Bacteriological and Pathological Investigations on Ovine Renal Diseases

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Abstract: The present study was carried out on 450 (male and female) sheep at Tiaret abattoir, (Algeria). Seventy (70) urinary samples were taken directly from bladder by sterile syringe after slaughter for the bacteriological study. Urine samples were incubated for isolation of bacteria on blood agar and MacConkey. Kidney samples were taken for histopathological study in order to determine the prevalence and type of renal lesions. Bacteriological examination of urine revealed that 23 (32.8%) of urine samples show positive results in bacterial isolation including 13 (56.5%) Escherichia coli, 7 (30.4%) Staphylococcus aureus and 3 (13.1%) Pseudomonas aeruginosa. Pathological study revealed different lesions and the most common were interstitial nephritis 39 (8.6%) and glomerulonephritis 28 (6.2%). In conclusion, kidney lesions found in the present study, are down hematogenous origin nephritis while isolated germs are commensal organisms that can be found usually in the lower tract urinary tract.

Key words: Bladder • Bacteriology • Kidney • Pathology • Sheep

INTRODUCTION

Topographic proximity of the urinary tract with genital tract facilitates ascending infections during genital infections, often occurring in the peripartum period, or for obstetric manipulations.

Kidney diseases affecting the glomerulus are often associated with proteinuria or hematuria [1]. Indeed, when the glomerulus is damaged, it leaks. Then it is the only route of entry of protein in the urine [2].

If the number of nephrons decreases, the glomerular filtration rate (GFR) continues to decline and it results in renal failure [2].

The incidence of disorders of urinary tract in ruminants is difficult to estimate, few publications are devoted to evaluation. Limited data acquired from slaughterhouses count kidney lesions responsible for organ seizures or total seizures at meat inspection but the obtained findings do not reflect the true prevalence of kidney disease.

The present study was undertaken to investigate the prevalence of urine infection and to determine the prevalence and type of kidney lesions in sheep.

MATERIALS AND METHODS

Isolation and Identification of Bacteria: After slaughter in Tiaret abattoir, (70) urine samples were taken directly from the bladder of sheep by a sterile syringe. Samples were incubated for isolation of bacteria on blood agar and MacConkey. The plates were incubated at 37°C for 24-48 h. After, this time plates were examined for characteristic colonies [3]. The following organisms were isolated: E. coli, S. aureus and Pseudomonas aeruginosa.

Pathology: 70 kidney samples were taken out of 450 slaughtered sheep and tissues were fixed in 10% neutral buffered formalin for 48 h and processed according to routine procedure and sectioned at 5 μm and stained with haematoxylin-eosin. The sections were examined using light microscope.
RESULTS

Out of 70 urine samples, 23 (32.8%) were positive and the following organisms were isolated: *Escherichia coli* (56.5%), *Staphylococcus aureus* (30.4%) and *Pseudomonas aeruginosa* (13.1%).

The percentage of urine infections in female and male was 19 (82.6%) and 4 (17.4%), respectively, (Table 1).

**Prevalence of Kidney Lesions:** Prevalence of kidney lesions is shown in Table 2. Seventy three (16.2%) of the examined sheep presented kidney lesions such as: interstitial nephritis (8.6%), glomerulonephritis (6.2%), acute tubular necrosis (ATN), (1.1%) and cyst (0.2%). The most common observed lesions were interstitial nephritis and glomerulonephritis.

- Interstitial nephritis was characterized by swelling in between the kidney tubules.
- Glomerulonephritis was the second observed kidney lesion. Kidneys were macroscopically normal. They were pale and hypertrophied and the cut surface was shiny.

**Microscopic Findings:** In interstitial nephritis: the interstitium was edematous and showed an inflammatory infiltrate of lymphocytes and eosinophils, (Figure 1).

- Glomerulonephritis: in acute form, inflamed glomeruli were very fine small, red, dense, uniformly distributed in the renal cortex.

The microscopic lesions consisted of cell proliferation in the renal glomerulus, which becomes hypercellular. A higher than normal leukocyte infiltration was observed, (Figure 2).

