

## Research Article

# Serum Biochemical and Haematological Changes in Sheep with Onion Toxicity

B Sudhakara Reddy<sup>1\*</sup>, S Sivajothi<sup>2</sup> and Y V Pridhvidhar Reddy<sup>3</sup>

<sup>1</sup>Faculty of Veterinary Medicine, Department of Veterinary Clinical Complex

<sup>2</sup>Faculty of Veterinary Parasitology, Department of Veterinary Parasitology

<sup>3</sup>Faculty of Veterinary Obstetrics and Gynaecology, Department of Veterinary Clinical Complex

College of Veterinary Science, Proddatur – 516 360, Sri Venkateswara Veterinary University, Andhra Pradesh, India

## Abstract

Present communication reports the serum biochemical and haematological changes in sheep with onion toxicity. Mortality of the kids was reported in a sheep flock with signs of staggering gait and passing of brown colour urine. Representative peripheral blood smears, whole blood and serum were collected for the laboratory analysis. Study findings reported that, increased total leukocyte count, aspartate aminotransferase, creatinine and bilirubin levels. Haemoglobin concentration, percentage of packed cell volume, total erythrocyte count and serum albumin levels were reduced than the reference range in sheep. During onion toxicity, developed anemia and changes in the liver parenchyma play a major role in the mortality of the sheep.

**Keywords:** Sheep, onion toxicity, bilirubin, albumin, haemoglobin

## \*Correspondence

Author: B Sudhakara Reddy

Email: bhavanamvet@gmail.com

## Introduction

Small ruminants have a long and useful productivity by their live body weight, production of kids. Most of the sheep are resistant to the diseases and parasites. But, environmental stress, immunity and the parasitic load of the individual sheep play an important role in mortality [1]. Different clinical conditions which include external and internal parasitic disease increase the economic loss in sheep industry [2]. Among the domestic animals, cattle & cats are the most susceptible and sheep & goats are being the most resistant to the onion toxicity. Due to ingestion of the leaves, dried products, waste products of onions leads to oxidative injury to the red blood cell membrane [3]. The literature on the laboratory findings during the onion toxicity in domestic animals was not reported in India [4]. Hence, the present study was undertaken to determine the serum biochemical changes and haematological findings in sheep with onion toxicity in the YSR Kadapa district of Andhra Pradesh, India.

