

SKIN LESIONS INDUCED BY SARCOPTIC AND DEMODECTIC MITES IN SHEEP

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ABSTRACT

Two hundreds and eighty five Egyptian sheep (Rahmani and Osimi) consisted of 277 ewes and 8 rams of 2-4 years old, located in a flock at Matrouh governorate during summer and winter 2000-2001 were used in this study. The clinical signs, were seen on 162 sheep of both breeds. The signs were intense in young sheep than old one and severe itching was common particularly at night. Macroscopically, alopecia, fissured skin covered with greyish white scabs on face and ears and small focal pustules scattered on the face. Microscopically, epidermal and dermal changes were seen with presence of sarcoptic mites inside the epidermal tunnels and demodectic mites inside the hair follicles of dermis. Epidermal hyperplasia hyperkeratosis and parakeratosis were recorded. Pustules of variable sizes between the epidermal cells were seen filled with neutrophils and mononuclear cells. The dermis showed elongated rete pegs from proliferative epidermal cells. Large dilated hair follicles filled with mites which surrounded by Hoeppli-splendore material. Granulomatous reaction represented by massive infiltrations in the interfollicular tissues with lymphocytes, plasma cells and macrophages resulting in perifolliculitis and frunklosis. Periarteritis was seen in the dermis beside demylination of the nerve ending. It could be concluded that mites infestation (sarcoptic and demodectic) induced severe skin lesions caused hyperexcitability of the affected animals with drop in its productivity and lower its resistance which consider as portal of entry of other parasitic, bacterial or viral pathogens.

INTRODUCTION

Sheep play an important role in Egyptian economy as a source of meat and wool production. Mange is a highly contagious ectoparasitic infestation which affects sheep of all ages and caused by different types of mites which

attack the skin causing extensive dermatitis, severe itching and alopecia **Jones et al., (1997)**. Mange affects sheep of both sex **Jabeen et al., (1998)**. The young is more sensitive than the adult otherwise, the highest prevalence was recorded in autumn and winter than summer and spring **Ghimire et al., (1998)**. The parasite usually sucks the lymph and feed on young epidermal cells caused excessive keratinization and crusts on the surface due to inflammation which accompanied with exudate and the skin becomes thickened and wrinkled with loss of hair **Sheahan, (1975)**. The previous signs lead to fleece loss, decreased body weight and decreased milk production **Fthenakis et al., (2000)**. **Danny and Scott, (1988)** reported difficulties in estrus detection, lowered conception, secondary infections, myiasis, increased susceptibility to other diseases and even death among sheep infected with mange. **Dalapati and Bhowmik, (1996)** studied pathologic affection of psoroptic and chorioptic mange on domesticated goat. They observed vacuolization and necrosis or sloughing of epidermal cells atrophy of hair follicles, acanthosis, hyperkeratosis, parakeratosis and cellular infiltrations beside dermal edema and congestion.

The control of the disease is still difficult due to the spreading of infection by direct or indirect contact through the wandering larvae, nymph and fertilized young females. Some mites lives in burrows in the host's skin which formed due to the activities of ovigerous females in their tunnels **Soulsby, (1982)**. Another type of mites burrows into sebaceous or sweat gland or to depth of the hair follicles to feed on contents of sebaceous glands and cells of follicular epithelium **Jones et al., (1997)**.

This work was planed to study the clinical signs and the pathologic changes in the skin of naturally infected sheep with mites and to facilitate their recognition and control.

MATERIAL AND METHODS

A flock of 285 Egyptian sheep (Rahmani and Osimi) consisted of (277 ewes and 8 rams), 2-4 years old in a farm at Matrouh governorate during summer and winter of 2000-2001, was employed in this work. The clinical signs, showed 162 sheep of both breeds suffered from skin lesions with severe itching which appeared in different regions particularly the neck, ears and face. Fecal samples were collected from the diseased sheep and examined microscopically for free internal parasites.

Diagnosis of mites in sheep was made on the basis of clinical signs and microscopic examination of skin scraping from the lesions of the affected areas. Specimens were collected by taking about 10% of the total area of any lesions at the periphery until blood is drawn and treated with 10% sodium hydroxide solution and stained with periodic acid shift (PAS) **Marharet and Russel, (1984)**.

Skin biopsy from active lesions of mange infested sheep was taken in 10% neutral buffered formalin. Tissues were processed for paraffin section at 5 μ m thick and stained with Mayer's haematoxylin and eosin for pathologic examination **Dalapati and Bhowmik, (1996)** and **Lillie and Fulmen, (1976)**.

