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INCIDENCE AND RISK FACTORS OF CHRONIC RESPIRATORY DISEASE IN INDIAN POULTRY FLOCKS

Susitha Rajkumar[1*], M.R. Reddy and R. Somvanshi[2]

Avian Health Lab, Directorate of Poultry Research, Hyderabad, Telangana State, India
[1]Central Coastal Agricultural Research Institute, Goa, India, [2]Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh, India
E-mail: susithavet@yahoo.co.in ([*]*Corresponding Author*)

Abstract: Chronic Respiratory disease is an economically important disease of chicken caused by *Mycoplasma gallisepticum*. The present study was carried out to study the incidence and factors affecting the incidence of CRD in poultry flocks under Indian conditions. Incidence during different seasons, among different types and breeds of chicken and among different age groups were studied. The overall incidence of CRD was 11.50%. Highest incidence was during summer followed by winter and rainy season. CRD incidence was highest in broiler type birds followed by indigenous and layer type. Among different age groups viz. chicks, growers and adults, the incidence was 6.62, 18.52 and 9.25%, respectively. The incidence was 12.89 and 8.04% in males and females. The results show an alarming rate of incidence of CRD cases in organised poultry farms which needs to be controlled and significant effect of various factors on CRD incidence.
Keywords: Chronic Respiratory Disease, incidence, poultry, risk factors, season, breed.

Introduction

Chronic Respiratory Disease (CRD) caused by *Mycoplasma gallisepticum* is one of the important infectious diseases of poultry causing huge economic losses to the industry. Avian mycoplasmosis caused by *M. gallisepticum* and *M. synoviae* has long been subject of extensive research due to its economic significance. Infection with these pathogens causes severe economic loss due to mortality, carcass condemnation, and reduction in the egg production, hatchability, feed efficiency and weight gain. In order to address these problems a variety of intervention strategies has been used in the poultry industry including biosecurity, vaccination and antimicrobial therapy. However, despite these advances in control strategies the avian mycoplasmosis still continues to be a major disease concern to the poultry industry worldwide including India. Climate is an extremely important environmental factor, which may have serious effects on the occurrence of diseases in poultry. As there is limited data on the incidence of CRD in Indian poultry flocks with regard to different climatic conditions and

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among different types of birds, the present work was carried out to study the incidence of CRD in an organized poultry farm for a year based on post mortem examination.

Materials and methods

Poultry carcasses from an organized poultry farm at Hyderabad, Telangana State obtained during the period from March 2013 to February 2014, were subjected to detailed necropsy examination. CRD cases were identified based on the gross lesions in the air sac, trachea, lungs, oviduct, joints, keel bursa and conjunctiva and gross lesions were recorded. The lesions of CRD were scored from 0 to 4+ based on the intensity of air sac lesions. The lesion scores include 0 (No Air sac lesion), CRD1+ (Presence of slight cloudiness of air sac membrane), CRD2+ (the air sac membrane is thickened with small accumulation of cheesy material), CRD3+ (Air sac is thickened and meaty in consistency with large accumulation of cheesy mass in the air sac) and CRD4+ (includes lesions in the 3+ with pericarditis and perihepatitis) [1]. The concurrent conditions observed in CRD cases were also recorded. The season-wise (summer, rainy and winter), month-wise, type-wise (Layer, broiler and indigenous), breed-wise and age-wise (chick, grower and adult) incidence of CRD was calculated and expressed as percentage over numbers of birds examined. Also the percentage of different lesion scores in different types, age groups and seasons were calculated. Chi-square test was used to compare incidence rate among different seasons or groups. All statistical analysis was carried out using PROC MEANS and PROC FREQ of SAS version 9.3 [2].

Results

A total of 13,394 birds were examined during routine post mortem examination for 12 months study period from March 2013 to February 2014. Based on gross lesions the overall incidence of CRD was 11.50% (1,540 out of 13,394 birds examined). Among different seasons, the incidence of CRD was observed highest during summer (16.99%) followed by winter (9.24%) and rainy season (6.24%). The incidence was observed highest in the month of May (23.94%) and lowest in the month of August (4.45%). Statistical analysis by Chi-square test shows that there is significant difference ($P<.001$) between the incidences in different seasons as well as in different months. The season-wise and month-wise incidence of CRD are presented in Table.1 and 2 respectively.