## Materials and Methods

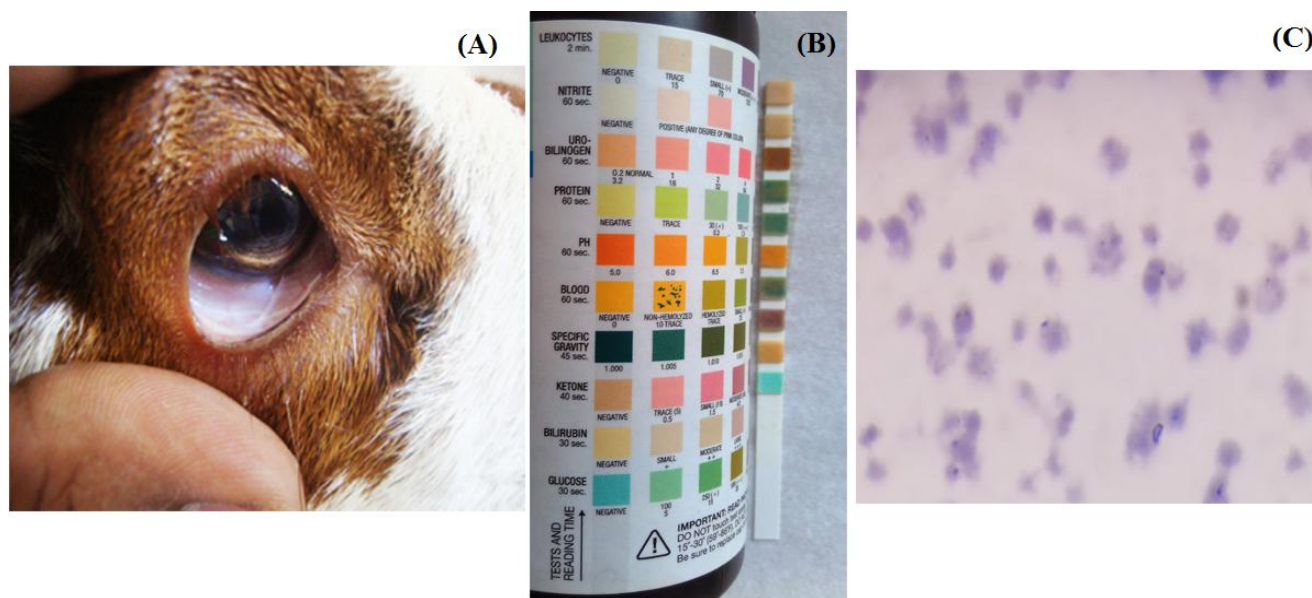
The present study was conducted in YSR Kadapa district of Andhra Pradesh in 2016. Two sheep were reported to have died with the signs of haemoglobinuria. Other sheep in the flock were showing the signs of anorexia, tachycardia, tachypnoea, staggering gait, pale yellowish mucus membranes and haemoglobinuria (**Figure 1A**). Upon complete anamnesis, sheep used to go for grazing on onion leaves daily for the past one month. From the representative flock, six sheep were selected for the present study and peripheral blood smears, whole blood, serum and urine were collected for laboratory analysis. Five millilitres of venous blood was collected in vacutainer tubes containing ethylenediaminetetraacetate (EDTA K<sub>3</sub>) as an anticoagulant for haematological investigation. For serum collection, blood was collected in vacutainer tubes without anticoagulant taking all precautions to avoid haemolysis. Serum biochemical parameters studied were total protein, serum albumin, aspartate aminotransferase, creatinine and bilirubin by using Span Diagnostics Ltd. Kits. Urine was examined with help of commercial urine analysis strips [5]. Obtained biochemical findings were compared with the standard reference range [6].

## Results and Discussion

Based on the anamnesis the condition was tentatively diagnosed as onion toxicity and treated with injections containing multivitamin, phosphorous and iron, oral liver tonics and discontinuation of the feeding on the onion leaves was advised. By the sixth day of therapy, uneventful recovery was noticed in the activity of sheep and further no mortality was recorded. Recorded serum-biochemical and haematological findings were mentioned in **Table 1**.

Urine analysis revealed positive for urobilinogen, protein, ketone bodies with alkaline pH (Figure 1B). Reduction in the level of haemoglobin, red blood cell count levels and packed cell volume were in association with the previous reports [7]. During onion toxicity, the formation of the Heinz bodies was noticed in erythrocytes due to the haemolysis of the red blood cells. Reticuloendothelial system, removes the formatted Heinz bodies from the circulation which further leads to anaemia [6, 8]. The sensitivity of deferent animals to onion intoxication depends on the amounts of the erythrocytic pentose phosphate pathway limiting enzyme, glucose 6 phosphate dehydrogenase [9]. Confirmation of the onion toxicities was done based on the history of ingestion of onion leaves, the presence of the Heinz body in the erythrocytes, absence of the haemoprotozoans in the blood smears and response to the therapy after discontinuation of the onion leaves feeding [10] (Figure 1C).

In conclusion, present study puts a record of onion toxicity is one of the differential diagnosis in sheep which showing the signs of passing brown colour urine. In the feed ration, if onion component is more than 25% dry matter will lead to the clinical onion toxicity. It is advised that whenever, onion leaves are considered for feeding ration, it needs to maintain the below toxic dose.



