

HAEMATO-BIOCHEMICAL ALTERATION AND THERAPEUTIC MANAGEMENT OF *Psoroptes natalensis* MITE INFESTATION IN MURRAH BUFFALO

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ABSTRACT

Psoroptic mange caused by *Psoroptes natalensis* is contagious disease rapidly transmitted due to poor hygiene and improper animal husbandry practices facilitate the spread of Psoroptic mange in developing countries. The present study was performed on four Murrah buffaloes showing the characteristic skin lesions such as alopecia, copper color skin discoloration and epidermal thickening of different body parts. The skin scrapping was positive for *P. natalensis* and was treated with ivermectin (parenteral) and amitraz (topical) along with multi-vitamin and minerals as supportive. There was moderate increase in MCV while decrease in Hemoglobin, RBC count and total protein as a result of mite infestation indicating regenerative anaemia (Macrocytic hypochromic) and mild hypoproteinemia however serum aspartate amino transferase and alanine amino transferase level remained in normal range

in both pre and post therapy.

Keywords: *Bubalus bubalis*, buffaloes, *Psoroptes natalensis*, haemato-biochemical alteration, treatment

INTRODUCTION

India holds the world largest buffalo population of 109.85 million (Basic Animal Husbandry Statistics, 2019). The emerging ectoparasite, *Psoroptes natalensis* is an obligatory non-burrowing mite that causes dermatitis in buffaloes in the Indian subcontinent (Sreedevi *et al.*, 2010). Morphologically, the mite body is oval and dorso-ventrally flattened (Amer *et al.*, 2015). *P. natalensis* mites abrade the epidermis to feed superficially on skin cells, skin exudates and the lipid emulsion of the lymph (Rafferty and Gray, 1987). In addition, actively feeding mites

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can cause skin irritation, excessive lymph fluid discharge, and crust formation (Shang *et al.*, 2014). Psoroptic mange caused by *Psoroptes* mite is one of the main skins infestations causing significant economic losses due to lower milk production, weight loss and greater susceptibility to various illnesses in infected animals (Richard and Karin 2006; Pegler *et al.*, 2006). The lifetime of parasitic mites consists of three stages: eggs, nymphs, and adults with incomplete metamorphosis. According to Fentanew *et al.* (2015) mange mites are spending entire life on the host. Psoroptic mange are contagious and rapid transmission between sheds due to their adeptness to survive in environment for many days. Direct skin-to-skin contact is the most efficient form of transmission because mites spread by crawling from one animal to another. However, there is a chance for indirect transmission; when an animal scrapes its body against a hard surface out of irritation, the skin mites become loose and commomlly spread to another host (Taylor *et al.*, 2007; Fentanew *et al.*, 2015). Manage infestation is influenced by environmental factors and livestock management. There are discrepancies in the literature on the vulnerability of different host species, ages, and genders to mange infestations (Asmare *et al.*, 2016). The emerging and re-emerging of mange infestation in livestock reported worldwide (Chen *et al.*, 2014; Fraser *et al.*, 2016). The present study was conducted to evaluate clinical symptoms, diagnosis, hematolo-biochemical alterations and therapeutic management of *P. natalensis* in Murrah buffaloes.

MATERIALS AND METHODS

Area of sampling

The skin scrapping from four buffaloes were collected from village Alipur Morna, Hastanapur block, Meerut, 29.1341°North, 77.6601°East (Figure 1) during animal health camp organized by College of Veterinary and Animal Science, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut-250 110, Uttar Pradesh and the project funded by IFFCO.

Skin scrapping

Skin scrapping was collected from 4 different areas of affected Murrah buffaloes and treated with 10% potassium hydroxide (KOH) and boiled for 3 minutes. The sediment was examined under microscope, and mites were identified on the bases of morphological characteristic as suggested by Griffiths *et al.*, 1990; Bochkov *et al.*, 2010, 2014.

Blood sample

The blood sample was collected from jugular veins in two aliquots. Five ml blood sample was collected in EDTA vial for haematology while second aliquot was collected in heparinised tube from which serum was separated for biochemical parameters such as serum aspartate amino transferase (AST) and alanine amino transferase (ALT), total protein (TP), albumin and globulin.

Clinical observation

The skin lesions were distributed all over the body in form of alopecia, epidermal thickening and cupper color skin, dry exudative crust around fetlock and pes of both four limbs, face, eyelids, ears and poll.

Treatment

The buffalo was treated with ivermectin 200 µg/kg (Hitak, Virbac Animal Health) body weight subcutaneously once a week consecutive

three weeks, vitamin E and selenium injection 10 ml intramuscular (Vita E selenium, Bioveta), mineral mixture 100 grams daily for 15 days (agrimin chelated, Virbac Animal Health) and Amitraz 2 ml/liter for topical application (Vitrax, Virbac Animal Health).

Statistical analysis

Hematological parameters of buffalo infected with *P. natalensis* for both pre and post therapy were taken and the data were analyzed statistically by SPSS V.20 using paired *t*-tests. $P \leq 0.05$ was considered as statically significant (Snedecor and Cochran, 1994).

