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Pathological findings of degenerative changes of heart of sheep (*Ovis aries*)

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Abstract

The present study was done to elucidate the pathological findings of degenerative changes of heart of sheep. A total 587 samples of cardiovascular system, irrespective of age, breed and sex were examined. Out of these, 147 specimens of heart, suspected for pathological abnormalities, were processed for histopathological examination. Degenerative changes were recorded in 23 cases. The occurrence of this condition was recorded as 15.65 per cent. Major degenerative changes of heart of sheep included myocardial necrosis, myocardial fibrosis, vacuolar degeneration, separation and degeneration of muscle bundles and fibers. Macroscopically heart was enlarged with pale necrotic areas. Discoloration of heart, pale streaking in the ventricular walls and the septum were also seen. On microscopic examination degeneration of myocytes and myofibrillar separation with necrotic areas and disappeared nuclei in myocardial cells were recorded, Loss of striations and coagulative necrosis were observed with mild infiltration of cells. Fibrosis was observed in myocardial cells with separation of muscle bundles. Abundance of fibers was present along with some areas of necrosis, mild infiltration of polymorphonuclear and mononuclear cells were present. Vacuoles were found between myocardial cells with mild infiltration. Vacuoles were of different size, shape and multiple in number. Myocardium showed degeneration, rupture and separation of muscle bundles. At the end of separated and ruptured fibers infiltration of polymorphonuclear and mononuclear cells were seen.

Keywords: Sheep, heart, degenerative changes, necrosis, fibrosis, vacuoles, pathology

Introduction

Sheep represent important part of world livestock industry. Sheep play important role in livestock farming industry in the rural and urban areas of world as well as in India. The total livestock population in the country is 535.78 Millions (20th livestock census). The total population of sheep in India is 74.26 Millions, with an increase by 14.10 per cent over previous census (20th Livestock census). Sheep contribute to the tune of 13.87 per cent to the total livestock population of the country. According to 20th livestock census, indigenous or non-descript sheep population is 70.17 Millions (94.49%) while exotic or crossbred sheep population is 4.09 Millions (5.51%). Rajasthan with 7.9 million sheep population is the 4th largest sheep rearing state of the country (20th livestock census).

The cardiovascular system is responsible for circulation of oxygenated and deoxygenated blood. It also helps in transporting various nutrients i.e. amino acids, electrolytes and sugar. It removes gaseous wastes from the body. Various endocrine hormones, excretory products are also transported by cardiovascular system. Therefore it became pertinent to study the cardiac affection and degenerative changes of heart of sheep.

Materials and Methods

In the present study, a total of 587 samples of cardiovascular system of sheep were examined grossly for pathological conditions. Out of these, 147 samples of heart, showing gross lesions, were collected in 10 per cent formal saline and processed for histo-pathological examination. Processing of tissues was done by paraffin embedding using acetone and benzene technique (Lillie, 1965) [11]. The tissue sections of 4-6 micron thickness were cut with help of hand operated microtome and stained as per haematoxylin and eosin staining method (Luna, 1968) [13].

Results and Discussion

The incidence of degenerative changes of heart of sheep in the present study was recorded as 15.65 per cent.

The incidence of degenerative changes of heart of sheep in the present study

1.	Degenerative changes	No. of cases	% occurrence
1.1	Myocardial Necrosis	6	4.08
1.2	Myocardial Fibrosis	4	2.72
1.3	Vacuolar Degeneration	5	3.40
1.4	Degeneration and separation of Muscle bundles and fibers	8	5.44
	Total	23	15.65

Degenerative changes of heart of sheep

On pathological examination degenerative changes were recorded in 23 cases. The occurrence of these changes was recorded as 15.65 per cent. Major degenerative changes of heart of sheep were myocardial necrosis, myocardial fibrosis, vacuolar degeneration and separation and degeneration of muscle bundles and fibers.

