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Life Cycle *Sarcoptes scabiei* and Pathogenicity Mite in Boarding School Malang, Indonesian

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Abstract: Scabies is a sort of skin disease caused by *Sarcoptes scabiei* var *hominis*, that a parasites mite species in human skin. These mites could spread and transmitted easily, so it needs to study for the life cycle and the pathogenicity. This research isdone identify and describe the phases in the mite life cycle, and themites pathogenicity. The mites were isolated from student skin tissue from the boarding school at Malang Raya. The research is an observational study. The mite life cycle consists of egg, larva, nymph and imago phases. The mite's pathogenicity to students is 85% in the form of lesions without secondary infection, the lesions with secondary infections is 15%. This research results is a primary research results information for the next research in order to the scabies prevent in the boarding school students skin.
Key words: scabies, life cycle, pathogenicity, mites, boarding school student.

Introduction

Scabies is an ectoparasitic infection disease on human epidermal layer caused by the *Sarcoptes scabiei* var*hominis* mite[1]. The mites get their food from the host by absorbing the epidermal cells and plasma proteins[2]. The infected host were still alive in unhealthy condition, which is characterized by itching, irritation, redness and lesions on their skin[3]. Thelesions have a special characters such as tunnels, and the non-specific lesions such as papules, vesicles and excoriations[4]. The scabies infection impact on patients are uncomfortable in the work, study or another activities[5]. The scabies disease is also causes the secondary infection for *Streptococcus pyogenes* and *Staphylococcus aureus* bacterias[1]. Ironically, the disease is a truly neglected, underappreciated and less attention from the global health agenda[6]. Based on this facts, scabies disease should not be neglected because it is quite high pathogenicity.

The pathogenicity of mite *Sarcoptes scabiei*mite is need a serious attention. Mites are an obligate parasites permanent, and have adapted to the immune system of the host[2]. It makes the patient feels no symptoms of scabies infection before 4-8 weeks of initial investment[6]. Scabies symptoms appear after 4-8 weeks of infestation of mites, such as itching, irritation and redness of the skin, as well as hyper-sensitivity reactions[7]. Based on these facts, it is need to investigate the mites pathogenicity based on the direct observation.

Sarcoptes scabiei could infect people easily. This mite could spread and transmitted easily. This mite can infect anyone regardless of the gender, the socioeconomic status, the races and attack everyone in all

countries easily[6]. The prevalence of scabies is high in areas with low socioeconomic level, the dirty environment[8], unhygienic conditions, lack of personal hygiene, poor ventilation and a very high density[1]. Boarding school is one of religious education boarding school that give the moral values education, but some boarding schools have a high enough density. That is caused the high prevalence of scabies in some boarding school. The prevalence of scabies at boarding scholl Bangladesh is 61%[9]. This prevalence of scabies in the boarding school at East Jakarta, Indonesia is 36%[10]. The fact of the high prevalence of scabies need a solution.

The efforts to overcome scabies can be done by raising the public awareness of the scabies disease, through biological research to provide information about the life cycle of mites and pathogenicyty[6]. Health education have been proved effective in improving the knowledge of the students and reduce the prevalence of scabies in 50% at boarding school Bangladesh[9]. Based on these conditions, so the biological research for describe the life cycle of the mite *Sarcoptes scabiei* should be done. It is important to know the information of the mite life cycle to study the mite's life cycle.

Methods

The boarding school located at Malang city, Batu city and District of Malang, East Java, Indonesia. The population object in this research is 4223 students, and the sample are 421 students. The diagnosis of scabies conducted by the researchers and the paramedical official. The mite samples collected from the epidermal tissue's students at the boarding school in Malang that infected by scabies.

The mite preparations were conducted by using skin scrapings following of procedure Chouela *et al*. 2002[4]. The first step is the epidermal tissue suspected infected by the mites is scraped by using the scalpel. Then the epidermal tissue placed in the tube containing KOH 10% were brought to the laboratory. The epidermal tissue were put on the glass objects and covered with a cover glass. After that, the mites in the epidermal tissue were examined under a light microscope, especially the colour, shape, size, and the legs number. The measurement were done by the ocular micrometer in the magnification of 400X.

