SHORT COMMUNICATION

Prevalence of Bacterial Infection in Lungs of Slaughtered Goats in North Eastern Uttar Pradesh

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Abstract

Goats are among the main meat-producing animals in India. Many bacteria, viruses, parasites and allergic reactions are contributors of pneumonia in goats. Pneumonia is a serious threat to either individual or flocks, resulting in poor live weight gain. In the present study 180 cases of goats slaughtered in the local market of Gorakhpur and Maharajganj districts of Uttar Pradesh were included. 63 lung samples exhibiting gross lesions of pneumonia were screened for bacteriological and histopathological changes. Identification of the organisms was done based on cultural, morphological and biochemical characteristics. Among the tested 63 lung samples, total 14 (22.22%), 08 (12.69) and 05 (07.93%) were found to be suggestive of *Escherichia coli*, *Staphylococcus* and *Klebsiella spp*., respectively. Necropsy revealed that 35% (63/180) of the slaughtered goats were infected with the lung lesions, and 42.87 % (27/63) of the lung lesions were due to the bacterial agents or organisms.

Key words: Bacterial isolates, Biochemical tests, Goat, Lungs, Pneumonia, Slaughter.

Ind J Vet Sci and Biotech (2022): 10.21887/ijvsbt.18.3.29

Introduction

In small ruminants, pneumonia is one of the most common respiratory problems worldwide. Pneumonia is a serious threat resulting in poor live weight gain, decreased milk and wool production, less number of off-spring, and a high mortality rate (Mc Gavin and Zachary, 2007). Lung lesions in sheep and goats are multifactorial. Pneumonia caused by *Pasteurella multocida* can lead to significantly decreased growth performance. Most of these organisms are secondary pathogens. In animals whose lungs are already weakened from previous diseases, increased leukotoxins and lipopolysaccharides, accelerate inflammation and severe damage to lung parenchyma (Jubb *et al.,* 2015).

Goat is one of India's most important sources of animal protein for human consumption. Therefore, it is important to know the prevalence of various affections causing pneumonia under different rearing and geo-climatic conditions, which might directly or indirectly affect human health. This study aimed to isolate and identify the various bacterial agents involved in lung lesions of goats.

Materials and Methods

One hundred and eighty goats slaughtered locally at different markets of Gorakhpur (n=120) and Maharajganj (n=60) districts of the Eastern plain zone of Uttar Pradesh between December 2020 and May 2021 were included in the present investigation. The lungs exhibiting gross pathological lesions on necropsy were considered for sampling, irrespective of sex, breed and age. The lungs (n=63) showing gross lesions were primarily disinfected with 70% alcohol to remove surface contaminants. The lungs were then cut into two halves by a sharp sterile knife. One-half of each lung was put into 10% neutral formalin for histopathological study and another half was kept aseptically in an ice box and brought to the laboratory for bacteriological study.

Bacteriological Examination

Impression smears from one-half of each granulomatous lung were stained by Zeihl-Neelson's method for detecting

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How to cite this article: Jaiswal, S.K., Niyogi, D., Tripathi, K.K., Shrivastav, D.P., Yadav, V., Gupta, R.K., Singh, S. (2022). Prevalence of Bacterial Infection in Lungs of Slaughtered Goats in North Eastern Uttar Pradesh. Ind J Vet Sci and Biotech. 18(3), 122-124.

Source of support: Nil

Conflict of interest: None.

Submitted: 20/01/2022 **Accepted:** 25/06/2022 **Published:** 10/07/2022

the presence of acid-fast bacterial organisms. All the lungs showing gross lesions were minced separately, and a portion of minced tissues was also inoculated aseptically into the Nutrient broth to enrich the organisms and incubated at 37°C for 24 h. The incubated broth samples were inoculated directly into different selective media (MacConkey's Agar, Eosin Methylene Blue Agar, Brilliant Green Agar, 10 % Salt Agar, Blood Agar) to isolate the specific common bacterial organisms. The inoculated agar plates were incubated overnight at 37°C. Identification of the organisms was made based on cultural, morphological and biochemical characteristics following standard procedures as described by Aneja (2003).

