

## Pathology of naturally occurring paratuberculosis in caprine

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### ABSTRACT

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Paratuberculosis is a chronic granulomatous disease caused by an acid fast *Mycobacterium avium subsp. paratuberculosis*. The present study was conducted to record the morphological and histological changes in naturally occurring caprine paratuberculosis. Out of 28 paratuberculosis suspected morbid cases, 8 showed gross lesions like oedematous and enlarged mesenteric lymphnodes with corrugation of intestinal mucosa. Microscopically, the lesions ranged from small granulomas (Paucibacillary; 3) with few epithelioid cells to large granulomas (Multibacillary; 5) with extensive infiltration of macrophages and epithelioid cells with acid fast organism. The over all post death prevalence of caprine tuberculosis in organized semi-intensive goat farming was 28.75%.

**Keywords:** Goat, multibacillary, paratuberculosis, paucibacillary

Paratuberculosis (Johne's disease) is one of the major economically important disease of small ruminants. The disease is caused by *Mycobacterium avium subsp. paratuberculosis* (Map), a slow-growing acid-fast bacterium and causes granulomatous enterocolitis, lymphadenitis and lymphangitis in domestic and wild ruminants<sup>1,23</sup>. In animals showing clinical signs, diffuse lesions with two main pathological forms were described: "paucibacillary" or "borderline" tuberculoid form, in which the inflammatory infiltrate was composed of lymphocytes with some macrophages but few, if any, mycobacteria; and "multibacillary" or "borderline" lepromatous form, in which macrophages filled with numerous mycobacteria were the main inflammatory cells<sup>1,3,4</sup>. In sheep or goats with no clinical signs or gross lesions, "focal" intestinal lesions, formed by small, well-demarcated granulomas located exclusively in the intestinal lymphoid tissue, were also described<sup>3,4</sup>. The absence of uniformity in caprine paratuberculosis have been reported which makes the disease diagnosis difficult<sup>5,6</sup>. The aim of the present study is to describe the pathomorphological and histopathological lesions in naturally occurring caprine paratuberculosis.

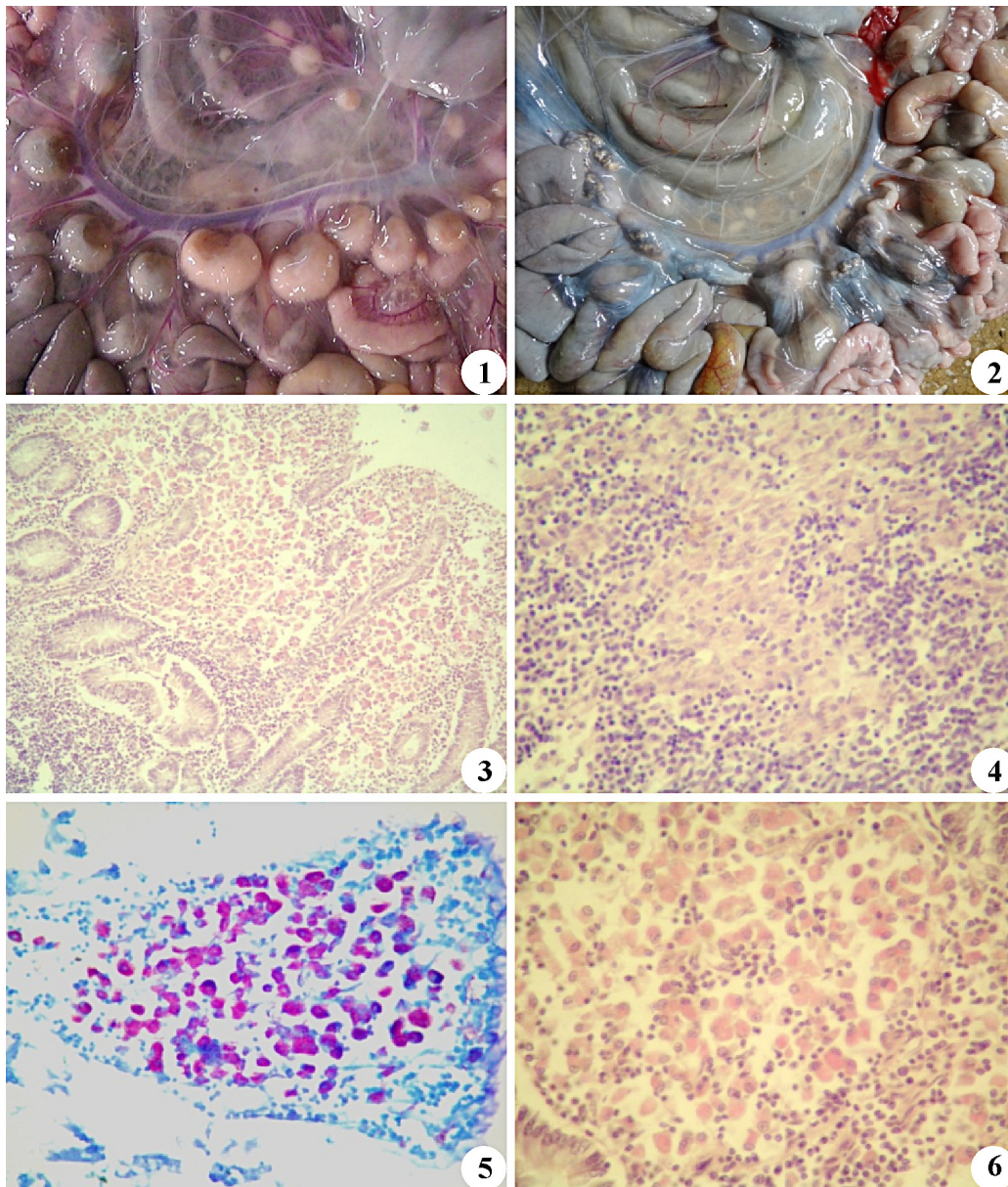
A total 28 goats (>1 year old) died with an history of diarrhoea and weakness from different livestock units of Central Institute for Research on Goats (CIRG) formed the materials for this study. The carcasses were subjected to detailed post-mortem examination and the gross morphological lesions were recorded. The pieces of intestines from different portions, ileocaecal junction and mesenteric lymphnodes were collected in 10%

