

PATHOLOGICAL, PARASITOLOGICAL AND HEMATO-BIOCHEMICAL STUDIES ON MONIEZIOSIS IN SHEEP

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ABSTRACT

Moniezia expansa, a cestode parasites of small ruminants is one of the most commonly found tapeworm in herbivores which causing foremost health issues in sheep. The aim of this study was to investigate the pathological and hemato-biochemical changes in monieziosis in sheep from the western arid region of Rajasthan. A total of 600 sheep were screened from slaughter houses of Bikaner, Jhunjhunu and Churu districts of Rajasthan from October 2021 to September 2022. On necropsy of all animals out of 600, 312 sheep intestines were showing lesions for various intestinal ailments thus samples were collected from them for further processing. Out of 312, 10 sheep were showing monieziosis (3.20%) histopathologically in intestinal tissues whereas overall occurrence of *Moniezia* parasite in fecal samples was found in 13 fecal samples out of 312 fecal samples (4.01%). In Monieziosis, significant gross lesions observed in the small intestine were whitish coloured flat and twisted, tape like worms were collected from the lumen of intestine. On histopathological examination, the proliferation of lining epithelial cells with the shortening and flattening of intestinal villi and local hemorrhages were observed with the parasite in the lumen along with eosinophilic homogenous necrotic areas of variable sizes that were present in the submucosa. The liver was slightly puffy with rounded edges with necrotic foci. Hematological parameter revealed a significant ($P<0.01$) decrease in Hb, PCV and TEC whereas increase in TLC with neutrophilia and eosinophilia when compared with healthy control. Biochemical parameter revealed a significant ($P<0.05$) decrease in total serum protein and highly significant ($P<0.01$) decrease in serum albumin and insignificant ($P>0.05$) decrease in serum globulin. Serum enzyme levels of AST, ALT and ALP were significantly increased ($P<0.01$).

Key words: Monieziosis, small intestine, histopathology, occurrence, hemato-biochemical.

Introduction

Intestinal parasites in small ruminants causes severe indirect economic losses by diminishing the weight gain, reducing growth rates of lambs thus, abate the food quantity with lowering fertility and production (Iacob *et al.*, 2020). According to "National Action Plan, 2022" issued by Government of India sheep having multi-facet utility as it contributes in providing wool, meat, milk, skin and manure thus become an integral part of rural economy particularly in the arid and semi-arid regions (BAHS, 2019). Sheep is a ruminant having carpet grazing behavior so infestation of enteric parasites become very common. It is definitely a major challenge for the health and the welfare of sheep as it causing inappetence, diarrhea, anemia and even death in severe cases accountable for considerable economic losses due to the diseases, treatment cost and deworming cost (Satish *et al.*, 2018).

Sheep are known to suffer from various gastrointestinal parasites, out of which monieziosis, in cestodes are still serious challenges in the region threatening for the small ruminant production (Choubisa and Jaroli, 2013 and Sharma *et al.*, 2020). Monieziosis is very common in lambs in early years of life and very few cases were reported in adults therefore *Moniezia* is also called milk tapeworm of small ruminants as during suckling period it affects the lambs. Monieziosis is also affected greatly by rain as intermediate host of the parasite is a forage mite which are more prevalent during monsoon (Sharma *et al.*, 2020). It is a great challenge to prevent and

cure parasitic infestations in small ruminants especially in young ones because live tapeworm can choke the gut when massive infection is present and dead and decaying worms in the gut yield ammonia gas which ultimately results in death (Maity *et al.*, 2018). Although, some work has been done on the parasitic infestation of sheep in southern part of Rajasthan (Choubisa and Jaroli, 2013 and Singh, 2019) but in western arid part where there is difference in agro-climatic conditions and feeding habits and very few investigations were reported on *moniezia* parasite, thus keeping all these factors in views the proposed investigations were undertaken.

Materials and Methods

Ethical Approval - All procedures were achieved in accordance with the ethical standards of ethical committee of College of Veterinary and Animal Science, RAJUVAS, Bikaner by approval no. CVAS/IAEC/2021-22/159-160.

