Detecting helminth eggs on the body surface of flies in markets in Makassar

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Abstract. Flies as mechanical vectors of disease spread in humans. This study aimed to detect helminth eggs on the flies body surface in markets in Makassar City Market. Flies collected in sale places such as vegetables, chicken and beef, cakes, fish, and trash cans at the market. Then flies and helminth eggs were identificated examined in the laboratory for identification of flies and helminth eggs. Flies found throughout markets in Makassar City were Musca domestica, Calliphora spp., and Sarcophaga haemorrhoidalis. The highest flies number of was Calliphora spp. (n=27) at the fish sale place in Tamalate market. The greatest number of egg helminth was Taenia sp. (n=17) found on the body surface of Chrysomia sp. This study showed that most helminth eggs found on the body surface of Chrysomia sp. compared to other flies.

1. Introduction

A market is a meeting place for buyers and sellers to make transactions for commodities and services. Makassar is one of the major cities in eastern Indonesia, with increasing trade and economic growth occurring in the market. Makassar City Government has several traditional markets such as Alauddin, Pabaengbaeng, Tamalate, Toddopuli, Antang, Maricaya, Jipang, Tammaung, Daya, Terong, and Bacan markets. Traditional market is a place that supports the survival of flies. Market provides organic materials and organic wasted, therefore market has the potential to become flies habitat [1].

Food and drinks can contaminate with helminth eggs carried by flies, especially diseases in digestive tract [2,3]. The presence of helminth eggs in flies’ body can occur if the fly previously perched on places containing helminth eggs. Helminth eggs found in the soil, water, and vegetables contaminted with feces of animals and humans. The presence of worm eggs in flies will contaminate food and beverages.

Types of helminth eggs found in flies body that cause infection are Ascaris lumbricoides, Trichuris trichiura, and Necator americanus [4]. Types of helminth eggs found on flies’ body surface are the
eggs of *Enterobius vermicularis*, *Ascaris lumbricoides*, *Ancylostoma duodenale*, and *Necator americanus*, and *Trichuris trichiura* [5]. The whole body of the fly carry various types of helminth eggs, namely *Strongyloides* sp., and *Hymenolepis nana* [3]. There is no data or publication about identification of helminth eggs in flies in Makassar City, especially in traditional markets. The purpose of this study was to detect helminth eggs found in flies in markets in Makassar City.

2. Metode

This research conducted from February to June 2018. Flies collected from market of Pa'baeng-baeng, Terong, Daya, Antang, Tello, Tamalate, Maricaya, Toddopuli, Then flies were identified. Helminth eggs identification carried out in Laboratory of Tropical Diseases, Study Program of DIII Medical Laboratory Technology, Megarezy University.

Flies sampling was carried out by purposive sampling using a sweeping net. The sampling places were the sale places of fish, meat, vegetable, indonesian cakes, and trash cans. The sweeping net swung for 5 minutes at each designated flies gathering place. In one market, flies collection starts at 9:00 a.m. till finish. The flies obtained put into a paper cup covered with gauze. Flies identification used identification key according to Tumrasvin and Shinonaga (1977), Spradbery (2002), and Dodge (1953) [6,7,8].

First, the flies were immersed in normal saline solution 0.085M and stirred for 5 minutes. Furthermore, it centrifuged at 2000 rpm for 5 minutes. The sediment formed was then mixed with a saturated sugar solution to be centrifuged again at 2000 rpm for 5 minutes [7]. The remaining sediment pipetted and placed on a clean and dry glass object. After that, it was observed by a microscope with a magnification of 100x to identify the type of helminth eggs based on Soulsby (1986) [9]. Data were analyzed descriptively.
3. Results and Discussion

Morphological characteristics of *Musca domestica* are hairy propleuron (bristles) (d), dark grayish thorax with 4 longitudinal black stripes on the dorsal thorax (a), 4th wing venation angled sharply (b), pale abdomen (c), lines black (vittae) on dorsal abdomen (e), body dark, gray, brown to black [6,7,8]. Morphological characteristics of *Calliphora* sp. are: basic stem veins (g) and (h) without hair (bristles), Antenna with arista plumose, metallic blue color (f), sharp blue-black, or greenish (i) close to brownish yellow, measuring 8-10 mm [7]. Morphological characteristics of *S. haemorroidalis* are three longitudinal black stripes on the top of the thoracic (j), arched wing venation, propleura without setae hair (l), pale 2nd genital segment (m), antenna with arista plumose (k), abdomen like a chessboard (n) [7,8,10]. (Fig.2).

![Figure 2. Morphology of flies, (a,b,c,d,e): Musca domestica, (f,g,h,i): Calliphora sp., (j,k,l,m,n): S. haemorroidalis](image)

The highest number of *Musca domestica* was 25 (n=25) found at the vegetable sale place in Toddopuli market (Tabel 1). The percentage of *M. domestica* was 41.03% at the Gunung Batu market compared to other markets in Bogor City [11]. Number of *M. domestica* was 32 (n=32) at the vegetable sale place in Jakabaring Market, Palembang [12]. *M. domestica* was often found in Toddopuli market, due to the market location which is close to residential areas and the presence of organic wastes that easily decays around this market location. Muscidae flies are cosmopolitan and synanthropic, which were easily find in every market block. Besides, these flies are active during the day to find food, mating, oviposition [13].

