Scabies in Indonesia

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Introduction

Scabies is very contagious skin condition or dermatitis characterized by pruritus, alopecia, and epidermal hyperplasia with desquamation. This is a disease common to global community that is found in both developed countries and developing countries. Scabies is caused by mange mites (families Sarcoptidae, Psoroptidae, and Knemidokoptidae). These mites are known as scabies, itch mites, sarcoptic mange, or psoroptic mange. In Indonesian language is known as kudisan, budug, kurap or agogo disease.

Scabies affects all domestic animals such as dogs, cats, horses, cattle, sheep, goats, pigs, rabbits, fowls, birds, and also human regardless of age, gender, race, social class, or personal-hygiene habits. However in human, it is usually found where people are crowded together or have frequent contact, and is most common among school children, families, roommates, and sexual partners where it can spread widely.

In Indonesia, scabies is widely distributed. Severe cases were reported in Central Java, West Java, DI Yogyakarta and Sumatera. However, the most frequent cases were found in dogs by S. scabiei var. canis and goats by S. scabiei var. ovis. Generally, domestic animals such as dogs, cats, pigs and rabbits are usually infested by scabies. In cattle and buffalo are rarely infested by this mange. Scabies was initiated by individual case, and then widely infested. There are tendency that the animal with bad nutrition or malnutrition more susceptible to the scabies.

The transmission of scabies among animals is by close contact and this is facilitated by close herding of domestic animals, and in wild animals by living in family or social groups. Among humans, scabies can be spread by scratching, picking up the mites under the finger nails and simply contact or touching another infested person's skin. They can also be spread onto other objects like stable or stall, bedding, furniture, clothing, towels, and anything else that the mite may be rubbed off onto, especially if an animal or person is heavily infested.
Agent

Mange mites belong to theordo Acariformes, sub-class Acari, in the Arachnida. There are three family of mange mites, i.e. Sarcoptidae (Sarcoptes and Notoedres), Knemidokoptidae (Knemidokoptes) and Psoroptidae (Psoroptes, Chorioptes, and Otodectes). Sarcoptic mites are parasitic throughout their life burrowing into the skin of mammals or birds. They are globose mites with the ventral surface somewhat flattened, the cuticle finely striated (Figure 1) and the chelicerae adapted for cutting and paring. The Sarcoptidae includes Sarcoptes scabiei and Notoedres cati, of which S scabiei is economically the more important. The Knemidokoptidae are skin parasites of birds, and the Psoroptidae are oval, non burrowing mites, which are parasites on the skin of mammals and some species live deep in the ear canal of dogs, cats and ferrets but lesions have also seen on the body.

In Indonesia, there are several species of mange mites found such as Sarcoptes scabiei, Notoedres cati, Psoroptes ovis, P. cuniculi, Chorioptes bovis, C. texanus, Otodectes cynotis, Knemidokoptes mutas, K. pilae and follicle mites, Demodex canis and D. bovis. Sarcoptes scabiei do cause serious skin lesions in various domestic animals; whereas N. cati occurs on cats and rabbits; P. ovis on sheep, goats and cattle; P. cuniculi on rabbits but also have been reported on goats, sheep and horses; C. bovis on the legs of horses and sheep, and on the base of cattle tail; O. cynotis on dog and cat ears; and Demodex canis and D. bovis on the hair follicles of dogs and cattle, respectively. In man, the scabies is caused by Sarcoptes scabiei var. hominis.

Many domestic animals have their own species of Sarcoptes mites, i.e. Sarcoptes scabiei var. canis (dogs), var. feline (cats), var. cuniculi (rabbits), var. ovis (sheep), var. caprae (goats), var. bovis (cattle), var. equine (horse) etc. Though all can transiently affect humans, the mites that cause scabies in animals cannot reproduce on the human body and will die within a few days. The most frequently diagnosed form is sarcoptic mange in dogs. In dogs and other animals, scabies produces severe itching and secondary skin infections.

