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Gunjan
 Department of Veterinary
 Pathology, Rajasthan
 University of Veterinary and
 Animal Sciences, Bikaner,
 Rajasthan, India

Tripti Gurjar
 Department of Veterinary
 Pathology, Rajasthan
 University of Veterinary and
 Animal Sciences, Bikaner,
 Rajasthan, India

Goverdhan Singh
 Department of Veterinary
 Pathology, Rajasthan
 University of Veterinary and
 Animal Sciences, Bikaner,
 Rajasthan, India

Rohitash Dadhich
 Department of Veterinary
 Pathology, Rajasthan
 University of Veterinary and
 Animal Sciences, Bikaner,
 Rajasthan, India

Corresponding Author:
Gunjan
 Department of Veterinary
 Pathology, Rajasthan
 University of Veterinary and
 Animal Sciences, Bikaner,
 Rajasthan, India

Nephrosis in sheep: A study in the southern region of Rajasthan

Gunjan, Tripti Gurjar, Goverdhan Singh and Rohitash Dadhich

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Abstract

This study scrutinized between January and December 2017, 1075 sheep samples, disregarding age groups, sex, and breeds. Among these, 157 samples with noticeable gross lesions in the kidneys underwent subsequent histopathological examination. The histopathologic analysis revealed occurrences of Cloudy Swelling, Hydropic Degeneration, Amyloidosis, Hemoglobinuric Nephrosis, and Coagulative Necrosis at rates of 10.2%, 2.54%, 5.1%, 3.82%, and 3.18%, respectively.

Keywords: Histopathologic examination, cloudy swelling, amyloidosis, nephrosis

1. Introduction

In India, a substantial 70 percent of rural households are engaged in livestock ownership, and a predominant share of these households falls within the category of small, marginal, and landless. Among the various livestock options, small animals such as sheep and goats are particularly favoured by economically challenged households with limited land resources. The strategic choice of these animals is attributed to their comparatively low initial investment and operational costs. Small-scale farmers find these animals conducive for commercial purposes, as they offer a viable means of income generation without imposing significant financial burdens. The versatility of sheep and goats in adapting to land-scarce environments makes them integral to the livelihoods of many economically vulnerable rural families in India. Sheep (*Ovis aries*) were among the first species to be domesticated approximately 12,000 years ago in Southwestern Asia, showcasing their early importance in human history (Zeder *et al.*, 2006) [17]. The majority of pathogenic organisms and toxins that infiltrate the bloodstream tend to inflict damage on vital organs such as the lungs and liver, with a particular emphasis on the kidneys. This heightened susceptibility is due to the fact that approximately one-fifth of the total blood volume circulates through the kidneys every minute. This continuous exposure leaves the kidneys vulnerable to a variety of circulating pathogenic agents, making them more susceptible to the detrimental effects of these agents in comparison to other organs. This study is focused on investigating various alterations in the kidneys under distinct pathological conditions.

2. Materials and Methods

The study, spanning from January to December 2017, involved the examination of 1075 sheep kidneys, disregarding age groups, sex, and breeds. Among these, 157 samples representing sheep kidneys with observable gross lesions underwent further scrutiny through histopathological analysis.

Tissue specimens for this investigation were collected from sheep carcasses, irrespective of sex, age groups, and breeds, subjected to post-mortem examinations at various veterinary clinics and slaughterhouses in Udaipur, Dungarpur, Chittorgarh, and Rajsamand districts of southern Rajasthan. Additionally, kidney samples were obtained from carcasses submitted to the Department of Veterinary Pathology, College of Veterinary and Animal Science, Navania, Vallabhnagar, Udaipur, during routine post-mortem examinations.

The inclusion criteria also encompassed samples received from field veterinarians at the Department of Veterinary Pathology for histopathological examination. Gross examinations of all samples were conducted, evaluating morphological alterations in terms of shape, size, color, consistency, odor, location, and type of lesions in individual parts of the kidney.

