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Occurrence and histopathology of various types of pneumonia in goat in Jaipur

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Abstract

The present investigation was carried out from March 2019 to December 2019. During this period, a total number of 630 specimens of lower respiratory tract samples of irrespective of age, sex and breeds were examined. Out of these representative samples 363 lower respiratory tract samples showed gross lesions, which were subjected to histopathological examinations. An overall occurrence of various types pneumonia in goats lower respiratory tract was observed 248 (68.31%) out of 363 samples. Different form of pneumonia was observed as bronchopneumonia 14.32 per cent, interstitial pneumonia 22.86 per cent, fibrinous pneumonia 5.78 per cent, suppurative pneumonia 18.18 per cent, haemorrhagic pneumonia 3.03 per cent, parasitic pneumonia 1.65 per cent, aspirated pneumonia 2.47 per cent.

Keywords: Pneumonia, Occurrence, histopathology

Introduction

Globally, India occupies second position in goat population and first position in terms of goat milk production. Total goat population in the country is 148.88 million and in Rajasthan 20.84 million. About 27.7% of the total livestock is contributed by goat (Livestock census 2019) [6]. Respiratory infections are most commonly found in goat flocks, affecting groups or individual. The lower respiratory tract consists of trachea, bronchi and lungs. Pneumonia in goats is associated with a wide range of infectious agents. Adverse weather conditions, stress, pregnancy, lactation, immunosuppression, and old age of animals favours the infection by normal inhabitants of the respiratory tract (Dadhich, 1996; Kumar *et al.*, 2014) [5, 4].

Material and Method

The study was conducted from March, 2019 to December, 2019 at slaughter houses and meat outlets of Jaipur. The tissue specimens were also collected from the carcasses of goats submitted to the department of Veterinary Pathology, College of post graduate institute of veterinary education and research (PGIVER), Jaipur for post mortem examination. Sampling was done from the affected lung and 0.5 cm thick lung tissues were collected in 10% NBF. For histopathological processing, the tissue samples were given overnight washing in tap water and dehydrated in increasing grades of ethyl alcohol, cleared in xylene and embedded in paraffin. From paraffin embedded tissue blocks, 4-5 µm thick tissue sections were cut on clean, grease free glass slides and haematoxylin and eosin staining was done. Then sections were examined under the light microscope for histopathological evaluation of tissue.

Result and Discussion

Table 1: Types of Pneumonia

Types of Pneumonia	248 (out of 363)	68.31%
Bronchopneumonia	52	14.32%
Interstitial Pneumonia	83	22.86%
Fibrinous Pneumonia	21	5.78%
Suppurative Pneumonia	66	18.18%
Haemorrhagic Pneumonia	11	3.03%
Aspirated Pneumonia	9	2.47%

Bronchopneumonia

Grossly, the lung becomes firmer and harder than normal. The affected lungs were appeared as liver. The lungs revealed the patchy to diffuse area of the consolidation in the cranial, cardiac and anterior parts of the diaphragmatic lobes. One or many lobules were affected which were red, firm and sank when put in water. The lymph nodes were swollen and hemorrhagic. The pleura over the affected parts showed inflammation of various degree with fibrinous exudates. The gross findings are in close approximation to the findings recorded by Ferdausi *et al.* (2008)^[2] and Kumar *et al.* (2014)^[4]. Microscopically, Primary lesion was seen as bronchiolitis. Air spaces were filled with inflammatory cells which are called consolidation. Inflammation was seen in the bronchus. Engorged blood vessels were seen in affected area of lung. Bronchi, bronchioles and alveoli was filled with exudate. Neutrophils and macrophages were severely infiltrated in

bronchioles, peribronchiolar spaces and in alveolies. Some haemorrhages, plasma and fibrinous exudates in area were seen. Purulent bronchopneumonia was characterised by heavy and severe neutrophilic infiltrations into the bronchus and the alveoli.

In acute bronchopneumonia found severe infiltration in bronchio-alveolar junction. And in chronic cases inter-alveolar septa were thickened due to proliferation of alveolar septal cells and inflammatory exudate. The bronchiolar lumen along with alveolar lumen filled with large number of polymorphonuclear and mononuclear cells forming bronchiolar obliteration. The blood vessels surrounding the bronchioles and interstitium were engorged and at places extravasation of erythrocytes into the parenchyma was present. The above observations are also in accordance with those described by Tijjani *et al.* (2012)^[1] and Ferdausi *et al.* (2008)^[2].



