Sains Malaysiana 45(5)(2016): 745–751

Epidemiological Survey on Mange Mite of Rabbits in the Southern Region of Egypt

(Tinjauan Epidemiologi Hama Kurap pada Arnab di Wilayah Selatan Mesir)

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ABSTRACT

The aim of the present study was to estimate the epidemic situation of mites, in rabbit dermatologic disease in and around Qena province, in the southern region of Egypt. Two hundred cases of dermatologic disease from the formentioned province were investigated by conducting deep skin scraping between May 2011 and October 2012. The overall prevalence was 25%. Sarcoptic scabiei uniculi *(22.5%) was the most frequent mite, followed by* Notoedres cati cuniculi *(2.5%). To the best of our knowledge this is the first report of* Notoedres cati cuniculi *among studied rabbits in the study region. Study on different breeds, English represents highest prevalence of mites 30%. Moreover, there was no significant difference in the prevalence of mange mite infection between male and female rabbits ($p > 0.05$). Similarly, the prevalence was not significant among the age groups and rabbit breeds ($p > 0.05$). In conclusion, the present prevalence of mange mites was still high enough to cause significant economic losses in the study area. Therefore, strengthening the control effort was suggested.*

Keywords: Egypt; epidemiology; rabbits; Sarcoptes*; skin*

ABSTRAK

Tujuan penyelidikan ini dijalankan adalah untuk menganggarkan keadaan wabak hama, penyakit dermatologi arnab di sekitar wilayah Qena, selatan Mesir. Dua ratus kes penyakit dermatologi dari wilayah tersebut telah dikaji dengan mengikis kulit dalam antara Mei 2011 dan Oktober 2012. Kelaziman keseluruhan adalah 25%. Sarcoptic scabiei uniculi *(22.5%) adalah hama yang paling kerap ditemui, diikuti oleh* Notoedres cati cuniculi *(2.5%). Sepanjang pengetahuan penulis ini adalah laporan pertama* Notoedres cati cuniculi *antara arnab yang dikaji di kawasan kajian. Kajian baka yang berbeza, baka English merupakan kelaziman tertinggi hama 30%. Tidak ada perbezaan yang signifikan dalam kelaziman jangkitan hama kurap antara arnab betina dan jantan ($p > 0.05$). Begitu juga, kelaziman yang tidak ketara dalam kalangan usia dan baka arnab ($p > 0.05$). Kesimpulannya, kelaziman semasa hama kurap masih cukup tinggi untuk menyebabkan kerugian ekonomi yang signifikan di kawasan kajian. Oleh itu, pengukuhan usaha kawalan telah dicadangkan.*

Kata kunci: Arnab; epidemiologi; kulit; Mesir; Sarcoptes

INTRODUCTION

Arachnid ectoparasites display a wide range of forms of association with their hosts: obligate to facultative, permanent to intermittent, superficial to subcutaneous. The activity of ectoparasites infesting livestock and companion animal hosts is of particular interest because it results in a wide range of pathogenic effects. Feeding may cause direct damage to skin and other sub-cutaneous tissues, inflammation and significant blood loss. This activity is usually associated with pruritis, erythema, excoriation, papules, lichenification, scale and crusting and self-trauma (van den Broek et al. 2003). The behaviour of ectoparasites may also cause harm indirectly, causing disturbance, increasing levels of behaviour such as rubbing and leading to reduced time spent grazing or ruminating and in some cases, to self-wounding (Berriatua et al. 1999).

Rabbits are important herbivores in many ecosystems and they may constitute primary prey species for many mammalian and avian predators. In many parts of the world including Egypt, rabbits have been deliberately released to create a source of meat and fibre, often to the detriment of the ecosystem.

Because rabbits are carriers of the virulent diseases, which is transmitted from rabbit to rabbit by certain ectoparasites and from rabbits to men by handling, the ectoparasites of these animals are of considerable importance to human beings as well as to rabbits (Tiawsirisup et al. 2005).

Skin diseases are among the most common reasons that lead owners to bring their pet rabbits to the veterinarian. Also, skin disorders negatively affect animals from laboratory colonies and commercial husbandries. Ectoparasites, especially mites, are the most frequent cause of these dermatologic problems (White et al. 2002). Furthermore, mange is a highly contagious skin disease, characterized by crusty, pruritic dermatitis and hair loss and caused by a variety of parasitic mites burrowing in or living on the skin (Pence & Ueckermann 2002).

