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Bacteriological and Pathological Study on Kidneys of Slaughtered Sheep in Fallujah City

Ahmed Sami Jarad[1], SMA AL-Kubaisi[1], Roua Jamal Abdulkhaliq[2], Mustafa Salah Hasan[1]

[1]University of Fallujah, College of Veterinary Medicine, Department of Pathology and Poultry diseases/Iraq,
[2]University of Fallujah, College of Veterinary Medicine, Department of Parasitology/Iraq.

Abstract

This study was carried out to determine the prevalence and type of renal lesions in sheep that were slaughtered at Fallujah abattoir. A total number of 100 clinically normal sheep of different sex and age randomly selected, renal samples were taken for , bacteriological, macro and micro study. One hundred swabs were taken from cortex and medulla were cultured on blood, nutrient, and MacConkey agars, then biochemical tests were done for identification of these bacteria. Bacteriological examination of kidney revealed that (65%) of samples show positive results in bacterial isolation including (15%) Bacillus, (10%) *Escherichia coli*, (11%) Klebsiella, (18%) Staphylococcus, (8%) streptococcus, (3%) *Corynebacterium* spp., (3%) *pseudomonas aeruginosa*, (1%) Salmonella and (1%) Proteus. Pathological study showed that 24 (24%) and 38 (38%) gave positive results in macroscopic and microscopic lesions respectively, the results of gross pathology were renal hemorrhage 8%, pale kidneys 4%, enlarged kidneys 4% white spotted kidneys 3%, renal fibrosis 2% , pigmented kidney 2% and renal cyst 1%. Meanwhile the microscopic lesion were nephritis 24 % (interstitial nephritis 9%, glomerulonephritis 6%, tubular nephritis 5%, and pyelonephritis 4%) nephrosis 5%, kidney fibrosis 3%, infarcted kidneys (2%), amyloidosis 2% hemosiderosis 2%. From the presented study, it was concluded that most kidneys are infected with many gram negative and gram positive bacteria and many kidney problems such as renal hemorrhage and interstitial nephritis are the most common renal lesions in sheep.

Keywords: *Kidney, sheep, bacteria, pathological.*

Introduction

Slaughter houses and butchery shops afford an excellent opportunity to detect animals health problems so it is a potential source of information for both economic and public health [(1)]. Sheep as food animals act as worthy strength to the economy of the nation [(2)], besides economic losses, diseases of sheep might constitute an epidemiologic and zoonotic threat [(3)].

kidneys are paired organs structures and with their physiological functions such as excretion of waste materials, regulation of acid-base balance, body fluid balance and hormonal effects, it plays a vital role in the life of animals for close inspection, the information resulting from abattoir data are a good source for evaluation and monitoring of renal disease in livestock [(4, 5, 6)].

Renal diseases are common and they are significant important problems and causes illness and death in many species of animals [(3)].

Renal diseases are not detected until they become generalized, leading to renal failure and death so collected evidence from abattoir studies remain a good source for evaluation and control of renal diseases in animals [(7)].

Many researches were done for bacterial isolation from the offal especially the kidneys in abattoir, from these a study of Abdul-Hadi (2010), who showed that the prevalence of microorganisms identified in kidneys

Corresponding author:
Dr. Ahmed Sami Jarad,
Assistant Professor, University of Fallujah, College of Veterinary Medicine, Iraq. E mail: dr.ahmed.s.jarad@uofallujah.edu.iq; drmustafasalah7@gmail.com

and other offal were Staphylococci, Corynebacterium, Streptococci, Micrococcus, Salmonella, *Escherichia coli* and Yeast [8].

The goal of this study was a bacterial isolation and pathological examination of kidneys of sheep slaughtered in Fallujah City/ Iraq.

Materials and Method

The study was conducted on 100 kidney samples of sheep collected from local abattoir during 5 months (November 2018 to march 2019). Swabs were taken from every sample (cortex and medulla) and inoculated in a nutrient broth, then incubated aerobically at 37°C for 24-48h. The primary growth were sub-cultured on nutrient, blood agar, EMB and MacConkey agars. The pure cultures obtained were subjected to gram stain and biochemical tests including catalase, oxidase, TSI, indole, Citrate and carbohydrate fermentation for characterization and identification, these were done according to 9. Markey *et al*. (2013) [9].

