

Case Report

Unusual microscopic appearance of *Sarcoptes scabiei* from skin scrapping sample and its epidemiology

Forman E. Siagian^{1*}, Ronny¹, Urip Susiantoro¹, Syahfori Widiyani²,
Hana C. Yulia², Sisirawaty¹

¹Department of Parasitology and The Centre of Biomedic Research, Faculty of Medicine, Universitas Kristen Indonesia, Jakarta, Indonesia

²Department of Dermatovenereology, Faculty of Medicine, Universitas Kristen Indonesia, Jakarta, Indonesia

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*Correspondence:

Forman Erwin Siagian,

E-mail: forman.siagian@uki.ac.id

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ABSTRACT

Scabies is still a global parasitic problem with an iceberg phenomenon. Vulnerable people including those with comorbidities and live in close contact to each other in a long time. Its causative agent is *Sarcoptes scabiei*, an Arthropod which live in the host by burrowing and making tunnel in the skin. The patient usually complaint suffer from nocturnal itching, beside the skin derangement of the affected areas. Here we reported an unusual appearance of *S. scabiei* from a skin scrapping sample sent to the laboratory of parasitology, Faculty of Medicine, Universitas Kristen Indonesia, Jakarta Indonesia and also discuss its epidemiology.

Keywords: Scabies, Burrow, Nocturnal itching, 10% potassium hydroxide, Arthropod, Parasite

INTRODUCTION

Scabies is still a global health problem, especially in the low income socio-demographic population.¹ Its reported incidence actually resemble an iceberg phenomenon.^{2,3} The causative agent, *Sarcoptes scabiei* or the itch mite, is an insect parasite from phylum Arthropod that burrows deep into the skin of their host.¹⁻⁶ It is a neglected communicable disease among people living in close contact for a long time.^{7,8} Major complain of the patient mostly unbearable pruritus, mainly at night.⁹ Due to this symptom, the host continuously suffer from severe itching and constantly want to scratch the affected area.¹⁰ Excoriation or scratching wound sometimes found in the affected area which also mixed with the crusted appearance.¹¹

Beside the dermal complaint, the host also usually was unable to sleep well due to pruritus, and some other consequences that follows were mostly sleep related

disturbances, from sleepy, lack of attention or even to reduced performance in school or in workplace.^{12,13} From community medicine point of view, this disease related with poor practice of hygiene, low level social economy and or people living in relative close contact for a long time with poor access to hygiene best practice, e.g. refugees in temporary shelter, orphand in orphanage, elderly living in the nursing home or people living in untreated dormitory.^{1,4,7,8,13}

The affected area can cover any part of the body, but commonly found in the interdigits, palms, wrist, axilla/armpit, gluteal/buttocks, scalp and maybe genital; usually it happened bilaterally.⁹⁻¹¹ In severe cases, scabies can affect all part of the body, called Norwegian scabies.^{14,15} The clinical manifestation of scabies varies, depend on the severity. Involvement of other family member or roommates and history of continuous close contact with the patient, must always be traced.¹⁶ Here we report an unusual microscopic appearance of *S. scabiei*

from a skin scrapping sample sent to our lab for laboratory confirmation and its epidemiology on our laboratory.

CASE REPORT

We received a sample of skin scrapping that put inside a closed petri dish (patient of Dr. Syahfori Widiyani from department of Dermatovenereology, Faculty of Medicine, Universitas Kristen Indonesia, Jakarta, Indonesia).

A potassium hydroxide mount of skin scrapings from various part of scrapping revealed numerous live and dead mites, eggs, and scybala, thus confirming our diagnosis of scabies. But after a more thorough and careful observation, we notice that our positive case of scabies showed an unusual appearance under the microscope.

Using 400X magnification (maximal magnification that can revealed its whole body inside one full ocular aspect field of view) there is a very interesting object inside the body of this adult stage, female mite. That object was a smaller *S. scabiei* with the size about one fifth or one sixth of its parent. This smaller *S. scabiei* in general also has the same morphology as common *S. scabiei*, but the difference is only in the size (Figure 1). The arrow inside the ocular lens was set to pointed at the impression of an object resembles egg shell which seems has been split in half.



Figure 1: The impression of small size mite inside the body of adult *S. scabiei* (using 400X magnification, light microscope Olympus CX21™).

