

## EVALUATION OF SERUM TOTAL PROTEIN, ALBUMIN, GLOBULIN, BUN AND CREATININE LEVEL IN SHEEP IN VARIOUS RENAL AFFECTIONS

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### SUMMARY

The present study was designed to evaluate the serum total protein, albumin, globulin, BUN and creatinine levels in sheep (*Ovis aries*) in various renal lesions. Study was conducted on 62 serum samples (10 serum samples collected from healthy sheep as control group and 52 serum samples collected from affected sheep that were showing various renal lesions) in and around Bikaner district. Blood urea nitrogen (BUN) and creatinine was found to be increased significantly ( $p < 0.01$ ) in case of affected animals showing various renal lesions in comparison with control group of animals.

**Keywords:** Albumin, Blood urea nitrogen (BUN), Creatinine, Globulin, Sheep, Total protein

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Sheep with its diversified utility for wool, meat, milk, skin and manure setup an important component of rural economy particularly in the arid, semi-arid and hilly areas. It provides support to the shepherds through sale of wool and animals. They play an important role in the livelihood of a large percentage of small and marginal farmers and landless labourers engaged in sheep rearing. The kidneys work for essential functions, such as filtration, excretion of metabolic waste products from the bloodstream, regulation of necessary electrolytes and stimulation of erythropoiesis. It also maintains blood pressure by the use of a renin-angiotensin-aldosterone system, controlling reabsorption of water and regulating the correct pH level as well as chemical balance and intravascular fluid status of the body (Maurya *et al.*, 2018). Biochemical evaluation of kidneys is of importance in diagnosis and monitoring of renal diseases. The markers of renal function test assess the normal functioning of kidneys. They indicate the glomerular filtration rate, concentrating and diluting capacity of kidneys (tubular function). If there is an increase or decrease in the values of these markers it indicates dysfunction of kidney the ideal markers most commonly estimated are-creatinine and blood urea nitrogen. Creatinine is the most widely available and commonly used biomarker of renal function. Creatinine is waste product formed by muscles after breakdown of creatinine. Urea commonly referred to as blood urea nitrogen (BUN) when measured in the blood, is a product of protein metabolism.

In the present study, blood samples were collected from sheep to evaluate blood urea nitrogen and creatinine

with other biochemical markers at Bikaner district and adjoining areas. Blood samples were collected from the jugular vein of sheep before slaughter at the slaughterhouse in a vacutainer without anticoagulant. Being confirmed after the slaughter of animal based on lesion, the collected blood was taken or discarded. Serum was separated from blood by making the blood slant and incubated at 37° C for 1 hr. Blood clots were broken and tubes were centrifuged at 2500 rpm for 30 minutes. Serum was separated into a small pyrex tube. The centrifuged serum was preserved in deep freezing at -20° C for further biochemical analysis for total protein, albumin, globulin, BUN and creatinine by IDEXX kit method. The data obtained from both apparently healthy and diseased sheep were analysed by using appropriate statistical method student's t-test using the SPSS software version-26.

### Total serum protein

The analysis of variance revealed that decrease in mean values of total serum protein was significant ( $p < 0.01$ ) from  $6.57 \pm 0.0715$  g/dl in non-infected animals to  $5.9019 \pm 0.0684$  g/dl in case of affected animal. Relevant non-significant decrease of serum total protein in case of kidney affection was also found by (Batavani *et al.*, 2006; Mehra, 2019). The glomerulus is a semipermeable filter that allows passage of water and low molecular weight solutes but restrict passage of high molecular weight substances such as plasma proteins. In the absence of disease, the rate of filtration through glomeruli is relatively constant. The epithelium of tubules actively and selectively reabsorbs substances from glomerular filtrate while permitting the excretion of waste products. Different

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affections of kidney because of renal cause include glomerulonephritis, interstitial nephritis, pyelonephritis and amyloidosis etc. affect glomerular filtration by producing damage to glomerular epithelium which destroy its selective permeability and permits passage of plasma proteins into the glomerular filtrate. This leads to proteinuria, that causes low level of protein in blood.

### Albumin

The analysis of variance revealed that decrease in mean values of serum albumin was significant ( $p < 0.01$ ) from  $2.96 \pm 0.04$  g/dl in non-infected animals to  $2.6134 \pm 0.0386$  g/dl in case of affected animals. Significant decrease of serum albumin in case of kidney affection was also found by (Batavani *et al.*, 2006; Mehra, 2019). Renal damage particularly in the glomerular epithelium affects its selective permeability and permits the passage of plasma protein into the glomerular filtrate. The predominant protein is initially albumin, because of its negative charge and a low molecular weight than globulins; with advanced glomerulonephritis, all plasma protein are lost.

### Globulin

The analysis of variance revealed that decrease in mean values of serum globulin was non-significant ( $p < 0.05$ ) from  $3.61 \pm 0.0809$  g/dl in non-infected animals to  $3.2884 \pm 0.0582$  g/dl in case of affected animals. Same findings were also reported by (Batavani *et al.*, 2006; Mehra, 2019).