For pathological study, gross pathological lesion of each sample was established and recorded as described by Gracey (1985)[10]. The Sectioning and staining were done according to Luna (1968) [11].

Results and Discussion

Out of 100 samples swab taken from cortex and medulla of sheep kidneys, total bacterial isolated (65%), while negative samples were (35%). Table (1) shows the distribution of percentage of finding bacteria according-to isolates culturing media.

The bacteriological examination of kidney were the following microorganisms isolated from kidney sheep include *Bacillus spp.* was (15%), *Klebsiella spp*. was (11%), *Escherichia coli* was (10%), *Staphylococcus aureus* was (9%), *Staphylococcus spp*. was (9%), *streptococcus spp.* was (8%), *Corynebacterium spp*. was (3%), *pseudomonas aeruginosa* was (3%), *Salmonella spp*. was (2%), *Proteus spp*. was (1%) (Table 1).

Table 1: Bacteria isolated from kidneys of sheep.

Isolated germs	Number/total (n) %
Bacillus spp.	10/100 (10%)
Klebsiella spp.	11/100 (11%)
Escherichia coli	10/100 (10%)
Staphylococcus aureus	9/100 (9%)
Staphylococcus spp.	9/100 (9%)
Streptococcus spp.	8/100 (8%)
Corynebacterium spp.	2/100 (3%)
pseudomonas aeruginosa	3/100 (3%)
Salmonella spp.	2/100 (2%)
Proteus	1/100 (1%)
Negative	35/100 (35%)
Total	100/100 (100)%

It has been reported that the most common causative organisms in kidney disorders were *Klebsiella* and *Escherichia coli*, bacteria that is responsible of ascending infection causing kidney disease [12]. Also other bacteria are involved such as *Proteus*, *Staphylococcus* and *Streptococcus*. The kidney infection can also occur through blood in the case of *Salmonella* and *Pseudomonas*. Kidney infection *via* the hematogenous route (suppurative embolic nephritis) is much less common but may result from bacteremia with such agents as *Salmonella* species [13, 14]. These results were in compatible with our results.

The current study were also in agreement with results of Mohammed (2009) who found that *Escherichia coli, Staphylococcus aureas, streptococcus spp., Proteus spp. and Klebsilla spp*. were the most bacteria isolated [15]. Also, Hirsbrunner *et al*. (1996) reported that Corynebacterium species is an obligate pathogen of the urinary mucosa and isolated this bacteria from cow suffered from unilateral pyelonephritis [16].

Out of one hundred animal's kidneys randomly collected from clinically healthy sheep, thirty four kidneys showed affection with different pathological conditions include 24 macroscopic and microscopic lesions table (2) and also 12 kidneys with microscopic lesions, table (3).

Table (2) Percentages of macroscopic changes in sheep kidneys

No.	Macroscopic lesion	Number	%
1.	Hemorrhagic kidney	8	8%
2.	Pale kidney	4	4%
3.	enlarged kidney	4	4%
4.	Focal and multifocal white spots	3	3%
5.	Renal fibrosis	2	2%
6.	Pigmentation	2	2%
7.	Cyst	1	1%
8.	Without any gross pathological lesion	76	76%

Table (3) Histopathological changes results of kidneys in sheep

No.	**Microscopic description**	**Number**	**%**
1.	Interstitial Nephritis	9	9%
2.	Glomerulonephritis	6	6%
3.	Tubular nephritis	5	5%
4.	Pyelonephritis	4	4%
5.	Nephrosis	5	5%
6.	Renal fibrosis	3	3%
7.	Infarcted kidney	2	2%
8.	Amyloidosis	2	2%
9.	Hemosiderosis	2	2%
10.	Without any histopathology changes	62	62%

The results of this study indicated that the highest incidence of occurrence of gross pathology were renal hemorrhage 8% , pale kidneys 4%, enlarged kidneys 4% white spotted kidneys 3%, renal fibrosis 2% , pigmented kidney 2% and renal cyst 1%.

The most common gross lesions were the hemorrhages in sheep kidneys with incidence of (8%) and it varied from pin point petechia to ecchymosis, renal hemorrhages may occur due to acute nephritis or with septicemia and bacterial intoxication [17,18].