Fig 1: Gross photograph of lung showing broncho pneumonia.

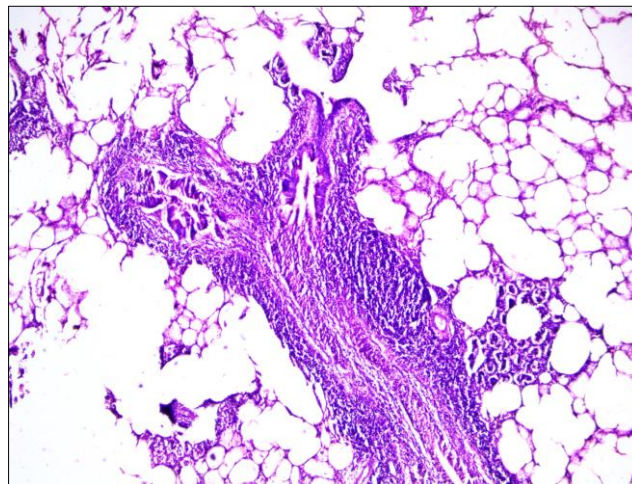


Fig 2: Microphotograph of lung showing bronchiolitis. The exudate with heavy infiltration of leukocytes filled bronchiolar lumina, H&E 100X.

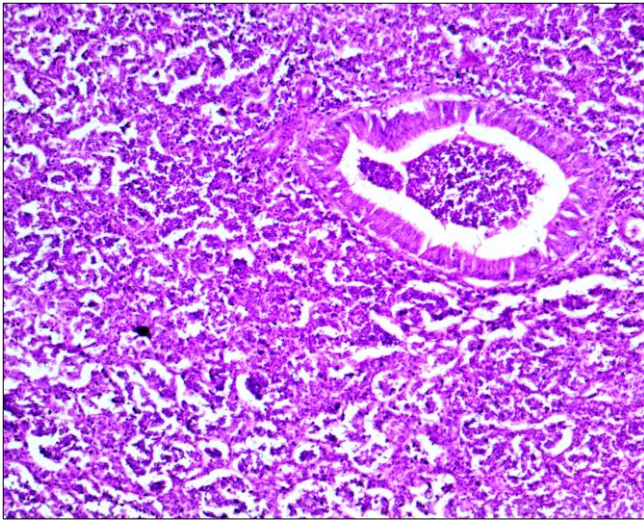


Fig 3: Microphotograph of lung showing Broncho pneumonia as bronchiolar and peribronchiolar, alveolar lumens are filled with heavy inflammatory cellular exudate, H&E 100X.



Fig 4: Gross photograph of lung having interstitial pneumonia

Interstitial Pneumonia

Grossly, the affected lungs appeared congested and consolidation with thickening on interlobular septa. The pleural surface had cyanotic blue. Affected lungs appeared congested and failed to collapse when thorax was opened. Lungs were also edematous and showed focal areas of consolidation. The affected lung portions were greyish in color, firm, rubbery and often failed to collapse. Cut surface revealed frothy exudates and fibrinopurulent fluid from the incised bronchi and bronchioles. The lesions were greyish pink areas of consolidation with presence of frothy exudates. Cut surfaces showed grey-white nodules embedded in the lung parenchyma. There were severe pleuritis and pleural adhesions to the affected lobes. The interlobular septa were prominent with fibrin deposition. On cutting fibrinopurulent fluid oozed out from the bronchi and bronchioles. These observations are similar to those described by Ceribasi *et al.* (2016) [40]. Microscopically, The affected areas were showing increased mononuclear cells in the interalveolar septa. Alveolar lumen contained neutrophils and inflammatory exudates. Alveolar wall more thickened due to inflammatory exudates accumulated in alveolar interstitium. Blood vessels were severely congested in the alveolar lumen. Proteinaceous fluid was leaking out into the alveolar lumen. Serum protein, cell debris and fibrin precipitate to form hyaline membrane lining of air spaces. Pleura were thickened with fibrin deposition and lymphocytic infiltration. Interlobular septa were very prominent and infiltrated by lymphocytes, macrophages, neutrophils and fibrin. Alveoli were filled with fibrin and neutrophils. There were mild interstitial thickening by lymphocytes and macrophages. Lamina propria of bronchi revealed infiltration by lymphocytes. Bronchitis and bronchiolitis with luminal presence of neutrophils and degenerated cells were noticed. Giant cells were also observed in alveolar exudates. The above findings are in concurrence with observation of Ceribasi *et al.* (2016) [40] and Tijjani *et al.* (2012) [1].