buffered formalin. Impression smears from ileocaecal junction and mesenteric lymphnodes were prepared and stained using ZN Acid Fast Stains – Kit (HiMedia, India). The tissues after proper fixation were processed to obtain haematoxylin and eosin (H&E) stained sections. Samples from the intestine and mesenteric lymph nodes with histopathological lesions were additionally stained by the ZN method.

Majority of the cases showed diarrhoea with gradual loss of body weight and weakness. It is difficult to identify early signs of caprine paratuberculosis since animals generally remain bright and alert with good appetite. As the disease progresses, weight loss becomes evident<sup>1</sup>. The gross and morphological lesions recorded were muscular atrophy, cachexia and hidebound condition, paleness of mucus membranes and internal organs, very less or no subcutaneous, mesenteric and omental fat, gelatization of pericardial and omental fat, accumulation of non inflammatory serous fluid in peritoneum and pericardial sac, cording and knotting of lymphatics with oedematous and enlarged mesenteric lymphnodes (Fig.1), thickening of intestines specially ileocaecal junction and corrugations were recorded. The characteristic lesions of paratuberculosis in goats were located mainly in the intestines and mesenteric lymph nodes and these findings coincide with the reports of previous workers<sup>7,8,9,10,11</sup>. In two cases, the intestines were filled with tape worms, but both of them were also found positive for paratuberculosis. In one case, caseous necrosis and calcification of mesenteric lymphnodes was recorded (Fig.2), which is one of the distinctive feature observed in caprine paratuberculosis compared to other ruminants<sup>7,12</sup>. Lesions associated with paratuberculosis infection were classified on the basis of their location in relation to intestinal lymphoid tissue, intensity,

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**Fig. 1.** Enlarged and edematous mesenteric lymph nodes; **Fig. 2.** Mesenteric lymph nodes showing caseation and calcification; **Fig. 3.** Villi and Lamina propria showing macrophages and epithelioid cells. H&E x100; **Fig. 4.** Lymph nodes showing sheaths of macrophages and epithelioid cells in a granuloma. H&E x200; **Fig. 5.** Villi showing acid fast bacilli containing macrophages and epithelioid cells. ZN x1000; **Fig. 6.** The small granuloma showing macrophages with distinct cytoplasm. H&E x200.

inflammatory cell types and numbers of mycobacteria present as proposed by Corpa *et al*<sup>4</sup> for goats. Of the 28 suspected cases examined, eight cases had lesions associated with MAP infection with 28.57% post death prevalence rate. The prevalence of up to 50% percent has been reported<sup>4</sup>, the lower prevalence in the study might be attributed to the continuous culling practices followed at farm and sensitivity of the diagnostic tests.

In three goats (37.5%), small granulomas (paucibacillary type) were observed mostly in villi (Fig.3), followed by lamina propria and lymphoid

follicles. The granulomas contained few macrophages with clear and large nuclei and abundant cytoplasm with heavy infiltration of lymphocytes (Fig.4). In some cases, the central areas of caseous necrosis was deserved with infiltration of neutrophils and lymphocytes. Out of eight positive cases, 5 cases (62.5%) revealed multibacillary type of lesions. There was high density of macrophages and few lymphocytes infiltration. The macrophages were entirely filled with acid fast bacteria (Fig.5). In one case, there was extensive caseation and calcification in mesenteric lymph nodes. Thickening of

mucosa with fibrous tissue was more prominent in multibacillary than the paucibacillary type. The mesenteric lymph nodes also revealed the same changes as that of intestine (Fig.6). The present findings simulate the previous studies in natural and experimental caprine paratuberculosis<sup>4,8,13,14</sup>. In conclusion, on the basis of morphological, histopathological and acid fast staining, 8 cases were diagnosed as paratuberculosis positive with 28.75% prevalence in organized semi intensive goat farming system.

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