Data analysis was done in descriptive method in order to identify the phaseof the mites. The pathogenicity mites were observed directly based on the type, size, and the distribution of lesion in the student's skin with scabies.

Results

The mite were isolated from epidermal tissue students which infected by mites showed thatthere are variation in the shape, size, the legs number. Based on the microscopic observation result showed that the mites were found in the egg, larva, nymph and adult phase's.Mite's egg colour is white-brownish, with a dark brown stripe on the edge of the egg (see Fig 1). Eggs has slightly oval-shaped on the side edges, there has been no legs. The mean ± SD eggs size is 0.10 x 0.16 mm ± 12.07. The eggs size is0.15 - 0.19 mm x 0.09 - 0.12 mm.

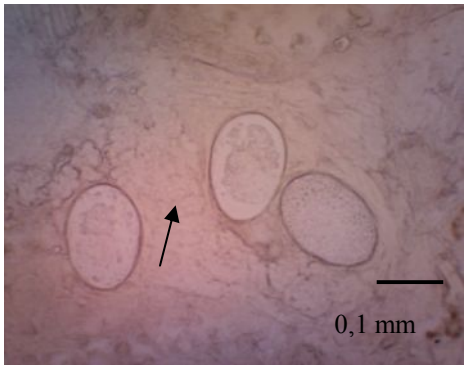

Figure 1. The Microscopic Imageof The Mite Eggs (200X)

The legs number in larva phase are 3 pairs, it is consists of 2 pairsat the front side and a pairat the back side of the body (see Fig 2). The mite's larva colour is creamy white- brownish. The larvae size is between 0.02 - 0.20 mm x 0.08 - 0.25 mm (The mean size ± SD: 10.90 mm ± 0.08 mm). The first leg is 1.54 mm ± 0.03 mm, the second legis 0.03 ± 0.01 mm and the third leg is 0.03 ± 9.81 mm.

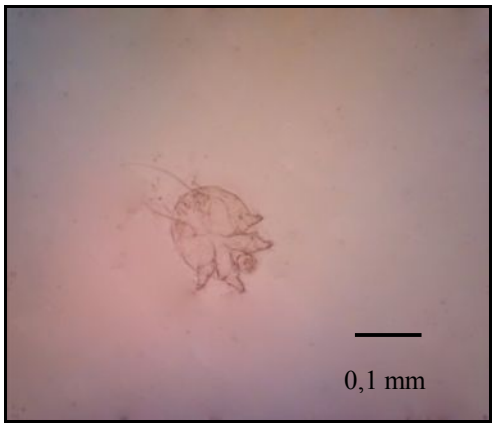

Figure 2. The Microscopic Image of The Larva Mite(200X).

The mites nymph have four pairof legs. The size are much bigger than the larvae leg size, but smaller than the imago leg size(see Fig.2, 3, and 4). They have notcomplete of legs,because there are no sucker and setae. The nymph body size is 0.03 - 0.21 mm x 0.13 -0.26 mm. The first leg lenght size is 0.02-0.05 mm, the second leg lenght size is 0.02-0.05 mm, and the third leg lenght size is 0.02-0.05 mm, and the fourth leg lenght size is from 0.02 to 0, 05 mm.

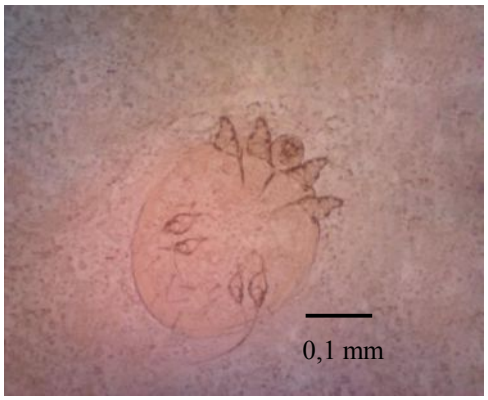

Figure 3. The Microscopic Image of The Mite Nymph (200X)

The Imago shape and the legs number are similar with the nymph, but the size is much larger than the nymph (see Fig.4). The imago has suckers and setaein their legs. The gnathosoma structure has chelicera and pedipalps. The mite imago size is 0.20 - 0.39 mm x 0.15 - 0.52 mm. The first leg length size is 0.05 to 0.11 mm, the second leg lenght size is 0.05 - 0.07 mm, the third leg length size is 0.05 - 0.10 mm, and the fourth leg length size is 0.05 – 0.10 mm.