Generic differentiation of mange mites was presented here by showing the key determination in Table 1. This key should be encountered in routine veterinary practice requires litte more than examination of their pretarsi (Fig.1). If the pretarsus has a long, unsegmented pedicel (stalk), the specimen is most likely Sarcoptes or Notoedres. If the pretarsus has a long, three-segmented pedicel, it is bound to be Psoroptes. Pretarsi with short pedicels are found on Chorioptes from ungulates and Otodectes from dogs; the species identity of the host is a sufficiently reliable differential criterion in this case. Knemidokoptes female lack pretarsi, but the males have pretarsi resembling those of Sarcoptes. Certain particularly destructive mange such as psoroptic mange in sheep and cattle and sarcoptic mange in cattle should be reported to state animal disease control authorities.

Demodex spp are the cause of red mange in a variety of host, e.g., D. canis (dog), D. bovis (cattle), D. ovis (sheep), D. ovis (sheep), D. caprae (goat), and D. phylloides (swine). The mites have a distinct characters i.e. the non-hairy body is elongated; the very short four pairs of legs are situated anteriorly; and the abdomen is transversely striated. The adults are approximately 0.1-0.4 mm in length, and live in the hair follicles, sebaceous glands, and the epidermis, where they reproduce.
Table 1. Microscopic characteristics of the mange or scabies mite

<table>
<thead>
<tr>
<th>Genus</th>
<th>Leg characteristics</th>
<th>Anus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Egg-laying Female</td>
<td>Male</td>
</tr>
<tr>
<td><strong>Sarcoptes</strong></td>
<td>Sucker on a long un-jointed stalk on pairs 1 and 2</td>
<td>Sucker on a long un-jointed stalk on pairs 1, 2 and 4</td>
</tr>
<tr>
<td><strong>Notoedres</strong></td>
<td>As above</td>
<td>As above</td>
</tr>
<tr>
<td><strong>Knemidokoptes</strong></td>
<td>No suckers</td>
<td>Sucker on an un-jointed stalk on pairs 1, 2, 3 and 4</td>
</tr>
<tr>
<td><strong>Psoroptes</strong></td>
<td>Sucker on a long jointed stalk on pairs 1, 2, and 4</td>
<td>Sucker on a long jointed stalk on pairs 1, 2, and 3</td>
</tr>
<tr>
<td><strong>Chorioptes</strong></td>
<td>Sucker on a short un-jointed stalk on pairs 1, 2, and 4</td>
<td>Sucker on a short un-jointed stalk on pairs 1, 2, 3 and 4. Pair 4 rudimentary</td>
</tr>
<tr>
<td><strong>Otodectes</strong></td>
<td>Sucker on a short un-jointed stalk on pairs 1 and 2. Pair 4 rudimentary</td>
<td>Sucker on a short un-jointed stalk on pairs 1, 2, 3 and 4.</td>
</tr>
</tbody>
</table>

Fig. 1 Pretarsi of mange mites. (A) **Sarcoptes** (x 830), (B) **Psoroptes** (x 870), (C) **Otodectes** (x 810), and (D) **Chorioptes** (x 710) (reproduce from Bowman & Lynn, 1999)

Sarcoptic mite

*S. scabiei* is oval, very small, measuring 0.2–0.4mm in length (Fig 2). Their bodies are covered with fine lines and several long hairs. The female mite has scattered on the dorsal surface some short blunt spines, which aid her in maintaining her position within the tunnel. The mites have no eyes, and they have short and thick legs, with the first two pairs in both
sexes and the fourth pair in males end in specialized structures called suckers that help them grip and move on the skin surface. The immature (larval) stages of the scabies mite are comprised of a six legged larval stage, followed by 2 nymphal stages that have eight legs, and each stage resembles the adult mite.

![Fig. 2 Adults of Sarcoptes scabiei. (A) female, dorsal view; B male, ventral view (reproduce from Varma, 1993)](image)

The entire life cycle of the mite occurs over 11-16 days. Newly mated females take approx. an hour to burrow into the outer layer of vertebrate skin and excavates a tunnel. The mite lays her eggs singly, depositing behind her 1-3 eggs each day for 5 to 8 weeks. Females burrow without direction, using their mouthparts to tunnel 0.5-5 mm a day, eating the skin and tissue fluids that ooze from their excavations. Each tunnel contains only one female, her eggs and faeces. The eggs will hatch in 3-4 days, and after 48 hours of hatching and the larval stages dig their way to the surface of the skin, where they immediately burrow. This burrow may only be a short distance into the skin, or they make use of hair follicles, to moults to the next stage (protonymph). During this time the larva and nymph find shelter and food in the hair follicles. The protonymph moults to become a deutonymph and again a few days later to become an adult. Newly moulted male and female mites start to feed and burrow at the skin surface, creating small pockets of up 1 mm in length in the skin. Despite their short legs, adults are highly mobile, capable of moving at up to 2.5 cm/min. Mating takes place on the surface of the skin and the male dies. It takes about two weeks for an egg to develop into a gravid female.

