

Management and Prevention of Nasal Schistosomosis in a She-Bufferalo: Clinical Insights

Gnani Charitha Vutharamalluru^{1*}, Gayathri Pathalota¹, Surendra Badvel², Guru Vishnu Pothanaboina³, Jagadeeswar Reddy Nandyala¹

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Nasal schistosomosis (Snoring disease) is a snail born trematode infection of domestic and wild ruminants caused by *Schistosoma nasale* (Chandra Sekhar *et al.*, 2021). This pathogen primarily affects cattle and buffaloes leading to significant economic losses in livestock dependent areas across Asia and Africa. Serious outbreaks of this disease among cattle and buffaloes have been reported in certain regions of India, *viz.*, Tamil Nadu, Karnataka, Kerala, West Bengal (Sumanth *et al.*, 2004; Agarwal, 2012; Ravindran and Kumar, 2012). Fresh water snail belonging to genus *Indoplanorbis* acts as intermediate host (Liu, 2010). Primary mode of transmission is through skin penetration when free swimming larval stage cercaria comes in contact with the ruminants in contaminated water bodies. Upon entering the definitive host, the parasite primarily affects nasal blood vessels. The main pathogenic effects are associated with the eggs that trigger granuloma formation through release of antigens that stimulate the host immune system, leading to a chronic inflammatory response in the nasal mucosa that may occlude the nasal passage.

Affected cattle exhibit symptoms like rhinitis, mucopurulent nasal discharges manifested clinically by signs of coryza, sneezing, dyspnea and snoring. Adult parasites cause dilatation and thrombosis of veins (Soulsby, 1982). Persistent infections are manifested as proliferation of nasal epithelium leading to cauliflower like growths with several small abscesses containing eggs. If the condition is ignored, it can escalate, significantly impacting the hosts well-being and overall performance. Diagnostic techniques like microscopic examination of nasal secretions and haematological assessments will help in early detection of this condition. Treatment strategies include anthelmintics and supportive therapy. The current study reports the therapeutic management of *S. nasale* infection in a five year old non-descript buffalo.

CASE HISTORY AND OBSERVATIONS

A non-descript buffalo in its 2nd parity was presented at Veterinary Clinical Complex of the College, Proddatur (AP, India) with disabling ailments like dyspnoea, reduced body score, mucopurulent discharges from dual nasal airways (Fig. 1), sneezing and coughing since a month. Clinical examination revealed the vital parameters, *viz.*, Temperature 102 °F; Schirmer Tear Test (STT) >2 secs; conjunctival mucous

¹Department of Veterinary Parasitology, College of Veterinary Science, Proddatur-516434, Sri Venkateswara Veterinary University, Andhra Pradesh, India

²Department of Veterinary Clinical Complex, College of Veterinary Science, Proddatur-516434, Sri Venkateswara Veterinary University, Andhra Pradesh, India.

³Animal Husbandry Polytechnic, Banavasi-518323 Sri Venkateswara Veterinary University, Andhra Pradesh, India.

***Corresponding Authors:** Gnani Charitha V, Associate Professor & Head, Department of Veterinary Parasitology, College of Veterinary Science, Proddatur-516434, SVVU, Andhra Pradesh, India. Email: dr.charithagnani@gmail.com

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membrane was congested with pulse rate 52/min; and heart rate 76 bts/min. Auscultation of lungs revealed crackling sounds indicating respiratory distress. The examination of the nasal mucosa revealed a small granulomatous growth, approximately the size of a peanut, in both nostrils (Fig. 2), leading to partial obstruction of the nasal passages. Saline washings/scrapings of nasal mucosa were collected and processed by adding 6 mL of 10% KOH; boiled for 3 min for lysis of mucus; cooled and centrifuged at 960 g for 3 min and sediment containing eggs examined under low power microscope (Sumanth *et al.*, 2004) revealed boomerang/palanquin shaped eggs with terminal spine (Fig. 3) and fully developed miracidium (Fig. 4). On micrometry, eggs measured 365 x 75 µm in size. Based on morphological features given by the standard taxonomical keys of Soulsby (1982), it was identified to be of *S. nasale*. Similar, type of egg in buffaloes was documented by Sumanth *et al.* (2004), Ravindran and Kumar (2012) and Satbige *et al.* (2018).

TREATMENT AND DISCUSSION

On confirmation of nasal schistosomosis, the animal was treated with Inj. Anthiomaline @ 2.5 mg / kg b.wt., IM at weekly interval for three weeks. Positive response was

noticed after the first dose, with a noticeable reduction in the size of nasal granuloma, although respiratory distress with mucoid discharges was prevailing. Further, to address the distress Inj. Ceftiofur (Antibiotic) @ 1.1 mg/ kg b.wt., Inj. Deriphylin (Bronchodilator) @ 10 mg/kg b.wt., and Inj. Flunixin meglumin (NSAID) @ 2.2 mg/kg b.wt. were administered intramuscularly for 3 days. Moreover, reduction in the size of granulomatous lesions was recorded along with decrease in snoring sounds after second dose of therapy. Complete recovery (with clear nasal passages) was reported by the owner after administration of the third dose of Anthiomaline.