**Figure 1** (A) Sheep with pale mucus membranes, (B) Urine analysis with strips, (C) Presence of the Heinz bodies in blood smears examination (1000X)

**Table 1** Serum biochemical and haematological changes in sheep with onion toxicity

S.No	Parameters	Sheep with Onion toxicity (n=6)	Normal range in sheep [6]
1	Total protein (g/dL)	5.82 ± 0.81	6.0 – 7.9
2	Serum albumin (g/dL)	1.66 ± 0.22	2.4 – 3.0
3	Aspartate aminotransferase (AST) (units/L)	486.6 ± 32.7	60 – 280
4	Total bilirubin (mg/dL)	2.8 ± 0.33	0.1- 0.5
5	Creatinine (mg/dL)	2.2 ± 0.16	1.2 - 1.9
6	Hb (g/dl)	7.22 ± 0.62	9.0 - 15. 0
7	PCV (%)	22.88 ± 3.04	27 - 45
8	TEC x10 <sup>6</sup> /cumm	5.82 ± 0.21	9.0 - 15.0
9	TLC /cumm	13820.4 ± 97.55	4,000 - 12,000

## Acknowledgements

The authors acknowledge the authorities of Sri Venkateswara Veterinary University, Tirupati for providing facilities to carry out this research.

## References

- [1] Sivajothi, S., Reddy, B. S. (2017). Therapeutic efficacy of closantel against different gastrointestinal parasites in sheep. *Arch Parasitol* 1: 111.
- [2] Sivajothi, S., Reddy, B.S., Reddy, T.N. (2016). Therapeutic management of rhinitis and nasal myiasis in sheep, *Intas Polivet* (2016) Vol. 17 (II): 531-532
- [3] Van Der Kolk, J.H. (2000). Onion poisoning in a herd of dairy cattle. *Vet Rec*, 147:517–518
- [4] Aslani, M.R., Mohri, M., Movassaghi, A. R. (2005). Heinz body anaemia associated with onion (*Allium cepa*) toxicosis in a flock of sheep. *Comp Clin Path*, 14: 118–120. DOI 10.1007/s00580-005-0563-5.
- [5] Reddy, B.S., Sivajothi, S., Praveena, G., Venkatasivakumar, R. (2014). Therapeutic management of postparturient haemoglobinuria in a buffalo. *Intas Polivet*, 15 (II): 526-527.
- [6] Radostits, O.M., Gay, C.C., Hinchellff, K,W. and Constable, P.D. (2007). In *Veterinary Medicine. A Textbook of the Diseases of Cattle, Horses, Sheep, Pigs and Goats*. Vol 2. 10th edn. Elsevier.
- [7] Kirk, J.H., Buugin, M.S. (1979). Effects of feeding cull onions (*Allium cepa*) to sheep. *Am J Vet Res*, 40:397–399
- [8] Sivajothi, S., Rayulu, V.C., Reddy, B.S. (2015). Haematological and biochemical changes in experimental *Trypanosoma evansi* infection in rabbits. *J Parasit Dis*, 39:216-220. DOI 10.1007/s12639-013-0321-6.
- [9] Kramer, J.W. (2000). Normal hematology of cattle, sheep and goats. In: Fedman BF, Zinkl JG, Jain NC (eds) *Schalm's veterinaryhematology*, 5th edn. Williams & Wilkins, Philadelphia
- [10] Reddy, B.S., Sivajothi, S., Reddy, L.S.S.V.P., Raju, K.G.S. (2016). Clinical and laboratory findings of *Babesia* infection in dogs. *J Parasit Dis*, 40 (2):268-272. doi: 10.1007/s12639-014-0491-x.

© 2017, by the Authors. The articles published from this journal are distributed to the public under “**Creative Commons Attribution License**” (<http://creativecommons.org/licenses/by/3.0/>). Therefore, upon proper citation of the original work, all the articles can be used without any restriction or can be distributed in any medium in any form.

### Publication History

Received 16<sup>th</sup> Nov 2017  
Revised 04<sup>th</sup> Dec 2017  
Accepted 10<sup>th</sup> Dec 2017  
Online 30<sup>th</sup> Dec 2017