Birds examined were belonging to 19 breeds/lines of chicken that were broadly classified as three types (broiler, layer and indigenous). In different type of birds, the incidence of CRD was highest in broiler type birds (17.49%) followed by indigenous breeds (10.04%) and layer

type birds (4.68%) (Table.3). Among 19 breeds/ lines the highest incidence was recorded in broiler line PB2 (20.99%) and lowest in layer line IWI (2.99%) (Table.4). Statistical analysis shows a significant difference (P<0.001) between the incidence in different types and in different breeds. Among different age groups, highest incidence of CRD was observed in growers of 6-20 weeks age (18.52%) followed by adults of > 20weeks (9.25%) and chicks of <6 weeks age (6.62%) (Table.5). The difference in CRD incidence among age groups are significant statistically (P<.001). In adults, the incidence was 12.89% in males and 8.04% in females.

Based on the severity of air sac lesions, the CRD cases were scored as CRD1+, 2+, 3+ and 4+ intensity. The incidence based on the severity of lesions in different types of chicken and in different age groups is presented in Tables 4.2 and 4.4, respectively. The overall distribution of CRD1+, 2+, 3+ and 4+ intensity was 62.4, 26.36, 7.53 and 3.7%, respectively. In broilers the distribution of CRD1+ and 2+ intensity were almost similar (41.38 and 43.19%) followed by CRD 3+ (9.52%) and CRD 4+ intensity (5.91%). The distribution of lesions scores among layers and indigenous chicken was similar with 71.43 and 76.46% CRD1+, 17.86 and 15.20% CRD 2+, 8.93 and 6.06% CRD 3+ and 1.79 and 2.29% CRD4+ intensity.

The distribution of four different lesion scores was similar among three age groups. The distribution of CRD1+ intensity was 63.58, 61.47 and 63.48%, CRD2+ intensity was 25.17, 28.89 and 21.91%, CRD3+ intensity was 7.95, 5.83 and 10.83%, and CRD 4+ intensity was 3.31, 3.8 and 3.78% in chick, grower and adult chicken, respectively. The overall trend of lesion scores in adult male and females was similar however; the incidence of CRD1+ intensity was higher in males (70.29%) as compared to females (59.85%).

Table 1. Season-wise incidence of Chronic Respiratory Disease based on necropsy findings

Season	Total Birds Necropsied	Birds positive for CRD		χ2Value	Probability
		No	Percentage		
SUMMER	5455	924	16.99	285.2554	<.0001
MONSOON	3924	245	6.24		
WINTER	4015	371	9.24		

Table 2. Month-wise incidence of Chronic Respiratory Disease based on necropsy findings

Month	Total Birds Necropsied	Birds positive for CRD		χ2Value	Probability
		No	Percentage		
March, 2013	1143	117	10.24	547.5378	<.0001
April, 2013	888	71	8.00		
May, 2013	2377	569	23.94		
June, 2013	1047	167	15.95		
July, 2013	1170	72	6.15		
August, 2013	1101	49	4.45		
September, 2013	904	69	7.63		
October, 2013	749	55	7.34		
November, 2013	785	38	4.84		
December, 2013	1296	134	10.34		
January, 2014	1141	127	11.13		
February, 2014	793	72	9.08		

Table 3. Incidence of Chronic Respiratory Disease among different Types of chicken

Type	Total Birds Necropsied	Birds positive for CRD		χ2Value	Probability
		No	Percentage		
Broiler	3483	609	17.48	195.5657	<.0001
Layer	1197	056	04.68		
Indigenous	8714	875	10.04		

Table 4. Incidence of Chronic Respiratory Disease among different breeds/ lines of chicken

