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Incidence of poultry diseases in different seasons in Khushab district, Pakistan

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ABSTRACT

A field study was conducted to determine the prevalence of various poultry diseases in broilers and layers at Khushab district in Pakistan. The prevalence study was conducted in 360 poultry farms. Diagnosis of diseases in poultry was done based on history, clinical signs, post-mortem examination, cultural, and biochemical characterization. Overall, incidence of Newcastle disease (ND) was found as the highest (avg. 7.85%) in broiler, followed by Fowl typhoid (avg. 6.58%), Mycoplasma (avg. 5.68%), *Escherichia coli* infection (avg. 5.52%), Coccidiosis (avg. 4.59%), Mycotoxicosis (avg. 4.56%), Infectious Bursal Disease (IBD; avg. 2.84%), Infectious coryza (avg. 2.50%), Hydropericardium syndrome (HPS; avg. 1.67%), and Infectious bronchitis (IB; avg. 1.59%). The period during April to June appeared to be comparatively safer for the broilers as low incidence of disease was recorded at this period. In case of layers, incidence of ND was the highest (avg. 7.92%), followed by Fowl typhoid (avg. 6.97%), Mycotoxicosis (avg. 5.52%), Coccidiosis (avg. 4.75%), IBD (avg. 3.17%), Mycoplasmosis (avg. 3.0%), Infectious coryza (avg. 2.52%), Fowl cholera (avg. 1.52%), IB (avg. 0.90k%), *E. coli* infection (avg. 0.73%), and HPS (avg. 0.46%). For layers, the period during January to March appeared to be safer. In conclusion, diversified diseases are prevalent in both layers and broilers. Thus, proper vaccination practices, brooding arrangements, preventive measures, and biosecurity practices are recommended.

Keywords

Bacterial infections, Newcastle disease, Poultry diseases, Viral infections

ARTICLE HISTORY

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INTRODUCTION

Poultry sector of Pakistan is distinguished by farm sizes ranging from the farms having <1,000 to ≥10,000 birds (Yunus et al., 2008). Generally, the average flock strength is approximately 2,000 to 3,000 for both broilers and layers: one can call this as rural farming. These farms are characterized by household labor and usually lack modern facilities.

In Pakistan, poultry enterprise has developed rapidly in recent years. However, various infectious diseases posed a serious threat for the survival of poultry farming especially at small scale level, and the diseases inflicted heavy economic losses to the country (Mustafa and Ali, 2005). The major poultry disease include Newcastle disease (ND), *Escherichia coli* infection, Infectious coryza, Infectious bronchitis (IB), Coccidiosis, Enteritis, Fowl pox, Salmonellosis, Hydropericardium syndrome (HPS), and Avian Influenza (AI) (Javed et al., 1994; Khan et al., 2000; Bano et al., 2003; Ahmad et al., 2008). A field survey done in 2005 revealed the status of the diseases prevalent in local and Fayoumi breeds of rural poultry in Sheikhupura district (Mustafa and Ali, 2005). The disease prevalence was found higher (57%) in Fayoumi as compared to *Desi* breeds (43%). The overall prevalence of various diseases was recorded as 40.33% ND, 5% *E. coli*, 2.66% IB, 7% Chronic respiratory disease (CRD), 8.33% Infectious coryza, 6.33% Salmonellosis, 15.66% Fowl pox, 4% HPS, and 10.66% Coccidiosis. Another study done in 2008 revealed that a