After fertilisation, female mites wander on the skin to seek a suitable site for a permanent burrow. The transfer of a female to another host at this stage will initiate a new infection. A fertilised female mite can only initiate successful scabies infections. Female mites rarely leave their burrows, and if removed by scratching and remain undamaged, they will attempt to burrow again. During an infection the number of mites increases rapidly, and then drops off, leaving infected persons with a relatively stable mite population of 15-20
females. The mortality rate of mites is high, 90% of mites that hatch will die, and mites removed from their host can only live a short time. The adult mites live 6–8 weeks in the host's skin. These mites are very sensitive against dry conditions. The parasite can survive up to 14 days away from a host, but often do not survive longer than two or three days away from host skin.

**Pathogenesis**

The initial infestation may remain undetected for a month or more, before sensitization develops and a immunological response in the host is triggered. The allergic reaction is from components of the mite's faeces, skin moults, saliva or moulting fluids diffusing into the tissues of the host from the burrows. The intense itching and rash characteristic of scabies infection is caused by this allergic reaction. The rash can be found over much of the body; the associated itching is often most prevalent at night. Secondary infection is often due to impetigo, a type of bacterial skin infection, after scratching. Cellulitis may also occur, resulting in localized swelling, redness and fever.

In immuno-compromised, malnourished, elderly or institutionalized individuals, infestation can cause a more severe form of scabies known as crusted scabies. This syndrome is characterized by a scaly rash, slight itching and thickened crusts of skin containing thousands of mites. This crusted scabies is the form of scabies that is hardest to treat.

**Clinical Sign**

Scabies infestations can present different clinical pictures and may be difficult to diagnose. In individuals never before exposed to scabies, the onset of clinical signs and symptoms is 4-6 weeks after infestation; in previously exposed individuals, onset can be as soon as 1-4 days after infestation.

Scabies causes severe itching, so animals that experience prolonged scratching and hair loss are suspect. Symptoms are most often seen on the elbows, hocks, abdomen, and chest of infested dogs. Scabies is difficult to diagnose so clinical signs and elimination of other risk factors is important as skin scrapings are often unreliable.

In human, the patient can experience severe itching all over the body, and especially at night. Large areas of the body can be covered by a rash that can last for weeks but which will not (or only rarely) coincide with the areas of mite infestation. Eruption of the skin into small itchy lesions may occur in conjunction with the rash. Scabies mites tend to burrow into the skin where there is a natural crease and the host's reaction will be minimal. The hands, and webbing between the fingers, the wrists, and elbows are common areas. From the surface of the skin, the tunnels appear as greyish pencil marks, in darker skin the tunnels appear paler. The severe itching and scratching can lead to secondary infections and, in cases of heavy infestations anemia can develop.

Generally, the primary signs of sarcoptic mange are similar for all species as: intense pruritus (itchiness); hair loss (alopecia); papules; crusts; grazes on the surface of the skin; secondary bacterial infection; thickening of the skin (in chronic cases); location of skin lesions is widespread on the neck and sacral region (cattle), the abdomen, chest, ears and legs
- especially the elbows and hocks (dogs), the head and neck (horses and ponies), the back (pigs), the face and ears (rabbits and cats), the face and ears (sheep and goats); weight loss, enlarged lymph nodes, and general debilitation. In humans, the primary clinical signs are papules - especially on the arms or midriff (trunk) and itchiness

**Diagnosis**

A firm diagnosis of scabies must be made on recovery of mites from the affected host. In animals, a skin scraping is made from the infested area by vigorously scraping the affected skin several times with a sterile scalpel blade. The scraping is then transferred to a glass microscope slide for examination directly, or preferable after disrupting the keratin by boiling for a few minutes in 10 percent caustic soda or potassium hydroxide. The fluid is then centrifuged and the sediment examined. In skin scrapings males are rare than females, and this probably reflects their being shorter-lived. Another method is to place skin scraping in a small Petri dish, or other container, and examine it after 12-24 hours for the presence of mites crawling on the bottom.