The paleness of kidney also recorded, with prevalence (4%) paleness may be due to, amyloidosis, infarction and obstruction of blood vessel at the base towards the periphery, nephrosis [17, 19]. While renal enlargement showed prevalence of (4%), it was occur as a result to accumulation of blood, edema, fluid, fat and urine in pelvis or tubules, moreover enlarged kidneys with pale grey color may be due to Interstitial nephritis, glomerulonephritis and tubular nephritis [20]. This results agreed with the result stated by Ali and Aljeboori, (2017) [21].

White spotted kidney prevalence were (3%), It is possible that these results are due to several pathogens especially bacteria e.g. *Leptospirosis spp*., *Escherichia coli* septicemia, also other pathogens cause this lesion [20, 22, 23].

kidneys with severe fibrous tissue formation (renal fibrosis) prevalence were (2%), fibrous tissue formation appear grossly as enlarged, fibrosed, hard and cut with difficulty**,** similar changes were observed in sheep kidney by several investigators [2].

Otherwise the presence of cyst in the kidney was (1%), this might be due to congenital malformation or obstructive lesion or as fundamental change of unknown origin may occur in the tubular basement membrane and result in formation of sacculation or fusiform dilation of tubules (hydronephrosis), [17, 19, 24]. These results are in agreement with those obtained by Ali & Aljeboori, (2017)[21].

All these histopathological changes were also recorded by other researchers, Jibat *et al.* (2008) and Woube (2008) reported nephritis as the major pathological observation and it is the principal cause for kidney condemnation in sheep[25, 26]. Also Ali and Aljeboori, (2017) who reported renal infarction was 28.57% followed by nephritis 26.53%, renal haemorrhages 20.40%, renal amyloidosis 14.28% and hydronephrosis 10.20% [21].

Our histopathological examination revealed that nephritis were the highest incidence.

The most common observed histological nephritis was Interstitial nephritis 9% which were characterized by lymphocyte and plasma cell infiltration in the interstitium with degenerative changes in the Proximal convoluted tubules (Fig.1). Interstitial nephritis occurred from bacterial and viral septicemias or following ingestion of certain irritants, poisons or toxins [4, 20, 27], also it were occurred due to side effects reactions to drugs, there were more than 100 different medications may trigger Interstitial nephritis like Antibiotics and NSAIDs [28].

Our Histopathological study showed prevalence of glomerulonephritis (6%) This finding corroborated with the findings of Sastry and Rao (2006) and Jones *et al.* (2006) [29, 30]. Also Mahouz *et al*. (2015) recorded the incidence of glomerulonephritis were (6.2%)[3].

Histologically, glomerulonephritis characterized by increase cellularity of glomerular tuft in size and number of endothelial and mesangial cells. Glomerulonephritis mainly occur due to antigen- antibody reactions to the foreign proteins and as a sequel to bacterial and viral diseases [29, 31, 32]. Caseous lymphadenitis may cause glomerulonephritis [33].

Tubular nephritis in microscopic examination coms with prevalence of (5%), kidney showed degeneration and necrosis of renal tubular epithelium with pyknotic nuclei (Fig.2). Sastry and Rao (2006) and Jones *et al.* (2006) also described degenerative and necrotic changes renal tubular epithelium[29, 30]. All these changes accrued due to various irritant toxic substances which act directly to produce degenerative changes and necrosis of delicate epithelial cells lining the tubules [19].

Acute Tubular Necrosis (hydronephrosis) also recorded with prevalence of 5% , This finding is in agreement with the findings of Sastry and Rao (2006) and Jones *et al.* (2006) [29, 30], hydronephrosis in microscopic view showed scattered atrophic glomeruli remain in the thin and fibrous mass with presence of polymorphs and monomorphic cell infiltration (Fig. 3). The obstruction produced by the stasis of urine causing its back pressure leading to atrophy of renal parenchyma was the primary cause [20, 24].

On histopathological examination of infarcted kidneys with prevalence (2%), showed glomeruli and the tubules were discerned through the whole area taking a homogenous pink stain showing coagulative necrosis. Such lesions in kidney were also described by Sastry and Rao (2006) and Jones *et al.* (2006) [29, 30]. All these histological alteration occurred due to the occlusion of main or branches of renal artery [20, 24, 27].