RESULT AND DISCUSSION

Current report shows characteristic skin lesions including alopecia, thickened and copper color skin, on different parts of body of Murrah buffalo (Figure 2). Similarly, Sreedevi *et al.* (2010); Mahajan *et al.*, 2013; 2017 reported severe skin lesions all over the body in the form of alopecia, thicker skin, and dry exudative crusts on the upper neck, face, upper eyelids, poll, and ears in *P. natalensis* infestation. Microscopically, skin scrapping was found positive for mites and morphologically identified as *P. natalensis* (Figure 3) (Griffiths *et al.*, 1990; Bochkov *et al.*, 2010; 2014). Amir *et al.* (2015) also reported similar morphological characters. In the present study, subcutaneous administration of ivermectin along with topical application of amitraz showed a good response and clinical recovery within 3 weeks. Similar therapeutic results using long-acting ivermectin (parenterally) against Psoroptic mange were reported by Gill *et al.*, 1989; Lifschitz *et al.*, 2007; Mahajan *et al.*, 2013; Hamel *et al.*, 2015;

Deepak *et al.*, 2020.

In terms of various clinic-pathological parameters, moderate increase in MCV while decrease in Hemoglobin and RBC count because of mite infestation indicating regenerative anaemia (Macrocytic hypochromic). There was no significant change in hemoglobin, PCV, total erythrocytes count, total leucocyte count, MCV, MCH and MCHC between pre and post therapy (Table 1). Mahajan *et al.*, 2017 reported significant change of neutrophil, TLC and lymphocyte count and no change in hemoglobin, PCV and TEC before and after treatment of *P. natalensis* infestation in water buffalo. The hematological alterations before therapy showed regenerative anaemia while the protein estimation revealed mild hypoproteinemia with non-significant alteration in serum albumin and globulin level while AST and ALT remained in normal range in both pre and post treated animals indicating the parasite was not detrimental to hepatic tissue (Table 1).

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Table 1. Haemato-biochemical parameters of buffalo infected with *P. natalensis* before and after treatment.

Parameter	Before treatment	After treatment
Hemoglobin (gm/dl)	8.54±0.58	10.23±0.69 ^{NS}
Total erythrocytes count ($\times 10^6 \mu\text{l}$)	4.51±0.83	5.01±0.93 ^{NS}
Packed cell volume (%)	27.28±1.21	28.96±1.35 ^{NS}
Total leukocyte count ($\times 10^6 \mu\text{l}$)	13.75±1.45	10.59±1.09 ^{NS}
Neutrophil (%)	37.21±1.33	30.56±1.07 ^{NS}
Lymphocyte (%)	56.25±1.22	68.45±1.31 ^{NS}
Monocyte (%)	2±0.45	1.07±0.25 ^{NS}
Eosinophil (%)	5±0.50	1.21±0.10 ^{NS}
MCV (μ^3)	60.49±0.35	57.80±0.30 ^{NS}
MCH ($\mu\mu\text{g}$)	18.94±0.20	20.42±0.65 ^{NS}
MCHC (%)	31.31±0.10	35.32±0.21 ^{NS}
Total protein (gm/dl)	4.96±0.30	5.27±0.65 ^{NS}
Albumin (gm/dl)	2.89±0.25	3.67±0.45 ^{NS}
Globulin (gm/dl)	2.7±0.21	2.01±0.50 ^{NS}
A:G ratio	1.14±0.41	1.69±0.33 ^{NS}
SGPT/ ALT (IU/L)	41.10±1.25	41.12±1.02 ^{NS}
SGOT/ AST (IU/L)	65.11±2.37	60.14±1.38 ^{NS}

*Differ significantly ($P \leq 0.05$); NS: Non significant.



Figure 1. Map of sample collection area, indicating the location of village Alipur Morna, Hastinapur Block, Meerut, Uttar Pradesh, 29.1341°North, 77.6601°East.



Figure 2. Clinical sign of *Psoroptes natalensis* in Murrah buffalo (a) Hoof (b) Head region.

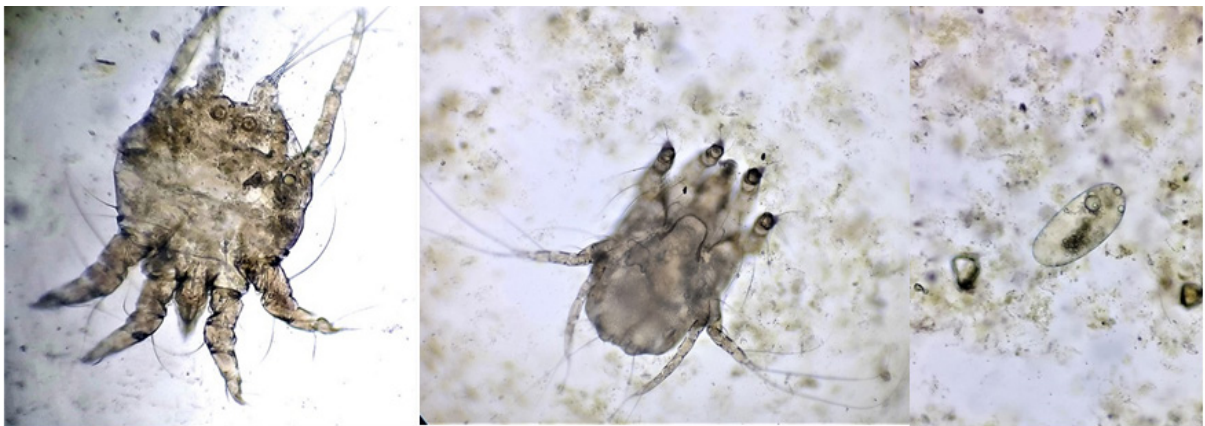


Figure 3. Skin scraping examination under 10X magnification (a) *P. natalensis* male ventral view (b) *P. natalensis* female ventral view (c) Egg of *P. natalensis*.

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