In mans this requires the recognition of the burrows of the female mite in the skin, removal of the mite, and its examination under suitable examination. The presence of burrow in characteristic location such as the wrists, fingers, elbows, and feet are considered nearly pathognomonic, i.e., by themselves they virtually confirm the diagnosis. To help locating burrows, one or two drops of ink can be applied to suspected areas and then wiped off with alcohol after 10 minutes. The ink is retained in the burrows, making them more discernible. Adult female mite can be removed from the blind end of their burrows by using a sharp-pointed scalpel blade to pierce the skin and gently pick out the mite. The scraping is then examined, and usually even the absence of adult mites, the oval shaped eggs (ca 170x 190 micron) are often clearly visible, as are the characteristic yellowish brown fecal pellets.

Skin biopsies can be taken and prepared for histopathological examination. The result will be best if take an undisturbed papule to section that mites, eggs or mite feces may be found, along with infiltrations of eosinophils, macrophages, neutrophils, and perivascular aggregates of lymphoid cells.

A centrifuge-flotation method also has been used with some success, especially in cases of crusted scabies or when material from affected areas can be collected. The scrapings are placed in 10% potassium hydroxide or sodium hydroxide and gently heated. The mixture then is added to a saturated sugar solution in a centrifuge tube and spun until any mites or eggs that are present float to the surface. Drops of the surface fluid can be microscopically examined. Eggs and egg shells have been detected by examining suspected skin scrapings in glycerin preparations using fluorescent microscopy.

In the diagnosis of scabies it is important to appreciate the fact that the distribution of the rash on the body bears no relation to the distribution of the mites. Nearly two-thirds of the mites are to be found on the hands and wrists with the remainder being more or less equally distributed between the elbows, feet and genital are. The rash develops bilaterally being concentrated on the axillae, waist, and inner and posterior parts of the upper thighs and buttocks.
Prevention and Control

There is no vaccine available for scabies, nor are there any proven causative risk factors. Therefore, most strategies focus on preventing re-infection. Maintaining the good health of domestic animals or man is important to preventing scabies. Dogs that roam with other dogs, reside at a shelter or boarding facility, or have frequent contact with other dogs are susceptible as scabies is easily transferred between dogs. The environment should also be treated in case mites have dropped off into bedding or floor coverings. Cleaning the environment should include treatment of furniture and bedding; vacuuming floors, carpets, and rugs; disinfecting floor and bathroom surfaces by mopping, cleaning the shower/bath tub after each use, daily washing of recently worn clothes, towels and bedding in hot water, drying in a hot dryer and steam ironing.

All family and close contacts should be treated at the same time, even if asymptomatic. Cleaning of environment should occur simultaneously, as there is a risk of reinfection. Therefore it is recommended to wash and hot iron all material (such as clothes, bedding, and towels) that has been in contact with scabies infestation.

All animals in a household, stables or farm should be treated. Several treatments are available for the treatment of mange mites including the following acaricides which kill the mites: Amitraz, Benzyl benzoate, Bromocyclen, Fipronil, Ivermectin, Milbemycin, Monosulphiram, Phosmet, Permetrin, and Rotenone. Some of these do not have product licenses for use in all species, and some can be toxic e.g. ivermectin is toxic to Collies. Animals with long hair coats may have to be clipped. The itchy pruritus can be controlled using anti-inflammatory drugs e.g. corticosteroids. Antibiotics may be needed if secondary bacterial infection is present, and Antiseborrhoeic shampoos are also helpful to cleanse the skin of the animals.

