

Abattoir study of the prevalence of renal lesions in slaughtered cattle

Nourmohammadzadeh, F.¹; Haji Hajikolaie M.R.^{2*}; Sasani, F.³ and Alidadi, N.¹

¹Department of Clinical Sciences, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran. ²Department of Clinical Sciences, Faculty of Veterinary Medicine, Shahid Chamran University, Ahvaz, Iran. ³Department of Pathobiology, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran.

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Correspondence

Haji Hajikolaie, M.R.,
Department of Clinical Sciences,
Faculty of Veterinary Medicine, Shahid
Chamran University, P.O. Box: 61355-
145, Ahvaz, Iran.

Tel: +98 (611) 3330073

Fax: +98 (611) 3360807

E-mail: mhajih@scu.ac.ir

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Abstract

This study was carried out to determine the prevalence and type of renal lesions in cattle that were slaughtered at the Ghaem (Shahriar) and Ziaran (Ghazvin) abattoirs. A total number of 405 clinically normal cattle were randomly selected and renal samples were taken for histopathological study. The cattle were divided into two groups according to sex, and female groups were divided into two age groups (heifer and cow). Thirty-five (8.6%) out of the studied animals had renal lesions including interstitial nephritis, cysts, glomerulonephritis, acute tubular necrosis (ATN), pyelonephritis, amyloidosis, leukosis hydronephrosis and unilateral renal aplasia. Interstitial nephritis was the most common observed lesion (85.7%). The prevalence of renal lesions in female and male cattle were 8.5% and 9.4%, respectively, which was not a statistically significant difference. The prevalence of renal lesions in cows and heifers were 10% and 2.8%, respectively ($p < 0.05$). It is concluded that age is more important influence factor on renal lesion than sex.

Introduction

Renal disorders have received much less attention in cattle than in other species and there is still a lack of knowledge in this field (Yeruham *et al.*, 2006; Divers *et al.*, 1982). This difference between species may be due to the low incidence of clinical nephrological diseases in cattle. However, most renal lesions are subclinical and they might have remarkably higher frequencies than expected; such lesions could result in the poor production of the involved animals. It is possible that the blood-saliva-rumen cycling mechanism of urea may have a role in the prevention of clinical uremia in ruminating animals with renal lesions. It has been reported that cattle following experimental bilateral nephrectomy had a significantly prolonged living period before the clinical features of uremia manifest (Radostits *et al.*, 2007).

Although the kidneys of all cattle slaughtered must be examined at post mortem inspections, and considerable numbers of these are rejected as a result, reports with regards to kidney diseases in slaughtered cattle are scarce. Abattoir surveys of bovine kidney diseases have not been reported in the area of Tehran. The present study was therefore undertaken to establish the rate and types of kidney lesions in Ghaem (Shahriar) and Ziaran (Ghazvin) abattoirs.

Materials and Methods

A total number of 405 clinically normal cattle were selected from the Ghaem (Shahriar) and Ziaran (Ghazvin) abattoirs. The cattle in Tehran province are slaughtered in these abattoirs. The cattle were divided into two groups according to sex (64 male and 341 female), and the female group was divided into two age groups (71 heifers and 270 cows). The kidneys were first examined macroscopically and then sampled for histopathological studies. The samples included a piece of each kidney with dimensions of $1 \times 1 \times 1$ cm, which were fixed in 10% neutral buffered formalin for routine hematoxylin and eosin staining.

The data were analyzed statistically using Chi-square test with 95% confidence levels ($p < 0.05$).

Results

The prevalence and types of renal lesions are shown in Tables 1 and 2, respectively. Thirty-five (8.6%) of the examined animals had renal lesions including the following: interstitial nephritis (85.7%), cyst (11.4%), glomerulonephritis (5.7%), ATN (5.75%), pyelonephritis (2.85%), amyloidosis (2.85%), leukosis (2.85%), hydronephrosis (2.85%), and unilateral renal aplasia (2.85%).

The prevalence of renal lesions in female and male

Table 1: Prevalence of renal lesions in slaughtered cattle.

Gender		Renal lesions		Total
		Positive	Negative	
Female	Cow	27 (10%)	243 (90%)	270
	Heifer	2 (2.8%)	69 (97.2%)	71
Male		6 (9.4%)	58 (90.6%)	64
Total		35 (8.6%)	370 (91.4%)	405

Table 2: Types of renal lesions.

	Cows No. (%)	Heifers No. (%)	Male No. (%)	Total No. (%)
Interstitial nephritis	23 (85)	2 (100)	5 (83)	30 (85.7)
Cyst	3 (11)	-	1 (17)	4 (11.4)
Glomerulonephritis	2 (7.4)	-	-	2 (5.7)
Acute tubular necrosis	1 (3.7)	-	1 (17)	2 (5.7)
Unilateral renal aplasia	1 (3.7)	-	-	1 (2.85)
Pyelonephritis	1 (3.7)	-	-	1 (2.85)
Amyloidosis	1 (3.7)	-	-	1 (2.85)
Leukosis	1 (3.7)	-	-	1 (2.85)
Hydronephrosis	1 (3.7)	-	-	1 (2.85)

cattle were 8.5% and 9.4%, respectively, which was not a statistically significant difference. The prevalence of renal lesions in cows and heifers were 10% and 2.8%, respectively, which was a significant difference ($p < 0.05$).

