

Incidence of Mange Infestation in Rabbits

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Abstract

Background: Rabbits are important animals, as farmers raise them in abundance in Iraq. Scabies infestation is one of the most common and prevalent diseases in rabbits. The current study investigates the infestation of scabies in rabbits, causing severe economic losses, such as itchy alopecia, hyperkeratosis, anorexia, self-trauma, weight loss, and high morbidity and mortality.

OBJECTIVES: This study designed to detection species mange infestation in rabbits using microscopic examination of skin scraping This study is the first detection of mange infestation in rabbits in Mosul city-Iraq.

Methods : Total 130 rabbits were examined and skin lesion was scraped.

Results: Totally, 56 out of 130 (43.1 %) were infested with mange including *Sarcoptes scabiei cuniculi* 50 (38.5%), *Psoroptes cuniculi* 32(25%), *Notoedres cati cuniculi* 26(20%), *Demodix cuniculi* 12(9%) and *Cheyletiella* spp 4(3%), with the high infestation rate for *S. s. cuniculi* and the lowest rate for *Cheyletiella* spp. The important lesion was hyperkeratosis followed by alopecia then pruritus on many area of the body (head, ears, abdomen, back, legs, tail and perineal area). The highest infestation rate was found on the abdomen and back., while the lowest rate found on tail and perineal area. There are significant differences according the ages, while no significant differences between the male and females and the significant differences among three types of infestation (single, double and mixed).

Conclusion: The rabbits were infested with several species with different percentage, There was no significant difference in infestation rates between males and females, although there was significant between younger and older animals. Lastly the significant difference was clear among the three types of infestation, and the double one was the dominant infestation rate 50%.

Keywords: Mange infestation Rabbits, *Notoedres caticuniculi*, , *Sarcoptes scabiei cuniculi*, *Psoroptes cuniculi*,

Introduction

Rabbits are important animals as farmers raise them in many parts of countries, Inadequate care and diseases are among the most important challenges facing rabbit breeding (Asmare *et al.*, 2016; Rodrigues *et al.*,2022) .Skin diseases are among the most common diseases in rabbits (Kumsa et al., 2012) causes severe economic losses due to alopecia, pruritus, inappetence ,self-inflicted trauma, ear canker and death (Abdelaziz *et al.*, 2020). In Egypt the sarcoptic mange in rabbits were considered to be in second place after coccidiosis importance, by recording the highest percentage of losses (Seddiek *et al.*, 2013). Veterinary ectoparasites in rabbits are economically important parasites that cause significant loss of weight, productivity and wool quality, with exudative pruritic skin inflammation, severe erythema and crust formation (Altamemy. 2014) *Sarcoptes scabiei* and *cuniculi*, *Psoroptes cuniculi* were the most common ectoparasites of rabbits (Nuru *et al.*,2017). The genus *Demodex* occur in hair follicles, sebaceous glands, or epidermal pits in the rabbits (Abu Hafsa *et al.*, 2021) *Notoedres cati cunculi* infestation in rabbits is clinically manifested by formation of scales and scab of lips, nose, face, external ear canal and other body parts (Rao1.,2020).*Cheyletiella* spp. large mites burrowing the keratin layer of the skin in humans and domestic animals which causes scales with pseudo-tunnels and debris on the skin surface (Cardells *et al.*, 2021).Mange causes many losses, leading to morbidity and mortality rate. In Spain, epidemic rate has reached 81% of a wild population (Leon. 1999). Due to the lack of studies on scabies in rabbits in Iraq, and given the importance of the veterinary and health problems it causes for we decided to investigate Mange infestation of rabbits

Materials and Methods

Animals:

130 rabbits (56 males and 74 females) were examined for lesions on different parts of the body such as (head, nose, ear canal and pinnae, lips, neck, breast, brisket, legs, feet, back, around genitalia) (Taylor *et al.*, 2016).