RESULTS

A- Parasitological results:

1- The incidence of sarcoptic and demodectic mites were 56.84% in all examined sheep.

2- The morphological description.

a- Sarcoptic scabiei var ovis:

- The ovigorous female characterized by oval body, no dorsal spines and the legs are long. Only leg 3 bears terminal bristle (Fig. 1).
- The male characterized by the leg number 4 is shorter than leg number 3 with adanal sucker on the posterior end of the abdomen.

b- Demodex ovis:

Very minute mites (0.1-0.4 mm long) with an elongated striated abdomen and four pairs of stumpy legs (the morphological description of the parasites was done by department of Parasitology).

B- Clinical signs and postmortem lesions:

The clinical manifestations were seen in large number of sheep in the examined flocks (Rahmani and Osimi). The same signs were seen in both sex (males and females) but the young sheep more affected with mites than old one (2 years old more affected than 4 years old) and affection increased in winter than summer. Severe itching lead to head-shaking and scratching to the affected part was common particularly at the night. Macroscopic examination, revealed that mites caused itching, alopecia, fissured skin covered with greyish white scabs in the face and ears, (Fig. 2). Large alopecic areas may be extend to involve greater portions of the skin accompanied with small focal pustules scattered on nose, lips, ear, around eye and neck of affected sheep causing pruritis with sloughed portions from extremities (Fig. 3).

Histopathologic findings were characterized by marked epidermal and dermal changes from mange in the skin of sheep. The epidermis revealed stages of sarcoptic mite inside epidermal tunnels where formed in the stratum corneum layer with scabs formation (Fig. 4). The previous lesions accompanied with hyperplasia in the epidermis, manifested by hyperkeratosis of stratum corneum (Fig. 5). Other areas showed parakeratotic changes around epidermal tunnels (Fig. 6). Pustules of variable size between the epidermal cells usually seen filled with neutrophils and mononuclear cells (Fig. 7). The dermis showed elongated rete pegs from proliferative epidermal cells and edema around dermal blood vessels beside numerous leukocytic aggregations in the papillary layer of dermis (Fig. 8). On the other hand, other mites (demodectic) burrowed into the hair follicles and sebaceous glands and

caused large dilated hair follicles, filled with demodectic mites which surrounded by hyalinized layer and proliferative epithelial cells of the hair follicles (Fig. 9). Moreover, dermatitis manifested by thickening in the papillary layer of the dermis due to inflammatory cells mainly lymphocytes and eosinophils (Fig. 10). Granulomatous reaction represented by massive infiltrations in the interfollicular tissues with lymphocytes, plasma cells, eosinophils, and macrophages, resulting in perifolliculitis and frunklosis (Figs. 11 and 12). Excessive leukocytic cells around lymph and blood vessels in reticular layer of the dermis were seen (Fig. 13). Numerous small arterioles of the dermis showed endotheliosis, vacuolation and hyalinization in the wall with perivascular aggregation of inflammatory cells particularly lymphocytes and eosinophils, suggestive periarteritis (Figs. 14 & 15). Otherwise, sebaceous glands in the dermis, suffered from degeneration with aggregation of inflammatory cells around it (Fig. 16). The dermis revealed demylination in the sensory nerve ending and proliferation in the sweat gland. Edema and hyalinization of muscles in subcutis layer were seen (Fig. 17).

DISCUSSION

The present investigation revealed that, sheep affected with mange (sarcoptic and demodectic) clinically developed itching and scratching of the affected portions (head, neck and ears), particularly at night. The female mites have greater role for the forementioned changes on the skin of the animals **Soulsby, (1982)**. The mites inside the skin resulting in hypersensitivity reaction and thus leading to pruritis. Macroscopically, alopecia, crusts, pustules and scabs developed in sheep affected with one or both type of mange **Danny and Scott, (1988)**. The migration of mites in the skin, resulting in intraepidermal and subepidermal cavities which filled with serous fluid, forming pustules, that discharge a purulent or serosanguinous material which became encrusted leading to alopecia **Danny and Scott, (1988)**.