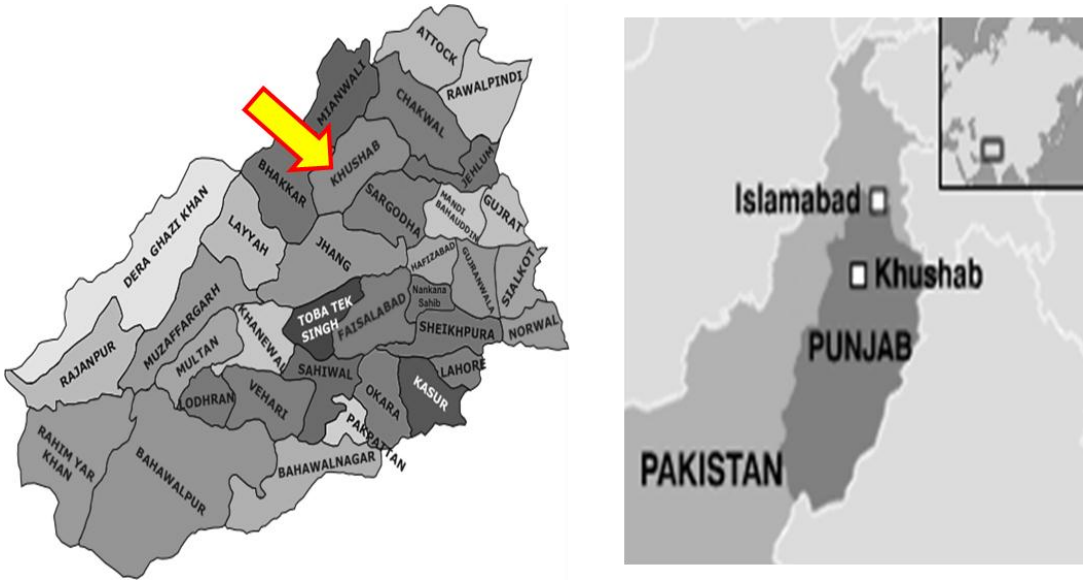

Figure 1: Map of Pakistan showing the study area (Khushab district).

number of infectious agents like NDV, AI along with *E. coli* and *Salmonella*, were responsible for the recent respiratory outbreaks in layer flocks around Sammundri Area (Khawaja et al., 2005). The diseases prevalent in rural poultry mostly occurred due to poor vaccination, poor feed, housing, and through wild and migratory birds (Khawaja et al., 2005). The widespread presence of contagious as well as infectious diseases indicated poor vaccination practices, poor management on farm, and non-adherence to biosecurity measures.

Season, an enormously important environmental factor, might have deep effects on occurrence of diseases in poultry. Previous surveys in this regard have reported prevalence of poultry diseases and their relationship with age and weather (Yunus et al., 2009). However, interactions of various diseases during different seasons have not been studied in Pakistan, particularly in low poultry populated area like Khushab district. Khushab district has 7.4 million broilers, 0.20 million layers, 0.08 million breeders, and 0.28 million rural poultry (Statistical Report, 2011-12). The district has three distinct areas: barani, plain, and mountainous. All these three areas have different climatic temperature especially in mountainous area which is more suitable for poultry production. The present study was conducted to investigate the incidence of different diseases in different seasons, which will provide baseline data for effective prevention, and control of infectious diseases in rural poultry.

MATERIALS AND METHODS

The current study was based on the postmortem and laboratory diagnosis of poultry disease during June 2007 to May 2008 in the Livestock Department (Poultry Wing) of Khushab district. The data were collected from 360 poultry farms during four quarters of the year using objective oriented questionnaire. The diagnosis depended mainly upon history, clinical signs, and postmortem examination in the district laboratories. The bacterial and viral diseases were differentiated in the laboratory at Disease Laboratory, Poultry Research Institute, Rawalpindi, by examining the growth on McConkey agar by incubating the suspected materials at 37°C for 24-28 h. The growth obtained was identified by various biochemical and sugar fermentation tests following methods described by Harrigan (1998). Bio-security status index was measured on aspects of management practices. The results were then analyzed statistically by using simple score test (Nam, 1995).

RESULTS AND DISCUSSION

Data regarding incidence of different diseases in broilers are presented in **Table 1**. Overall, the incidence of ND was found as the highest in broiler, which was followed by Fowl typhoid, Mycoplasmosis, *E. coli* infection, Coccidiosis, Mycotoxicosis, Infectious Bursal Disease (IBD), Infectious coryza, , HPS, and IB. These findings are in support of a previous survey conducted by Yunus et al. (2008). However , a lower incidence was

noted at Chakwal district; this might be due to the difference in location or improved vaccination practices (Yunus et al., 2008).

Table 1: Seasonal incidence (%) of diseases in broilers on quarterly basis in district Khushab, Pakistan.

