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## Pathological studies of interstitial nephritis in pig

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### Abstract

The objective of this survey was to provide information about pig renal diseases to reduce death rate in pig. Five hundred and eighty-six kidney samples were screened to establish the diversity of renal disorders in pigs irrespective of age, sex and breed at organized and unorganized farms of Bikaner, Jaipur and Alwar districts of Rajasthan. Out of 586 specimens, total of 154 specimens of kidneys were showing macroscopic lesions. Thirty-eight cases of interstitial nephritis, out of 154 specimens of kidney after visual or palpation were processed for further histopathological examination at the Department of Veterinary Pathology, Bikaner. Diffuse interstitial nephritis 17 (11.04) and Focal interstitial nephritis 21 (13.64) cases was reported. Interstitial nephritis is infiltration of inflammatory cells in interstitial tissue. Diffuse interstitial nephritis showed gross lesion, many grey-white foci observed on the surface of the cortex. The gross lesion of focal interstitial nephritis was the kidneys were swollen, small greyish foci scattered over the cortex. Histopathological studies revealed inflammatory cells infiltration in interstitium tissue of kidney in diffuse and scattered manner.

**Keywords:** Interstitial nephritis, pig, kidney, histopathology

### Introduction

The Pig population is 9.06 million (1.69%) which has decreased by 12.0% over previous Livestock Census, 2012 (20th livestock census, 2019) [1]. Various pathogenic organisms and toxins enter the blood stream and pass through the kidneys (Roesel *et al.* 2017) [13]. Diseases of pig with serious economic concern, owing to loss due to mortality, loss of body weight, and loss due to impaired fertility, along with export restriction no pork and pork products from the affected countries (Sarma *et al.* 2008) [14]. Renal disorders are considered to be a most important cause of illness in pig. Interstitial nephritis is one of the renal disorders affecting kidneys of pigs badly. Interstitial nephritis is most common causes of the condemnation of pig kidneys at the local slaughterhouse (Drolet and Dee, 2006) [7]. The kidney is one of the most affecting organ causing of death of pigs so it is challenging organ for a pathologist (Sarita, 2016). In this condition, mainly tubules are involved so also known as tubulointerstitial nephritis (Vegad and Swamy 2004) [17]. Inflammatory disorders of the kidney are a common cause of acute renal failure (Toto 1990) [16]. This problem is associated with not only economic losses but also poses a potential health risk to abattoir workers (Baker *et al.*) [3]. It is an inflammatory changes of interstitial tissue which may be acute, subacute or chronic form also. Chronic stage of interstitial nephritis may lead to fibrosis (Yadav 2018) [18]. Infiltration of inflammatory cells in interstitium, scatteredly that is focal interstitial nephritis and in diffuse manner that is diffuse interstitial nephritis. Gross lesions of multifocal interstitial nephritis, often called 'white-spotted kidneys' are common.

### Materials and Methods

For the proposed interrogation 586 samples of the kidneys of pig (*Sus scrofa domestica*) irrespective of age, sex and breed were observed from various organized and unorganized slaughterhouses of Bikaner, Jaipur and Alwar districts of Rajasthan. During the post-mortem examination, the samples were thoroughly examined by visual examination and gross palpation.

