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Transverse study of Newcastle disease in chicken of Kashmir valley

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Abstract

The present study was undertaken for assessment of occurrence of Newcastle disease virus in chicken of various poultry farms including district Srinagar, Ganderbal, Budgam and Sopore of Kashmir valley. Samples comprised of dead chicken from various poultry farms of Kashmir valley, including those from University farms. These samples were brought to Division of Veterinary Pathology for postmortem examinations. Suspected outbreaks of NCD in broiler chicken were identified considering the history, clinical manifestations and observed lesions during post mortem examination of birds. Each suspected flock's history encompassing details such as flock size, mortality rates and the total number of birds affected in each outbreak was recorded. A total of 32 outbreaks were recorded during the study period from four districts, Srinagar (6), Ganderbal (13), Budgam (8) and Sopore (5). The average strength of the flock affected with the disease ranged between 3000-5000. The highest mortality was recorded in district Ganderbal (53.7%), followed by Srinagar (37.9%), Budgam (33.2%) and Sopore (31.7%). Age-wise proportionate mortality due to Newcastle disease was 19.5%, 30.4%, 27.2, 39.2%, 64.8% in age group of 0-7, 8-14, 15-21, 22-28 and 29-35 days respectively. The present study recorded that higher mortality associated with Newcastle disease was recorded in the age group of 28-35 days. And among the affected flock mortality ranged between 12.3-64.8%, with overall mortality of 44.7%.

Keywords: *Avulavirus*, mortality, Newcastle disease, occurrence, poultry

Introduction

Newcastle disease (ND) is a continuous threat to the global poultry industry, leading to substantial economic losses (Alexander, 2003) [1]. It is a highly acute illness affecting domestic poultry and other bird species irrespective of sex and age (Haque *et al.*, 2010) [7]. Chickens and guinea fowl show highest susceptibility, followed by pheasants, turkeys and ostriches (Capua *et al.*, 2002) [4]. The causative pathogen is Newcastle disease virus (NDV), belonging to the *Avulavirus* genus in the *Paramyxoviridae* family within in the *Mononegavirales* Order (Mayo, 2002) [10]. Due to its severe nature and widespread occurrence, the disease is ranked third among the most consequential list A poultry disease, with documented instances in 109 member countries of the World Organization for Animal Health (Anonymous, 2011 and OIE, 2020) [2, 13].

The poultry industry in India is experiencing rapid growth, contributing significantly to the agricultural sector, by supplying protein rich meat and eggs globally. However, the surge in poultry population and drastic changes in the farming practices have led to an increase in the poultry diseases. Notably, NDV infections have long been acknowledged for their impact on to avian health, prompting extensive scientific investigations in recent decades (Miller and Koch, 2013) [11]. The continuous emergence and evolution of virulent NDV isolates pose a serious concern for the global poultry industry (Diel *et al.*, 2012) [5].

The poultry sector of the Kashmir valley has been also badly affected as thousands of birds die every year due to outbreak of Newcastle disease or Ranikhet disease, called Kokuer Kone in local parlance. Vaccines are routinely administered in the commercial poultry industry to mitigate the severe impacts of outbreaks. However, the extensive use of billions of vaccine doses raises concern about potential release of live virus, potentially influencing virus evolution. In the absence of definitive data on NDV surveillance and outbreak patterns in

poultry of Kashmir valley, implementing effective preventive and control measures becomes challenging. Consequently, this study aimed to investigate the occurrence of Newcastle disease in different districts of Kashmir valley.

Material methods

The proposed research work was conducted at the Division of Veterinary Pathology, FVSc & A.H, Shuhama, SKUAST-K.

Study area for New Castle Disease

In order to study the occurrence of Newcastle disease, samples comprised of dead chicken from various poultry farms of Kashmir valley, including those from University farms. These samples were brought to Division of Veterinary Pathology for postmortem examinations. Suspected outbreaks of NCD in broiler chicken were identified considering the history, clinical manifestations and observed lesions during post mortem examination of birds. Each suspected flock's

history encompassing details such as flock size, mortality rates and the total number of birds affected in each outbreak was recorded. A preliminary diagnosis was framed through a systematic necropsy of the dead carcasses.

Experimental findings

Occurrence of Newcastle disease

The research was undertaken to evaluate the presence of the Newcastle disease in chicken of various poultry farms including district Srinagar, Ganderbal, Budgam and Sopore.

A total of 32 outbreaks were recorded during the study period from four districts, Srinagar (6), Ganderbal (13), Budgam (8) and Sopore (5). The average strength of the flock affected with the disease ranged between 3000-5000. The highest mortality was recorded in district Ganderbal (53.7%), followed by Srinagar (37.9%), Budgam (33.2%) and Sopore (31.7%). District wise outbreak of Newcastle disease is given in Table 1.

Table 1: District wise status of Newcastle disease

District	Total no. of outbreak	No. of Susceptible/ Flock Size	No. of Affected	No. of Death	Morbidity Rate (%)	Mortality Rate (%)	Case Fatality Rate (%)
Srinagar	6	19000	11691	7202	61.5	37.9	61.6
Ganderbal	13	38600	27635	20716	71.6	53.7	75.0
Budgam	8	28857	19873	9595	68.9	33.2	48.2
Sopore	5	15672	9343	4964	59.6	31.7	53.2
Total	32	102129	68542	42477	67.1	41.6	62.0

$\chi^2 = 2.715$, P value = 0.099

Age-wise proportionate mortality due to Newcastle disease was 19.5% (1840/9432), 30.4% (3723/12212), 27.2(3984/14619), 39.2%(6731/17158), 64.8(24946/38945) in age group of 0-7, 8-14, 15-21, 22-28 and 29-35 days respectively (Table 2). And the higher mortality associated with Newcastle disease was recorded in the age group of 28-35 days. Among the affected flock mortality ranged between 12.3-64.8%, however overall mortality was 44.7%.

