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Epidemiological studies on sheep bacterial respiratory tract infections in and around proddatur, YSR Kadapa, Andhra Pradesh

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Abstract

Sheep showing clinical signs of nasal discharges, coughing, fever and dullness were tentatively diagnosed as respiratory tract infections were included in the present study which were confirmed as respiratory diseases of bacterial origin through cultural examination. Over all occurrence of sheep respiratory tract infections is found to be 2.09% (54/2768) in the study period. Age-wise analysis revealed higher occurrence of respiratory tract infections in 3-6 m age group (42.20%) followed by 6-12 months (29.97%) and lower in 3months (14.68) followed by 1-3 years (13.15%) . Occurrence was higher in Male animals compared to female. Relatively higher occurrence was observed in rainy season (55.66%) followed by winter (31.19%) and a comparatively lower occurrence in summer (13.15%). Month wise occurrence analysis revealed higher number of cases in the month of September (n=60) followed by October (n=53), November (n=47) and August (n=45). Whereas lower incidence was observed in the month of May (n=7) followed by April (n=11). Relatively higher prevalence (22.66%) is recorded in semi intensive farming system when compared to open grazing system of rearing (10.81%).

Keywords: sheep, bacterial respiratory tract infections, *Mannheimia haemolytica*, occurrence, epidemiology

Introduction

Respiratory tract diseases are considered to be most common entity of livestock health and pneumonia is considered as single greatest cause of death in sheep as they seems to have a very low resistance to respiratory tract infections.

Sheep pneumonia outbreaks are usually characterized by high morbidity, low mortality, and impaired weight gain. At early stages, sheep show pyrexia, cough, nasal discharges, anorexia, reduced growth rates and decreased milk production (in dairy ewes). Complication of the disease, characterized by pleuritis, pulmonary consolidation, abscess formation and fibrinous pneumonia can lead to mortality of the animal with high economic losses for the shepherd besides reduced feed efficiency as well as expenses related to treatment and prevention measures ^[1].

Assessment of clinical and epidemiological aspects of disease is necessary to prevent any future outbreak situation through planning an effective disease control and management strategy ^[2]. Besides rapid and accurate identification of *M. haemolytica* and concurrent etiological agents, study of associated risk factors combining with adaptation of good management practices plays crucial role in reducing the disease occurrence.

Hence the present study was carried out to study the epidemiological factors associated with sheep bacterial respiratory tract infection in and around Proddatur, YSR Kadapa district, Andhra Pradesh.

Materials and Methods

Sheep ailing from respiratory signs like coughing, nasal discharge, pyrexia from various sheep flocks and semi intensive organized farms in and around Proddatur, YSR Kadapa district, Andhra Pradesh, India were included for this study. Dead sheep with the history of respiratory illness were also included in the current study. Selection criteria were, sheep with nasal discharges, coughing, dullness, pyrexia and sheep died with such history. Sheep flocks and organized farms were visited during the study period (July-2017 to August-2020) and collected detailed history of respiratory illness and other relevant epidemiological data in a proformas for further analysis.

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Nasal swabbing was carried out using sterile nasal swabs from ailing sheep. Sheep that died due to respiratory illness were subjected to postmortem examination and lung specimens were collected for isolation, PCR work and histopathology (in 10% formalin).

Results and Discussion

Occurrence

A overall occurrence of sheep respiratory tract infections in present study was found to be 2.09 per cent (54/2768) among which 54 samples (33 nasal swabs and 21 lung tissues were positive for *Mannheimia haemolytica* and nine lung samples were positive for *Mycoplasma ovipneumoniae*. This finding is in accordance with the findings of earlier workers (2019) from Andhra Pradesh [3] and from Uttar Pradesh [4] who recorded prevalence of 2.57 per cent and 8.62 per cent respectively.

Whereas, higher prevalence of 24.18 per cent lung affections were reported in northern temperate regions of India and they attributed to unfavourable and frequently fluctuating environmental conditions in the Kashmir valley as well as intensive rearing system with minimal ventilation for most part of the year except summer season [5].

A multi-centric study from various regions of India in an attempt to study pathological lung lesions of sheep and goat and documented 20 per cent of pneumonic lesions. They documented fibrinous pneumonia in 11.1 per cent of cases mostly associated with pasteurellosis which is in accordance with the present finding [6].

The reports from other parts of the world (Ethiopia) showed higher prevalence of respiratory tract infections in a range of 16 to 37.1 per cent [7, 8, 9].

The variations in the prevalence might be due to geographical location of study area, managerial practices and environmental conditions prevailing in the respective regions.

Age wise occurrence

A higher prevalence was observed in the age group of 3-6 months (42.20%) followed by 6-12 months (29.97%) and lower in 3months (14.68) followed by 1-3 years (13.15%). (Table 1 and Fig, 1).

Table 1: Age-wise occurrence of sheep respiratory infections

Age group	No of cases	Per cent (%)
<3months	48	14.7
3-6 months	138	42.2
6-12 months	98	30.0
1-3 years	43	13.1

This observation of higher prevalence in less than one year age group has also been recorded by earlier workers [1, 9, 10]. Higher lamb mortality due to respiratory infections in less than 15 days group in lambs over 28 days age group [1].