Diseases	Quarters				Average
	Jan-March	April-June	July-Sep	Oct-Dec	
ND	9.20	7.68	7.91	6.62	7.85
Fowl typhoid	7.94	5.47	5.70	7.23	6.58
Mycoplasmosis	7.10	7.82	2.70	5.10	5.68
E. coli	3.10	3.01	8.58	7.40	5.52
Coccidiosis	4.20	4.30	6.49	3.39	4.59
Mycotoxicosis	6.20	3.81	3.40	4.84	4.56
IBD	2.03	2.18	3.03	4.11	2.84
Infectiuos coryza	1.60	1.88	4.84	1.70	2.50
HPS	2.10	2.9	0.86	0.81	1.67
IB	1.21	0.93	2.42	1.81	1.59
Total :	44.68	39.98	45.93	43.01	
Average :	5.50	4.00	4.60	5.95	

ND=Newcastle disease, IBD=Infectious Bursal Disease, HPS= Hydropericardium syndrome, IB=Infectious bronchitis.

The period between April to June appeared to be comparatively safer for broiler birds as due to lowest disease incidence (Total 39.98%; avg. 4.00%) was recorded at this period. Incidences of *E. coli*, Infectious coryza, HPS, and IB were not equally distributed in all the months. Fowl typhoid and Mycotoxicosis occurred during January to March, and *E. coli* infection and Coccidiosis were mostly found during July to September. These results were similar to findings of Khan (1994). It was noted that Fowl typhoid, Mycoplasmosis and *E. coli* infections were the 2nd, 3rd, and 4th most prevalent diseases, respectively during all seasons with almost similar trend throughout the year.

Mycoplasma synoviae (MS) is an important pathogen of domestic poultry, causing severe economic losses in poultry industry worldwide. It is considered to be the most important pathogenic mycoplasmas, and the Office International des Epizooties (OIE) declared the disease caused by *Mycoplasma gallisepticum* (MG) as notifiable (OIE, 2004). It is the major cause of CRD, and causes more economic losses as compared to other Mycoplasma species. Birds of all age groups are susceptible to this disease but young birds are more prone to the infection than adults (Mukhtar et al., 2012). Besides, MS has also been proven to affect the humoral response of chicks vaccinated with La-Sota strain of ND virus. Protection of MS infected and ND-vaccinated broilers could be induced only after a second dose of ND-vaccine (Nascimento et al., 2005). Another study conducted by Ahmad (1998) showed 35.8% prevalence of MG infection was occurred during five years from 1991 to 1995 in northern areas of Pakistan. The incidence of Mycoplasmosis was reported higher in the study of Ahmad (1998) as compared to our study. In some countries like Brazil, the prevalence of MS in chicken flock is increasing and even exceeding to that of MG in breeding flocks (Nascimento et al., 2005). Our results revealed a higher prevalence of MG in winter months as compared to the summer months in broilers, and similar report was published earlier (Sarkar et al., 2005). This seasonal variation in infection might be due to the sudden change in temperature and cold stress on the birds.

The data regarding prevalence of different diseases in layers are depicted in **Table 2.** In case of layers, ND prevalence was the highest, followed by Fowl typhoid, Mycotoxicosis, Coccidiosis, IBD, Mycoplasmosis, Infectious coryza, Fowl cholera, IB, *E.coli*, and HPS . The period between January to March appeared to be safer for layers (Total 32.27%). Overall disease incidence during each of the quarter months starting from January to March, April to June, July to September, and October to December was 32.27, 35.64, 41.26 and 40.70%, respectively. The incidence of ND in the different quarters was 8.34, 8.88, 7.10, and 7.37% and that of Fowl typhoid was 5.01, 6.01, 8.84, and 8.02%, respectively. The incidence of *E. coli* infections was 7.5 times higher in broilers than in the layers.

Table 2: Seasonal incidence (%) of diseases in commercial layer on quarterly basis in district Khushab, Pakistan.

Diseases	Quarters				Average
	Jan-March	April-June	July-Sep	Oct-Dec	
ND	8.34	8.88	7.1	7.37	7.92
Fowl typhoid	5.01	6.01	8.84	8.02	6.97
Mycotoxicosis	3.21	3.1	8.79	6.97	5.52
Coccidiosis	2.22	3.27	6.92	6.60	4.75
IBD	2.73	5.62	2.12	2.21	3.17
Mycoplasmosis	3.15	2.43	3.41	3.02	3.00
Infectiuos coryza	3.2	2.9	1.8	2.2	2.52
Fowl cholera	1.88	1.1	0.62	2.46	1.52
IB	0.88	1.01	0.81	0.90	0.90
E.coli	1.31	1.11	0.10	0.40	0.73
HPS	0.34	0.21	0.77	0.55	0.46
Total :	32.27	35.64	41.26	40.70	
Average :	2.94	3.24	3.75	3.70	

ND=Newcastle disease, IBD=Infectious Bursal Disease, HPS= Hydropericardium syndrome, IB=Infectious bronchitis.

