



ISSN (E): 2277-7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2022; SP-11(10): 958-960  
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[www.thepharmajournal.com](http://www.thepharmajournal.com)

Received: 02-08-2022

Accepted: 07-09-2022

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## A study on hematobiochemical alterations in cattle affected with lumpy skin disease in and around Bidar

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### Abstract

28 cattle showing clinical signs such as decreased feed intake, fever, nodular skin lesions, oedema of limbs and brisket region, enlargement of prescapular and prefemoral lymph nodes and lymphatic tracts, lacrimation and nasal discharge were clinically examined thoroughly, increase in the rectal temperature and respiratory rate were evident. Complete blood count revealed leucocytopenia and anemia. Significant increase in the levels of ALT, AST, ALP, TP, creatinine and significant decrease in the levels of albumin, glucose and calcium were the important findings of serum biochemistry.

**Keywords:** Lumpy skin disease, lymph nodes, leucocytopenia and anemia

### Introduction

Lumpy skin disease (LSD) is an infectious, non-zoonotic, vector borne viral disease with narrow host range restricted to ruminants (i.e., cattle and Buffaloes), caused by Lumpy skin disease virus (LSDV) of Capripoxvirus genus, subfamily Chordopoxvirinae, family Poxviridae (Gupta *et al.*, 2020) [5]. The disease is characterized by high morbidity and low mortality (Abutarbush *et al.* 2015) [1]. Mainly transmitted mechanically by biting insects like flies (*Stomoxys calcitrans* and *Biomyia fasciata*), mosquitoes (*Culex mirificens* and *Aedes nutritionus*) (Gupta *et al.*, 2020) [5] and ticks of *Amblyomma* spp., *Rhipicephalus* ssp., are reported for the transmission of LSDV (Tuppurainen *et al.* 2013) [11]. Clinical signs in cattle affected with LSDV includes fever, ocular discharge, decreased milk production, enlargement of lymph node, raised nodules on skin of the muzzle, nares, back, legs, scrotum, perineum and eyelids (Salib and Osman 2011; Gupta *et al.*, 2020) [9, 5]. It is the disease of high economic importance causing losses in terms of severe emaciation, hide damage, infertility animals, mastitis, drop in milk production and abortions (Tuppurainen and Oura 2012) [12], reduction in quality of meat and hide of animals, cost of treatment of disease and vaccinations (Gupta *et al.*, 2020) [5]. The disease can be tentatively diagnosed based on clinical signs and definitive diagnosis can be arrived by virus isolation and identification, histopathology of the affected skin and molecular diagnosis by PCR (Bowden *et al.* 2008) [3].

### Materials and Methods

The study was conducted on 28 animals presented to department of veterinary clinical complex veterinary college Bidar- KVAFSU, age ranging from 5 to 6 years and 6 apparently healthy cattle were selected for determining the reference values, animals showing clinical signs like presence of nodular skin lesions, fever, enlargement of lymph nodes and lymphatic tracts, swelling of limbs, oedema of brisket region, lachrymation, ulcerative lesions on the mucous membranes of eye or oral or nasal cavity were selected for detailed clinical examination and parameters like temperature and respiratory rate were recorded. 2ml of blood was collected in EDTA vial and complete blood count was carried out using fully automated haematology analyser (ERMA PCE 210® by AGD biomedical private limited, Chennai-India) and 4ml of blood was collected in clot activated vial and serum parameters like ALT, AST, ALP, TP, albumin, calcium, glucose and creatinine was estimated using commercially available kits (ERBA Mannheim®) in semi-automated biochemical analyser (MICROLAB-300®, Eli Tech Group).

All the data obtained were statistically analysed as described by Snedecor and Cochran (1994) [10]. The data were analysed by student t-test using SPSS software 20.0 (SPSS Inc. Chicago, IL,

USA). Difference at  $p \leq 0.05$  was considered statistically significant.

**Results**

Clinical signs in Lumpy skin affected cattle were nodular lesions on the skin, fever, oedema of limbs, oedema of brisket region, enlargement of lymph nodes and lymphatic tracts and lacrimation (Figure 1 and 2).

The rectal temperature and respiratory rate were significantly increased in cattle affected with lumpy skin disease when compared to healthy cattle (Table 1).

Significant decrease in leucocytes, RBCs and haemoglobin were the findings on haematological examination of cattle affected with LSD were as the packed cell volume, platelet count, neutrophil, lymphocyte and monocyte counts did not vary significantly compared to healthy cattle (Table 2).

The levels of ALT, AST, ALP, TP and creatinine were significantly increased in LSD affected cattle compared to healthy ones, further there was significant decrease in the levels of albumin, calcium and glucose in cattle suffering of

LSD when compared to healthy control (Table 3).