Tissue color was recorded immediately after collection and before fixation, covering all seasons during the study period. Following collection, proper preservation of all samples was ensured in 10% formal saline after cutting into individual parts. The kidney tissue sections, measuring 2-5 mm in thickness and encompassing both lesions and normal tissue, were used for fixation and subsequent pathological examinations. Histopathological examination involved tissue processing through paraffin embedding using the acetone and benzene technique (Lillie, 1965)^[10]. Sections of 4-6 microns were cut and stained with Hematoxylin and

Eosin using the routine staining method (Luna, 1968)^[11].

3. Results & Discussion

The present study was carried out from January, 2017 to December, 2017. During this period, a total number of 1075 samples of sheep irrespective of age groups, sex and breeds were examined. Out of these 157 representatives of samples of kidney of sheep showing gross lesions were further examined histopathologically. Occurrence of Nephrosis in kidney of sheep (*Ovis aries*) at Southern region of Rajasthan mentioned in table 1.

Table 1: Occurrence of Nephrosis in kidney of sheep (*Ovis aries*) in Southern region of Rajasthan

S.No.	Type of Lesion	Name of districts								Total no. of sample	Percentage % (N= 157)
		Udaipur (N= 53)		Dungarpur (N= 42)		Chittorgarh (N= 36)		Rajsamand (N= 26)			
3.1	Nephrosis										
3.1.a	Cloudy Swelling	6	11.32	2	4.76	3	8.33	5	19.23	16	10.2
3.1.b	Hydropic Degeneration	1	1.89	2	4.76	1	2.78	0		4	2.54
3.1.c	Amyloidosis	1	1.89	2	4.76	3	8.33	2	7.7	8	5.1
3.1.d	Hemoglobinuric Nephrosis	2	3.77	1	2.4	1	2.78	2	7.7	6	3.82
3.1.e	Coagulative Necrosis	1	1.89	2	4.76	1	2.78	1	3.85	5	3.18

3.1 Nephrosis

All degenerative changes occurred in kidney mentioned below

3.1.a. Cloudy Swelling

The overall occurrence of this condition was observed in 16 cases (10.19 Percent) and individually occurrence of this condition was observed in Udaipur, Dungarpur, Chittorgarh and Rajsamand 11.32%, 4.76%, 8.33% and 19.23% respectively. Grossly, kidney was enlarged and pale in colour with smooth round bordered (Fig. 1). Microscopically, the lumen of tubules were narrowed and the cytoplasm was ground glass like clear (Fig. 2). In some there was necrotic epithelial debris in the tubular lumen. Some of samples tubules were showing further degenerative changes. The recorded observations are well in accordance with those described by Tafti *et al.* (2008)^[15].

3.1.b. Hydropic degeneration

The overall occurrence of this condition was observed in 4 cases (2.54 Percent) and individually occurrence of this condition was observed in Udaipur, Dungarpur, Chittorgarh and Rajsamand 1.89%, 4.76%, 2.78% and 0% respectively. Grossly, Kidney was enlarged in size and pale and in some cases there was so given by change. Microscopically, the cytoplasm of tubules showed numerous small to larger vacuoles in their cytoplasm (Fig. 3). also the cytoplasm was hazy. Some tubules were showing necrotic changes in nearby areas. It is in conformity with the findings of Barbour *et al.* (2014)^[2].

3.1.c. Amyloidosis

The overall occurrence of this condition was observed in 8 cases (5.1 Percent) and individually occurrence of this condition was observed in Udaipur, Dungarpur, Chittorgarh and Rajsamand 1.89%, 4.76%, 8.33% and 7.7% respectively. Grossly, the kidneys were normal except for a slight increase in size and pale to yellow coloured with smooth to finely granular capsular surface. The capsule stripped smoothly to reveal a cortical surface with a finely stripped appearance due to numerous fine yellow dots and grey points of translucence were present. In some cases kidneys showed tense and non-adherent capsule. The cortex

was widened. Microscopically, the nodules of amyloid gradually developed in glomeruli and basal membrane of the tubules. A portion of the normal glomerular architecture was replaced by eosinophilic, homogenous to slightly fibrillar material. In some cases glomeruli loops were swollen and converted into hyaline balls. The amyloid was deposited in tubular basement membrane and around the tubules (Fig.4.). The tubules showed pink hyaline casts of protein and were dilated. There were lymphocytic infiltration, tubular atrophy, tubular dilation, glomerular atrophy and glomerulosclerosis. These observations were in agreement with those described by Yener and Erer (2000)^[16], Bannele *et al.* (2014)^[1], Mensua *et al.* (2003)^[12].