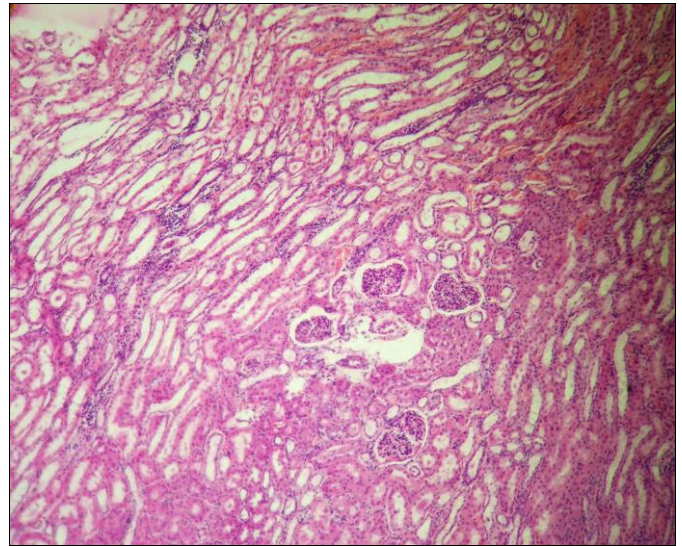


The kidney tissue specimens were collected from the carcasses of pig and submitted to the Department of Veterinary Pathology, College of Veterinary Science, Bikaner. Those samples showing macroscopic lesions were used for further histopathological examination. Following collection, all the kidney samples were properly preserved in 10 percent formalin after cutting the affected parts and whole organ. The parts of affected tissue measured 2-5 mm thickness and presenting the lesions with normal tissue were used for fixation and further examination. For histopathological examination, processing of tissues was done by paraffin embedding using acetone and benzene technique (Lillie 1965) [9]. The tissue sections of 4-6 micron thickness were cut and stained with routine staining method of haematoxylin and eosin staining (Luna 1960; Bancroft *et al.* 2013) [10, 2]. Following deparaffinization, the sections were dehydrated using serial changes in ethanol and stained using Harris haematoxylin. After differentiation and follow up staining with Eosin, the slides were dehydrated and then permanently mounted using DPX. As far as possible, results were recorded by microscopic examination.

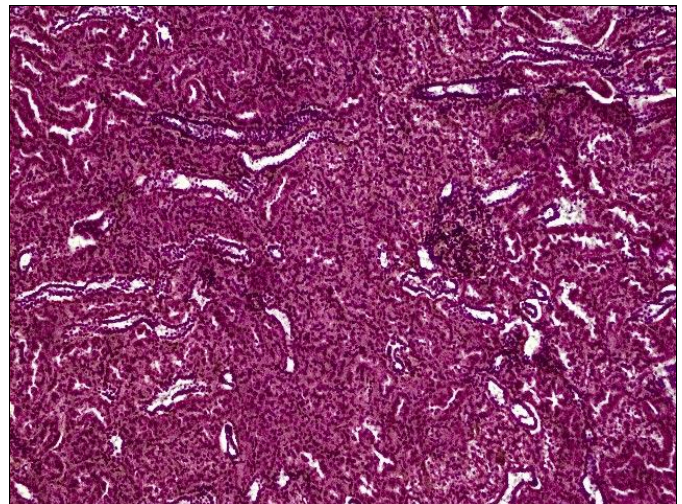
### Results and Discussion

Interstitial nephritis is infiltration of inflammatory cells which is polymorphonuclear cells and mononuclear cells. Diffuse interstitial nephritis was noticed in 17 (11.04 percent) cases. A higher incidence of 39.12 percent was recorded in pig. Grossly, The size of kidneys was normal in some cases or slightly increased in some, with distinct red- cherry and grey mottling on the capsular surface. Red and grey mottling was also observed in the cortex (Segales and Domingo, 2002) [15]. The capsule was stripped off easily. In chronic cases, kidneys were shrunken, granular, pale grey and firm. Microscopically, there was diffuse inflammatory infiltration of plasma cells and lymphocytes in the cortex area. There were marked degenerative changes in the epithelium of the cortical renal tubules. The changes varied in severity from hydropic swelling to necrosis and desquamation of tubular cells were seen. This desquamation produced granular and cellular casts in addition to the hyaline casts in tubules. Chronic cases of inflammation showed fibrosis of tissue. In some, the glomeruli were distorted, the capsule was thickened in chronic changes. The tubules were dilated, hypertrophic and contained granular material (Nietfeld and Leslie-Steen, 1993 [12]; Becker *et al.* 1999) [4] (Fig. 1 and Fig. 2)