Myocardial Necrosis

This condition was found in 6 cases. The occurrence of this condition was recorded as 4.08 per cent. Lower incidence was recorded by Goswami (2018) [9] as 2.70 per cent. Macroscopically heart showed pale and necrotic areas (Fig.1). The macroscopic findings of pale necrotic areas are in close approximation to the findings reported by Uzal *et al.* (2003) [17]. On microscopic examination degeneration of myocytes and myofibrillar separation with necrotic areas were found with disappeared nuclei in myocardial cells. Loss of striations and coagulative necrosis were observed with mild infiltration of cells (Fig.2). Microscopic lesions observed in this study such as necrosis of myofibrils, degeneration of myofibers and loss of architectural structure are in agreement with findings of Abo-Shehada *et al.* (1991) [1], Agaoglua *et al.* (2002) [2], Aslani *et al.* (2007) [3], Dawood and Alsaad (2018) [7], Hamouda *et al.* (2019) [10] and Mohammed *et al.* (2019) [15].

Myocardial Fibrosis

This condition was found in 04 cases. The occurrence of this condition was recorded as 2.72 per cent. Similar incidence was recorded by Goswami (2018) [9] as 2.02 per cent. Grossly pale necrotic areas were seen on myocardial layer. Microscopically fibrosis was found in myocardial cells with separation of muscle bundles, Abundance of fibers were present along with this some areas of necrosis with mild infiltration of polymorphonuclear and mononuclear cells were present (Fig. 3, 4). The microscopic findings of this condition such as fibrotic lesions, necrotic areas, degenerative lesions and infiltration of cells are in close approximation to the findings of Prasad *et al.* (1973) [16] and Batista *et al.* (2019) [6].

Vacuolar Degeneration

This condition was found in 05 cases. The occurrence of this condition was recorded as 3.40 per cent. Grossly heart was increased in size. Macroscopic findings such as enlargement of heart are in close conformity with Goldberg (1926) [8] and Dawood and Alsaad, (2018) [7]. On microscopic examination vacuoles were found between myocardial cells with mild infiltration (Fig.5). Vacuoles were different in size, shape and multiple in number. Microscopic findings such as vacuolation between myocardial muscles are in close approximation to the findings of Prasad *et al.* (1973) [16] and Dawood and Alsaad (2018) [7].

Degeneration and separation of muscle bundles and fibers

This condition was found in 08 cases. The occurrence of this condition was recorded as 5.44 per cent. Lower incidence was recorded by Goswami (2018) [9] as 3.37 per cent. Macroscopically pale streaking in the ventricular walls and the septum were seen. Microscopically myocardium showed degeneration, rupture and separation of muscle bundles (Fig.6). At the end of separated and ruptured fibers infiltration of polymorphonuclear and mononuclear cells were seen (Fig.7). Microscopic findings of this condition including degeneration and separation of muscle bundles and fibers, infiltration are in close conformity with findings earlier reported by Aupperle *et al.* (2001) [5], Asopa (2012) [4] and Mehra (2013) [14].



Fig 1: Gross photograph of pale and necrosed heart of sheep.

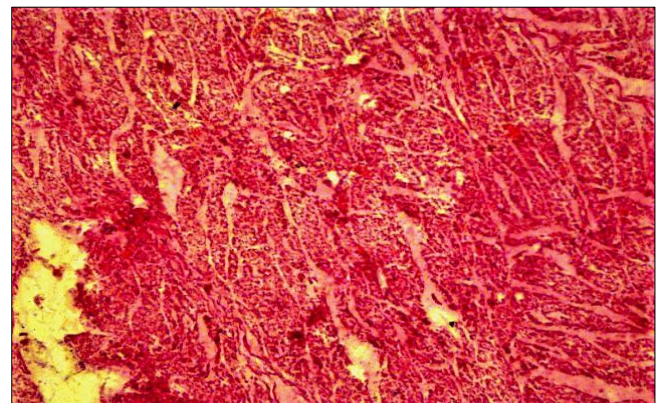


Fig 2: Microphotograph of myocardium of heart of sheep showing necrosis and separation of myofibers. (H&E, 100X).



Fig 3: Microphotograph of myocardium of heart of sheep showing fibrosis along with separation of muscle bundles. (H&E, 100X).