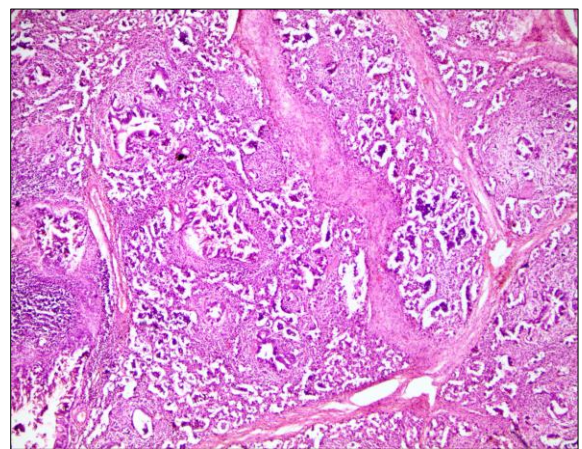


Fig 5: Microphotograph of lung showing chronic interstitial pneumonia characterized by marked proliferation of fibrous tissues in interlobular septa, around the bronchiole, and thickening of alveolar walls with infiltration of inflammatory cells, H& E 40X.

Fibrinous Pneumonia

Grossly, the affected lung grossly seen enlarged, consolidated and dark reddish color. The affected piece of lung sank when put in water.

Microscopically, the affected lung bronchioles filled with exudates. Which contained mononuclears, polymorphonuclears and degenerated detached bronchiolar epithelial cells suggesting bronchiogenic spread. Interlobular septa were thickened with infiltration of fibrinocellular. Some cases showed pleura was greatly thickened and infiltrated by mononuclear and polymorphonuclear cells. Peribronchial and perivascular tissues to replace the alveolar exudates filling the alveolar lumens and extending through the pores of Kohn. New fibroblastic tissue proliferate from alveolar walls in damaged areas. The above findings are in concurrence with observation of Dadhich, H. (1993) [5].



Fig 6: Gross photograph of lung having fibrinous pneumonia.

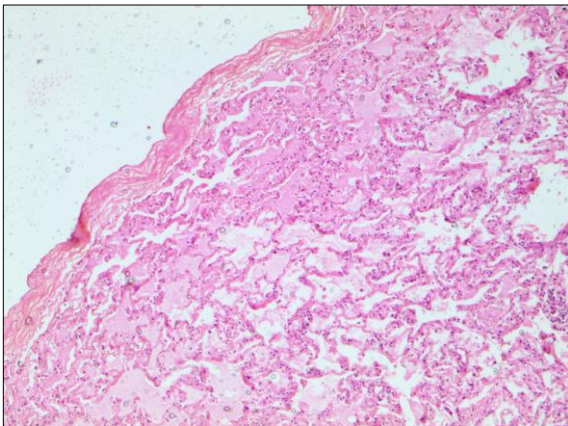


Fig 7: Microphotograph of fibrinous pneumonia in lung showing fibrin deposited in alveolies and thinning of septas and congestion, H&E 100X.

Suppurative Pneumonia

Grossly, The affected portions of lung were consolidated having grayish white foci caeseous upon incision. The lesions were mainly distributed over all lobes especially the cranioventral aspect of the lung. Microscopically, The bronchiolar and alveolar lumen were filled with exudates consisting mainly of polymorphonuclear cells (mainly neutrophils) and denuded epithelial cells, along with few mononuclear cells. Most of the area showed partial to complete destruction of alveolar walls forming purulent foci. In some areas abscessation were also observed. These findings are well in accordance with those mentioned by Mahdi *et al.* (2015) [41], Rashid *et al.* (2013) [24], ferdausi *et al.* (2008) [2].



Fig 8: Gross photograph of lung having suppurative pneumonia showing consolidation and grayish white foci distributed in all lobes.