Breed/line	No. of Birds examined	Birds positive for CRD		χ2Value	Probability
		No	Per cent		
PB-1	915	129	14.10	382.6829	<.0001
PB-2	1853	389	20.99		
Krishibro	136	5	03.68		
Boiler Control	254	26	10.24		
Naked neck	209	43	20.57		
Dwarf	116	17	14.66		
IWH	106	8	07.55		
IWI	134	4	02.99		

IWK	87	7	08.05
Layer Parent	789	27	03.42
Layer Control	81	10	12.35
VFL	2465	171	06.94
VML	1133	180	15.89
GPFL	3369	413	12.26
GPML	675	36	05.33
Srinidhi	51	5	09.80
Aseel	369	29	07.86
Ghagus	590	34	05.76
Nicobari	62	7	11.29

Table 5. Incidence of Chronic Respiratory Disease among different Age groups of chicken

Age	Total Birds Necropsied	Birds positive for CRD		χ2Value	Probability
		No	Percentage		
Chick	4561	302	6.62	347.9673	<.0001
Grower	4541	841	18.52		
Adult	4292	397	9.25		

Discussion

It is essential to study the incidence rate and influence of various factors on the incidence of CRD for proper control of the disease. The current investigation based on gross lesions showed an overall incidence of CRD as 11.50%. This finding was similar to the observations of earlier workers Yunus *et al.,* 2008; Uddin *et al.,* 2010; and Razia *et al.,* 2012 who reported incidence of CRD by post mortem examination as 11.5, 9.87 and 12.84%, respectively [3,4,5]. Among different seasons, the incidence of CRD was observed highest during summer followed by winter and rainy season which was in accordance with that of Yunus *et al.* (2009) where they observed highest incidence of CRD during April to June (21.1%) in Pakistan [6]. Balasubramaniam and Dorairajan (2009) observed that the season had no influence on the incidence of CRD in Tamil Nadu in India [7]. The findings of present study were not in agreement with the report of Razia *et al.,* (2012) and Irsahad *et al.* (2013) where higher prevalences of CRD were seen in winter [5,8]. The variation in incidence during different climate shows that the occurrence of disease and mortality is highly influenced by the adverse weather like extreme summer in Hyderabad during the month of May and very cool dry weather during the months of December and January. In summer there were an

increased number of cases of CRD with concurrent conditions-like heat stress or septicaemia which may be due to higher susceptibility of CRD affected birds to the heat stress during the summer.

In different type of birds, the incidence of CRD was highest in broiler type birds followed by indigenous breeds and layer birds. The present findings were in agreement to those of Irsahad *et al.,* 2013 and Ahmad *et al.,* 2012 where higher incidence of CRD was observed in broiler flocks than in layer flocks [8,9]. Mortality due to CRD was higher in broiler type of birds which might be due to higher body weight, faster growth rate and less adaptability to higher environmental temperature in summer.

Among different age groups, highest incidence of CRD was observed in growers of 6-20 weeks age followed by adults of > 20weeks and chicks of <6 weeks age. Similar report was demonstrated by Uddin *et al.* (2010) where a higher incidence 5.37% of CRD was observed in birds of 8-20 weeks followed by 3.7% in 21-35 week old birds and 0% in 36-60 week old birds [4]. But the present findings are not in agreement to the findings of Irsahad *et al.* (2013) who reported a higher prevalence of CRD in flocks of 1-10 weeks of age (38%) than in birds of 10-20 (18%), 21-40 (14%) and 41-60(10%) weeks of age [8]. A lower incidence in chicks and higher incidence in grower might be due to regular medication of the chicks to prevent the general disease outbreaks which was stopped once the birds reach grower stage.

The results of the present study shows the alarming rate of incidence of CRD cases in scientifically managed organised farm. When infection is present in the flocks, various factors affect the occurrence of the disease and mortality. The significant difference in the incidence rates during different months and among different types or breeds of birds shows the effect of different factors on the disease outbreak and mortality. The results showed that highest mortality was during the months of May and June when the environmental temperature was very high and measures to reduce the heat stress in birds might reduce the disease incidence and mortality. In order to reduce the disease incidence and mortality, overall control of the Mycoplasma infection has to be achieved by the appropriate use of measures including medication, vaccination, prevention of vertical transmission and biosecurity measures.

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