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Research Article

PARASITOLOGICAL DIAGNOSIS WITH HAEMATO-BIOCHEMICAL ALTERATION AND THERAPEUTIC MANAGEMENT OF *SCHISTOSOMA INDICUM* IN BULLOCK: A CASE REPORT

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ABSTRACT

Two Kankrej bullocks, ages 3.5 and 5 years, were brought to the Veterinary Clinical Complex, Veterinary College, Kamdhenu University, Junagadh with symptoms of anorexia, brisket oedema, abdominal pain persisted for five days, reduced feed as well as water intake, bloody, watery, blackish colour diarrhoea. Clinical findings included dehydration, tenesmus, colic symptoms, pale conjunctival mucus membrane, blood mixed with black diarrhoea, and a rectal temperature of about 103ºF. Examination of the faecal sample indicated a distinctive *Schistosoma indicum* egg, with the characteristic of small spine at posterior region. The haematological analysis revealed anaemia with neutrophilia, while serum biochemical test revealed elevated values of SGPT, SGOT, BUN and hypoprotenemia. Infected bullocks were administered a single oral dose of Closantel@-10 mg/kg body weight, complemented by supportive therapies including ranitidine, metronidazole, fluid therapy, meloxicam, chlorpheniramine maleate, and haematinics. By the 15th-day post-treatment, faecal sample examinations revealed no detectable parasitic eggs, and haemato-biochemical parameters had returned to normal ranges, indicating a successful recovery. This treatment regimen aligns with documented efficacy against *Schistosoma indicum* infections in bovines.

Keywords: Dysentery, Faecal examination, Haemato-biochemical, *Schistosoma indicum*

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Schistosomiosis is a significant parasitic disease affecting both domestic and wild animals across tropical and subtropical regions of Asia (Ayanda, 2009). The sixth most prevalent helminthosis afflicting domestic animals in the Indian subcontinent is schistosomiosis (Sumanth *et al.*, 2004). According to Kumar and Burbure (1986), *Schistosoma indicum* is one of the prevalent species that causes visceral schistosomiosis in cattle. In India, the disease is common in goats, sheep, cattle, and buffaloes and it's popularly called as "blood flukes". Additionally, schistosomes are morphologically elongated, unisexual trematodes parasite that live in the blood vessels of their definitive hosts.

Adult schistosomes colonize specific blood vessels based on their species: *Schistosoma nasalis* inhabits the capillaries of the nasal mucosa; *S. haematobium* resides in the venous plexus of the urinary bladder and the intestinal and visceral species are *Schistosoma indicum*, *S. spindale* and *S. incognitum* are found within the mesenteric venules. The most prevalent infections in endemic parts of the Indian subcontinent are caused by *S. indicum*, which is subclinical and costs the farming community a lot of money in terms of growth, productivity and increased vulnerability to other parasites (Bulbul *et al.*, 2022). *Schistosoma indicum* females produce numerous oval eggs, each bearing a terminal spine and containing a fully developed miracidium upon laying (Soulsby, 2012). Animals display common clinical signs like dehydration, pale mucous membrane, significant weight loss, emaciation, and decreased production caused due to the irritation produce by the spined eggs (Bhatia *et al.*, 2010).

Clinical symptoms and an investigation of infected animal's faeces are necessary for the routine diagnosis of *S. indicum* infection. Current communication describes the diagnosis of *S. indicum* infection in bullocks using parasitological technique, haemato-biochemistry, and therapeutic management.

MATERIALS AND METHODS

Two bullocks were presented to the Department of Veterinary Clinical Complex, College of Veterinary Science and Animal Husbandry, Junagadh with a history of blood mixed watery black colour diarrhoea, reduced feed and water intake, anorexia, brisket oedema, 103 ºF body temperature and abdominal pain for last five days. For further diagnosis, faecal sample examination was recommended and standard sedimentation methods described by Hansen and Perry (1994) and Rana *et al.*, (2011) were used to concentrate the samples. Additionally, blood samples were drawn from the animal's jugular vein in both serum and an EDTA-coated vacutainer for hematological and biochemical analysis.

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RESULTS AND DISCUSSION

a) Clinical manifestations

Schistosomes are significant helminth parasite responsible for causing infections in both human and animals worldwide. Cattle and buffaloes, due to their habit of free grazing in waterlogged area where infective cercariae are present, are highly susceptible to *Schistsosome* infections (Rashid *et al.*, 2022). In the present case of Kankrej bullocks, clinical signs such as pale mucus membrane, bloody diarrhea, tenesmus and straining while defecation were observed. These findings are consistent with observation by Sucharitha *et al.*, (2024). Physical examination revealed blood mixed watery black colour diarrhoea, rectal temperature of around 103 ºF, pale conjunctival mucus membrane, dehydration, tenesmus and colic signs. Additional clinical findings included dull behavior, lethargy and unwilling to move. Vital parameters such as heart rate and respiratory rate were noted to be within the normal limits, through the elevated body temperature and dehydration point towards systemic involvement. Base on history and clinical signs, it was suspected that bull might be suffering from severe gastrointestinal infection (Fig.1 & 2).

b) Microscopic examination

Faecal sample examination using the sedimentation technique revealed oval, thin-shelled eggs with a terminal spine, characteristic of *Schistosoma indicum* identified based on their distinctive morphology (Figs. 3 & 4) (Bhatia *et al.*, 2010 and Chaudhary *et al.*, 2000).