Table 2: Overall mortality and occurrence of Newcastle disease among the chicken on the basis of age group

Age group	Total No. of birds in the flock	Mortality associated with Newcastle disease	
		No. of chicken died	%
0-7 days	9432	1840	19.5
8-14 days	12212	3723	30.4
15-21 days	14619	3984	27.2
22-28 days	17158	6731	39.2
29-35 days	38495	24946	64.8
Layers	10213	1253	12.3
Total	102129	42477	41.6

$\chi^2 = 4.964$, P value = 0.026

Discussion

Newcastle disease (ND) is an extremely infectious and deadly in nature that emerges as continuous risk to poultry industry and resulting in significant economic damages. It is a highly acute illness affecting domestic poultry and other bird species irrespective of sex and age (Haque *et al.*, 2010) [7]. The poultry industry in India is experiencing rapid growth, contributing significantly to the agricultural sector, by supplying protein rich meat and eggs globally. However, the surge in poultry population and drastic changes in the farming practices have led to an increase in the poultry diseases. Notably, NDV infections have long been acknowledged for their impact on to avian health, prompting extensive scientific investigations in recent decades (Miller and Koch, 2013) [11].

From 2006 and 2009, ND held the eighth position in terms of significance among wildlife diseases and ranked as the third most impactful poultry disease (Anonymous, 2011) [2].

Also, the poultry sector of the Kashmir valley has been badly affected as thousands of birds die every year due to outbreak of Newcastle disease or Ranikhet disease, called Kokuer Kone in local parlance. Vaccines are routinely administered in the commercial poultry industry to mitigate the severe impacts of outbreaks. However, the extensive use of billions of vaccine doses raises concern about potential release of live virus, potentially influencing virus evolution. In the absence of definitive data on NDV surveillance and outbreak patterns in poultry of Kashmir valley, implementing effective preventive and control measures becomes challenging.

Consequently, this study aimed to investigate the occurrence of Newcastle disease in different districts of Kashmir valley including district Srinagar, Ganderbal, Budgam and Sopore. A total of 32 outbreaks were recorded during the study period from four districts, Srinagar (6), Ganderbal (13), Budgam (8) and Sopore (5). The highest mortality was recorded in district Ganderbal (53.7%), followed by Srinagar (37.9%), Budgam (33.2%) and Sopore (31.7%). In current research, it was found that 41.6% of the total mortality and 61.7 % of total morbidity was associated with New castle disease, strengthening the fact that the it is one of the major threat to the poultry worldwide due to its highly contagious, deadly and destructive nature. In this study, the mortality rates attributed to Newcastle disease align with previous research conducted by Khorajiya *et al.*, (2018) [8] in all the thirteen flocks varied from 6.53 to 53.88 percent. Bereket *et al.*, (2017) [3], documented a mortality rate of 21.21% in chicken affected by ND outbreak. Ewies *et al.*, (2017) [7] investigated broiler flocks with vNDV infection in his current study suffering from variable mortalities (15–20%). However, Mariappan *et al.*, (2018) [9] and Saidu and Abdu (2008) [14] observed mortality rates of 79.50% and 97.7% respectively surpassing the present study's findings.

The case fatality rate reported in our study was 62%. According to the study conducted by Worku *et al.*, (2021) ^[16] on field outbreaks among chickens in Central Ethiopia, the overall rates of morbidity, mortality and case fatality were 18.7%, 9.5% and 50.5%, respectively.

Age-wise proportionate mortality due to Newcastle disease was 19.5% (1840/9432), 30.4% (3723/12212), 27.2(3984/14619), 39.2%(6731/17158), 64.8(24946/38945) in age group of 0-7, 8-14, 15-21, 22-28 and 29-35 days respectively. And higher mortality associated with Newcastle disease was recorded in the age group of 29-35 days. This is in concurrence with the results of Tran *et al.*, (2020) ^[15]. Also Momin and Singh (2018) ^[12] reported most cases of ND in 6-9 weeks old birds, 9-12, 1-3 and above 12 weeks old. Mariappan *et al.*, (2018) ^[9] found mortality rate recorded in the investigated layer flock of different age groups 10-18, 19-35, 36-72 weeks were 84.41, 83.00 and 76.80%, respectively. The observed could be linked to the immune status and genetic resistance of the chicken, the virus strain, vaccination status, elevated stock density, frequent contact with local and migratory birds and failure of cold chain maintainance during bird vaccination.

Conclusion

Newcastle disease (ND) is an extremely infectious and deadly in nature that emerges as continuous risk to poultry industry and resulting in significant economic damages. The present study recorded highest mortality in district Ganderbal (53.7%), followed by Srinagar (37.9%), Budgam (33.2%) and Sopore (31.7%). Further in the age group of 28-35 days higher mortality associated with Newcastle disease was recorded. And among the affected flock mortality ranged between 12.3-64.8%, with overall mortality of 44.7%. We concluded that careful NDV monitoring of outbreak patterns in poultry of Kashmir valley and implementing effective preventive and control measures are very essential steps in combating the disease.

Conflict of Interest

The authors state that they do not have any competing interests.

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