



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2018; 6(4): 118-120

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Received: 05-05-2018

Accepted: 06-06-2018

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Survey of lung affections in sheep and goats: A slaughterhouse study

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Abstract

The present investigation was carried to study the occurrence of lung affections in the sheep and goats. The slaughterhouse, Shimla, Himachal Pradesh was surveyed from December, 2017 to February, 2018 and 800 lungs of sheep and goats were examined for gross pathological lesions. Total 127 lungs (38 sheep, 89 goats) tissues were collected in 10% buffered formalin and processed for histopathology. Bronchopneumonia was the most common type of pneumonia (27.55%) diagnosed by histopathology, followed by interstitial pneumonia (16.54%), maedi (6.3%), OPA (2.36%) and verminous pneumonia (1.57%). Among bronchopneumonia, acute bronchopneumonia (18.11%) was most common, followed by chronic bronchopneumonia (5.51%) and fibrinous bronchopneumonia (3.94%). Chronic interstitial pneumonia (10.25%) was more frequent than acute type (6.3%). Further, miscellaneous lesions viz. emphysema and atelectasis (21.26%), pulmonary hemorrhage (5.51%) and pulmonary edema and congestion (18.89%) were also seen. This study concludes that the occurrence of bronchopneumonia was higher than interstitial pneumonia in sheep and goats.

Keywords: Goats, pneumonia, sheep, slaughterhouse

Introduction

Livestock plays an important role in Indian economy and about 20.5 million people depend upon it for their livelihood providing employment to 8.8% of the population in India ^[1]. Among various causes of production losses in sheep and goat industry, losses due to infectious diseases are major contributors, which cause decrease in weight gain, milk yield, wool production and high mortality among kids and lambs ^[2]. Among pathological conditions diarrhea and pneumonia are most common causes of mortality in small ruminants, which constitute 35.71% and 28.57%, respectively ^[3].

Pneumonia in sheep and goats is associated with a wide range of infectious agents, which includes bacterial, viral, fungal and parasitic agents ^[4, 5, 6]. Bacterial pneumonias are most common and they may act as a primary or secondary cause to it ^[4, 5]. The viral diseases viz. PPR, bluetongue, sheep pox and some retroviral diseases i.e. ovine pulmonary adenocarcinoma (OPA) and maedi are associated with pneumonia, which pose great threat to intensive rearing of sheep and goats, and adversely affects international trade ^[6]. Pneumonia in sheep and goats is classified according to the involvement of different pulmonary regions and anatomical sites, and nature of the inflammatory exudate and reaction present ^[7, 8]. The alteration in the homeostatic environment of the lung parenchyma due to stressors like physiological/environmental stress, decreased immunity, infectious pathogens and the environmental pollutants lead to the development of the pneumonia ^[9]. The present investigation was carried out to study the occurrence of different pathological affections present in the lungs of sheep and goats.

2. Materials and methods

Survey of slaughterhouse: The Municipal Corporation slaughterhouse, Shimla, Himachal Pradesh, India was visited and about 800 lungs of slaughtered sheep and goats were thoroughly screened by gross examination for the presence of any pathological lesion.

Sample collection: Total 127 lungs (38 sheep, 89 goats) were showing the gross pathological lesions and tissue samples (0.5 cm thick) from these affected lungs were collected in 10% neutral buffered formalin (NBF).

Histopathology: After proper fixation of lung samples in 10% NBF, the samples were taken

out, trimmed and shifted to fresh 10% NBF solution. For histopathological processing, the tissue samples were given overnight washing under tap water and dehydrated in increasing grades of ethyl alcohol, cleared in xylene and embedded in paraffin. From paraffin embedded tissue blocks, 4-5µm thick tissue sections were cut on glass slides and hematoxylin and eosin (H & E) staining was done. Then sections were examined under the light microscope for pathological alterations [10].