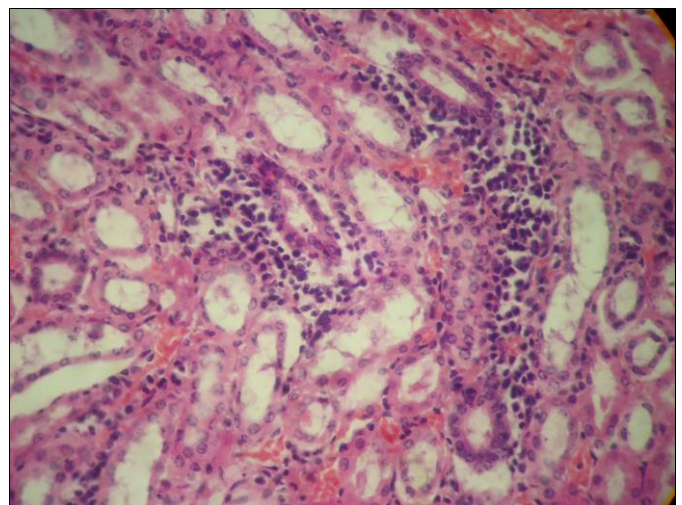
Focal interstitial nephritis was noticed in 21 (13.64 percent) cases. A higher incidence was recorded as 75 percent in pig (Boqvist *et al.* 2003) [5] and a lower incidence was recorded as 9.43 percent in goat (Dadhich 1996) [6]. Grossly, the kidneys were swollen, and small greyish foci scattered over the cortex. On cut surface, nodules were present at the cortex and medulla. These nodules were pea-sized to bean-sized. Kidneys characterized by either a few randomly distributed or numerous widely distributed whitish foci, these kidneys were called 'white-dotted kidneys' (Drolet *et al.*, 2002) [8]. Microscopically, In acute cases, the interstitial tissues were oedematous and infiltrated by neutrophils, lymphocytes and plasma cells. Dilated tubules containing proteinous cast or hyaline material were also observed in some cases. Haemorrhages were also seen in intertubular space (Martinez *et al.* 2006) [11]. In this condition, scattered interstitial foci consisting of lymphocytes and plasma cells were seen (Fig. 3).



**Fig 1:** Microphotograph of kidney showing diffuse interstitial nephritis with lymphocyte and plasma cells in renal parenchyma along with cloudy swelling in tubular epithelium. H & E -100x

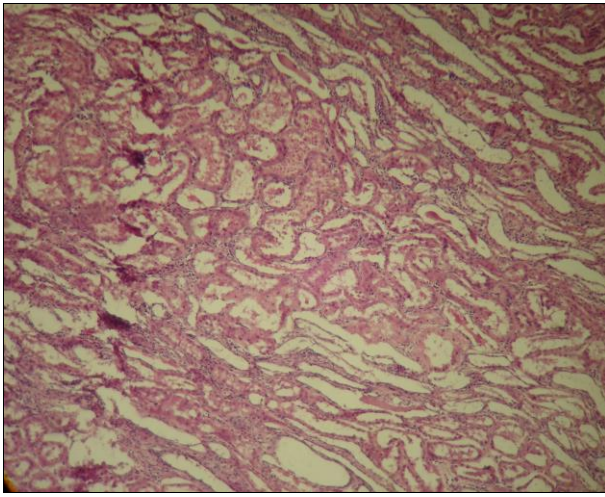


**Fig 2:** Microphotograph of kidney showing diffuse interstitial nephritis with dilated, hypertrophic tubules and contained granular or hyaline cast and protein cast in tubules. H & E -100x



**Fig 3:** Microphotograph of kidney showing focal interstitial nephritis, infiltration of neutrophils, mononuclear cells along with haemorrhage and protein cast in tubules. H & E - 100x





**Fig 4:** Higher magnification of figure 3. H & E - 1000x

### Conclusion

Further studies will allow us to understand the causes of kidney damage and find ways to prevent it.

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