Although Mange has become a common and major constraint in rabbit production in Egypt, limited research has been performed on the prevalence of mites in rabbit dermatologic disease. Additionally, to implement effective control strategy against the external parasites, good epidemiological knowledge on distribution is of paramount importance, hence the need to investigate the incidence of mange and therefore, this study focuses on epidemiological survey of mange in rabbits of upper region of Egypt.

Materials and Methods

Study area

The present study was carried out in and around the Qena region located between 26°10′12″N latitude and 32°43′38″E longitude, in the Southern Egypt. The climatic condition of the area has a hot desert climate according to Köppen climate classification, with very hot summers and very little precipitation year round. Winters are warm at days, but become cool at nights.

Animals

Between May 2011 and October 2012, a total of 200 rabbits brought to veterinary clinic were subjected to detailed examination for the presence of skin lesions. Records were also taken with regards to age, sex and breed of each selected animals.

Collection of the samples

Rabbits were thoroughly examined for the presence of mange like lesions on different parts of the body such as head, face, neck, breast, brisket and tail. Skin scrapings were taken only from animals suspected for having clinical signs of mange as hair loss, severe itch and crusty or scaly skin lesions, following the method described by Fthenakis et al. (2000). Then, the samples transported directly to the parasitic laboratory of Faculty of Veterinary Medicine in the South Valley University for proceeding diagnosis.

Laboratory tests

Briefly, a part of the scraping was taken and placed in a test tube containing 5 mL of KOH 10%. The tubes are placed in a water bath with 60-80˚c for 15 min then centrifuged in a speed of 1500-2000 rounds per minute for 5 min, discarded the supernant by an automatic pipette and the sediment is mixed well in a test tube. Then some drops are drawn from the sediment with a pipette, placed on a glass slide and covered with a cover slide and permanent mounts of mites were also prepared (Higgins 1984). For species determination of mites was carried out with the help of morphological characteristics (Hansen et al. 2005; Soulsby 1982).

Data analysis

The data were analyzed using the Statistical Package for Social Science version-15.0 (SPSS Inc., Chicago, IL). Association between prevalence and explanatory variables such as sex, age and rabbit breeds were carried out by using chi-square (χ^2) test. Significant difference was set at $P < 0.05$ in all analyses.

Results

Survey analysis

Out of the 200 specimens studied, 50 (25%) were found to be infected with ectoparasitic mites, of which 45 (22.5%) were proved to be infected with *Sarcoptes scabiei cuniculi* while 5 (2.5%) were found to be positive for *Notoedres cati cuniculi* as illustrated in Table 1.

The current study showed that the most susceptible breeds to mite infections seemed to be English breed with an overall prevalence of 30%, while California and Belgicie sp. represented the least susceptible breeds (20%). On the other hand, the other breeds showed variable infection rates ranging from 23.1% to 29.2% as depicted in Table 2.

Likewise male rabbits (31.4%) were more susceptible to the mite infection than females (22.8%). However males generally had a higher infection rate than females, it was not statistically significant (p= 0.22). Besides, young rabbits (29.5%) appeared to be more frequently infected than adults (19.3%) by mite and particularly by *Sarcoptes scabiei cuniculi*. Although young rabbits generally had a higher infection rate than adult, it was not statistically significant (p= 0.1) as shown in Table (3).

Tables (4) and (5) summarized the seasonal prevalence of mange infection among examined rabbits in relation to age and sex.

The most common lesions manifested in all symptomatic rabbits (*n*=50) were nasal hyperkeratosis in 40% of cases (*n*=20) and ear hyperkeratosis (*n*=13) or

TABLE 1. Prevalence of ectoparasites among examined rabbit

Total no. of examined rabbits	Ectoparasites				Total	
	Sarcoptes scabiei cuniculi		*Notoedres cati cuniculi*			
200	No. of infected cases	%	No. of infected cases	%	Total no. of infected cases	%
	45	22.5	5	2.5	50	25