3.1.d. Hemoglobinuric Nephrosis

The overall occurrence of this condition was observed in 6 cases (3.82 Percent) and individually occurrence of this condition was observed in Udaipur, Dungarpur, Chittorgarh and Rajsamand 3.77%, 2.4%, 2.78% and 7.7% respectively. Grossly, the kidney was dark reddish to black in colour with enlarged in the size. The cut surface showed linear black hemorrhages like appearance (Fig. 5), on cut red to black exudates oozes out. Microscopically, the tubules showed severe degenerative changes with tubular epithelium contained fine particles of hemoglobin and also hyaline deposits. In some case showed haemoglobin cast (Fig. 6). The recorded gross and microscopic observations to those described by Hatipoglu and Erer (2010)^[8].

3.1.e. Coagulative necrosis

The overall occurrence of this condition was observed in 5 cases (3.18 Percent) and individually occurrence of this condition was observed in Udaipur, Dungarpur, Chittorgarh and Rajsamand 1.89%, 4.76%, 2.78% and 3.85% respectively. Grossly, the kidney was dark reddish in colour and the capsule was pulpy in nature. Microscopically, tubules were homogenous pink in colour and the nucleus was absent. Tubular lumina was filled with desquamated pink colour material. (Fig. 7). The recorded observations are similar to those described by Hassanein *et al.* (2017)^[7], Jemal *et al.* (2016)^[9], Erokusz *et al.* (2013)^[3], Fartashvand *et al.* (2012)^[5].



Fig 1: Gross photograph of kidney showing cloudy swelling, enlarged round bordered

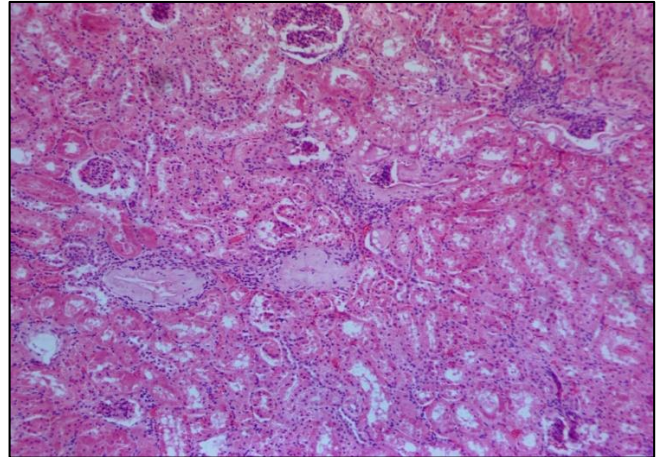


Fig 4: Microphotograph of kidney showing amyloidosis, glomeruli loops swollen and converted into hyaline balls. The amyloid deposited in tubular basement membrane and around the tubules and pink hyaline casts of protein and were dilated. - H&E 10x

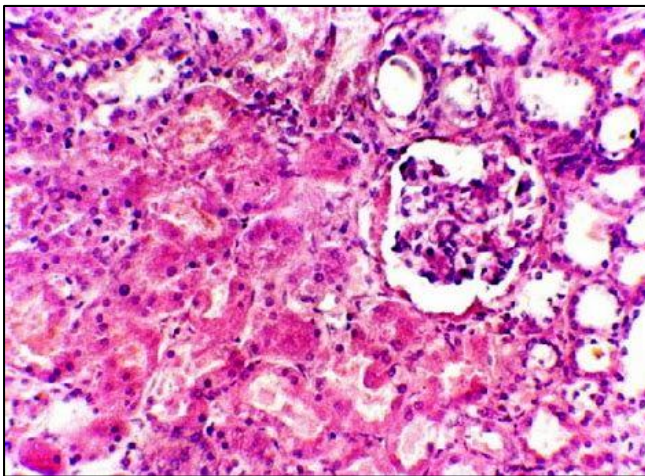


Fig 2: Microphotograph of kidney showing cloudy swelling, the lumen of tubules narrowed and the cytoplasm is ground glass like clear - H&E -10x