Microscopically, 2 types of mites were recorded in our work in the skin of sheep (sarcoptic and demodectic mites). The sarcoptic mites formed epidermal tunnels and don't burrow into the underlying layers and the demodectic mites were found inside the hair follicles causing damage of the hair sheath and folliculitis. Our results were in agreement with **Jones et al., (1997)**. The mites caused hyperplasia in the epidermis, manifested by thickened stratum corneum (hyperkeratosis) with parakeratotic changes around the epidermal tunnels and thus due to repeated parasitic attack and rapid mitotic activities in basal cell layer **Danny and Scott, (1988)**. The dermis showed elongated rete pegs and thus due to hyperplasia of the epidermal cells as a result of mechanical irritation caused by the mites which persist for long times. Our results were in agreement with **Hassan, (1991)**, who found rete pegs in calves naturally infested with mange. The demodectic

mites burrow into the hair follicles and caused dilated follicles and the mites coated by hyalinized layer which may be secreted by the mites to protect themselves from the phagocytic cells. **Danny and Scott, (1988)**, reported that mites were coated by Haeppli-splendore material inside the hair follicles. Dermatitis manifested by thickening in the papillary layer of the dermis by edema and inflammatory cells (lymphocytes and eosinophils). Moreover, granulomatous reaction, represented by massive infiltration in the interfollicular tissues with lymphocytes, plasma cells, macrophages and eosinophils resulting in perifolliculitis and frunklosis **Jones et al., (1997)**.

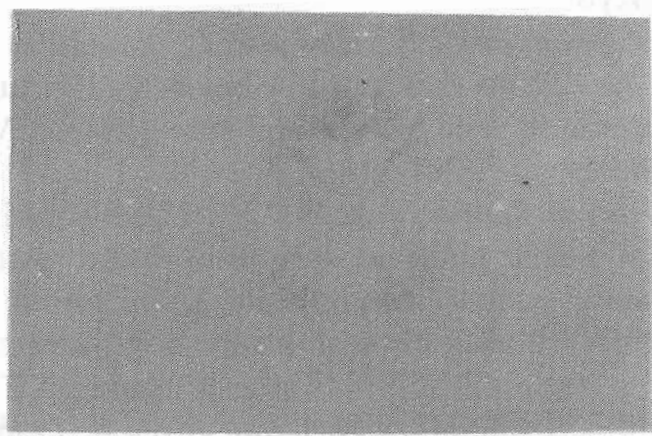
Periarteritis was recorded in our work represented by endotheliosis with vacuolation and hyalinization in the wall beside perivascular aggregation of inflammatory cells (lymphocytes and eosinophils) and thus may be due to cell mediated immunity following repeated attack of skin by mites (**Jones et al., 1997**). The dermal nerve ending revealed demylination of the sensory nerve ending and thus due to the toxins caused by the metabolites of the parasites **Jones et al., (1997)**. Edema in muscles in subcutis was recorded, due to arteritis **Jones et al., (1997)**. It could be concluded that mites infestation (sarcoptic and demodectic) induced severe skin lesions caused hyperexcitability of the affected animals with drop in its productivity and lower its resistance which consider as portal of entry of other parasitic, bacterial or viral pathogens.

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(1)

Fig. (1): Female sarcoptic scabiei var ovis, stained with PAS, x100.



(2)



(3)



(4)



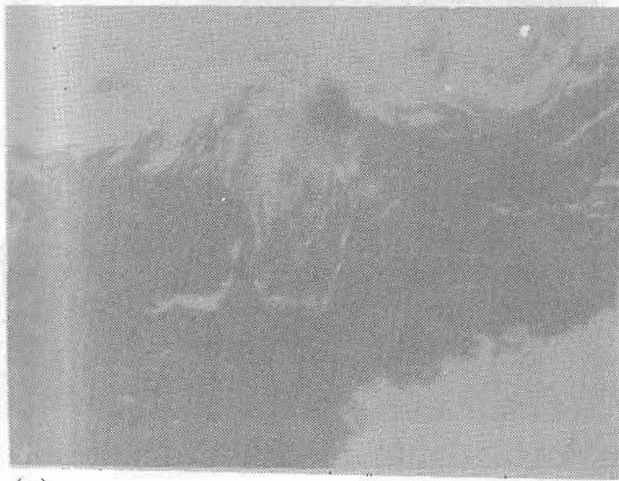
(5)

Fig. (2): Osimi sheep suffered from mange characterized by alopecia with fissured skin covered with greyish white scabs on the ears and face.

Fig. (3): Rahmani sheep showing diffuse or large alopeic areas on dorsum of the neck, face and ears accompanied with focal scattered pustules with partial sloughing of areas from ears.

Fig. (4): Epidermis showing sarcoptic mites inside epidermal tunnels formed in stratum corneum layer with scabs formation (H & E., x150).