Nasal schistosomosis is a rare but serious parasitic infection caused by *Schistosoma* species, typically affecting the nasal and respiratory passages of animals such as buffaloes and cattle. Dendritic cells and macrophages recognize the antigens released by the eggs of *S. nasale* in nostrils and present them to CD4+ T helper cells, initiating a Th2-dominated response. This response is characterized by the production of cytokines such as IL-4, IL-5, and IL-13, which recruit eosinophils, mast cells, and other inflammatory cells to the site of infection. Eosinophils release toxic granules to combat the parasite, but their activity also damages surrounding tissues. Macrophages aggregate around the eggs, forming granulomas to encapsulate and isolate the antigens. Over time, fibroblasts are activated by cytokines like TGF- β , leading to collagen deposition and fibrosis (Schwart and Fallon, 2018). The granulomatous inflammation, while protective in containing the eggs, results in tissue thickening, obstruction, and chronic pathology in the nasal passages such as small pin head sized granulomas and congestion of nasal mucosa (Rajamohan and Peter, 1975). However, in

the present case pronounced clinical signs observed may possibly be attributed to various influencing factors like high parasitic load, host immune status, repeated exposures due to wallowing preferences that usually enhance contact with infective stage cercaria (Jayalakshmi and Sudha Rani, 2016), and stressors like poor nutrition, overcrowding, or suboptimal living conditions like poor hygiene in the farm and premises can compromise the buffalo's overall health and immune response, allowing the infection to progress unchecked. In addition, higher incidence of the infection in she-buffaloes could be attributed to lactation stress and immunosuppression due to prolactin hormone (Jayalakshmi and Sudha Rani, 2016) that supports the present case.

Anthiomaline has emerged as a drug of choice specifically for nasal schistosomosis due to its unique pharmacological properties and efficacy in treating parasitic infections localized to the nasal cavity (Roopali *et al.*, 2017). The drug action is through disruption of thiol metabolising and inhibition of adenosine triphosphate (ATP) synthesis of the parasite thus initiating paralysis of the schistosome's muscular system; disruption of nutrient absorption in the parasite and decreased ability of the worm to adhere to the nasal mucosa and other tissues (Qadri and Ganguly, 2016). Further, the drug has relatively quick onset of action in treating nasal schistosomosis, with significant improvement in symptoms, including nasal discharge and inflammation within a few days of treatment. However, the prolonged therapeutic regime (almost one month) in the study might be due to complication with secondary bacterial infection of animal due to prolonged inflammation of respiratory system that led to slow and progressive reduction in clinical signs and recovery.



Fig. 1: Clear mucopurulent discharges from nasal passages before therapy



Fig.2: Granulomatous growth in nasal passages

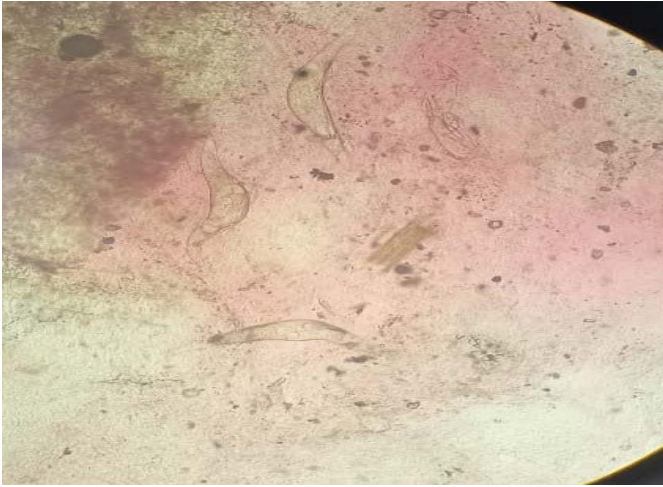


Fig. 3: Nasal washings subjected for 10% KOH processing; boomerang shaped *S. nasale* eggs



Fig. 4: Free escaped miracidium from the eggs of *S. nasale* in the nasal scrapings

On interaction with the owner, it was found that the main source of water for the animal was nearby pond extensively harbouring intermediate host (snails) and cercariae from *S. nasale*. Therefore, it is crucial to closely monitor snail population in such water sources that is necessary for effective disease control. Nasal schistosomosis in buffaloes, though a rare condition, it poses a significant health risk, particularly in areas where animals are exposed to contaminated water sources inhabited by *schistosome* larvae. Diagnosing this condition in buffaloes necessitates careful monitoring of clinical signs and parasitological testing to confirm the presence of schistosome eggs in nasal secretions. Treatment options, including Anthiomaline, have demonstrated effectiveness in managing the infection with its targeted action, offering relief by preventing further migration of *schistosome* larvae. However, it is essential to adopt a comprehensive approach that combines managing snail populations, avoiding grazing in areas infested with snails, improved water hygiene, deworming programs, effective pharmacological treatment, and preventive measures to reduce exposure to the disease (Soulsby, 1982) to mitigate the negative impact of nasal schistosomosis on livestock health, welfare, and productivity.

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