Fig 5: Gross photograph of kidney showing hemoglobinuric nephrosis large dark red colored

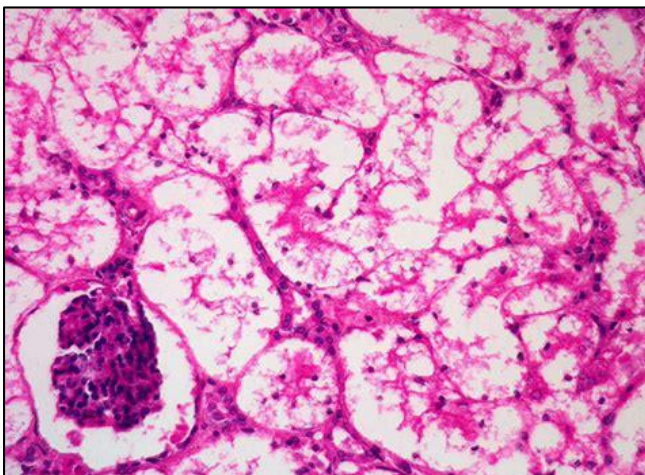


Fig 3: Microphotograph of kidney showing hydropic degeneration the cytoplasm of tubules showing numerous small & large vacuoles in their cytoplasm H&E-40X

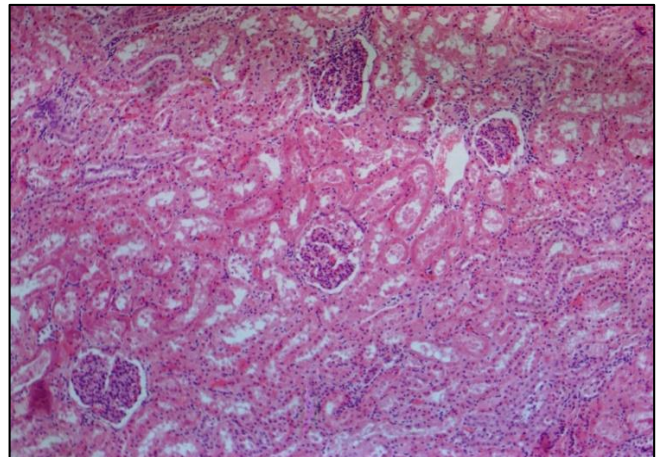


Fig 6: Microphotograph of kidney showing hemoglobinuric nephrosis, various size of haemoglobin and hyaline cast in tubules with degenerative changes in tubules H&E -10x

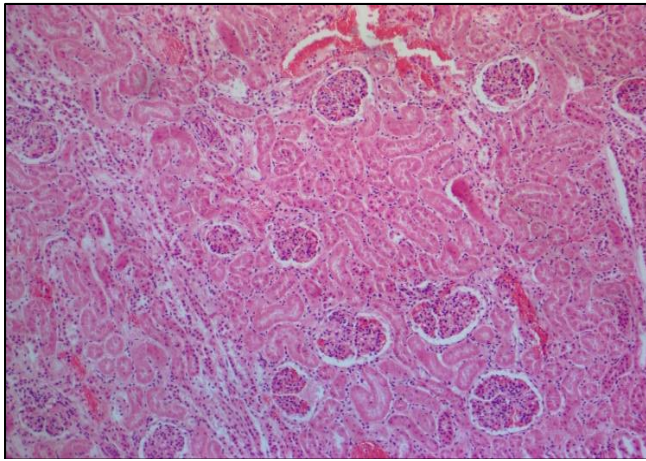


Fig 7: Microphotograph of coagulative necrosis showing homogenous pink colored tubules with absence of nuclei – H&E-10x