We did further checking under the microscope on this image, switch the objective lens for the larger magnification so that we got a more bigger view. After a careful inspection, we notice the shape that resemble of hatching egg shell, an image that was not intact anymore. but if carefully observed, the clear colorless, curved shaped resembling only half part of an egg shell; and it can be seen still covered the upper part head of the

smaller organism (arrow). We also believed that the smaller one is another mite that was still in larvae stage, because if we closely examined the body we can found three pairs of leg (the location of the legs are as follow: one pair infront, and two pairs at the dorsal part of the body).

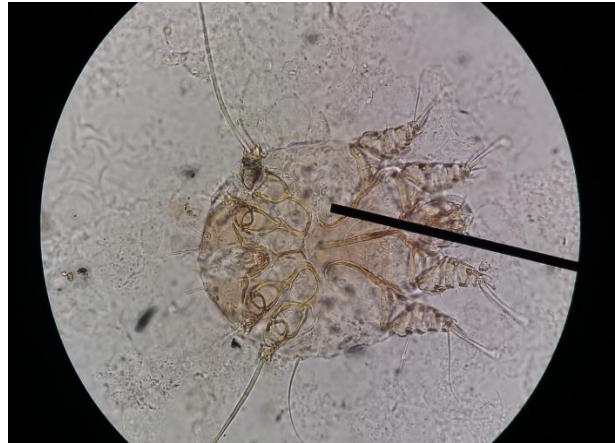


Figure 2: The regular appearance of *S. scabiei*.

Notice the 4 pairs of legs located in opposite direction from each other. This parasite shown is different case as shown in Figure 1 (using 100X magnification, light microscope Olympus CX21™).

The description of regular adult stage of *S. scabiei* mites usually as follows. It sized 0.2-0.5 mm in length, in general, the colour is pale whitish to clear transparent, its geometry shaped is spherical in general appearance, have no eyes at all and also have distinctive four pairs of legs, where two pairs located in front part of the body and two pairs located behind. The sucker bearing pairs of legs have unjointed pedicles, a specific characteristics for this mite; leg pairs no. 1 and no. 2 usually extended beyond the body margin. Leg pairs no. 3 and no. 4 are only visible from ventral view. They are easy to recognize by their classic descriptive appearance: oval, ventrally flattened and dorsally convex tortoise-like bodies with multiple cuticular spines. It has short rounded shape mouthparts. The dorsal surface covered with transverse ridges and bears numerous triangular chitinous scales and some spiny setae. Morphological distinction of host-based specific varieties are possible. This mite undergoes four stages in its life cycle: egg, larvae, nymph and adult. Upon infesting a human host, the adult female burrows into the stratum corneum (outermost layer of skin) where she deposits two or three eggs per day. The egg are oval in shape, sized 0.1-0.15 mm long; and during incubation time (in three to four days), it may hatch as larvae. A study stated that 90% of hatched egg mites produced larvae will die. A female can lay up to 30 eggs, then dies at the end of a burrow.

Living larvae (has 3 pairs of legs) migrate to the skin surface and burrow into the intact stratum corneum to make short burrows, called molting pouches within 3-4 days. Larvae then molt into nymphs (which already has 4

pairs of legs) which then molt once again into a bigger nymphs before it turn to be adult mite. Mating takes place once and the female is become fertile for the rest of her life; while the male mites soon dies after mating. The female mites make a serpentine burrow using proteolytic enzymes to dissolve the stratum corneum of the epidermis; then laying their eggs during the process and while doing so she also extending the burrow and again lay eggs for the rest of her life with survival time is about 30-60 days.

Transmission of impregnated female mites occurred from human to human due to direct or indirect skin contact. Indirect skin contact is possible due to shared use of toiletries e.g solid bathing soap, comb, towel and sharing bed and or clothes. Direct skin contact made possible especially when the vulnerable hosts have difficulties on conducting self- personal hygiene, e.g elderly with comorbidities, retarded people or refugee. Figure 2 the photograph of regular appearance of adult stage *S. scabiei*, collection of department of Parasitology, Faculty of medicine, Universitas Kristen Indonesia, Jakarta Indonesia.

