

STUDIES ON PATHOLOGICAL EFFECTS OF SARCOPTES SCABIEI INFESTATION ON VARIOUS ORGANS IN RABBITS IN THE STATE OF CHHATTISGARH

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ABSTRACT:

New Zealand white crossbreed rabbits belonging to both sexes and age group between 5 months to 1.5 years were presented for postmortem examination within a span of 8 months in the Department of Veterinary pathology, College of Veterinary Science and AH, DSVCKV, Anjora, Durg, C.G. The rabbits were reared in the rabbit unit and small animal unit in different flooring systems of the institution. It was noted that the rabbits were having scabs around the eyes, mouth and ears which fully covered the organs. There was hyperkeratosis and thickening of ear pinna. Alopecia was noticed around the nose, lips, legs, abdomen, perianal region, and genitalia. The animals were emaciated and some were very cachectic. Gross examination revealed that the lungs were adhered to the thoracic cavity along with some showing whitish deposition in the lungs covering it fully. Urinary bladder showed turbid fluid. The lesion scoring for skin near mouth, ear pinna, areas near eyes, legs etc. was 4 which was very severe form of the disease. Microscopical examination of potassium hydroxide digested skin scrapings of the lesion showed *Sarcoptes scabiei*. Tissue samples were observed with routine histopathological examination for complications of suppurative pneumonia along with liver and urinary bladder lesions. Observation on flooring systems of rearing also indicated and gave insight into the mite infestation and its relevant outcome.

KEYWORDS: Scabies, Rabbit, affections of skin, lungs, liver and urinary bladder, lesion scoring and deep litter flooring system,

INTRODUCTION

Rabbits are key livestock, which are increasingly being raised in many countries worldwide. They are mainly suitable as a good source for fur and meat. Proper feeding with balanced nutrients, suitable hygienic breeding practices, along with effective marketing strategies can lead to a profitable and sustainable rabbit farming business¹. In 2017, scabies has been added to the World Health Organization Neglected Tropical Diseases portfolio. The anthro-zoonotic importance of mites cannot be ruled out as globally more than 100 million people suffer from mite infestation. Mange infestation is one of the main constraints affecting commercial rabbit flocks. This disease causes severe economic losses in the production system of rabbits due to loss of productivity, poor leather quality, decreasing conception rates, loss of weight and high mortalities. Scabies is a skin infestation caused by *Sarcoptes scabiei* var *cuniculi*. It is a highly pathogenic, contagious ectoparasitic skin infestation. Body mange and ear mange are the most common forms of this disease in rabbits^{2,6}. Animals can get mite infestation through direct contact with infected animals i.e from one rabbit to another, contaminated fomites, infected environment, overcrowding and poor hygiene³. This infestation is considered to be of zoonotic nature and public health burden. The skin affection is characterized by pruritis, alopecia, severe cachexia, and if not treated on time can lead to death sometimes. Infestation is diagnosed mainly by skin scrapings and microscopical examination for the organism. Pruritis and skin lesions are formed as a result of the parasites feeding on the stratum granulosum of epidermis and animal's serum. Blood loss and frequent complications with secondary bacterial infections may be expected after mite infestation.

In the Department of Veterinary pathology, College of Veterinary Science and AH, DSVCKV, Anjora, Durg, C.G, a total of 16 rabbits were brought for PM examination within a span of 8 months. Out of which, it was noticed that about 10 rabbits suffered with mange infestation and rest 6 died of pneumonia along with age factor. Rabbits included in the study were reared under different flooring systems. The 10 rabbits, that were suffering with mange were reared under deep litter system in the rabbit unit of the institute and other six were reared in cage system in the small animal unit of