3. Results and Discussion

In present investigation, altogether 127 lungs (38 sheep, 89 goats) were found to show pathological lesions and histopathological examination revealed various types of pathological conditions viz. bronchopneumonia, interstitial pneumonia, ovine pulmonary adenocarcinoma (OPA), maedi, verminous pneumonia, emphysema, atelectasis, haemorrhage,

edema and congestion (Table 1). Out of 127 lung tissues examined, bronchopneumonia was the most common type of pneumonia (27.55%), followed by interstitial pneumonia (16.54%), maedi (6.3%), OPA (2.36%) and verminous pneumonia (1.57%). Similarly, previous investigations also found bronchopneumonia as the commonest type of pneumonia in sheep and goats [7, 11, 12]. Microscopic alterations like inflammatory exudates predominantly of neutrophils was present in bronchi, bronchioles and alveoli in acute bronchopneumonia (Fig. 1A); proliferation of fibrous tissue, thickened pleura and predominantly mononuclear cell infiltration in chronic bronchopneumonia and fibrinous exudate mixed with neutrophils and macrophages predominantly in the bronchi, bronchioles and alveolar parenchyma in the fibrinous bronchopneumonia were reported in present study. Similar microscopic changes were reported by earlier researchers [8, 13, 14].

Table 1: Histopathological diagnosis of affected lungs in sheep and goats

Pneumonia	Sub-types of pneumonia	No. of cases	Occurrence (%)
Bronchopneumonia	Acute bronchopneumonia	23	18.11
	Chronic bronchopneumonia	7	5.51
	Fibrinous pneumonia	5	3.94
Interstitial pneumonia	Acute interstitial pneumonia	8	6.3
	Chronic interstitial pneumonia	13	10.25
Special pneumonia	Ovine pulmonary adenocarcinoma	3	2.36
	Ovine progressive pneumonia	8	6.3
	Verminous pneumonia	2	1.57
Other miscellaneous lesions	Emphysema and atelectasis	27	21.26
	Pulmonary hemorrhage	7	5.51
	Pulmonary edema and congestion	24	18.89
Total		127	100%

In the present study, acute bronchopneumonia was found in 18.11%, which may develop due to transportation stress and/or lower pulmonary defenses leading to pneumonia. Higher occurrence of acute bronchopneumonia vary from 33.3 to 44.33% as reported in previous investigations [7, 15]. Chronic bronchopneumonia was detected in 5.51% cases, which is higher than the earlier report [7]. While few reports are available in which comparatively higher occurrence 15-16% of chronic bronchopneumonia is reported [8, 16]. Fibrinous bronchopneumonia occurrence (3.94%) in present study was lower than the findings of others [15, 17]. Variation in the occurrence of different types of pneumonia in various reports may be due to the variability in the sampling season, geographical locations, disease predominance and the animal husbandry practices followed at the farms from which samples were collected.

Interstitial pneumonia was recorded in 16.54% cases, which was slightly higher than the earlier studies [7, 8, 12]. Interstitial pneumonia may develop due to the initial injury and the inflammation process in endothelium, alveolar epithelium and bronchiolar epithelium, which later leads to the infiltration of leukocytes and thickening of interalveolar septa (Fig. 1B). Acute interstitial pneumonia due to PPR in goats was reported in earlier studies [15, 18].

In OPA affected lungs, microscopically proliferation of alveolar pneumocytes and Clara cells of bronchioles is the characteristic feature (Fig. 1C). In present investigation, similar OPA histopathological features were observed in 2.36% cases. Earlier findings reported OPA prevalence between 0.50% to 10% [7, 12, 19]. Maedi like microscopic lesions were found in 6.3% lung tissues collected from HP slaughterhouse. In earlier reports, occurrence of maedi like

changes was comparatively lower [7]. Higher occurrence in present study may be due the different climatic and geographical area from which the samples were screened. The characteristic gross and microscopic lesions of maedi such as heavy whitish and meaty lungs, lymphoproliferation in the interstitium and BALT hyperplasia (Fig. 1D) were similar to those described by earlier workers [12, 20].