### A/G Ratio

The analysis of variance revealed that decrease in mean values of A/G ratio was non-significant ( $p < 0.05$ ) from  $0.824 \pm 0.0255$  in non-infected animals to  $0.849 \pm 0.014$  in case of affected animals. The findings of the present study were matched with the findings of (Mehra, 2019). Low A/G ratio might be sign of kidney damage of autoimmune origin, inflammatory conditions, tumor, chronic inflammatory conditions such as CKD (chronic kidney disease).

### BUN (Blood Urea Nitrogen) (mg/dl)

Analysis of variance revealed that increase in mean values of serum BUN was highly significant ( $p < 0.001$ ) from  $18.39 \pm 0.7783$  mg/dl in non-infected animals to  $27.0019 \pm 0.1888$  mg/dl in case of affected animals, having similarity with the findings of Mehra (2019) and Veena *et al.* (2020). Decreased glomerular filtration results in retention of metabolic waste products such as urea and creatinine. Although marked increase in serum urea concentration probably not responsible for the production of clinical

**Table 1. Showing biochemical parameters in sheep in cases of renal affection**

S. No.	Blood Parameters	Healthy animals (n=10)	Affected Animals (n=52)	Significance
1.	Total Protein (g/dl)	$6.57 \pm 0.0715$	$5.9019 \pm 0.0684$	*
2.	Albumin (g/dl)	$2.96 \pm 0.04$	$2.6134 \pm 0.0386$	*
3.	Globulin (g/dl)	$3.61 \pm 0.0809$	$3.2884 \pm 0.0582$	N.S
4.	A/G Ratio	$0.824 \pm 0.0255$	$0.849 \pm 0.014$	N.S
5.	BUN (mg/dl)	$18.39 \pm 0.7783$	$27.0019 \pm 0.1888$	**
6.	Creatinine (mg/dl)	$0.694 \pm 0.01384$	$1.6876 \pm 0.0130$	**

\*\* $p < 0.01$  (Highly significant), \* $p < 0.05$  (Significant), N.S.- Non-Significant

signs, because urea readily crosses cell membranes. Urea clearance is a poor indicator of glomerular filtration rate as its overproduction rate depends on several non renal factors, including diet and urea cycle enzymes. Increased blood urea nitrogen (BUN) is seen associated with kidney disease or failure, blockage of the urinary tract by a kidney stone, congestive heart failure, dehydration, fever, shock and bleeding in the digestive tract.

### Creatinine (mg/dl)

The analysis of variance revealed that increase in mean values of serum creatinine was highly significant ( $p < 0.001$ ) from  $0.694 \pm 0.01384$  mg/dl in non-infected animals to  $1.6876 \pm 0.0130$  mg/dl in case of affected animals. Najafzadeh *et al.* (2013) and Langenberg *et al.* (2014) were also reported significant increased values of creatinine having similarity with the findings of present study. Creatinine, excreted almost entirely by the kidney. Creatine originates from breakdown of creatinine phosphate in muscle, and it is useful marker of glomerular filtration rate. Renal failure results in impaired renal excretory and homeostatic functions giving increased level of creatinine. Reduction in GFR by half results in doubling of serum creatinine, this relationship was hyperbolic (Pressler, 2013).

### CONCLUSION

In this study total Protein and albumin values were found to be decrease significantly ( $p < 0.001$ ) in case of affected animals Whereas globulin and A/G Ratio found to be decrease non-significantly. Values of blood urea nitrogen (BUN) and Creatinine in this study was found to be increased highly significant ( $p < 0.01$ ) in affected animals.

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## REFERENCES

- Batavani, R.A., Ansari, M.H. and Asri, S. (2006). Concentrations of serum total protein and protein fractions during diestrus and pregnancy in Makuiiewes. *Comp. Clin. Pathol.* **15(4)**: 227-230.
- Langenberg, C., Gobe, G., Hood, S., May, C.N. and Bellomo, R. (2014). Renal histopathology during experimental septic acute kidney injury and recovery. *Crit. Care Med.* **42(1)**: 58-67.
- Murthy, H., Kumar, T. and Kumar, S. (2018). Anatomical and physiological similarities of kidney in different experimental animals used for basic studies. *J. Clin. Exp. Nephrol.* **3(9)**: 9. doi: 10.21767/2472-5056.100060.
- Mehra, M. (2019). Pathomorphological and hematobiochemical analysis in urinary system of camel (*Camelus dromedarius*). Ph.D. thesis submitted to Rajasthan University of Veterinary and Animal Sciences, Bikaner, Rajasthan, India.
- Najafzadeh, H., Ghoreishi, S.M., Mohammadian, B., Rahimi, E., Afzalzadeh, M.R., Kazemivarnamkhasti, M. and Ganjealidarani, H. (2013). Serum biochemical and histopathological changes in liver and kidney in lambs after zinc oxide nanoparticles administration. *Vet. World.* **6(8)**: 534-537.
- Pressler, B.M. (2013). Clinical approach to advanced renal function testing in dogs and cats. *Vet. Clin. North Am. Small Anim. Pract.* **43(6)**: 193-208.
- Veena, M.P., Nagarajan, K., Vairamuthu, S., Subapriya, S., Dhanalaksmi, H., Kalmath, G.P., Shwetha, H.S. and Megaha, K. (2020). Evaluation of serum biochemical profile of kidney disorders in canine. *Int. J. Curr. Micro. App. Sci.* **9**:700-705.

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