musca domestica also found eggs of Ascaris lumbricoides (Tan Machrumnizar, 2017). In line with the research conducted by the author, Muscomoprha is mostly contaminated with intestinal parasites in the form of intestinal nematodes, namely, Ascaris lumbricoides eggs, Hookworm eggs and Trichuris trichiura eggs.

Based on some of the studies above, most intestinal parasites found are intestinal nematodes. The discovery of intestinal parasites in the form of intestinal nematodes in Muscomorpha samples may be related to the prevalence of helminth infections that are quite high in some regions of North Sumatra. This is in line with the results of a survey by the North Sumatra Health Office on the prevalence of worms in a number of districts in North Sumatra of 22.5% in 2016 with the most causes of worm infections being Ascaris lumbricoides as much as 50.7%, Trichuris trichiura 33.4% and Hookworm 0.6% (Ginting, 2020)

Ascaris lumbricoides eggs are the most common type of parasite found compared to other nematodes, which can be due to the ability of female Ascaris lumbricoides to produce larger eggs, which is as much as 200,000 per day than the ability to produce eggs of other nematodes and the ability to adapt to the environment. Eggs can survive for 2-3 weeks during drought and survive for 2 years at temperatures of 5-10oC (Scott, 2008). The presence of intestinal nematode eggs in Muscomorpha can occur if the Muscomorpha previously landed in places containing worm eggs, namely in soil, water, vegetables, which have been contaminated by feces of helminthic patients

both animal and human feces. There is vegetable waste in the Inpres Market, it is possible that Muscomorpha brought the worm eggs from vegetable waste.

Different results were shown in a study conducted by Fadilla, et al. (2022) from 68 Chrysomya megacephala caught in the Pecan Market, North Kembangan found 1 egg of Clonorchis sp. Clonorchis sp requires intermediate hosts such as fish, where in the body of the fish the cercariae form develops into metacercariae. The author did not find Clonorchis sp. eggs, possibly related to the author's limitation of catching flies at more points in freshwater fish sales, given the development of Clonorchis sp. rely on fish as intermediate hosts.

Based on the identification of intestinal parasites on the body surface of Musca domestica and Chrysomya megacephala obtained at the Putri Cempo Mojosongo Surakarta landfill, 1 Entamoeba coli cyst was found in Musca domestica (10%) and 1 Entamoeba histolytica cyst in Chrysomya megacephala (10%) (Rafflesia, 2017). Research conducted by Ahmad and Rasad (2008), on Musca domestica originating from Kebon Roek Market found Balantidium coli cysts. The study is not in line with the authors' research. The authors did not find intestinal protozoa in Muscomorpha samples. The differences in intestinal parasites found in Muscomorpha are due to differences in the types of intestinal parasites that come into contact with Muscomoprha, which are related to different types of intestinal parasites originated. The author's assumption is that there is no intestinal protozoa in Muscomorpha because identification of intestinal protozoa is difficult without staining due to more microscopic size

Based on the results of the analysis of this research data, it can be concluded that the types of Muscomorpha found in the Tanjung Morawa Inpres Market are Musca domestica as many as 129 heads (22.13%) and Crysomya Megacephala as many as 454 heads (77.87%). Muscomorpha were most commonly found in polling stations, namely 252 heads (43.22%). Intestinal parasites found were 14 Ascaris lumbricoides eggs (48.28%), 8 hookworm eggs (27.59%) and 7 Trichuris trichiura eggs (24.13%).

CONCLUSION

Based on the results of the analysis of this research data, conclusions can be drawn: The types of *Muscomorpha* found in the Tanjung Morawa Inpres Market are *Musca domestica* as many as 129 heads (22.13%) and *Crysomya Megacephala as* many as 454 heads (77.87%). *Muscomorpha* were most commonly found in polling stations, namely 252 heads (43.22%). Intestinal parasites found were *14 Ascaris lumbricoides* eggs (48.28%), 8 hookworm *eggs (27.59%) and 7 Trichuris trichiura* eggs (24.13%). Further research is needed to determine the prevalence of intestinal parasitic worm infections in the Tanjung Morawa Inpres Market area community and in future studies it is expected to use more capture points so that the results of the study can describe conditions more accurately, specific to the role of flies as mechanical vectors of intestinal parasites.

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