Verminous pneumonia was found in two (1.57%) cases of goats. Grossly, lungs were slightly enlarged in size and had few small grayish foci in the parenchyma. Microscopically, cut section of the parasitic structures of variable shape and size were observed in the lumen of the alveoli and bronchioles (Fig. 1E). The adjacent interstitial tissue was infiltrated with the MNCs and few eosinophils. Earlier reports revealed slightly higher occurrence (2.98%) of verminous pneumonia in sheep population [8]. Worldwide reports indicated the occurrence of verminous pneumonia in 3.8 – 4.7% in small ruminant population and *Dictyocaulus filaria* was the most common lungworm [21]. The other miscellaneous lesions observed in the present study included emphysema and atelectasis in 21.26%, pulmonary haemorrhage (Fig. 1F) in 5.51% and pulmonary edema and congestion in 18.89% cases. In earlier studies also these miscellaneous lesions in the lungs of sheep and goats were reported with varying degree of prevalence [7, 12, 16, 19].

From present investigation it can be concluded that the bronchopneumonia is more common than the interstitial pneumonia in sheep and goat population. Involvement of specific pneumonias like OPA, maedi and verminous pneumonia are also contributing in the lung affections of small ruminants.

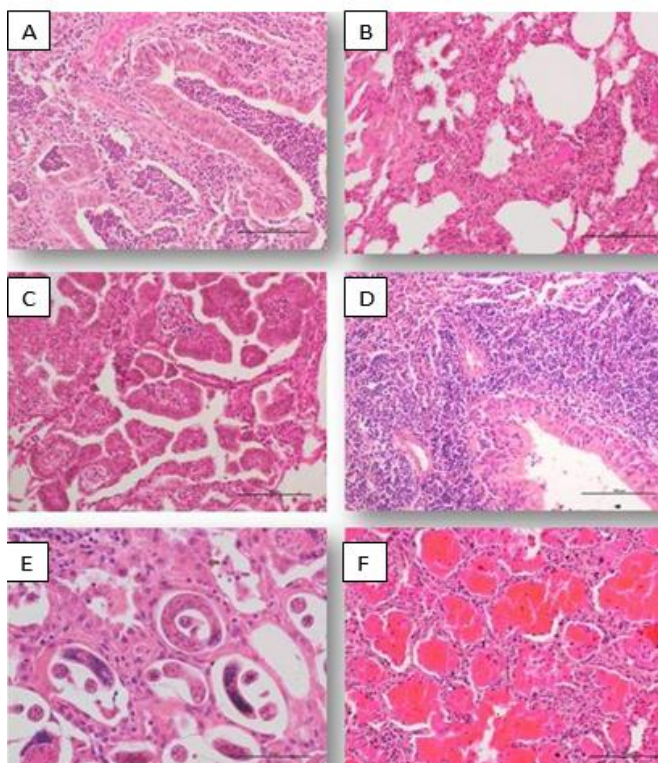


Fig 1A: Bronchopneumonia: Lung sections showing predominance of neutrophils, and few mononuclear cells infiltrations in the alveoli and bronchioles. H&E **B:** Interstitial pneumonia: Thickening of inter-alveolar septa with engorgement of blood vessels and mononuclear infiltration in the interstitium of lung. H&E **C:** Ovine pulmonary adenocarcinoma: Lepidic pattern of the proliferated pneumocytes with infiltration of neutrophils and MNCs. H&E **D:** Maedi: Marked lymphoid tissue proliferation in the BALT and formation of lymphoid follicular structures in interstitium. H&E **E:** Verminous pneumonia: Cross section of the worm present in the alveolar lumen with fibroplasia and infiltration of MNCs and eosinophils. H&E **F:** Pulmonary haemorrhage: Alveolar lumen filled with erythrocyte and engorgement of alveolar capillaries. H&E

Acknowledgments

The authors are thankful to the SERB-DST for providing funds and Director, ICAR-Indian Veterinary Research Institute, Izatnagar for providing the necessary facilities for carrying out this research work.

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