Sample Size - Intestine of 600 sheep in different age groups, both the sex was examined. Out of all screened animals 312 animals were showing various gross lesions in intestine were further processed for histopathological examinations.

Sample collection area - Various slaughter houses of Bikaner, Jhunjhunu, Churu districts of Rajasthan (western arid zone).

Histopathological examination - Gross lesions of intestine were recorded and affected tissue were preserved in 10% formalin. The formalin fixed tissue collected for

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Table1: Hematobiochemical parameters of healthy group (control) and monieziosis affected sheep (mean±SE): level of Significance.

Parameters	Healthy Group (n=10)	Diseased Sheep (n=10)	Level of Significance
Hb (g %)	10.83±0.25	7.015±0.09	**
PCV (%)	33.3±0.75	24.92±0.88	**
TEC (million/ μ l)	10.02±0.34	7.16±0.09	**
MCV (fl)	33.55±1.24	34.91±1.41	NS
MCH (pico gram)	10.9±0.39	9.80±0.03	*
MCHC %	32.7±1.09	28.47±1.05	*
TLC (10^3 / μ l)	8.11±0.16	13.83±0.45	**
Neutrophils (%)	36.83±0.58	43.43±0.58	**
Lymphocyte (%)	59.39±0.48	49.36±0.62	**
Eosinophils (%)	2.28±0.17	4.77±0.24	**
Monocyte (%)	1.47±0.05	2.3±0.05	**
Basophils (%)	0.02±0.01	0.14±0.05	*
TP (g/dl)	6.76±0.08	5.32±0.34	**
Albumin (g/dl)	4.25±0.05	2.41±0.19	**
Globulin (g/dl)	2.51±0.09	2.92±.045	NS
AST (IU/L)	97.61±3.17	239.97±8.11	**
ALT (IU/L)	25.5±1.3	36.27±1.99	**
ALP (IU/L)	79.52±3.32	124.96±6.31	**

**highly Significant (P<0.01), * Significant (Pd*0.05), NS – NonSignificant

histopathological examination processed for paraffin embedding by acetone and benzene technique (Lillie, 1965). The tissue sections of 4-5 micron meter thickness cut and stained with haematoxylin and eosin staining method (Luna, 1968) as a routine.

Parasitological examinations- faecal samples were collected from diseased sheep/lambs which showing symptoms of intestinal disorders. Examination of faecal samples was performed by using centrifugal floatation technique (Soulsby, 1982) to find out presence/absence of eggs in the faeces.

Hemato-biochemical examination - The blood samples were collected prior to slaughter from jugular vein in two vials, one with EDTA and another without EDTA for serum separations. Hematological studies were done manually and analyzed as per the standard method described by Jain (1986) within six hours of blood collection. Serum samples were analyzed for different biochemical parameters were estimated by using the IDEXX VetTest Chemistry Analyzer.

Statistical analysis—Unpaired ‘t’ test was used to compare hemato-biochemical parameters between group of affected animals and control group of 10 apparently healthy animals.

Results and Discussion

The over all prevalence of monieziosis was recorded in 10 cases out of 312 sheep (3.20%). A slightly higher incidence was observed by Singh (2019) as 5.48% in Southern Rajasthan it may be due to southern Rajasthan is having humid climate favourable for the intermediated host. The occurrence of *Moniezia* infection in sheep ranged from 0.2 to 30.4 per cent (Sharma *et al.*, 2020).

Gross findings such as intestine with heavily loaded whitish coloured flat, tape like worms these were collected from the lumen (Fig. 1). A cestode of sheep was verdict as *Moniezia expansa* based on certain morphological characteristics of the adult tapeworm which included presence of band of inter-proglottid glands. Similar findings were reported



Fig. 1: Lamb intestine loaded with *Moniezia* parasite causing obstruction of the lumen (left) and whitish coloured tapeworm *Moniezia expansa* (right) collected from the lumen of intestine



Fig. 2: Microphotograph of intestine showing sloughing and degenerated villi as pressure atrophy of the intestine wall due to presence of *Moniezia expansa* in lumen. H&E,40X

by Ved and Siddiqua (2008), Maity *et al.* (2018).