Discussion

The results of this study showed that 8.5% of slaughtered cattle in the Tehran region had renal lesions. However, Amatredjo (1976) clarified that 3.8% of 4,388 beef cattle that were slaughtered between 1970 and 1973 had renal lesions. Of these, 99% were identified macroscopically as nephritis, and these proved to be of an interstitial type after histological examination, in which lymphocytic infiltration predominated (Amatredjo, 1976). Another abattoir study indicated 4.2% of 416 cattle that were slaughtered in the abattoir in Dublin had kidneys that were rejected due to gross abnormalities. The rejection rate were 7.7%, 1.7%, 2.2% and 28% for cows, bullocks, heifers and bulls, respectively. Focal interstitial nephritis composed the most frequent renal lesion (60.1%) in the slaughtered cattle (Monaghan *et al.*, 1983). The prevalence of renal lesions in this present study is at a higher level compared to the studies described above, and the hypothesis that subclinical losses from renal lesions are not negligible in cattle populations may be correct.

Some studies have been performed to focus on a particular renal lesion to the exclusion of other lesions. For example, in 47,454 Japanese Black cattle slaughtered at Osaka City abattoir, five animals (0.011%) were found to have renal dysplasia (Sugiyama *et al.*, 2007). In the study by Rude *et al.*, (2005), 359 (0.27%) cases out of 133,939 slaughtered

cattle had "black kidneys". In the 57 cases that were examined histologically, the meat inspection diagnosis of "black kidneys" was confirmed. The simultaneous occurrence of other tissue pigmentation or diagnoses was not reported (Rude *et al.*, 2005).

The prevalence of renal lesions in this study was significantly different between cows and heifers, which was a similar finding to the results of Monaghan *et al.* (1983). The reasons for this difference are not clear, but it appears that age is a more important influence on renal pathology than sex since no difference could be demonstrated between the male and female groups.

Interstitial nephritis was the most common lesion found in this study. Interstitial nephritis is rarely recognized as a cause of clinical disease in farm animals although it is a frequent post mortem finding in some species. Interstitial nephritis may be diffuse or have a focal distribution (Radostits *et al.*, 2007). Focal chronic interstitial nephritis (FCIN), also called "white spotted kidneys" by veterinary inspection staff, is a common finding in clinically healthy cattle after slaughter. Although several pathogens can cause this lesion, FCIN is frequently assumed by veterinary inspection staff to be related to current or prior *Leptospira* spp. infection (Divers, 2002; Monaghan *et al.*, 1983), but the role of *Leptospira* spp. is debatable (Uzal *et al.*, 2002; Skilbeck *et al.*, 1988; Prescott *et al.*, 1987). In view of the fact that bovine leptospirosis is recognized both clinically and serologically in Tehran province, and 88.3% of the 60 herds were seroconverted against the *Leptospira* spp. (Abdollahpour, 2002; Goli, 2002), further studies are required to determine the etiology of interstitial nephritis and its relationship to *Leptospira* spp. infection.

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References

1. Abdollahpour, G.R. (2002) Study of an outbreak of Leptospirosis in the feedlot in Mardabad (Tehran province). In: Proceedings of XXII World Buiatrics Congress, Hanover.
2. Amatredjo, A. (1976) A study of nephritis of beef cattle in North Queensland. *Aus. Vet. J.* 52: 398-402.
3. Divers, T.J; Crowell, W. A.; Duncan, J. R. and Whitlock, R. H. (1982) Acute renal disorders in cattle: a retrospective study. *J. Am. Vet. Med. Assoc.* 181: 694-699.
4. Divers, T.J. (2002) Interstitial nephritis. In: *Large Animal Internal Medicine*, edited by Smith, B.P., Mosby publication, Philadelphia, USA.
5. Goli, G. A. (2002) A sero-epidemiologic study of bovine

- Leptospirosis in Karaj (Tehran Province), Thesis for DVM degree, Faculty of Veterinary Medicine, University of Tehran.
6. Monaghan, M.L.M.; Hannan, J. (1983) Abattoir survey of bovine kidney disease. *Vet. Rec.* 113: 55-57.
 7. Prescott, J.F.; Miller, R.B. and Nicholson, V.M. (1987) Isolation of *Leptospira hardjo* from kidneys of Ontario cattle at slaughter. *Can. J. Vet. Res.* 51: 229-231.
 8. Radostits, D.M.; Gay, C.C.; Hinchcliff, K.W. and Constable, P.D. (2007) *Veterinary Medicine*, 10th edition, W. B. Saunders, London. 789-790.
 9. Rude, H.; Agerholm, J.S.; Maddox-Hyttel, P.; Christensen, K. and Flagstad, P. (2005) Renal Lipofuscinosis in Danish Slaughter Cattle. *J. Comp. Path.* 132: 303-312.
 10. Skilbeck, N.W.; Forsyth, W.M. and Dohnt, M. (1988) Bovine leptospirosis: microbiological and histological findings in cattle at slaughter. *Aust. Vet. J.* 65: 73-75.
 11. Sugiyama, A.; Ozaki, K., Miyazaki, T.Y.; Takeuchi, T. and Narama, I. (2007) Renal Dysplasia Unrelated to Claudin-16 Deficiency in Japanese Black Cattle. *J. Comp. Path.* 137: 71-77.
 12. Uzal, F.A.; Dobrenov, B.; Smythe, L.; Norris, M.; Dohnt, M.; Symonds, M.; O'Boyle, D.; Schouten, F. and Kelly, W.R. (2002) A study of "white spotted kidneys" in cattle. *Vet. Microbiol.* 86: 369-375.
 13. Yeruham, I.; Elad, D.; Avidar, Y. and Goshen, T. (2006) A herd level analysis of urinary tract infection in dairy cattle. *Vet. J.* 171: 172-176.