Possible differential diagnosis was done for paramphistomosis, fasciolosis and coccidiosis.

The gastrointestinal tract is the main site of schistosomosis, which is caused by the genus *Schistsosoma* and results in anorexia and bloody diarrhea. Local cattle breed had a higher risk of infection for bovine schistosomosis than crossbred (Yihunie *et al.*, 2018). Diarrhoea, weight loss, anemia, hypoalbuminemia, hyperglobulinemia and pronounced eosinophilia typically develop once egg shedding begins. Animals with heavy infections often deteriorate rapidly and may die within a few months, whereas those with milder infections exhibit growth retardation and chronic illness (Yogeshpriya, 2022).

c) Haemato-biochemical parameters

Serum biochemical study indicates elevated levels of SGPT, SGOT, blood urea nitrogen and hypoproteinaemia. Haematological results were not significantly changed, but demonstrated mild anaemia, neutrophilia and an elevated total leucocyte count. As a result of parasite-induced damage to intestinal and mesenteric arteries during parasite migration and egg deposition, anaemia and leucocytosis were frequently observed. In contrast, leucocytosis is brought on by an inflammatory reaction to schistosome antigens that are present during severe and acute infections. According to serum biochemical data, migrating schistosome induced hepatic cell damage resulted in raised levels of SGOT and SGPT, while dehydration or decreased renal clearance caused an increase in BUN. Here, both bullocks exhibit hypoproteinaemia as a result of the host's intestinal injury (Table 1 & 2). When coupled, haemato-biochemical marker along with faecal sample examination aids in diagnosis.

d) Therapeutic Management

To treat schistosomosis and its related complications, a thorough treatment protocol was started. Praziquantel @ 25 mg/kg and Closantel @10 mg/kg body weight P/O were administered to the afflicted Kankrej bullocks on the first day of presentation and continued for a total of 14 days. To address dehydration and restore electrolyte balance, supportive treatment included Metronidazole @ 25 mg/kg BW IV, Streptochrome at 10 ml IM, Meloxicam @ 0.2 mg/kg BW IM, Chlorpheniramine Maleate @ 0.5 mg/kg BW IM for anti-inflammatory and allergic reaction, and Ranitidine @10 ml IM.

The animals' bloody diarrhea decreased on the second day of treatment, and the following treatments were administered on the second and third days: Metronidazole at a dose of @ 25 mg/kg BW IV, Tribivet @15 ml IM, Meloxicam @0.2 mg/kg BW, IM, Chlorpheneramine Maleate @ 0.5 mg/kg BW IM and Streptochrome @10 ml IM. After three days, both bullocks began eating normally and the faeces substance and appearance were normal. This comprehensive strategy bought to effectively promote the animal's rehabilitation, address underlying issues and reduce clinical symptoms. The recovery was evaluated based on the fact that, following the fifteenth day of treatment, no eggs were found in the faecal sample. After 15 days, regular feeding, watering and faecal consistency also indicated clinical recovery.

Schistosoma indicum females deposit ova which is oval, thin-shelled and bearing a terminal spine via the faeces of infected ruminants. Upon contact with freshwater, these eggs hatch almost immediately, releasing miracidia that actively penetrate the gastropod *Indoplanorbis exustus* a well-established intermediate host. Within the snail, the miracidium develops into a mother sporocyst, which gives rise to daughter sporocysts; the latter generate motile cercariae, the infective larval stage. These cercariae emerge and actively penetrate the skin of the definitive bovine host, subsequently transforming into schistosomula that migrate via the circulatory system to mature into adults within the mesenteric vein. Clinically, *S. indicum* infection in Kankrej bullocks' manifests with muco-haemorrhagic diarrhoea, elevated rectal temperatures, pale mucous

Fig. 1. Bullock with symptoms (Age 3.5 year)

Fig. 2. Bullock with symptoms (Age 5 Year)

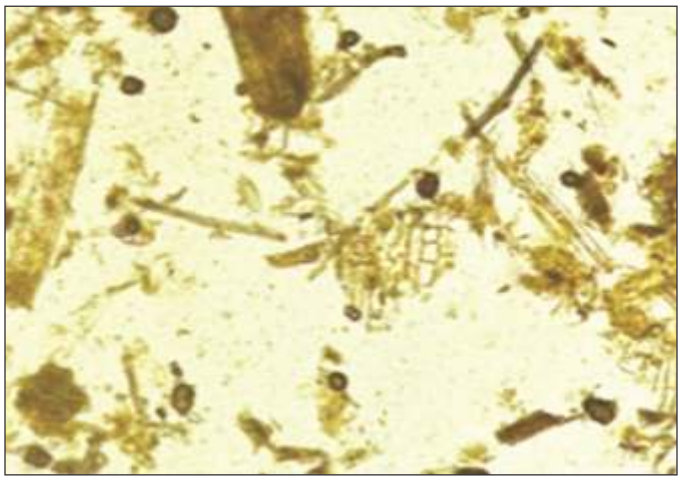

Fig. 3. Egg of Schistosoma indicum (10X)