TABLE 2. Prevalence of ectoparasites in relation to rabbit breeds

Rabbits	No. of examined rabbits	No. of infected rabbits	%
English	10	3	30
Babion	15	4	26.7
Newzeland	109	27	24.8
Flander	4	1	25
Rex	24	7	29.2
Belgicie	10	2	20
Shenshella	13	3	23.1
California	15	3	20
Total	200	50	25

TABLE 3. Prevalence of ectoparasites in relation to age and sex of examined rabbit

Animals		No. of examined rabbits	No. of infected cases	%
Kitten	Female	104	26	25
	Male	8	7	87.5
Total kitten (up to one year)		112	33	29.5
Adult	Female	45	8	17.821
	Male	43	9	
Total adult (Over one year)		88	17	19.3
Total	Female	149	34	22.8
	Male	51	16	31.4
Total		200	50	25

facial (*n*=7) alopecia. Pruritus was observed in 10 infested rabbits (20%) (Figure 1(a) & 1(b)).

MORPHOLOGICAL RESULTS

SARCOPTES SCABIEI CUNICULI

It was recognized by the characteristic oval, ventrally flattened and dorsally convex tortoise-like body (similar to a turtle), stout dorsal setae, numerous cuticular spines and transversely ridged cuticular striations. Most of the mite was creamy white except for the legs and the mouthparts that were brown.

Adult females Their size range between 300-504 µm long and 230-420 µm wide, it exhibits an external copulatory papilla of the bursa on the posterior idiosoma anterior to the posterior-dorsal anal opening, the last segment (tarsus) of legs I and II have a long, unjointed empodium or stalk with a small sucker-like pad at its end, while legs III and IV terminate in a long seta. In addition, the tarsus of legs I and II and tibio-tarsus III bear two spur-like claws in both sexes (Figure 1(e) & 1(f)).

Adult male Their size range between 213-285 µm long and 162-240 µm wide, about two thirds the size of the female, the last segment (tarsus) of legs I, II and IV have a long, unjointed empodium or stalk with a small sucker-like pad at its end, while the leg III of males terminate in a long seta. The anterior stubby legs extend beyond the anterior-lateral margin of the propodosoma, while the posterior legs do not extend beyond the body margin (Figure 1(d)). The eggs were oval-shaped with main diameters of 0.082 -0.012 mm as average size (Figure 1(c) & 1(I)).

NOTOEDRES CATI CUNICULI

Notoedres mites are generally similar to *Sarcoptes* but smaller in size and it is distinguished from *Sarcoptes* by its concentric 'thumb print' striations and absence of spine. Additionally, they lack the mid-dorsal field of tooth-like cuticular spines and peg-like setae, which may be replaced by a slight scale-like pattern in the cuticular striations and short, stout setae.

ADULT FEMALES

It had rounded idiosoma, its mean size was 230.2 × 200.4 µm, the legs I and II with pretarsus long pedunculated, while legs III and IV long bristle and the anus was in a dorsal position surrounded by delicate blunt spines (Figure 1(g) & 1(h)).

ADULT MALE

Its mean size was 137.6 × 104.9 µm, the legs I, II and IV end with long, pedunculated pretarsus, while the leg III ending in a long bristle with dorsally located anus.

TABLE 4. Seasonal prevalence of ectoparasites in relation to breed and age of examined rabbit

Breed	no of examined rabbits	Season															
		Winter=60				Spring=40				Summer=60				Autumn=40			
		Young rabbits		Adult rabbit		Young rabbits		Adult rabbit		Young rabbits		Adult rabbit		Young rabbits		Adult rabbit	
		+ve	%	+ve	%	+ve	%	+ve	%	+ve	%	+ve	%	+ve	%	+ve	%
English	10	0	0	0	0	0	0	1	10	0	0	1	10	1	10	0	0
Babion	15	0	0	0	0	1	6.7	1	6.7	0	0	2	13.3	0	0	0	0
Newzeland	109	15	13.8	0	0	4	3.7	0	0	1	0.9	2	1.8	2	1.8	3	2.8
Flander	4	0	0	0	0	0	0	0	0	1	25	0	0	0	0	0	0
Rex	24	0	0	0	0	0	0	2	8.3	3	12.5	1	4.2	0	0	1	4.2
Belgicie	10	0	0	0	0	0	0	0	0	1	10	0	0	1	10	0	0
Shenshella	13	0	0	0	0	0	0	1	7.7	1	7.7	0	0	0	0	1	7.7
California	15	0	0	0	0	0	0	0	0	2	13.3	0	0	0	0	1	6.7
Total	200	15	25	0	0	5	12.5	5	12.5	9	15	6	10	4	10	6	15