the institute. It was noted that the rabbits under deep litter system of housing were having scabs around the eyes, mouth and ears, which fully covered approximately two-thirds of these areas. . There was hyperkeratosis and thickening of ear pinna. Alopecia was noticed around the nose, lips, legs, abdomen, perianal region and genitalia. The animals were emaciated and some were cachectic. The lesion scoring was 4 indicating a very severe form of the disease.4. A rapid and reliable method to diagnose scabies under level A in the guidelines by IACS 2020 is to visualize mites, eggs, or faecal pellets through optical microscopy (4 - 400×) of material taken from skin lesions5. The samples were collected from the affected areas over the face and ears after making it moist followed by scraping it carefully with scalpel. It was put in a test tube, added with 0.5 -10 ml of 10% NAOH or KOH. It was bBoiled to digest the hair, crust and the tissue debris. Further it was cooled and centrifuged for 2 min at 2000rpm. The supernatant was discarded and the sediments were examined for mites microscopically. Moreover postmortem examination of the dead rabbits were done and tissue samples were collected for histopathological examination in 10% formalin. Following proper fixation , the tissue samples were trimmed, processed, sectioned and stained with the standard haematoxylin and eosin (H&E).

On the basis of clinical symptoms that characterizes scabies in the form of alopecia and crust, assessment of the severity of scabies was done. To determine the severity of scabies based on the results of scoring & assessment of scabies accordingly4, and by observing several other components such as the history of the disease the extent of crust distribution, thickness of crust, percentage of presence of crust on several regions of body due to scabies was also the basis for grouping the severity of the disease. Lesions observed on different parts of the body helped in ascertaining the severity of the infection. The lesion scoring was found to be 4 which was indicative of severity of the disease. Mange was characterized by pruritus, alopecia, and prolonged illness with severe cachexia. Pruritis and skin lesions were formed as a result of the parasites feeding on the stratum granulosum of epidermis and animal's serum. Blood loss and frequent complications with secondary bacterial infections was seen after mite infestation. Skin lesions showed *Sarcoptes scabiei*. The species of mites were confirmed by morphological features. Adult *Sarcoptes scabiei* was recognized with round body, short legs with long unjointed stalk and sucker on the front pairs of leg7. Size of adult mites was 313-567 micro meter in length with short legs and round body. Similarly morphological features like unsegmented suckers on 1st, 2nd 4th pair of legs in male and female was observed. Spines in the dorsum and termina in the anterior were seen Figure 1. Externally rabbits showed severe pruritus, alopecia with scab formation in the eyes, ears and mouth region. Pruritis and skin lesions are formed as a result of the parasites feeding on the stratum granulosum of epidermis Figure 2(A,B). Further blood loss and frequent complications with secondary bacterial infection leading to prolonged illness with severe cachexia were noted on PM examination and it was observed that internal organs were also affected severely, starting from thoracic cavity to urinary tract. In two cases rabbit's lung showed severe suppurative pneumonia with whitish hard material in the lungs. In others, lungs had undergone dissolution and they were adhered or attached to the thorax. Liver showed many areas of abscess over the parenchyma. Intestine showed hemorrhagic streaks. In 2 rabbits, urinary bladder had turbid fluid Figure 3(A,B). Internal organs showed hemorrhagic lesions and appeared reddish in color. Microscopically affected organs revealed, degenerative and necrotic changes with perivenular sinusoidal congestion in liver and severe hemorrhages, accumulation of sero-fibrinous exudate along with infiltration of mononuclear cells with presence of large number of neutrophils along with hemorrhagic areas within the parenchyma of lungs were also observed Fig.4(A,B). Therefore, on the basis of clinical manifestation along with history and presence of mites in skin scrapping, it was confirmed that rabbits were suffering with *Sarcoptes scabiei* infection.

Moreover, in high prevalence areas, scabies is a major underlying cause of bacterial skin infections and serious complications affecting lungs and renal function. Secondary bacterial infections of scabies lesions, most notably with Group A *Streptococcus* or *Staphylococcus aureus* have been linked to serious complications, such as renal damage and respiratory diseases. Present study reveals clinical finding of *Sarcoptes* infested rabbit farm with housing in litter system. Weight gain in rabbits reared on deep-litter systems has been reported to be lower compared to those housed on wire-mesh flooring (8,9). Additionally, ingestion of spoiled litter material may contribute to increased mortality (10,16). The findings of the present study also suggest that rabbits reared under deep-litter systems are more prone to adverse clinical manifestations. Chronic cases of sarcoptic mange are associated with anorexia, lethargy, emaciation, and may even result in death (12). Increased housing density and poor hygiene have been identified as major predisposing factors for *Sarcoptes scabiei* infestation (3). The morphological features observed in the present study were consistent with previous reports (11). Similar gross lesions, including scab and crust formation over the head, ears, and facial regions, have also been documented by earlier workers (12). Scabies mite gut proteases play a significant role in maintaining infestation within the epidermis, functioning both as digestive enzymes and in facilitating host complement evasion (13–15). Despite the economic and health significance of *S. scabiei* infestation in both human and animal populations, the pathogenesis and immune responses to this disease is not well understood., Research should result in innovative tools for the prevention, monitoring and further investigation of this important and widespread parasitic disease.