Fig. (5): Epidermis showing mites inside epidermal tunnels accompanied with hyperkeratosis (H & E., x 600).



(6)



(7)



(8)



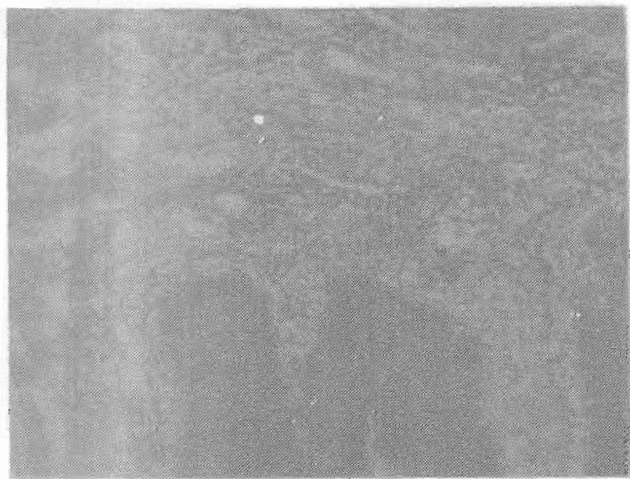
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Fig. (6): Epidermis showing parakeratotic changes around the epidermal tunnels (H & E., x 600).

Fig. (7): Epidermis showing pustules of variable size between the epidermal cells filled with neutrophils and mononuclear cells (H & E., x600).

Fig. (8): Dermis showing elongated rete pegs from proliferative epidermal cells and edema around blood vessels beside numerous leukocytic aggregations in the papillary layer (H & E., x150).

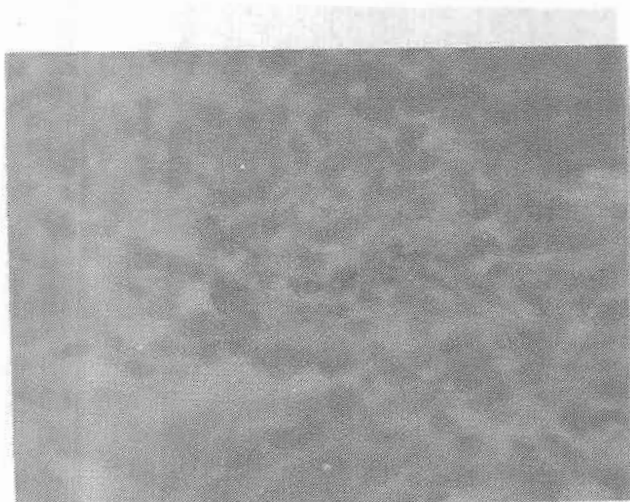
Fig. (9): Dermis showing large dilated hair follicles filled with demodectic mites surrounded by hyalinized layer (H & E., x600).



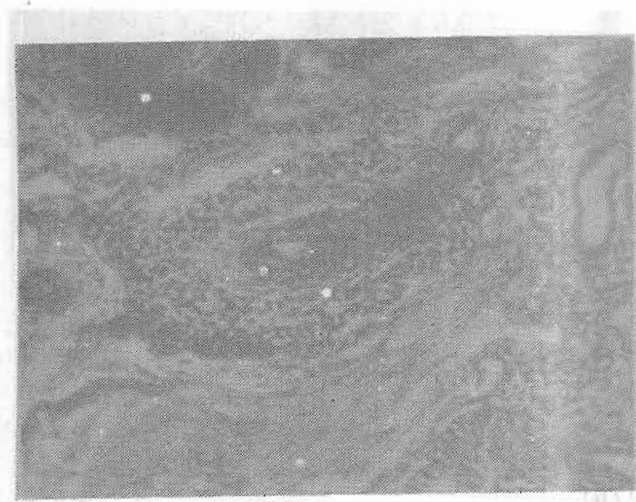
(10)



(11)



(12)



(13)

Fig. (10): Dermis showing dermatitis manifested by thickening in the papillary layer of dermis with inflammatory cells (H & E., x600).

Fig. (11): Dermis showing granulomatous reaction represented by massive inflammatory cells in interfollicular tissues resulting perifolliculitis and frunklosis (H & E., x600).

Fig. (12): High power of the previous figure to show massive inflammatory cells mainly lymphocytes, plasma cells, eosinophils and macrophages in interfollicular tissues (H & E., x1200).