Histopathological Examination

The lungs kept in 10 % neutral formalin were cut into thin pieces (about 2-4 mm thickness) and kept under running tap water overnight to remove all formalin from the tissues. Then the tissues were dehydrated through ascending grades of alcohol (50%, 70%, 80%, 90% and absolute alcohol) followed by clearing in xyline. The cleared transparent tissues were subjected to routine paraffin embedding techniques and blocks were prepared. The blocks were then cut into 4-5 micron thickness with a fully automatic microtome (Medimes, MRM-AT). The cut sections were fixed on clear glass slides and stained with Haematoxylin and Eosin (Luna, 1968).

Results and Discussion

The data presented in Table 1 reveals that 35% (63/180) goats were suffering from various lung lesions. Also, numerically there was minor difference in lung lesions between two local markets, *i.e.,* Gorakhpur (44/120, 36.67 %) and Maharajganj (19/60, 31.67 %) and thus, it can be presumed that geographical area has no impact on lung infection rate. Further, the emphysematous lungs observed were highest (17.77%) followed by pulmonary edema (07.77%), hemorrhagic lesions (06.11%), granulomatous lesions (01.67%) and the least occurrence of verminous pneumonia and interstitial pneumonia (0.55% each) was noted (Figs. 1 to 4). Only one case of fibrosarcoma (0.55%) was found in the total lung lesions observed in the present study.

The different pathological conditions of the lungs observed in the goats slaughtered in the local market of Gorakhpur and Maharajganj districts were more or less similar with the reports of Priyadarshi *et al*. (2013), Mishra *et al*. (2018), Hashemnia *et al*. (2019) and Mashed *et al*. (2019) in the sheep and goats.

Prevalence of Bacterial Isolates

Out of 63 lung samples cultured, 27 yielded different bacterial isolates, either single or mixed. Based on typical colony characteristics, morphology, motility, and biochemical

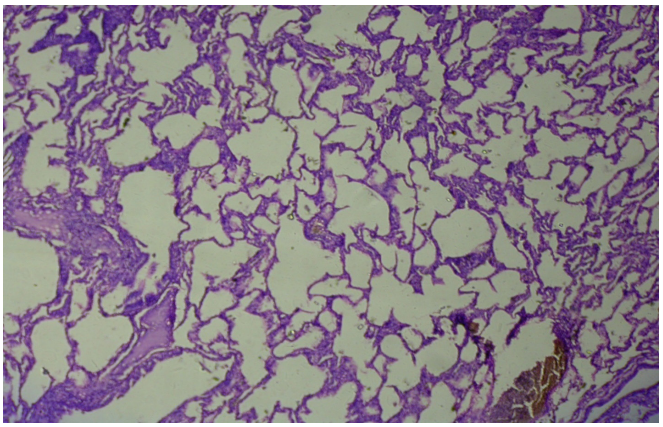

Fig. 1: Section of the lung showing rupture of alveoli forming giant alveoli and remnants of alveolar wall. H & E X 200

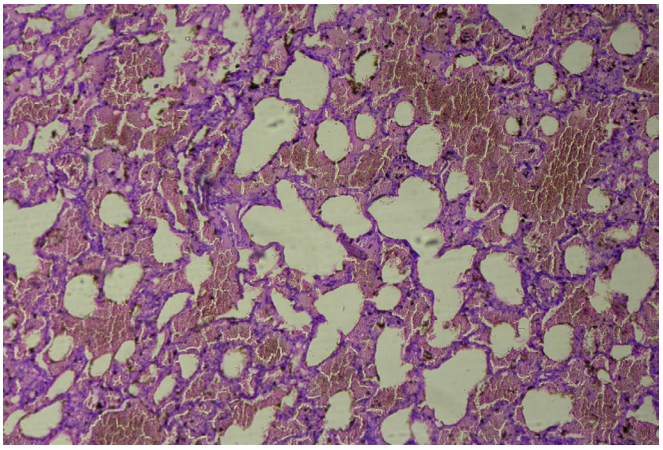

Fig. 2: Section of the lung showing the presence of large number of erythrocytes in the interstitial spaces. H & E X 200.