Fig. 4. Egg of Schistosoma indicum (40X)

(Size of egg: 130-160 µm in length × 70-90 µm)

Table 1. Haematological parameters in diseased bullocks

Parameters	References ranges	Before treatment (0^{th} day)		After treatment (15^{th} day)	
		3.5 years bullock	5 years bullock	3.5 years bullock	5 years bullock
Haemoglobin (g/dL)	8-14	7.8	8.8	11.8	12.3
PCV (%)	24-44	31.56	40	40.6	39.5
RBCs ($x10^6$/µL)	5-9.5	7..84	7.57	8.2	8.9
MCV (fl)	40-60	42	53	56.2	57.0
MCH (pg)	10-17	11.6	14	15.0	16.8
MCHC (g/dl)	30-34	27.8	26	33.4	33.9
Plateles ($x10^6$/µL)	1-10	2.58	2.07	6.0	8.0
WBCs count	4000-11000	12340	14930	10232	11020
Neutrophils (%)	15-45	49.0	47.0	23.0	29.0
Lymphocytes (%)	40-75	59.0	49.0	43.0	66.0
Monocytes (%)	2-8	1.0	1.0	6.0	7.0
Eosinophils (%)	1-15	2.00	1.00	0.00	0.0
Basophils (%)	0-2	0.00	0.00	0.00	0.00

membranes, abdominal discomfort, tenesmus and anal spasms. These symptoms reflect the inflammatory and haemorrhagic damage induced by egg migration across the intestinal mucosa and mesenteric vessels.

Digraskar *et al.* (2018) and Deepak *et al.* (2022) reported similar clinical findings. Anaemia and eosinophilia were indicated by the haematological examination, which also showed a decrease in Hb, PCV, TEC and a high eosinophil count. Digraskar *et al.* (2018) and Giri *et al.* (2018) reported similar results. Examination of faecal sample showed that the egg of *S. indicum* had a terminal spine and a miracidium within (Fig. 1). Fresh faeces can be examined to diagnose hepato-intestinal schistosomosis

Table 2. Serum Biochemical parameters in diseased bullocks

Parameters	References ranges	Before treatment (0^{th} day)		After treatment (15^{th} day)	
		3.5 years bullock	5 years bullock	3.5 years bullock	5 years bullock
Creatinine (mg/dl)	0.8-2.5	1.90	2.09	1.0	1.25
Blood Urea Nitrogen (mg/dl)	6.25	27.01	32.11	13.02	17.5
Cholesterol (mg/dl)	35-160	64	71	60	69
SGOT(IU/L)	60-115	126.53	128.12	110.12	109.5
Bilirubin –Total (mg/dl)	0-1.9	0.17	0.03	0.7	0.5
Total Protein (g/dL)	5.6-7.0	4.6	5.0	6.9	7.2
Albumin (g/dL)	2.0-3.5	3.91	3.58	2.5	3.1
SGPT- (IU/ml)	6.9-35.3	40.3	39.01	20.2	30.3

(Bhatia *et al.*, 2006; Digraskar *et al.*, 2018; Giri *et al.*, 2018; Deepak *et al.*, 2022). A single oral dose of closantel @ 10 mg/kg body weight, administered alongside supportive therapy, proved effective in the treatment of *S. indicum* infection in bullocks. Closantel, a salicylanilide anthelmintic, acts by disrupting oxidative phosphorylation in the parasite's mitochondria, leading to a critical depletion of energy reserves (Sandhu, 2013). The drug interferes with the mitochondrial proton gradient, thereby inhibiting ATP synthesis, which is essential for parasite survival and motility (Pax & Bannette, 1989). This mechanism underscores its potent flukicidal activity and therapeutic efficacy in managing trematode infections.

CONCLUSION

This case report highlights the importance of a comprehensive, integrated treatment strategy in managing *S. indicum* infections in livestock. *S. indicum* infection in Kankrej bullocks presented with distinct clinical signs of anaemia, diarrhea, edema and fever, which can be effectively diagnosed through faecal sample examination to identify the characteristic eggs. Haemato-biochemical findings, including anemia, neutrophilia and hypoproteinemia, further supported the diagnosis and revealed the systemic impact of the parasitic infection. The use of anthelmintics, particularly closantel and praziquantel, proves to be effective in managing the infection by targeting the parasites' metabolic processes and causing their expulsion. Timely intervention with appropriate treatment offers a favorable prognosis, restoring health and improving the overall productivity of the affected animal. Early detection and treatment remain a key to prevent severe complications and ensuring the well-being of livestock.

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