### Table 1: Bacteria isolated from urine bladder in examined sheep

<table>
<thead>
<tr>
<th>Isolated germs</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td>12</td>
<td>1</td>
<td>13 (56.5%)</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>5</td>
<td>2</td>
<td>7 (30.4%)</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>2</td>
<td>1</td>
<td>3 (13.1%)</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>4</td>
<td>23 (32.8%)</td>
</tr>
</tbody>
</table>

### Table 2: Prevalence rate of kidney lesions in examined slaughtered sheep

<table>
<thead>
<tr>
<th>Lesions Number</th>
<th>(N/450)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interstitial nephritis</td>
<td>39 (8.6%)</td>
</tr>
<tr>
<td>Glomerulonephritis</td>
<td>28 (6.2%)</td>
</tr>
<tr>
<td>ATN</td>
<td>5 (1.1%)</td>
</tr>
<tr>
<td>Renal cyst</td>
<td>1 (0.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>73 (16.2%)</td>
</tr>
</tbody>
</table>

ATN (acute tubular necrosis)

**DISCUSSION**

In the present study, 32.8% bacterial culture of the urine samples collected from the slaughtered sheep were positive and *E. coli*, *Staphylococcus aureus* and *Pseudomonas* were isolated.

The most common causative organisms in urinary tract infections *Corynebacterium* and *Escherichia coli*, bacteria that are responsible of ascending infection causing urinary tract [4]. Also other bacteria are involved as *Proteus*, *Staphylococcus* and *Streptococcus*. The urinary tract infection can also occur through blood in the case of *Salmonella* and *Pseudomonas*. A urine analysis may be interesting to identify the causative organism and thus target treatment [5].

Renal infection via the hematogenous route (suppurative embolic nephritis) is much less common but may result from bacteremia with such agents as *Salmonella* species, *arcanobacterium pyogenes* or in small ruminants, *Corynebacterium pseudotuberculosis* [6-8-9].
The bacteriological examination of urine revealed that 23(32.8%) of female and male urine samples show positive results in bacterial isolation including *Escherichia coli*, (56.5 %), *Staphylococcus aureus*, (30.4%) and *Pseudomonas aeruginosa* (13.1 %). These findings are lower than those reported by Mohamed [9] in a study conducted to evaluate 150 sheep urine samples.

The results of the present study revealed that 16.2 % of slaughtered sheep in Tiaret abattoir had kidney lesions. The most common observed lesions were interstitial nephritis and glomerulonephritis.

Acute interstitial nephritis (AIN) is frequently the result of an allergic reaction. The majority of AIN cases (at least 70 percent) may be attributed to bad reactions to drugs. More than 100 different medications may trigger AIN. Many of these medications fall into the following categories: Antibiotics and NSAIDs (nonsteroidal anti-inflammatory drugs). They are also more likely to cause permanent kidney damage [6].

The most common observed lesions were interstitial nephritis(8.6%) and glomerulonephritis (6.2%).

Manisha and Hemant [10] and Hatipoglu[11] reported an incidence of interstitial nephritis of 20.17 and 62.24% respectively which is higher than the result reported in our study.

Glomerulonephritis results from several disease mechanisms. It can be caused by deposition of immune complexes from a focus of infection in the glomerular basement membrane, or to the antibody formation against exogenous antigen present in the basal membrane, or against the basement membrane itself [11]. Spontaneous proliferative glomerulonephritis in small ruminants seems to fairly frequent.

Indeed, in a study by Lerner et al. [13] made of 347 sheep in England and the United States, 90% of them showed lesions of glomerulonephritis. A study conducted two years later to determine the prevalence of such disease in other animal species showed that out of 25 oxen and 4 goats, spontaneous glomerulonephritis affected 23 oxen and all goats. Glomerulonephritis lesions were associated with pregnancy toxemia in ewes [14] This condition is often associated with a focus of infection such as metritis, mastitis and arthritis [15].

An association between the development of glomerulonephritis and parasitic infestation was also shown in sheep suffering from hydatidosis [16] and caseous lymphadenitis [17].

Kidney disease is not uncommon in food animals and information resulting from abattoir data is a good source for evaluation and monitoring of renal disease in livestock [18].

Urinary tract infections are relatively undervalued in current practice, judging by the age and rarity of publications that approach. However, we have seen that they are many and varied; the kidney can be affected by both hematogenous and via the lower urinary tract. Urinary disorders are rarely diagnosed alone, but often when complications or concurrent disease occur.

REFERENCES