A lower prevalence rate in above one year age group in the present study was in accordance with earlier researchers [3, 5, 7, 9, 10]. Relatively lower prevalence rates in the age group of more than one year can be attributed to well-developed immune status and acclimatization towards various environmental and managerial risk factors. Higher prevalence in the young animals (3-6 months) in the present study might be due to stress associated with early weaning, waning of maternal derived antibodies and thereby compromising the immune status of the animals.

Sex wise occurrence

Relatively higher number of cases were recorded in male animals (57.49%) when compared to female (42.51%) (Fig.2 and Table.2).

Table 2: Sex-wise occurrence of sheep respiratory infections

Sex	No of cases	Per cent (%)
Male	188	57.49
Female	139	42.51

This finding is in concurrence with that of earlier worker who observed higher incidence of pneumonia in male small ruminants and attributed to sniffing of the female goat by the male during estrous. [11] In contrary to this finding, higher prevalence of pasteurellosis was reported in female animals, which was attributed to diminished immune status in females during lambing and estrous periods, good care and higher plane of nutrition received by the rams for fattening purpose. [7]

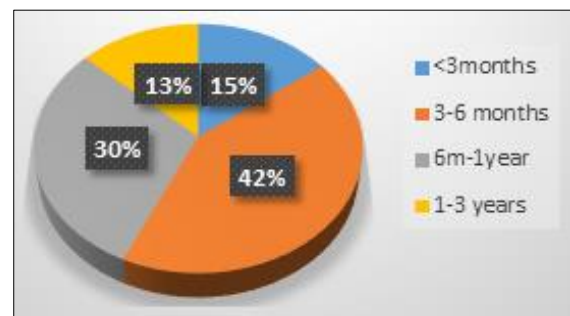


Fig 1: Age- wise occurrence of sheep respiratory infections

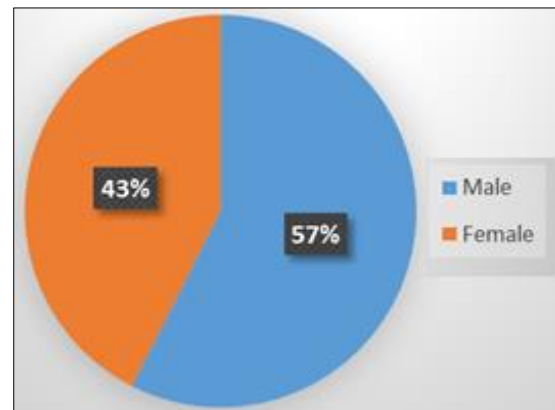


Fig. 2: Sex- wise occurrence of sheep respiratory tract infections

Season and month-wise occurrence

Season-wise analysis of disease occurrence revealed higher number of cases in monsoon season (55.66%) followed by winter (31.19%) and a comparatively lower no of cases were observed in the summer months (13.15%) (Table.3 and Fig.3). Higher incidence in monsoon season was attributed to higher relative humidity and greater concentration of contaminating agents like ammonia that favoured the invasion, growth and multiplication of *M. haemolytica*, *Mycoplasma ovipneumoniae* and other pathogens [11]. However, some workers observed higher lamb mortality due to pneumonia during the particular rainy days of autumn. [1]. Contrary to this, higher prevalence was observed in winter

months by few workers which was attributed to the high rain fall of the area in winter and spring exposing the animals to cold stress [7, 12].

Higher prevalence of pneumonic manheimiiasis in Syrian Awassi sheep was reported during the summer and winter months and the variation was considered due to adverse climatic conditions such as desert climate, drought, and shortage of rainfall, wind, dust and cold. [13] Peak prevalence was reported in the late summer and autumn in Australia and New Zealand, whereas; winter in European countries and this differences in seasonal occurrence might be due to prevailing climatic conditions and seasonal patterns in respective geographical areas [14].

Table 3: Season- wise occurrence of sheep respiratory tract infections

Season	No. of cases	% of cases
Summer	43	13.15
Monsoon	182	55.66
Winter	102	31.19

Month-wise occurrence

Month wise analysis of disease occurrence revealed higher number of cases in the month of September (n=60) followed by October (n=53), November (n=47) and August (n=45).

Whereas lower incidence was observed in the month of May (n=7) followed by April (n=11). Data depicted in the Table 4 and Fig.4.

Table 4: Month-wise occurrence of sheep respiratory tract infections

Month	No. of cases
January	16
February	12
March	14
April	11
May	7
June	12
July	23
August	45
September	60
October	53
November	47
December	27

This finding can be explained by the fact that, majority of the rainfall is received during the periods of monsoons which coincides these months in Andhra Pradesh, thus exerting stress on animals. Similar observation was also made by earlier worker who attributed this to monsoon patterns in the studied geographical areas [3].