ND was the most frequently occurring disease in all types of birds. However, its incidence was found

comparatively lower in layers (8.88%) as compared to broilers (9.20%). Our findings indicated that in all cases vaccination could not protect the birds for infection. This might be due to use of inappropriate vaccine, presence of maternal antibody, faulty storage, brooding and administration of vaccine, as described by Godwin (2001). In the present study, 9.20 and 8.88% of ND positive cases were found in broilers and layers respectively, as compared to the findings of Talha et al. (2001) and Islam et al. (1998). The present findings indicated that the re-emergence of ND in commercial flocks was still a threat to the poultry industry.

A survey was conducted on Fowl typhoid disease in Hyderabad district and reported only 1.34% incidence of the disease by Habib-ur-Rehman et al. (2004). A survey conducted in Nigeria showed that ND accounted for 14.66%, Fowl typhoid 12.02% and Coccidiosis 10.81% (Bukar-Kolo et al., 2006). Then, some workers reported that 18.4% (n=129/700) prevalence was recorded for Fowl typhoid in Nigeria (Mbuko et al., 2009). The outbreaks of Fowl typhoid were also observed to be 3.1 times more likely to occur in December, 2.4 and 1.3 times more likely to occur in birds of 15 weeks and above and 1-5 weeks of age, respectively. Outbreaks of Fowl typhoid were closely associated with age, type and poultry species of birds. The highest number of outbreaks of Fowl typhoid was recorded in the rainy season (July-September). Similar observations were recorded in the present study, most incidence occurred in the same months in layers but January to March in broilers. Another worker also reported that outbreaks of Fowl typhoid were observed in summer particularly when the weather was wet and moisture was persistent in the air (Rao, 2000).

Kwon et al. (2010) investigated the prevalence of Fowl typhoid during 2000 to 2008 in Korea. According to the analysis based on the chicken breeds (n=521 farms), the incidence of Fowl typhoid in commercial broilers, Baeksemi (a mixed breed of male meat-type breeder and female commercial layer), commercial layers, native chickens, and broiler breeders were 47.7, 28.4, 17.2, 5.1, and 1.3%, respectively. Of the affected broilers, over 90% birds were of less than 2 weeks of age, indicating it was possible that they were infected with *Salmonella gallinarum* via vertical transmission. This disease occurred frequently in Asian poultry. For example, from 1996 to 2008, Fowl typhoid was diagnosed in India. In Japan, the last case of Fowl typhoid was found in 1990 (OIE, 2010). Korea has taken a great interest with this disease, because since the first case in the field in 1992, Fowl typhoid has spread throughout the country affecting mainly brown layers. Between 2000 and 2008, about 1,000 Fowl typhoid outbreaks were reported. After adopting a national-wide vaccination program, the prevalence of Fowl typhoid in Korea decreased rapidly from 206 outbreaks in 2002 to 31 in 2008 (Kwon et al., 2010).

Mycotoxicosis falls on third ranking in the layer flock in this study. Higher incidence of mycotoxicosis was reported during monsoon in Chakwal district (Yunus et al., 2009), as obtained in the present study. The Pakistan is now considered to be the most intensive poultry farming region in the world. The widespread prevalence of multiple mycotoxins today in this region might be due to: improved analytical procedures, which have increased the chances of mycotoxin detection in conventional ingredients and complete feed; increased use of by-products and alternative feed ingredients, which are likely to have a higher incidence of mycotoxins, in an effort to reduced feed costs; and changes in global climatic conditions, which are more conducive to the growth of mold and subsequent mycotoxin production. Climatic conditions in the country range from tropical to semi-tropical and temperate; the global trade in feedstuffs, which means feedstuffs are derived from crops both grown locally, and imported and hence subjected to different conditions during growing, storage and transport.

CONCLUSION

In district Khushab, there are limitations of housing and environmental management, where contact with the environment cannot be avoided, suggests that different approaches involving biological interventions may be necessary. Under such situations, live vaccines, nutritional (short chain fatty acids) interventions, and other novel approaches can be considered, either individually or in combination.

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