Skin scraping:

Skin scrapings were taken from rabbits having some clinical signs of mange following the method described by (Solikhah *et al.*, 2021; Ola-Fadunsin *et al.*,2023).The samples of skin scraping transferred to the laboratory of parasites at the College of Veterinary Medicine in Mosul University. All instructions and methods of animal welfare laws in accordance with the guidelines by the International Animal Ethics Committee or the Institutional ethics committee and as well as with local laws and regulations

Laboratory tests:

The Scraped parts placed in tubes containing 5 ml of KOH 10%, the tubes are placed in a water bath at 60-80 °c for 15 minutes and centrifuged for speed of 1500-2000rpm for 5 min.,discarded the supernatant some drops of sediment were placed on a glass slide with cover slide (Yasine *et al.*,2015). The Scabies species were diagnosed based on morphological characteristic using the identification keys (Taylor *et al.*, 2016). Data was analysed by SPSS software using chi-square test (Version 17; SPSS Inc., Chicago, USA).

Results

In this study, a total of the examined 130 rabbits showed that 56 (43.1%) were naturally infected with several types of mange. The results revealed that the incidence of *Sarcoptes scabiei cuniculi* was 50 (38.5%), *Psoroptes cuniculi* was approximately 32 (25%), *Notoedres cati cuniculi* 26 (20%), *Demodex cuniculi* 12 (9%) and *Cheyletiella* spp. 4 (3%) as shown in Table (1) and Figures (1, 2, 3). In relation to organ susceptibility to mange infestation, the results showed that almost infestation was in the abdomen and back, while the lowest infestation rate was found on tail and perineal area. The infestation rate and the common lesions of symptomatic rabbits and the sites of those lesions were clarified in (Table 2). The rate of the highest infested sites (alopecia and pruritus and hyperkeratosis) were found on abdomen and back, while the lowest lesion rate (alopecia) was found on tail and perineal area figure (4). Based on animal age, The percentage of infestation in the group of animal age under one year was 63.3% while it was 25% in one year old animals. The chi-square test showed a significant difference in the percentage of infestation in relation to the animal age, while no significant differences were observed between the male and females in the same age at $p \leq 0.05$. In the (table 3,4). Results of the current study revealed significant differences among three types of infestation (single, double and mixed) at $p \leq 0.05$

Discussion

Mites are agents of highly contagious and skin disease of rabbits, which influence the health and productive capacity of these animals in many countries (Sant and Rowland., 2009). The present study distinguished the morphological characteristics of *Sarcoptes scabiei cuniculi*, such as size which ranged between 320-500 μm length and 250-410 μm width. These results were in agreement with that of (Elshahawy *et al.*, 2016) who found that the size of *S.sabiei cuniculi* was 300-504 μm length and 230-420 μm width. *Psoroptes cuniculi* have an oval body shape with pointed mouth parts as described by (Nonga and Mkula ., 2015). Results of the current study revealed other morphological characteristics of *Notoedres cati cuniculi*, *Demodex cuniculi* and *Cheyletiella* spp. Which were similar to those found by (Elshahawy *et al.*, 2016).

The results of this study clarified that the percentage of infestation with *Sarcoptes scabiei cuniculi* was (38.5%) which was too close to the infestation rate with the same mite (34.6%) on sheep and (41.6%) on rabbits as reported by(Shahatha *et al.*, 2022) whereas the infestation rate with *Psoroptes cuniculi*, *Notoedres cati cuniculi*, *Demodex cuniculi* and finally *cheyletiella* spp. Were 25%, 20%, 9% and 3% respectively and these rates disagreed with the results of (Hoshem.,2014) who referred that the percentage of *p. cuniculi*, *Notoedres cati* and *Cheyletiella* sp. (7.55%), (3.43%) and (1.51%) respectively. These differences could be attributed to the number of animals, which were examined and the measurement of management performance. On the other hand, our results agreed with (Shahatha *et al.*, 2022) who reported that the infestation rate with *S. scabiei* on cow was (37.5%). The most lesions in rabbits were hyperkeratosis on(head and ears), (abdomen and back) and on legs at rate of 26.8%, 57.1% and 44.6% rates respectively, while the

alopecia came in the second place after hyperkeratosis and it was seen on (head and ears), (abdomen and back), (tail and perineal area) at infestation rate of 26.8%, 57.1% and 19.6% respectively.

Pruritus was the third noticed lesion on the infested animals especially in (head and ears). (abdomen and back) 26.8% and 57.1% respectively. These results agreed with those reported by (Shahatha *et al.*, 2022) who concluded that the hyperkeratosis had the highest lesion rate 40% while the pruritus had the lowest one 20%. In this study the results showed that the youngest animals had greater rate of infestation with mange mites than those above one year old was 68% for males, 63.3% for females under one year old (youngest animals) while it was 29 % for males and 25 % for females more than one year. Our results approached the outcomes of (Elshahawy *et al.*, 2016) who reported higher infection rate in younger rabbits (29%) compared to oldest animals (19.3%), and that could be attributed to the keeping of more than several age groups of animals together which might have infestation via direct contact.