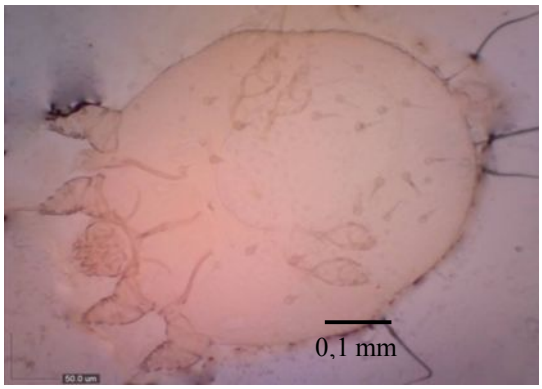

Figure 4. The Microscopic Image of Imago (200X).

The mite phasesof life based on the research are egg, larva, nymph and imago. The Mite's life cycle begins sincethe female were mating at the skin surface, the the female mites dig the tunnels in the epidermal layer to take their eggs. The mite eggs hatched into larvae. The larvae develop into nymphs. Afterwards the nymphs develop into female and male mite.

Themite is cause intense itching at the night. The students skin thatinfected by *Sarcoptes scabiei*look red in colour and have some lesion in the sizeof 0.2 mm - 1 cm. The smallest lesionsize are0.2-0.5mm, the large lesions are more than 0.5 mm.It is also found that the infected students with secondary infectionare 15% from421 students. The infected student without secondary infection are 85% from 421 (Table 1).Generally the lesions can be found in allstudent's body part, in example at thefinger, elbows, hand, at the body folds, the chest, the genitals, the buttocks, the back, the stomach, and another part of body, such as neck (Table 2).

Table 1. Pathogenicity Mite (Lesion Without and with Secondary Infection)

Pathogenicity Mite	sum (students)	Percentase (%)
Lesion without secondary infection	358	85
Lesion with secondary infection	63	15
Total	421	100

Table 2. PathogenicityMiteCauseLesion in All Part of Body Students

	Lesion distribution	Sum (students)	Percentase (%)
1	Finger	67	15.91
2	Hand	69	16.39
3	Elbows	19	4.51
4	Body Folds	30	7.13
5	Chest	24	5.70
6	Genital	24	5.70
7	Buttocks	29	6.89
8	Leg	57	13.54
9	Back	4	0.95
10	Stomach	2	0.48
11	Another part of Body	96	22.80
	Total	421	100

Discussion

The life cycle of the mites consist of four phases: egg, larva, nymph, and imago.The most pathogenicphase is imago phase. It could be physical activity and biological activity of mites. The physic

activity mitesisdig tunnels, running/migration and expansion using the legs and claws[2]. The purpose is to obtain more nutrients during nesting and laying eggs for a more safe place. The biological activity of mite is absorbs nutrients from the host, the adult mite alsoproduce secrete saliva, and the adult mites also produce waste metabolite such as, feces, excret, enzymes and hormone secretion. There are source of allergens that cause the pathogenicity in human skin[8].

One of the secretory products mites are aspartic protease enzyme. There are digest the epidermis skin, serum molecules, hemoglobin, albumin, fibrinogen and fibrionectin on the host, but not digest collagen[11]. This enzyme is active to invasion, migration, digestion, reproduction, and moulting[2]. Based on this condition, it can conclusion that the eggs, larvae and nymphs are pathogenic as well as imago. The protease enzyme is found in each phase on life cycle mite's. Each phase of life cycle mite could be death.The death body could be decompose to become allergen compoud on the student skin with scabies infection.

The mite pathogenicity is a mutual endosymbiosis between *Sarcoptes scabiei* with bacteria[7]. Both of are parasites in humans skin. The physical activity of mite is a potential portal for entry to variety of bacterial, and then theywill growth fast[6]. The bacteria infections is called a secondary infection, which is characterized by pus-filled lesions. Based on this fact, we can conclude that the scabies mite life cycle was needed to know and need to be disconnected, before the secondary infection by bacteria were emerge.

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