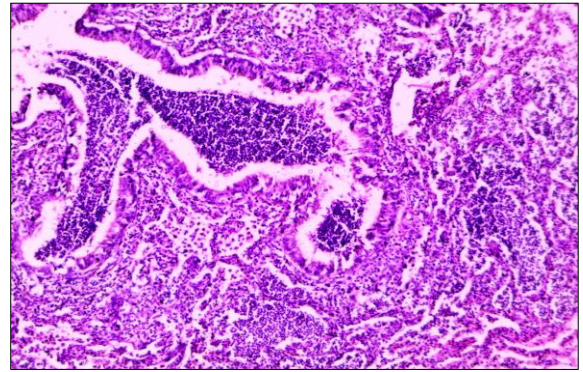


Fig 9: Microphotograph of suppurative pneumonia showing purulent bronchiolitis, exudate spread endobronchially to related alveoli, H&E 100X.

Haemorrhagic Pneumonia

Grossly - Lungs showed bright or red patchy haemorrhagic lesions. On incision little amount of blood with froth oozed out from affected areas. microscopically- Alveolar wall appeared thickened and congested. The alveolar and bronchiolar lumen were carried erythrocytes and pinkish serous fluid. The alveoli bronchioles apparedent homogenous eosinophilic mass due to lysis of erythrocytes and leukocytic infiltration appeared in alveoli and bronchiolar lumen showed diffuse severe dilatation and engorgement of alveolar capillaries and blood vessels along with multifocal severe haemorrhages within the alveoli, interalveolar septa and bronchioles. These observations are well in agreement with those described by Rashid *et al.* (2013) [24], Dadhich, H. (1993) [5].



Fig 10: Gross photograph of lung having haemorrhagic pneumonia showing dark red patchy lesions.

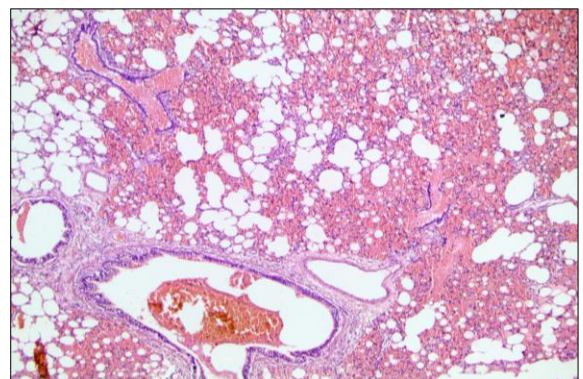


Fig 11: Gross photograph of lung having haemorrhagic pneumonia showing dark red patchy lesions.

Aspiration Pneumonia

Grossly - The affected portion of the lung showed patchy areas of congestion consolidation and greenish discolorations. The cut surface appeared greenish material in the lumina of bronchi and bronchioles. microscopically- The lung parenchyma showed presence of aspirated foreign material within the bronchi, bronchiolar and alveolar lumina, leading to their obliteration. This aspirated material produced purulent necrotic bronchiolitis. The surrounding lung tissue showed purulent and necrotic foci. The above findings are in concurrence with observation of Mekibib *et al.* (2019) [23].



Fig 12: Gross photograph of lung having aspiration pneumonia as aspirated feed material seen in trachea.

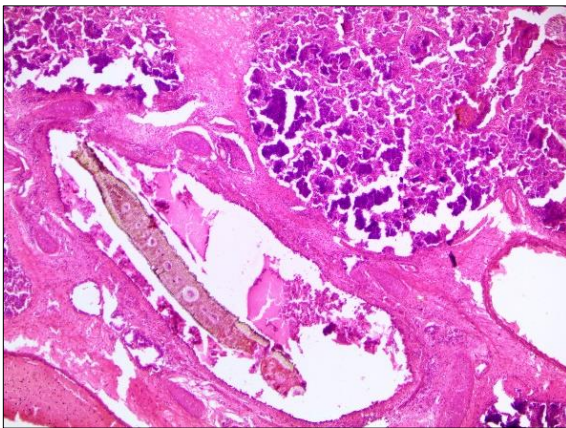


Fig 13: Microphotograph of lung section showing aspirated feed material seen in bronchiole with exudate and purulent changes in alveoli of lung tissues, H&E 40X.

Conclusion

In this study, overall occurrence of various types pneumonia in goats lower respiratory tract were observed 248 (68.31%) out of 363 samples. Different form of pneumonia were observed as bronchopneumonia 14.32 per cent, interstitial pneumonia 22.86 per cent, fibrinous pneumonia 5.78 per cent, suppurative pneumonia 18.18 per cent, haemorrhagic pneumonia 3.03 per cent, aspirated pneumonia 2.47 per cent.

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