In the parasitology department, laboratory examination service to patients was available from university hospital, Rumah Sakit UKI, and also patients or sample that being sent to us from clinic or hospitals outside our hospitals. The lab was open from Monday to Saturday in office hours. In general, examination was categorized into three types, first is mycology examination which comprise mostly skin scrapping, mostly on working diagnosis fungus or parasite infection to be confirmed in the lab, second is stool examination for suspected parasite as causative agent and third is blood examination for confirmation of suspected clinical malaria or filaria. In suspected case of scabies, skin scrapping was done in the affected area. All crusted skin was scrapped that technically able to be removed and quite big in size using blunt part of the scalpel, collected in a clean petri dish, then using 10% KOH (potassium hydroxide), and examined the skin scrapping under light microscope, firstly using small magnification (100X) and if something found suspicious, the higher magnification was used to check it more carefully (400X). The summary of total examination conducted in the lab during 2014 until 2019 was presented in Table 1.

Table 1: The amount of parasitology examination conducted in our lab, from 2014-2019.

Year	Mycology examination (mostly skin scrapping)	Stool examination	Blood examination (malaria)	Total sample (myco+stool+blood)
2014	166	146	26	338
2015	110	104	27	241
2016	147	154	24	325
2017	178	177	35	390
2018	181	89	24	294
2019	187	43	14	244
Total	969	713	150	1832

The total number of confirmed diagnosis of scabies made in the lab in six years, from January 2014 to December 2019, are 32 cases. So, its prevalence among all mycology examination in the lab was 3 mille (32 divided with total number of as much 969 mycology laboratory examination), and if continues further, scabies prevalence among all parasitology lab examination in the department was 17 mille (32/1832).

DISCUSSION

According to Andriantsoantnirina et al, the mites *S. scabiei* in humans do not denote only to single homogeneous population.¹⁷ The difference of clinical appearance of scabies in general supported that theory, where it presents in three forms: classic, nodular, or a contagious crusted variant also called Norwegian scabies.

In the context of making the correct diagnosis of scabies, a parasitology laboratory examination must be conducted. Actually, direct microscopic examination using 10%

potassium hydroxide (10% KOH) considered as the gold standard for diagnosing scabies.^{9,11} To date, it is still a simple, most widely used, trustworthy but valuable technique to apply in the diagnosis of scabies.^{14,19}

Epidemiologically in our lab, the incidence of scabies is very low. This is probably due to the very wide type of examination under the skin scrapping group. Most of our received samples were sent for confirmation using mycology examination. Suspected cases of scabies were rarely sent to our lab for confirmation. It is so often misdiagnosed and leads to mistreated/mistreatment and in the end can developed into full blown crusted scabies. This is a very good example of an ice berg phenomenon, not because there are no cases of scabies in our surrounding environment but because the number of suspected cases sent to us to be confirmed is very minimal. Furthermore, due to the tiered health service system, patients complaint that resemble scabies usually come to the primary health care (PUSKESMAS) rather than goes directly to secondary or tertiary health care, like our hospital.

Table 2: Various clinical form of scabies modified.^{15,18-20}

Characterization	Classic	Nodular	Contagious crusted (Norwegian scabies)
Population of mites	10-15 organisms	More in number	>millions in 1 single host
Method of transmission	Skin to skin contact/direct contact, or fomite transmission via clothing or bed sheet/ in-direct		
Estimated time from contact until infection occurs	Direct contact, at least 10 minutes ¹⁸ Indirect contact, longer in time, more intense shared use of personal belongings, e.g. towel, linens, clothing, blanket/bed sheet, carpets or shared public facility, e.g. childcare settings which is not maintained its cleanliness		
Clinical appearance	Diffuse and or localized hyperkeratotic plaques	Erythematous nodule*	Marked thickening and crusting of the skin, Lesions are often hyperkeratotic and crusted. Marked scaling is common, and pruritus may even be minimal or absent
Affected area	Palms, soles, underneath finger nail/nail bed	Axilla, groin	Cover large areas of the body, in fact it can affect the whole body
Underlying condition	Poor hygiene practice	Poor hygiene practice	Poor hygiene practice and immuno-compromised (due to immunosuppressive therapy, diabetes, human immunodeficiency virus (HIV), or disability related condition or elderly

CONCLUSION

S. scabiei and scabies continues to become a global parasitic problem. Its appearance underneath microscopic examination is very typical. Epidemiologically, Poor practice of hygiene, inappropriate sanitary set-ups and to some extent the immuno-compromised condition may predispose the infection to become severe. Early diagnosis and prompt treatment with proper education to the patients and his/her family are pre-requisite in order to cut off the chain of transmission.

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