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Gross pathology of small ruminants affected with anaemia

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Abstract

Present study was conducted on the Gross pathology of anaemic small ruminants was undertaken for a period of 6 months from June 2021 to November 2021. Animals affected with anaemia were considered for the present study. Postmortem examination of anaemic sheep and goats revealed emaciation, pale conjunctiva, sunken eye balls, gelatinisation of subcutaneous fat was most striking features observed externally. In heart, hydropericardium, gelatinisation of epicardial fat was observed. Enlargement, thickened Glissons capsule, hard consistency, *Cysticercus tenuicollis* cyst was seen in liver. Oedema, consolidation, froth in trachea, bronchi and bronchioles in was observed in lungs. *Haemonchus* worms in stomach, tapeworms in intestinal lumen, serosanguinous fluid in the peritoneal cavity, enlarged lymph nodes were observed in various cases.

Keywords: Anaemia, Postmortem examination, *Cysticercus tenuicollis*, *Haemonchus* worms

1. Introduction

Diseases are one of the major hurdles in sheep and goat farming. Anaemia is a pathologic condition or diagnostic problem rather than a disease and it is due to increased erythrocyte destruction, increased erythrocyte loss through hemorrhage and decreased production of erythrocytes, or a combination of all. Anaemia is a clinically important syndrome in small ruminants and is divided into regenerative and non-regenerative anaemia. Common causes of anemia in small ruminants include gastrointestinal and external parasitism resulting in chronic hemorrhage, and anaemia of inflammatory or chronic disease (Johns and Heller, 2021) [6]. It is a condition that silently kills the production and reproduction performance of animals and also suppresses the resistance power of animals (Benjamin, 1978) [3].

2. Materials and Methods

Present study was undertaken for a period of 6 months from June 2021 to November 2021. Samples were collected from post-mortems conducted at Animal Disease Diagnostic Laboratory (ADDL), Anantapur, sheep and goat flocks of farmers in and around Anantapur. A detailed post-mortem examination was conducted on sheep and goat carcasses suspected for anaemia. The gross lesions were recorded and the representative tissue pieces like liver, heart, lung, spleen, kidney, intestine, stomach were collected and preserved in 10% neutral buffered formal saline for the histopathological studies.

3. Results and Discussion

In majority of sheep and goats carcass with anaemia the commonly affected organs were lungs, liver, intestine, kidneys whereas the heart, stomach, spleen and lymph nodes were less commonly affected.

3.1 External examination

External examination revealed emaciated body condition, pale visible mucous membrane (Fig. 1). Post mortem examination showed extreme pale viscera indicating severe anaemia (Patel *et al.*, 2019) [11]. Discharges from nostrils, sunken eye balls in few sheep and goats, gelatinisation of abdominal, sub cutaneous (Fig. 2) and pericardial fat in few sheep and goats. These findings were in accordance with (Kelkele *et al.*, 2012) [7].



Fig 1: Photograph showing pale conjunctival mucous membrane in Sheep with anemia.

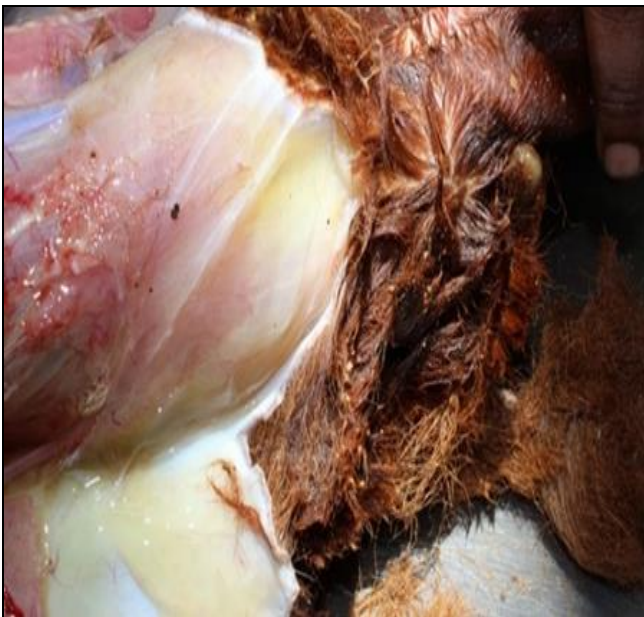


Fig 2: Photograph showing gelatinisation of subcutaneous fat in sheep with anemia.