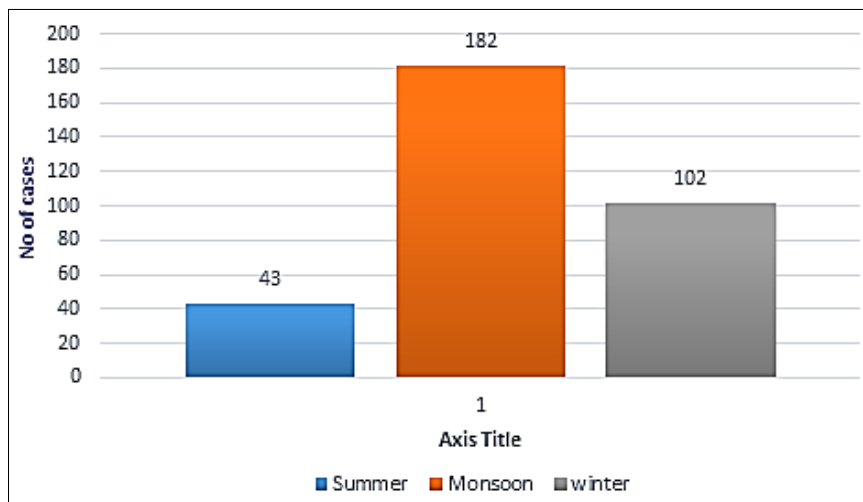


Fig 3: Season-wise occurrence of sheep respiratory infections

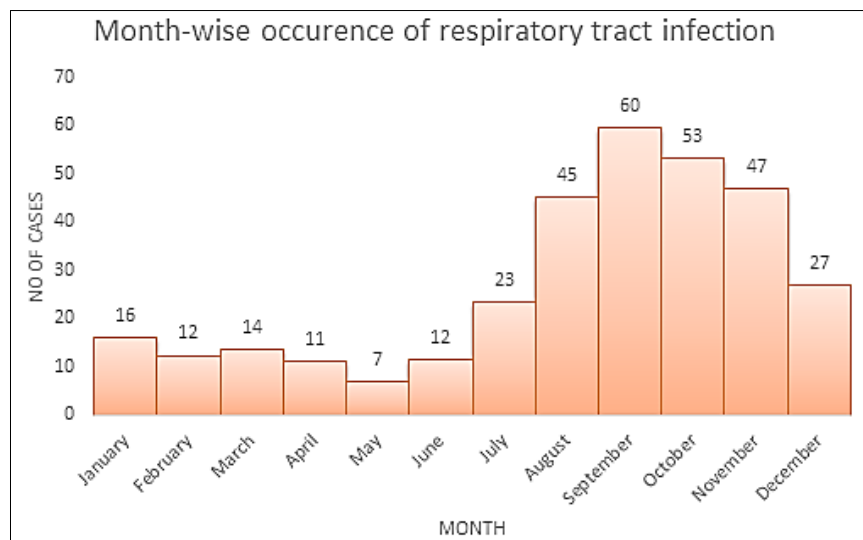


Fig 4: Month-wise occurrence of respiratory infections in sheep

Influence of rearing system on occurrence of sheep respiratory tract infections

The current study revealed higher prevalence (22.66%) of the respiratory infections in semi intensive farming system when compared to open grazing system of rearing (10.81%). This variation might be due to close proximity between the healthy and ailing animals within in confinement for longer duration.

Table 5: Farming system –wise occurrence

Type of farming	No of ailing animals	% of positivity
Extensive farming (Open grazing system)	240/2220	10.81
Semi intensive farming	87/384	22.66

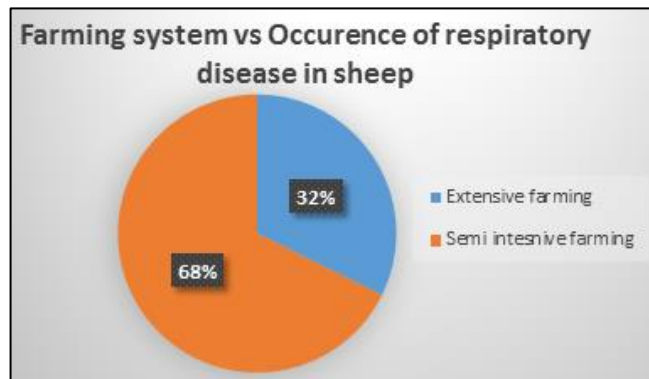


Fig 5: Farming system wise occurrence

In spite of risk of under nutrition, infrequent inspection of health status, extreme weather conditions like severe winter and monsoons, extensively reared sheep are at low risk from infectious diseases compared to intensive farming. Sheep on enclosed land are usually kept at much higher stocking densities and thus particularly at risk of infectious diseases spread by close contact^[15].

Contrary to our finding other researcher documented significantly higher incidence in extensive management system when compared to semi intensive system of rearing and attributed to unrestricted contact between sheep.^[7]

Conclusion

As the sheep is considered to be one of the chief protein source for the human being which is more vulnerable to respiratory infections among which bacterial etiology has of prime importance. Present study emphasizes need and scope of developing vaccine against *Mannheimia haemolytica* as there is currently no prophylactic vaccine is available against sheep bacterial pneumonia in India.

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