TABLE 5. Seasonal Prevalence of ectoparasites in relation to breed and sex of examined rabbit

Breed	no of examined rabbits	Season															
		Winter=60				Spring=40				Summer=60				Autumn=40			
		Female rabbits		Male rabbit		Female rabbits		Male rabbit		Female rabbits		Male rabbit		Female rabbits		Male rabbit	
		+ve	%	+ve	%	+ve	%	+ve	%	+ve	%	+ve	%	+ve	%	+ve	%
English	10	0	0	0	0	1	10	0	0	0	0	1	10	1	10	0	0
Babion	15	0	0	0	0	1	6.7	1	6.7	0	0	2	13.3	0	0	0	0
Newzeland	109	15	13.8	0	0	2	1.8	2	1.8	2	1.8	1	0.9	2	1.8	3	2.8
Flander	4	0	0	0	0	0	0	0	0	0	0	1	25	0	0	0	0
Rex	24	0	0	0	0	2	8.3	0	0	2	8.3	2	8.3	1	4.2	0	0
Belgicie	10	0	0	0	0	0	0	0	0	1	10	0	0	1	10	0	0
Shenshella	13	0	0	0	0	0	0	1	7.7	1	7.7	0	0	1	7.7	0	0
California	15	0	0	0	0	0	0	0	0	0	0	2	13.3	1	6.7	0	0
Total	200	15	25	0	0	6	15	4	10	6	10	9	15	7	17.5	3	7.5