3.2 Internal examination

In the abdominal cavity little amount of serosanguinous fluid found (30-40 ml) in few animals due to secondary to hypoproteinemia. Galiza *et al.*, (2011) [5] reported watery blood, pale tissues, and the presence of liquid in the peritoneal and pericardial cavity. Patel *et al.*, (2019) [11] noticed serous exudates were found in the abdominal cavity. In heart hydropericardium, gelatinisation of epicardial fat (Fig. 3) occurs rapidly during anorexia, starvation or cachexia because fat is catabolized to maintain energy balance (Zachary and McGavin, 2012) [13]. Epicardial fat necrosis, heart chambers filled with chicken fat clot, endocardial haemorrhages (Fig. 4) were noticed. Endocardial haemorrhages attributed to severe septicaemia and anoxia. Hydro pericardium observed in sheep and goats can be correlated with heavy infection of blood sucking stomach worms resulting in excessive loss of serum albumin decreasing the osmotic pressure of plasma which forces fluid to move out of blood to tissues and accumulation of fluid in pericardial sac resulting in hydropericardium (Kumar *et al.*, 2011) [9].



Fig 3: Photograph showing the gelatinisation of epicardial fat in anaemic sheep.

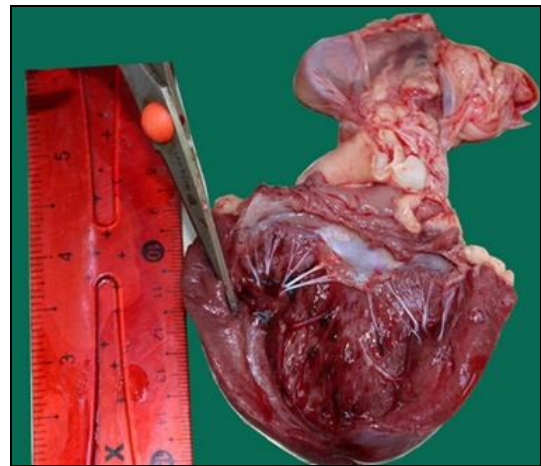


Fig 4: Photograph showing the severe endocardial hemorrhages in heart of anaemic sheep.

Lungs were pale, mild congestion of lungs, pulmonary oedema with areas of emphysema, focal consolidation, haemorrhages in trachea (Fig. 5), froth in trachea, bronchi and bronchioles. Haemorrhages in trachea due to septicemia, inflammation. Liver were pale, enlargement with rounded borders, hard in consistency in few sheep (Fig. 6). In goat carcass were thickened Glisson's capsule, congestion upon cut section, *Cysticercus tenuicollis* cyst, distended gall bladder with thick bile. These results were in accordance with Saminathan *et al.*, (2015) [12]. Distended gall bladder is due to after a prolonged period of fasting because there is no stimulus for emptying the gall bladder.



Fig 5: Photograph showing the focal areas of consolidation on lung lobes of anaemic sheep.



Fig 6: Photograph showing the diffused pale areas on various liver lobes of anaemic goat.

In kidneys gelatinisation of renal fat, pale kidneys, haemorrhagic kidneys (Fig. 7), pale areas in cortex and medulla, congested cortico medullary junction, severe congestion of cortex and medulla, fibrinous layer at junction of cortex and medulla, thinning of cortex were noticed. Aslani *et al.*, (2005) [2] reported enlarged kidneys in onion toxicosis. Oedematous and congested abomasal mucosa with severe *Haemonchus* worms (Fig. 8), haemorrhagic abomasal mucosa were noticed in stomach. Petechial haemorrhages due to the attachment and feeding of the parasite, and severe congestion in the abomasal mucosa were corresponded with the observation of McKenna (1998) [10]. Similarly, Koudela *et al.*, (1998) [8] observed haemorrhages in the abomasum infested with *Haemonchosis* and whitish nodular polyps in the jejunum. Engorged mesenteric and serosal blood vessels, congested intestinal mucosa, haemorrhages in small and large intestine (Fig. 9), catarrhal changes in intestine, thickened small intestinal wall, thickened large intestine with thick fibrinous layer on mucosa of all parts of intestine. These findings were corresponded with the observation of Saminathan *et al.*, (2015) [12]. Tapeworm infestation in the lumen of intestines in sheep. In goats gelatinisation and necrosis of mesenteric fat, parasitic cysts along mesentery (Fig. 10), round worm's infestation in caecum. Lymph nodes were haemorrhagic, band like appearance of mesenteric lymph nodes. In brain mild congestion of cerebral blood vessels. Petechial haemorrhages on the surface of spleen. Similar lesions were recorded by Chauhan *et al.*, (2011) [4]