The results of the current study revealed no significant differences between male 46.4% and female 40.5% infestation rate with mange, that agreed with the results of (Shahatha., 2020; Parakash *et al.*, 2017). At last this research clarified the significant differences among three types of infestations (single, double and mixed), the double one had the highest rate 50% followed by mixed infestation 33.9% and finally the single one which was 16.1%, so these results were closely to those obtained by (Choe *et al.*, 2020; Ammam *et al.*, 2022) who showed that rabbits could infested with more than one species of mange mites at the same time.

Conclusion

The rabbits of Mosul city were infested with several species of the mange with different percentages, it is necessary to establish control via treatment with forceful drugs, also to maintain the hygiene of the rabbit's environment, and the most vulnerable age group to the many species of mange mites was less or equal to one year.

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Uncorrected Proof

Table .1 Infestation rate and morphological characteristics of mange based on mite species of infected rabbits

Species of mites	No. rabbits infested	Infestation rate %	Morphological characteristic
<i>Sarcoptes scabiei cuniculi</i>	50	38.5	Oval, dorsally convex and ventrally flattened, Size (320-500)x (250-410) μ m, The final segment of the first and second legs have elongated, unjointed empodium which had a pint-size sucker-like pad at the terminal edges.
<i>Psoroptes cuniculi</i>	32	25	Oval body, mouth parts pointed, Jointed pedicles with funnel-shaped suckers.
<i>Notoedres cati cuniculi</i>	26	20	Small size was 230x200 μ m with rounded idiosoma, the first and the second legs were have pretarsus and elongated stalked, while third and fourth legs had long bristle.
<i>Demodex cuniculi</i>	12	9	Elongate approximately 224 μ m long fusiform bodies.
<i>Cheyletiella</i> spp.	4	3	Size 0.5 mm in length and prominent curved, palpal claws that points inwards, The important feature is the characteristic hooks of the accessory mouthparts.

Table .2 the infestation rate and the common lesion in symptomatic rabbits according on the site of infestation

Site of infestation	Number of rabbits infested	Infestation rate %	Types of lesion
Head + Ears	15	26.8	Alopecia+ pruritus + hyperkeratosis
Abdomen+Back	32	57.1	Alopecia+ pruritus + hyperkeratosis
Legs	25	44.6	Hyperkeratosis
Tail and Perineal area	11	19.6	Alopecia

Table .3 Incidence of mange mites **according on** to age and sex of examined rabbit

Sex Age	Male			Female		
	No. examine d	No. infestati on	(%)	No. examine d	No. infestati on	(%)
≤ 1 year	25	17	68 a	30	19	63.3 a
> 1 year	31	9	29 b	44	11	25 b
Total	56	26	46. 4*	74	30	40.5*

Different letters vertically indicate significant differences at $p \leq 0.05$

*No significant differences at $p \leq 0.05$

Table .4 Types Of mange infestation in the rabbits

Type of infestation	Number of infested rabbits	infestation rate %
Single infestation	9	16.1 a
Double infestation	28	50 b
Mixed infestation	19	33.9 c