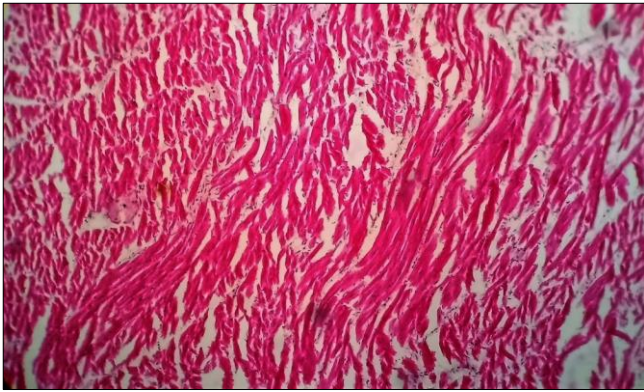


Fig 4: Microphotograph of myocardium of heart of sheep showing fibrosis and infiltration of polymorphonuclear and mononuclear cells. (H&E, 100X).

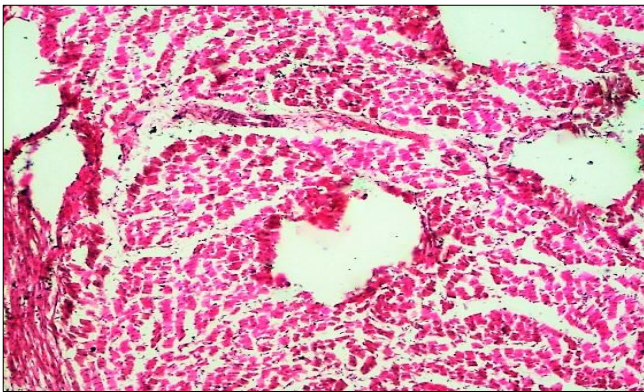


Fig 5: Microphotograph of myocardium of heart of sheep showing vacuoles between myocytes with mild infiltration. (H&E, 100X).

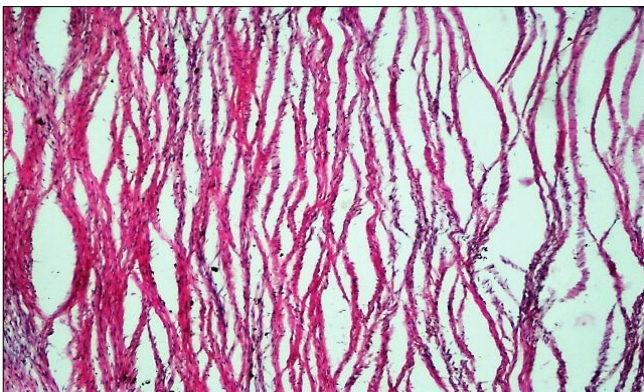


Fig 6: Microphotograph of heart of sheep showing separation of myocardial muscle fibers. (H&E, 100X).

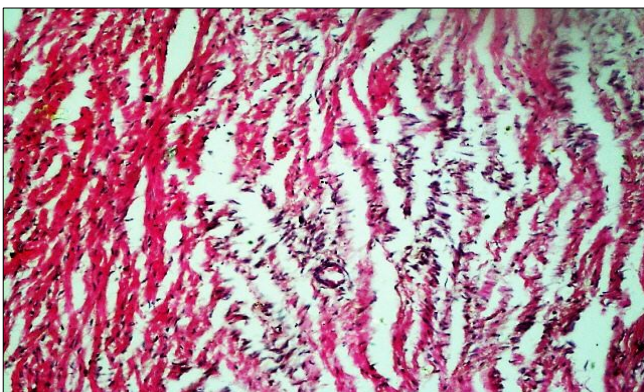


Fig 7: Microphotograph of myocardium of heart of sheep showing infiltration of leucocyte cells. (H&E, 200X).

Conclusion

It is concluded that the degenerative changes of heart muscles are pathological abnormalities in domestic animals resulting in weakness of animal with poor performance which in turn leads to economic losses to the rural and urban farmer.

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