Table 1: Distributions of different lung lesions in slaughtered goats in Gorakhpur and Maharajganj district

Lung lesions	*No. of Lung lesions*		*Total No. of Lung lesions*
	Gorakhpur n=120	*Maharajganj n=60*	*n=180*
Emphysematous lungs	23 (19.17%)	09 (15.00%)	32 (17.77 %)
Haemorrhagic lungs	08 (6.67%)	03 (5.00%)	11 (06.11 %)
Fibrosarcoma	01 (0.83%)	Nil	01 (0.55 %)
Granulomatous pneumonia	02 (1.67%)	01 (1.67%)	03 (01.67 %)
Verminous pneumonia	01 (0.83%)	Nil	01 (0.55 %)
Pulmonary oedema	09 (7.50%)	05 (8.33%)	14 (07.77 %)
Interstitial pneumonia	Nil	01 (1.67%)	01 (0.55 %)
Total	44 (36.67 %)	19 (31.67 %)	63 (35.00 %)

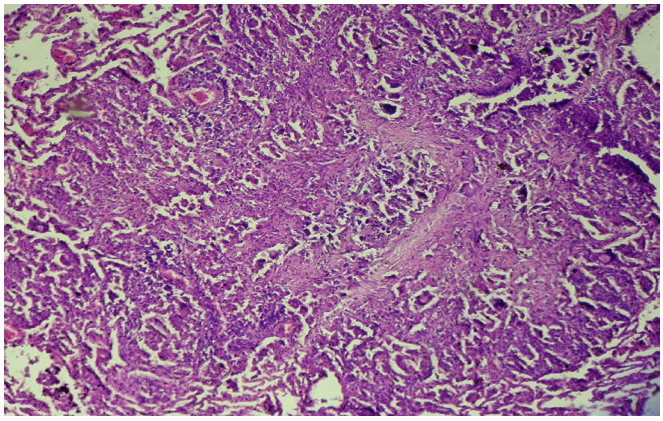

Fig. 3: Section of the lung showing well defined granulomatous lesions having mucoid cells and multinucleated giant cells. H&E X 200

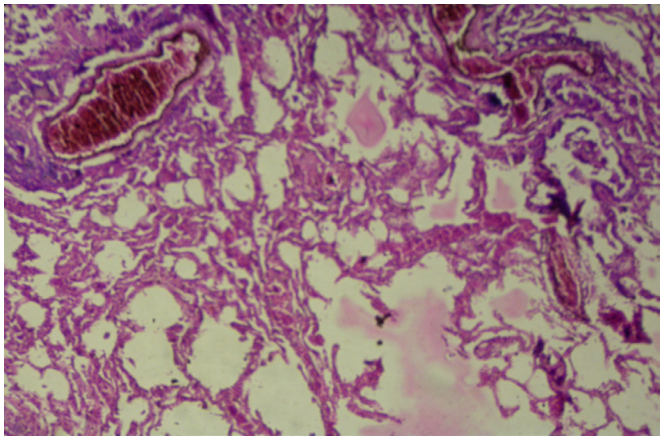

Fig. 4: Section of the lung showing congestion of the blood vessels, rupture of the alveoli and severe pulmonary oedema. H&E X 200

properties, the highest frequency of organisms observed was of *Escherichia coli* (14, 22.22%) followed by *Staphylococcus* (08,12.69%) and *Klebsiella* spp. (05, 7.93%). Our observations are nearly similar to the earlier report of Mahmoud *et al*. (2005), who reported bacterial isolates, *viz., Staphylococcus aureus* (12%), *Streptococcus pneumonia* (04%), *E. coli* (08%), *Pseudomonas aeroginosa* (04%) and *Klebsiella pneumonia* (08%) in sheep and goat.

Histopathological Findings

The lungs affected with emphysema showed rupture of alveoli and formation of large alveoli (Fig. 1). In hemorrhagic lung alveoli were filled with erythrocytes in multiple focal areas. The erythrocytes were also present in the interstitial tissue of the lung (Fig. 2). One sample of lung showed granulomatous lesions characterized by proliferation of fibrous connective tissue with infiltration of epithelioid and giant cells (Fig. 3). Pulmonary edema was found in nine cases characterized by congestion of blood vessels, rupture of alveoli, and edematous fluid in large ruptured alveoli (Fig. 4).

Conclusion

From the present study it is concluded that the 35% (63/180) of the slaughtered goats were suffering from pneumonia, out of which 42.87 % (27/63) were found infected with the bacterial agents or organisms.

Acknowledgement

The authors are highly thankful to the Dean, C.V.Sc. & A.H, ANDUAT, Kumarganj, Ayodhya for providing facilities required for research work.

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