Fig 7: Photograph showing the hemorrhagic kidney in anaemic goat.



Fig 8: Photograph showing the congested and edematous abomasal mucosa with *Haemonchus* worms in anaemic goat.



Fig 9: Photograph showing the severe hemorrhagic enteritis in anaemic goat.



Fig 10: Photograph showing the parasitic cysts along the mesentery in abdominal cavity of anaemic goat.

3.3 Bone marrow

Grossly pale bone marrow was noticed in sheep. In smears prepared from bone marrow red cell aplasia was observed due to nonregenerative anaemia with severe depletion of red cell precursors in the bone marrow. Normal population of granulocyte precursor (Fig. 11) lymphocyte precursor (Fig. 12) cells were noticed. Granulocytic precursors had irregular shape

and eccentric nuclei, with fine to stippled chromatin patterns and basophilic cytoplasm. Lymphocytic precursors with round indented nucleus, diffuse chromatin pattern without visible nucleoli and scanty basophilic cytoplasm were noticed. Mitotic figures were also observed. Similarly type of findings observed by Al Izzi *et al.*, (2007) ^[1].

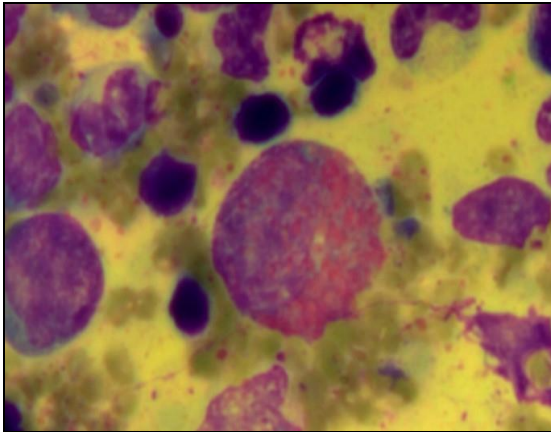


Fig 11: Photomicrograph showing granulocyte precursors in Giemsa-stained bone marrow impression smears. H&E: x 1000

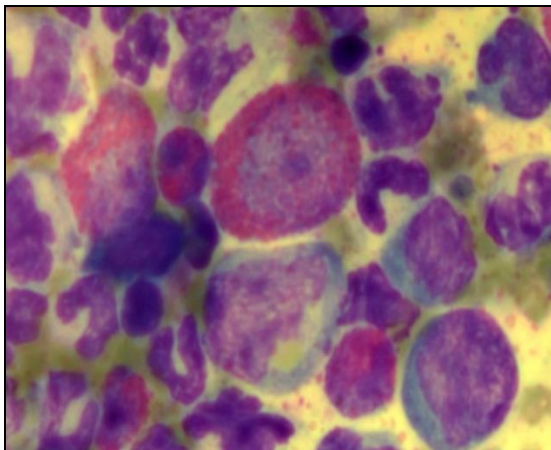


Fig 12: Photomicrograph showing granulocyte and lymphocyte precursors in Giemsa-stained bone marrow impression smears. H&E: x 1000

4. Conclusion

It was concluded that anaemia in sheep and goat exhibits clinical lesions externally and internally in various organs. In some diseases anaemia is the secondary to the primary cause of the disease in a sheep and goat. Primary cause of disease shows peculiar lesions in various organs apart from anaemia. Impression smear staining of bone marrow shows the primitive cells of erythropoiesis based on anaemic condition. Thus the anaemia is due to various etiological conditions and based on condition gross lesions appears in the body.

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