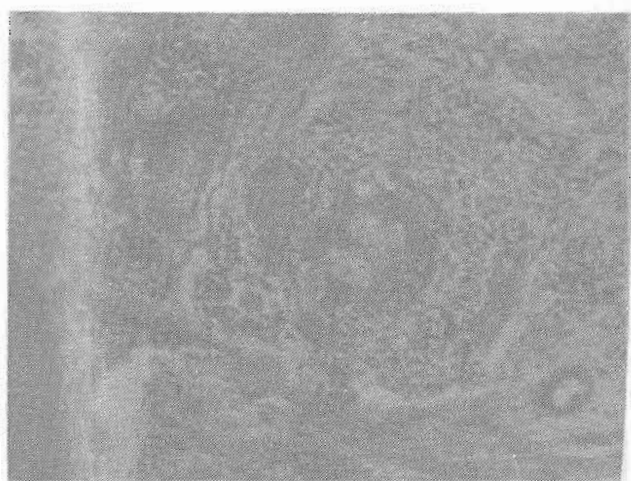
Fig. (13): Dermis showing excessive leukocytic cells around lymph and blood vessels in the reticular layer of the dermis (H & E., x600).



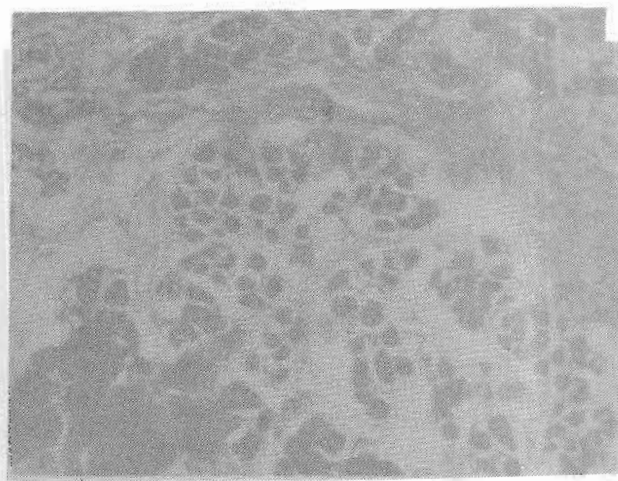
(14)



(15)



(16)



(17)

- Fig. (14): Dermis showing small arterioles suffered from endotheliosis, vacuolation and hyalinization in the wall with perivascular aggregation of inflammatory cells of blood vessels (H & E., x600).
- Fig. (15): High power of the previous figure to show perivascular aggregation of inflammatory cells particularly lymphocytes and eosinophils (H & E., x1200).
- Fig. (16): Dermis showing degeneration in the sebaceous glands in the dermis with aggregation of inflammatory cells around it (H & E., x600).
- Fig. (17): Subcutis showing edema and hyalinization in the muscles (H & E., x 150).

الملخص العربي إصابات بالجلد نتيجة الجرب في الأغنام

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استخدم في هذا البحث ٢٨٥ من الغنم البلدى (رحمانى وأوسيمى) وقسمت إلى ٢٧٧ إناث و٨ ذكور عند عمر ٢-٤ سنين من مزرعة في محافظة مرسى مطروح أثناء صيف وشتاء ٢٠٠٠-٢٠٠١. وظهرت الأعراض الإكلينيكية للجرب على ١٦٢ حالة في كلا النوعين.

ووجد أن الأعراض الإكلينيكية تظهر بنسبة عالية في فصل الشتاء عن الصيف وفي الأعمار الصغيرة أكثر من الكبيرة وهي حك الجلد المصاب بصورة مستمرة وتترايد أثناء الليل. وقد أظهر الفحص تشقق الجلد المصاب مع سقوط الصوف خاصة بالوجه والأذنين وأعلى الرقبة مع وجود قشور مع تكون بعض البقع الصديدية بالإضافة إلى هزال شديد وفقدان للشهية في الحيوانات الأكثر إصابة.

وبالفحص المجهرى وجد تغلظ بالجلد في أماكن الإصابة بالطفيل مع وجود جيوب بداخل البشرة بالإضافة إلى التهاب جذور الشعر نتيجة لوصول الطفيل إليها مع التهابات مختلفة بالأدمة مع وجود وزمة والتهاب للأوعية الدموية نتيجة للعدوى المتكررة للطفيل.

استخلصت النتائج خطورة الإصابة بالجرب في قطعان الغنم الذي يؤدي إلى قلة

الإنتاجية مع نفوق بعض الأغنام في الإصابات الشديدة.