Microscopic study exposed the proliferation of lining epithelial cells with the shortening and flattening of intestinal villi and local haemorrhages with the presence of parasite in the lumen. There was thickening of mucosa and submucosal layers due to infiltration of mononuclear cells and a few plasma cells. The present study findings were similar the findings noticed by Bashtar *et al.* (2011). Cross section of worm seen in the lumen might be responsible for necrotic enteritis, necrosis of superficial part of villi and marked infiltration of lymphocytes, plasma cells in the lamina propria in agreement of host immune mechanism (Fig. 2). The mucosal surface became thickened due to infiltration of mononuclear cells and few plasma cells were in close agreement with the study of Singh (2019). There was an increase in the number and size of Peyer’s patches in the sub mucosa. The intestine glands were highly distended with their secretions and glandular epithelium showed various stages of degeneration due to pressure atrophy of parasite which occluded lumen. This study was in coordination with the changes observed by Mir *et al.* (2013), Kumar *et al.* (2015) and Iacob *et al.* (2020).

Parasitological examination of faecal samples revealed 4.01% (13 out of 312) occurrence of *Moniezia* by presence of triangular shaped eggs of *Moniezia aexpansa* (Fig. 3). The significantly (p < 0.01) lower concentrations of hemoglobin, packed cell volumes and total erythrocyte counts in the present study could be correlated with the heavy parasitic burden thus, anemia was common with monieziosis (Kar *et al.*, 2007). Severe leucocytosis was observed with neutrophilia and eosinophilia were in unison with the observation of Moudgil *et al.* (2017). Hematological profile revealed nonsignificant (p > 0.05) increase in MCV where as significant (p<0.05) reduction in MCH and MCHC. Serum biochemical profiles of present study revealed a significant (p < 0.01) decrease in values of



Fig. 3: Eggs of *Moniezia expansa* in the faecal content. 100X

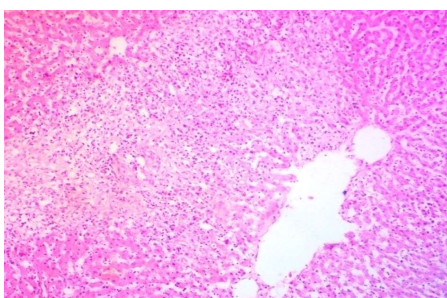


Fig. 4: Histopathological section of liver showing coagulative necrosis in hepatic parenchyma and infiltration of mononuclear inflammatory cells surrounding the necrotic areas (H&E, 200X).

total protein and serum albumin. These results are in ordinance with finding of Singh (2019) (Table. 1).

Inappetence due to monieziosis resulting in reduction in dietary protein, malabsorption and plasma losses from damaged intestinal mucosa might be the most common cause for marked hypoproteinemia. The inflammation of the intestine by developmental stages of Dparasites might also be due to poor absorption of protein metabolites resulted in low level of total protein count (Pandit *et al.*, 2009). The activity of aspartate aminotransferase alanine aminotransferase and alkaline phosphatase significantly increased in diarrhoeic sheep/lamb in the study because specific hepatic function was greatly affected by a wide variety of the pathological condition of extrahepatic origin especially intestinal origin. Similar finding was also reported by Sharma (2021). Specific hepatic functions were greatly affected as coagulative necrosis in hepatic lobules and in periportal area were observed (Fig. 4). In periportal area portal triad was disturbed and infiltrated with lymphocytes and macrophages. Since hepatic enzymes have their function and greatest concentration within the cell. Thus, increase in enzymatic activities reflect cellular abnormalities which directly related to damage of hepatocytes similar as earlier studied by Kumar (2015).

Conclusion

It was concluded from this study that monieziosis is moderately prevalent in sheep especially in young lambs. It causes intestinal ailments which directly affects growth and production so impacts sheep industry. It also impacts on liver functions. Variation in blood profile indicated normocytic hypochromic anaemia with eosinophilia. Serum analysis is evident for reduced protein levels but liver enzyme levels were elevated.

Declaration of conflict of interest

No conflict of interest with respect to the publication of the manuscript lies among the authors.

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