Our results showed prevalence of amyloidosis was (2%). Histologically, kidney showed presence of pinkish amyloid material in Bowann's space of hypercellular

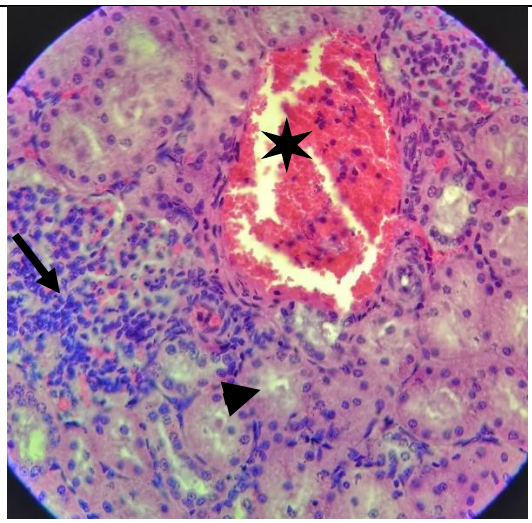
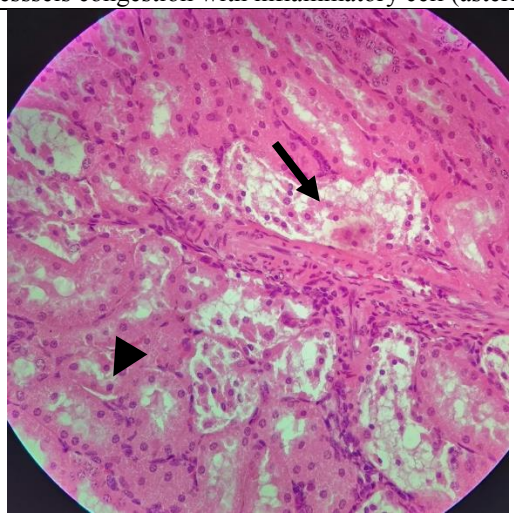
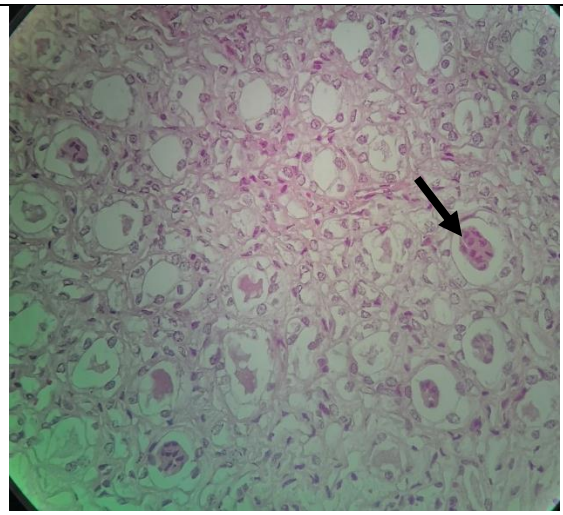


Fig.1. Histopathological section of sheep kidney showed lymphocyte and plasma cell infiltration in the interstitium (arrow), with degenerative changes in the Proximal convoluted tubules (arrowhead) and blood vesssels congestion with inflammatory cell (asterisk). H&E X40.



(Fig.2).kidney showed degeneration and necrosis of renal tubular epithelium (arrow) with pyknotic nuclei(arrowhead). H&E X40.



(Fig.3). histopathological section of kidney showed presence of polymorphs and monomorphic cell infiltration within renal tubule (arrow). H&E X10.

glomeruli. Similarly, Mensua *et al.* (2003) also described the renal amyloidosis in sheep and goats [34].

The histomorphologicl results showed the presence of hemosiderin pigment with prevalence of (2%). The pigment deposited in the epithelial cells of renal tubules and glomeruli, resulted from degradation of resorbed hemoglobin [17, 24].

Conclusion

It was concluded that most kidneys are infected with many gram negative and gram positive bacteria and the pathological examination revealed that the most common observed lesions were renal hemorrhage at macroscopic exam and interstitial nephritis at microscopic exam.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

Conflict of Interest: The authors declare that they have no conflict of interest.

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