The number of *Calliphora* spp. was 27 (n=27) at the fish sale place in Tamalate market. A Number of *Calliphora* spp. was 7.65% was mostly found in Jambu Dua Market compared to other markets in Bogor City [11]. According to Labud et al. (2003), as many as two *Calliphora* spp. (n=2) were found to be associated with sanitary in urban and semi-urban areas [14]. These flies are commonly found in meat and fish sale place because this place provides a place and food for the survival of these flies. Flies will come to a place that has food source and a place to lay their eggs.

| Tabel 1. Distribution species of fly in the markets in Makassar City |
| No. | Market     | Sale         | Musca domestica | Calliphora sp. | Sarcophaga sp. |
|-----|------------|--------------|----------------|----------------|----------------|
| 1   | Pa’baeng   | Vegetable    | 13             | 0              | 0              |
|     | baeng      | Meat         | 0              | 16             | 4              |
|     |            | Indonesian cakes | 10         | 0              | 0              |
|     |            | Trash cans   | 14             | 0              | 0              |
|     |            | Fish         | 0              | 19             | 0              |
| 2   | Terong     | Vegetable    | 17             | 0              | 0              |
|     |            | Meat         | 0              | 21             | 3              |
|     |            | Indonesian cakes | 15         | 0              | 0              |
|     |            | Trash cans   | 16             | 0              | 0              |
|     |            | Fish         | 0              | 18             | 0              |
| 3   | Daya       | Vegetable    | 14             | 0              | 0              |
|     |            | Meat         | 0              | 18             | 2              |
|     |            | Indonesian cakes | 13         | 0              | 0              |
|     |            | Trash cans   | 15             | 0              | 0              |
|     |            | Fish         | 0              | 20             | 0              |
| 4   | Antang     | Vegetable    | 20             | 0              | 0              |
|     |            | Meat         | 0              | 10             | 0              |
|     |            | Indonesian cakes | 10         | 0              | 0              |
|     |            | Trash cans   | 20             | 0              | 0              |
|     |            | Fish         | 0              | 23             | 0              |
| 5   | Tello      | Vegetable    | 19             | 0              | 0              |
|     |            | Meat         | 0              | 23             | 5              |
|     |            | Indonesian cakes | 13         | 0              | 0              |
|     |            | Trash cans   | 15             | 0              | 0              |
|     |            | Fish         | 0              | 25             | 0              |
| 6   | Tamalate   | Vegetable    | 22             | 0              | 0              |
|     |            | Meat         | 0              | 15             | 7              |
|     |            | Indonesian cakes | 11         | 0              | 0              |
|     |            | Trash cans   | 17             | 0              | 0              |
|     |            | Fish         | 0              | 27             | 0              |
| 7   | Maricaya   | Vegetable    | 13             | 0              | 0              |
|     |            | Meat         | 0              | 18             | 0              |
|     |            | Indonesian cakes | 14         | 0              | 0              |
|     |            | Trash cans   | 17             | 3              | 0              |
|     |            | Fish         | 0              | 25             | 0              |
| 8   | Toddopuli  | Vegetable    | 25             | 0              | 0              |
|     |            | Meat         | 0              | 17             | 3              |
|     |            | Indonesian cakes | 9          | 0              | 0              |
|     |            | Trash cans   | 23             | 0              | 0              |
|     |            | Fish         | 0              | 17             | 0              |
| **Total** | | | **375** | **315** | **24** |

The number of *Sarcophaga* sp. (n=7) most found in the meat sale site of Tamalate Market (Table 1). The highest percentage of these flies is 0.64% in Gunung Batu Market compared to other markets in Bogor City [11]. According to Chaiphongpachara *et al.* (2018) percentage was 1.29% of *Sarcophaga* sp. the least is found in urban areas than in other neighborhoods [15]. *Sarcophaga* sp. attracted to carrion, meat and causes myiasis in animals and humans. Also, the abundance of flies is affected by temperature and humidity [16]. Sarcophagidae are viviparous and lay their eggs on meat, vegetables, snails, and insects [7].
Tabel 2. Helminth eggs on the flies body surface in the Markets in Makassar City

| No | Market       | Egg of helminth | Species of flies |
|----|--------------|-----------------|------------------|
| 1  | Pa’baeng-baeng| Trichuris trihiura | 1 0 0            |
| 2  | Terong       | Taenia sp.      | 0 1 0            |
| 3  | Daya         | Trichuris trihiura | 1 0 0            |
| 4  | Antang       | Trichuris trihiura | 1 0 0            |
|    |              | Taenia sp.      | 0 17 0           |
| 5  | Tello        | Taenia sp.      | 0 1 0            |
| 6  | Tamalate     | Ascaris lumricoides | 0 5 0          |
| 7  | Maricaya     | Taenia sp.      | 7 0 0            |
| 8  | Toddopuli    | Trichuris trihiura | 0 1 0            |
|    |              |                 | Total 10 25 0    |

Egg of Taenia sp. (n=17) most found on the body surface of Calliphora sp. According to Adenusi and Adewoga (2013), the percentage of Taenia sp. was 7.14% [18]. As much as 6 (n=6) Taenia sp. were on the fly’s body surface [18]. Flies can act as mechanical vectors of Taenia sp. Flies cause disease indirectly because of their role as mechanical vectors of helminth. Flies breed in carcasses, meat, and food contaminated with egg helminth in feces, garbage, animal waste on the fly’s body. Contamination occurs in the mouth or other parts of the fly’s body, such as the feet, after the flies eat feces containing disease agents, flies will move and lands on healthy food while transferring the disease-causing agent [19].

4. Conclusion
The highest number of Calliphora spp. was 27 (n=27) at the fish sale place in Tamalate market. The greatest number egg helminth was Taenia sp. (n=17) found on the body surface of Chrysomia sp. This study showed that flies have potential to spread helminth to humans. The role of flies to spread helminth is supported by their high reproductive capabilities, long flight distances, and the resistance of helminth agents to the environment.

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