Different letters have significant differences at $p \leq 0.05$



Figure 1. *Sarcoptes scabiei cuniculi*

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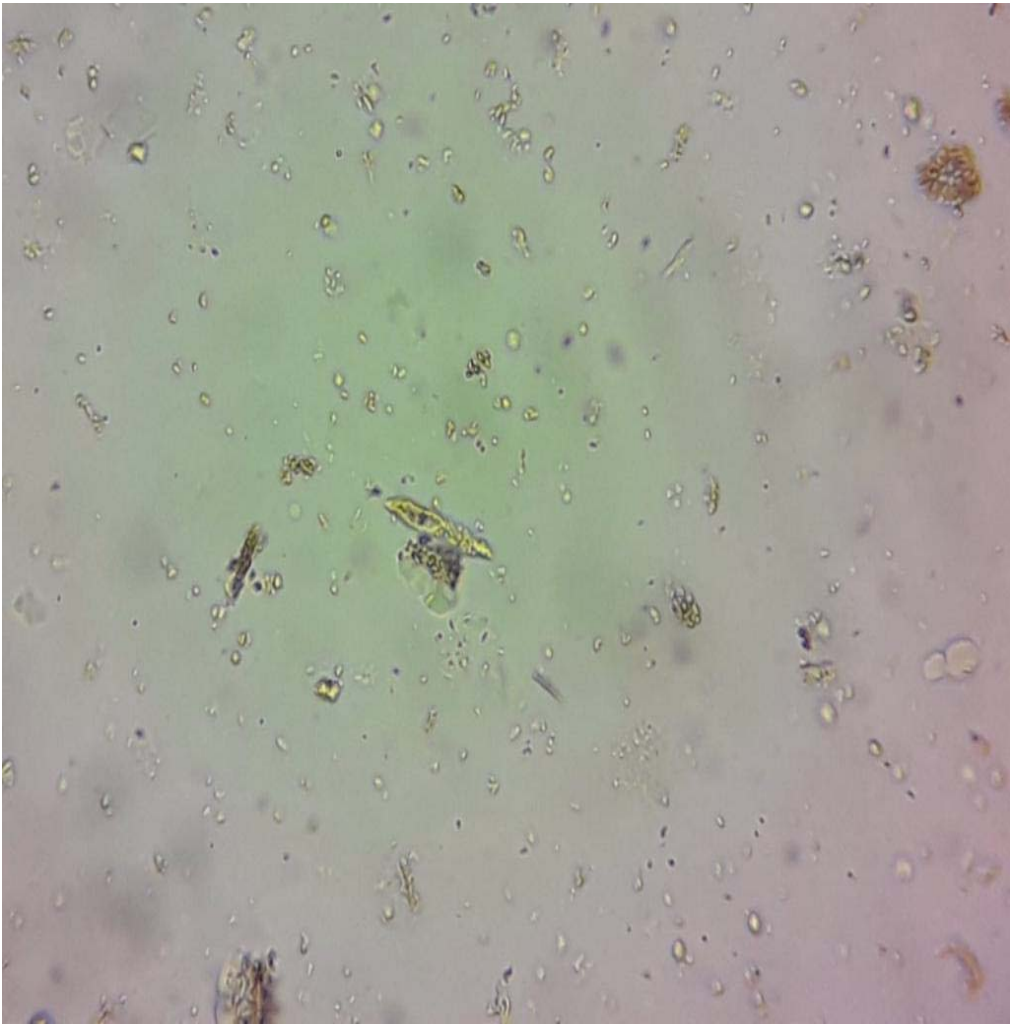
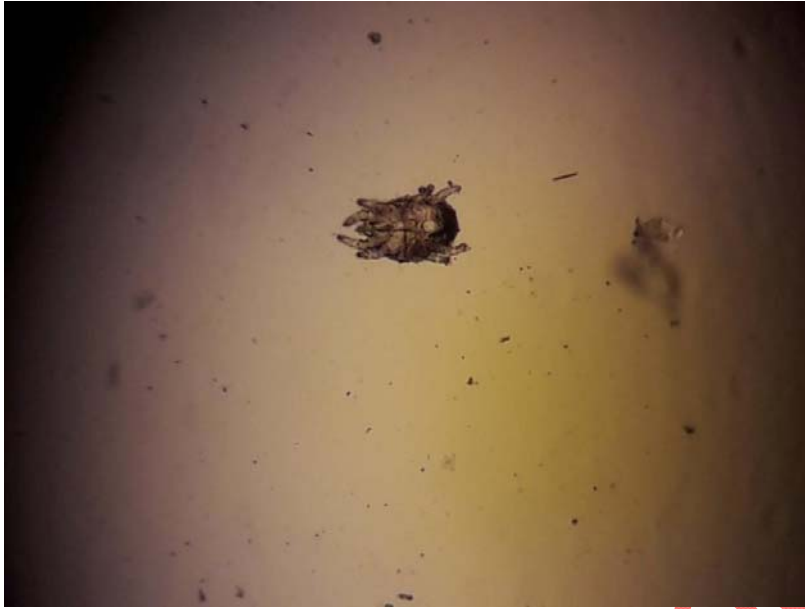


Figure 2. *Demodex cuniculi* 40x

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Figure 3. *Cheyletiella* spp. 40x

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Figure 4. Hyperkeratosis and Alopecia on animal's back

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