**Table 1:** Mean±SE values of vital parameters in healthy and LSD affected cattle

Parameter	Healthy cattle	LSD affected cattle
Temperature (°F)	100.15±0.84 <sup>a</sup>	102.51±0.25 <sup>b</sup>
Respiratory rate (breaths/min)	15.0±0.85 <sup>a</sup>	23.71±1.06 <sup>b</sup>

**Table 2:** Mean±SE values of haematological parameters in healthy and LSD affected cattle

Parameters	Healthy control	LSD affected
TLC (10 <sup>3</sup> /μL)	9.06±0.84 <sup>a</sup>	6.49±0.38 <sup>b</sup>
RBC (million/μL)	7.31±0.87 <sup>a</sup>	5.62±0.19 <sup>b</sup>
Hb (g/dL)	9.03±0.18 <sup>a</sup>	6.93±0.14 <sup>b</sup>
PCV (%)	36.70±4.65 <sup>a</sup>	31.20±1.15 <sup>a</sup>
PLT (x10 <sup>3</sup> /μL)	136.50±30.45 <sup>a</sup>	146.53±8.75 <sup>a</sup>
Neutrophil's (%)	39.33±1.80 <sup>a</sup>	42.17±1.78 <sup>a</sup>
Lymphocyte's (%)	60.00±1.73 <sup>a</sup>	57.07±1.78 <sup>a</sup>
Monocyte's (%)	0.66±0.33 <sup>a</sup>	0.39±0.13 <sup>a</sup>

**Table 3:** Mean±SE values of biochemical parameters in healthy and LSD affected cattle

Parameters	Healthy control	LSD affected
ALT (U/L)	30.58±1.52 <sup>a</sup>	37.62±1.43 <sup>b</sup>
AST (U/L)	46.35±4.46 <sup>a</sup>	80.81±6.28 <sup>b</sup>
ALP (U/L)	47.83±12.70 <sup>a</sup>	212.33±30.98 <sup>b</sup>
TP (g/dL)	9.36±0.81 <sup>a</sup>	11.01±0.22 <sup>b</sup>
Albumin (g/dL)	3.85±0.40 <sup>a</sup>	2.78±0.88 <sup>b</sup>
Calcium (mg/dL)	10.10±0.67 <sup>a</sup>	8.59±0.27 <sup>a</sup>
Glucose (mg/dL)	64.90±1.61 <sup>a</sup>	44.77±4.11 <sup>b</sup>
Creatinine (mg/dL)	0.93±0.05 <sup>a</sup>	2.035±0.11 <sup>b</sup>

**Note:** Mean±SE values bearing different superscript differ significantly at ( $p \leq 0.05$ ).



**Fig 1:** Presence of lumps on the body of bullock affected with LSD



**Fig 2:** Brisket oedema in bullock affected with LSD

**Discussion**

Clinical signs in cattle affected were mainly presence of nodular skin lesions, fever, lacrimation, enlargement of superficial lymph nodes and lymphatic tracts, limb oedema similar findings were recorded by (Salib and Osman 2011: Gupta *et al.*, 2020) [9, 5]. Lumpy skin disease is one of economic importance disease loses due to expenses in treatment, decreased production and permanent damage to hide of the animals affecting foreign trade.

Increase in the rectal temperature and respiratory rate was recorded in affected group similar findings were recorded by Neamat-Allah (2015) [8], Al-saad and Al-saad (2020) [2] the increased temperature might be due release of endogenous pyrogens due to presence of virus in the body and the increased respiratory rate could be due to acute phase of disease.

Haematological studies revealed leucocytopenia this was in agreement with El-Mandrawy and Alam, (2018) [4], Al-saad and Al-saad (2020) [2], this could be due to acute phase of disease. There was significant decrease in erythrocyte count and haemoglobin indicating anaemia these findings were in accordance with Neamat-Allah and Mahmoud, (2019) [7], this could be due to oxidative stress.

Serum biochemistry revealed significant increase in the activity of AST, ALT and ALP similar results were recorded by El-Mandrawy and Alam, (2018) [4], Helal *et al.* (2019) [6], this could be due to impaired hepatic function as a consequence of hepatic damage. Significant increase in the concentration of total protein was recorded in this study this is in accordance with Neamat-Allah (2015) [8], El-Mandrawy and Alam, (2018) [4], this could be due to activation of

immune response of the host following infection. Hypoalbuminaemia recorded in this study similar findings were recorded by Neamat-Allah (2015) <sup>[8]</sup>, El-Mandrawy and Alam, (2018) <sup>[4]</sup>, this might be due to hepatic dysfunction. There was significant decrease in the serum concentration of calcium this was in concurrent with Helal *et al.* (2019) <sup>[6]</sup> off food and impairment of renal infiltration. Significant decrease in the level glucose indicating hypoglycaemia was found in this study this was in accordance with El-Mandrawy and Alam, (2018) <sup>[4]</sup>, this might be due to anorexia and subsequent hepatic damage. The concentration of serum creatinine was significantly increased in cattle affected with lumpy skin disease similar findings were recorded by El-Mandrawy and Alam, (2018) <sup>[4]</sup>, Neamat-Allah and Mahmoud (2019) <sup>[7]</sup>, this might be due to effect of virus on kidney leading to renal impairment.

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