Dogs and cats. In treating sarcoptic mange in dogs should be clipped, especially around the lesions and keratolytic shampoo used to remove the crust and scale. A topical acaricidal shampoo or wash should be used every 7-14 days for 4-6 weeks. Systemic ivermectin at 200-400µg/kg given twice, 14 days apart is effective, but should not be used in collies or collie crossbred. It is important to trat all incontact dogs and identify the source if possible. In treating otodectic mange in dogs and cat, topical ceruminolytic ear preparation should be used to remove crust and cerumen from the external ear canal. An otic acaricidal products (e.g. permetrin) should then be used for 2 weeks beyond clinical cure. Amitraz (1 ml diluted in 33 ml mineral oil) can be used as an otic acaricide. Sistemic ivermectin also can be used as for sarcoptic mange. In treating notoedric mange in cats, the standard treatment previously used was lime sulfur. The cat is bathed with lime sulfur first, and then dipped or wash with a 1:40 solution of lime sulfur in warm water. This treatment is applied weekly for at least six weeks. In treating demodicete mange, there are two ways. The localized form of demodicete mange may be controlled by applyeing benzyl benzoate lotion or rotenone ointment daily. The treatment of generalized demodicete mange is amitraz, usually used at 0.05% every 7-14 days until two consecutive negative skin scrapings are obtained. Systemic ivermectin given orally at between 400-800 µg /kg daily has been reported to be effective.

Ruminants. Sarcoptic mange of beef cattle and nonlactating dairy cattle is treated with avermectins, ivermectin, doramectin or eprinomectin. It also can be treted with sprays or dips
containing lime sulfur, phosmet, and tetrachlorvinphos. Eprinomectin can be applied to lactating dairy cattle without withholding of milk and is approved for the treatment of chorioptic mange. Psoroptic scabies in cattle or sheep can be treated with coumaphos, phosmet, hot lime sulfur, and injectable ivermectin. Cattle treated with ivermectin must be isolated from untreated cattle for two weeks after treatment, and withheld from slaughter for the required period. Holding facilities vacated by sheep or cattle with psoroptic mange should be left vacant for at least two weeks to give the mites time die off before housing new stock.

**Horses.** Topical treatments using organophosphates (coumaphos, malathion, metoxychlor) applied twice, 2 weeks apart are effective. Ivermectin applied topically at 200 µg /kg is also effective against scabies in horses. Isolate mangy horses and sterilize all water buckets, brushes, curry combs, and the like. Stalls should be thoroughly disinfected or left vacant for two to three weeks.

**Swine.** Ivermectin given orally at 300-500 µg /kg is highly effective in treating sarcoptic mange in swine. Topical organophosphates (coumaphos, chlorfenvinphos, diazinon, fenchlorvos, malathion), pyrethroids (decametrin, flumethrin, cypermetrin) and amitras can be apply to the entire body and all in-contact animals. Sarcoptic mange in swine responds to malathion sprays applied twice at an interval of two weeks.

**Poultry.** Spraying the housing with organophosphates (coumaphos, malathion, metoxychlor, diazinon) or lime sulfur is effective if thorough. Systemic treatment of birds with ivermectin at 200 µg /kg intramuscularly is effective. Topical ivermectin applied as a spot-on is also effective. Investigation and removal of the source of infestations also should be done.

**Human.** In humans, most scabies infections are easy to control, providing the directions of the scabicide or acaricides treatments are followed. Any pharmacy will supply a chemical preparation such as 5% permethrin cream, and a prescription is not necessary. Care should be taken in re-applying scabicides unnecessarily, to avoid skin irritation and added costs. In most cases, itching may persist for a week or more after the treatment, but this is not necessarily a sign of treatment failure. Re-examination of the patient at four weeks after the treatment is appropriate. For patients diagnosed with crusted scabies, the patient should be isolated, and barrier nursing implemented throughout the treatment. All individuals that have had significant contact with the primary patient should also be treated. Scabies is highly contagious in overcrowded situations and close contact with infected individuals should be avoided. Touching, shaking hands, or sharing beds and contaminated objects of an infected person are common modes of transmission.

In Indonesia scabies is belong to the zoonotic diseases that can be passed from animals to humans, so pet owners that have close contact with their animals may develop an itchy rash. However, after the pet has been treated, the symptoms usually disappear. Sarcoptic mange and psoroptic mange in livestock in Indonesia should be reported to state disease control authories and treatment carried out under their supervision.


Reference