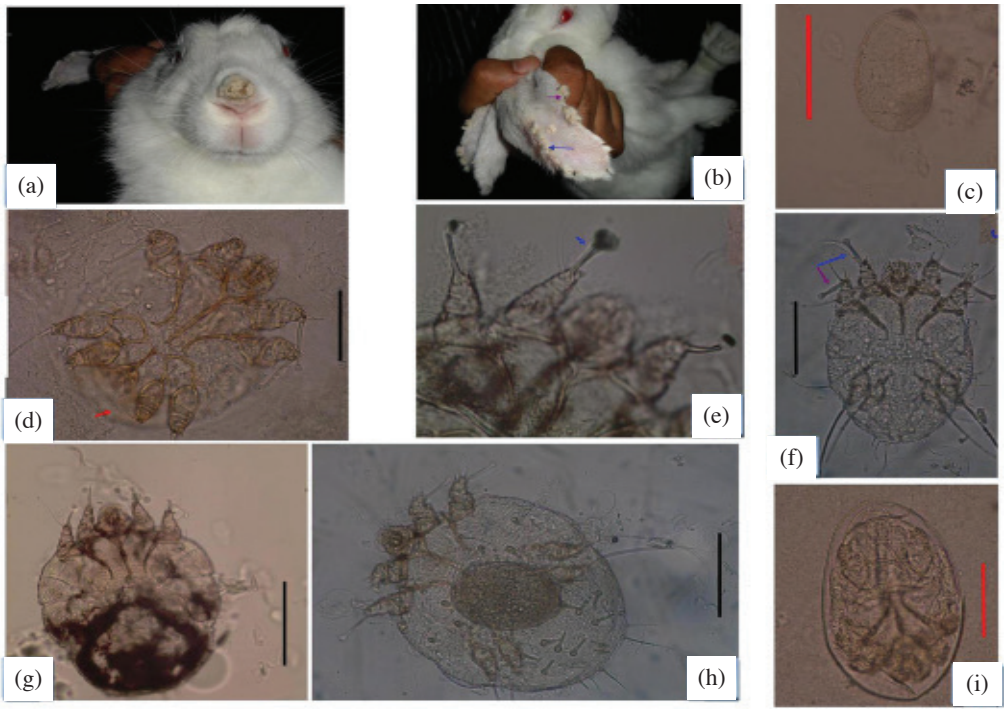

FIGURE 1. (a) Rabbits showing gross scaly lesions on the nose, (b) Rabbits showing a gross scaly lesion on the edge of the ears (arrow) and alopecia (arrow), (c) Photomicrograph of *Sarcoptes scabiei cuniculi* eggs, (d) Photomicrograph of adult male *Sarcoptes scabiei cuniculi* mite. Note: Long unsegmented pedicles (stalks) with sucker at end on legs I, II & IV (arrow), while III leg end with long bristles; (e) & (f) Photomicrograph of adult female *Sarcoptes scabiei cuniculi* mite Note: Long unsegmented pedicles with sucker at end on legs I & II (arrow); (g) & (h) Photomicrograph of adult female *Notoedres cati cuniculi* and (i) Photomicrograph of *Sarcoptes scabiei cuniculi* larvated eggs

DISCUSSION

Mange is a highly contagious and debilitating skin disease of rabbit, which badly affects the health and productive capacity of these animals in our country. The species of three main genera i.e. Psoroptes, Sarcoptes and Notoedres are of particular clinical importance in our part of the globe (Afzal et al. 1995). During the present study only *Sarcoptes scabiei cuniculi* and *Notoedres cati cuniculi* were identified infesting rabbit population in and around Qena governorate, Egypt.

Through this study, the overall prevalence of mite spp. infection among rabbits was 25%. This finding was much higher than that reported among the Israel rabbits (8.2%) in previous studies (Eshar 2010). The high prevalence of mange in the present study might be due to the poor management of flock by the owner as animals in poor condition appear to be more susceptible (Abu-Samra et al. 1981).

Similarly the higher prevalence of mange (29%) in young rabbits as compared to older animals (19.3%) may be due to keeping young and adult animals together thus getting infection through direct contact. Additionally, in Egypt the farmers are not well acquainted with modern livestock management practices.

In respect to the rabbit breeds, according to the present results the prevalence of mite infection was highest in English breed (30%) and lowest in California and Belgicie sp. (20%). They explained that the breed differences could be due to differences in resistance to parasitic infection because some breeds are more resistant than others.

With regard to the sex, male rabbits were found to have higher prevalence than females. Higher prevalence of lesions in female Iberian ibex was detected, although no hypothesis was given to explain these differences. If female rabbits are also more prone to suffer and eventually die from mange, this may explain the observed higher prevalence in males (Pérez et al. 1997). On the other hand, males seem to have higher contacts with other rabbits rather than females because they occupied larger home ranges and are in charge of the territory defense (Cowan 1987). Additionally, this was might be due to the area of people use one male for many flocks of rabbits, due to this the males have opportunity to frequent contact with infected rabbits.

Mange in rabbits due to *Sarcoptes scabiei cuniculi* and *Notoedres cati cuniculi* was reported earlier (Aulakh et al. 2003; Kuizheng et al. 1994; Raji et al. 1997; Saha 1998). Both belong to the family *Sarcoptidae* and are highly contagious and burrowers (Wall & Shearer 1997). The present observation indicates that both types can infect rabbits concurrently. However, *Sarcoptes scabiei* predominated.

S. scabiei mange was described as a rare to uncommon disease in rabbits (Percy & Barthold 2007; Scott et al.

2001). Some reports suggested that it is more commonly found in some parts of the world, such as Africa (Scott et al. 2001). One report from India showed an overall 9.3% incidence of mange infestation in rabbits (Soundararajan & Iyue 2005). In that report, the mange incidence in Soviet Chinchilla rabbits was found to be 32.6% and in German Angora rabbits 17.6%, while white Giant and New Zealand white rabbits were free from mange infestation (Soundararajan & Iyue 2005). Additionally, it was said to have seasonal occurrence, being active mainly during cold and wet weather (Blood et al. 1983).

Conclusion

This study showed high prevalence of scabies in the southern zone of Egypt. This disease with important health and economic consequences needs to be duly considered in development of prophylactic guidelines. Furthermore, the zoonotic nature of the rabbit dermatologic diseases, *Sarcoptic scabiei uniculi* and *Notoedres cati cuniculi* investigated in this study could be regarded as a public health alert. In order to prevent the possibility of continued transmission of mites from rabbits, instructions should be provided to the rabbit owners.

Acknowledgements

We thank the reviewers for their time to carefully review our manuscript. We believe that their positive comments substantially improved this article.

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Received: 24 November 2014
Accepted: 8 December 2015