Rabbit farming industry is subject to several challenges that make it difficult to manage. One of the main constraints that still encounters rabbit farming is the mange disease. Many strategies have been applied to control mange in rabbits. Application of restricted hygienic measures surrounding the animal such as flooring system, feeding etc. is crucial to prevent such infestation. Humans also must take all precautions during handling of rabbits to avoid zoonotic transmission. Searching for new types of acaricides or even developing vaccines should be taken into consideration in future research work. Vaccination may be a good alternative to therapy for mange control.

Acknowledgment- Authors are thankful to the In-charge Rabbit unit and small animal unit, DSVCKV, Anjora Durg, C.G.

Fig.1 Adult *Sarcoptes scabiei* with round body, short legs with long unjointed stalk and sucker on the front pairs of leg (×10). Fig.2.A. Alopecia with scab formation in the eyes, ears and mouth region, B. Showed grievous cachexia, pruritis and skin lesions due to prolonged illness Fig.3.A.Acute suppurative pneumonia with whitish hard material in the lungs

B. Urinary bladder had turbid fluid Fig.4. (Photomicrograph-H&E- $\times 40-100$) A. Degenerative and necrotic changes with severe perivenular sinusoidal congestion in liver. B. Accumulation of sero-fibrinous exudate and infiltration of mononuclear cells with presence of large number of neutrophils. Numerous hemorrhagic areas with presence of RBC's seen in the parenchyma of lungs.



Fig.1



Fig.2(A,B)



Fig. 3(A,B)

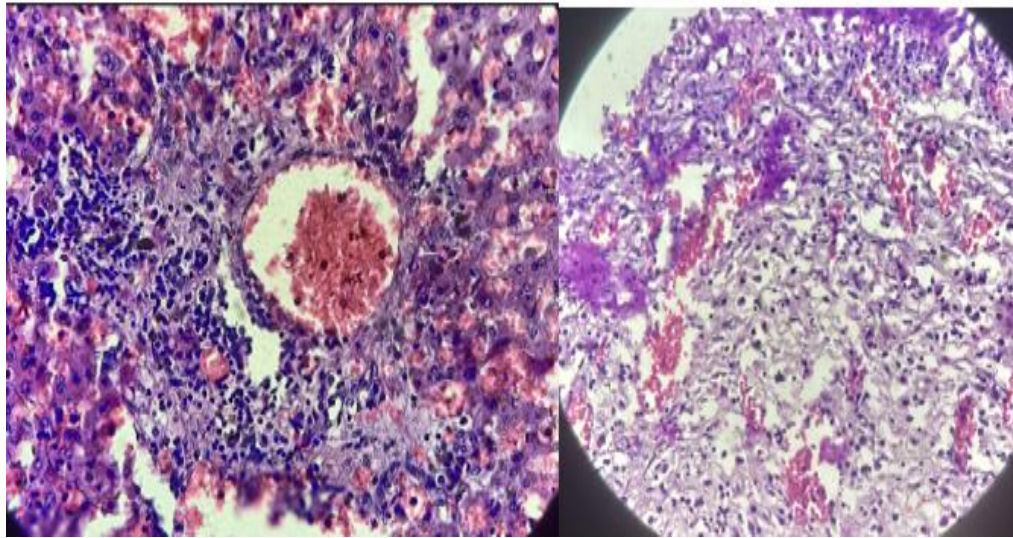


Fig. 4(A,B)

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