4. Conclusion

Histopathological findings revealed the following percentages of recorded lesions: Cloudy Swelling at 10.19%, Hydropic degeneration at 2.54%, Amyloidosis at 5.1%, Haemoglobinuric Nephrosis at 3.82%, and Coagulative Necrosis at 3.18%. The study findings align closely with the work of other researchers, as documented in the text, presenting comprehensive correlations between gross and microscopic observations. Detailed histopathological changes associated with each condition have been thoroughly observed and documented.

5. References

1. Bamnele R, Garg UK, Shukla S, Shukla PC, Das G, Singh S, *et al.* Histopathological studies of spontaneous kidney lesions in goats (*Capra hircus*). Indian Journal of field Veterinarian. 2014;9:65-66.
2. Barbour EK, Abou-Alsaud ME, Gheith NA, Abdel-Sadek MA, Heba HMA, Harakeh S, *et al.* Evaluation of a Diagnostic Model for Aflatoxicosis in Sheep: A Prerequisite for Future Adoption of National Surveillances. Intern J Appl Res Vet Med. 2014;12(2):121-129.
3. Eroksuz Y, Dabak M, Eroksuz H, Baydar E, Turkoglu I, Yilmaz I. Acute Oak (*Quercus Infectoria*) Toxicosis In Lambs. Revue Méd. Vét. 2013;164(6):302-306.
4. Farshad B, Hooshang Y. Histopathological lesions of condemned kidneys of sheep and goats slaughtered in Yasuj Abattoir, Iran. Indian Journal of Veterinary Pathology. 2016;(4):356-358.
5. Fartashvand M, Mousavi G, Hajisadeghi Y. Gentamicin-Induced Nephrotoxicity in Adult Sheep. ABR. 2012;3(4):116-120.
6. Guzman M, Navas I, Maria Mojica P, Romero D. Sunflower meal as cause of chronic copper poisoning in lambs in South Eastern Spain. The Canadian veterinary journal. 1999;40(11):799.
7. Hassanein KMA, Sayed MM, Hassan AM. Pathological and biochemical studies on enterotoxemia in sheep. comp clin pathol. 2017;26(3):513-518.
8. Hatipoglu F, Erer H. Lesions of cloisonne kidney in sheep: report on four cases Revue Méd. Vét. 2010;152(4):311-315.
9. Jemal D, Shifa M, Kebede B. Review on Pulpy Kidney Disease. J Vet. Sci. Technol. 2016;7:361.
10. Lillie RD. Histopathological technique and practical histochemistry, McGraw Hill Book Co., New York and London; c1965.
11. Luna LG. Manual of histologic staining method of armed forces institute of pathology. 3rd ed. Mc. Grow. Hill book company, New York; c1968.
12. Mensua C, Carrasco L, Bautista MJ, Biescas E, Fernandez A, Murphy CL, *et al.* Pathology of amyloidosis in domestic sheep and goats. Vet. Pathol. 2003;40:71-80.
13. Pajouhesh, Sazandegi. Histopathologic survey of sheep rejected kidneys in Brujen abattoir. Scientific Research. 2007;73:142-146.
14. Sarita. Occurrence and pathology of various conditions of urinary system in sheep: M.V.Sc., thesis submitted to Rajuvas, Bikaner; c2016.
15. Tafti AK, Nazifi S, Rajaian H, Sepehrimanesh M, Poorbaghi SL, Mohtarami S. Pathological changes associated with experimental salinomycin toxicosis in sheep. Comp Clin Pathol. 2008;17:255-258.
16. Yener Z, Erer H. The pathology of kidney abnormalities in cattle slaughtered at Konya slaughter houses, Veteriner Bilimleri Dergisi. 2000;16:63-74.
17. Zeder MA, Emshwiller E, Smith BD, Bradley DG. Documenting domestication: the intersection of genetics and archaeology. TRENDS in Genetics. 2006;22(3):139-155.