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Retrospective Study of Newcastle Disease Cases Diagnosed at the Veterinary Teaching Hospital, Ahmadu Bello University, Zaria, Nigeria

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ABSTRACT

Newcastle Disease (ND) is a contagious viral disease of birds affecting many domestic and wild avian species. Even though vaccines and vaccination schedules are currently being employed in the prevention of the disease, prevention and control are still a problem in the poultry industry. This study was conducted at the Veterinary Teaching Hospital (VTH), Ahmadu Bello University (A.B.U), Zaria and the aim was to determine the monthly, yearly and seasonal prevalence of ND diagnosed in the Avian Clinic of the VTH, A.B.U., Zaria. Case record files were collected, studied, and clinically diagnosed cases of ND for five years (2014-2018) were extracted. Diagnosis of ND was by history of the case, clinical findings and post mortem lesions observed. Results showed that out of 1,768 cases of poultry presented, 42.6 % (754 cases) were confirmed via necropsy findings as ND. The highest number of cases of the disease was in June having a prevalence of 4.98% followed by March with a prevalence of 4.64 % and July with a prevalence of 4.47 %. The annual prevalence was highest in 2014 (14.82 %). The cases of ND were observed to be higher in the pre-rainy season (April to June) with a prevalence of 12.33%. The environmental stress condition of these periods of the year was likely to be the main reason that potentiate and worsen the occurrence of ND at these periods. Also, stress condition suppresses the immune system of birds making them more susceptible to infection leading to an outbreak of disease. It is recommended to administer anti-stress before these periods in order to protect the birds from the disease.

Keywords: Newcastle disease; Diagnosis; Prevalence; Season

INTRODUCTION

Newcastle disease (ND) is one of the most important diseases in the poultry industry with a morbidity and mortality as high as 100 % (Alders and Spradbrow, 2001; Saidu and Abdu, 2008). It is an acute, highly contagious, rapidly spreading, viral disease affecting birds of all ages (Abdu, 2005). This virus belongs to the order *Mononegavirales*, family *Paramyxoviridae*, and genus *Avulavirus* (Amarasinghe *et al.*, 2018), an extremely diverse group with a wide host range and varying virulence (Dimitrov *et al.*, 2019). The disease is transmitted when healthy birds come in contact with the faeces and other body fluid of infected birds. It can also be transmitted through contaminated feed, water, equipment and clothing (Olabode *et al.*, 2006). Also, suitable climatic factors and high poultry farm concentrations favour air transmission (Alexander, 2001). The windy harmattan also encourages the spread of the virus (Musa *et al.*, 2009). Sa'idu *et al.* (2006) reported that cold weather induces stress in chickens and subsequently lowers their immunity to ND. Newcastle

disease has a short incubation period of 2-3 days (Chansiripornchai and Sasipreeyajan, 2006). Outbreaks of ND were reported to occur in farms that kept exotic birds together with local chickens and other poultry species like ducks and turkeys (Abdu *et al.*, 2005b; Adene *et al.*, 2003). The disease remained a notable problem in poultry production systems in Nigeria (Oladele *et al.*, 2002) and has become endemic with annual epidemics recorded in highly susceptible flocks with pockets of outbreaks occurring in between the annual epidemic periods (Sa'idu *et al.*, 2006). Newcastle disease alone accounts for more than 50 % of total losses in poultry flocks in Africa (Ezeibe *et al.*, 2006; Musa *et al.*, 2009). In fact, it has been argued that ND may represent a bigger drain on the world economy than any other animal viral disease (Alexander and Senne, 2008).

As a disease with economic importance, ND has an effect on the meat quality of poultry and decreases the development and growth of poultry industry (Ezeibe *et al.*, 2006; Musa *et al.*, 2009). Newcastle disease is still a major obstacle to

poultry farmers in Zaria in particular and North-Western Nigeria in general (Aliyu *et al.*, 2014).

This study was conducted to investigate cases of ND presented and diagnosed at the Avian Clinic of the Veterinary Teaching Hospital Ahmadu Bello University, Zaria from 2014-2018, and also to provide information with regards to strategic control measures of ND within the study area.

MATERIALS AND METHODS

Data Collection

This study covered five – year period, from January 2014 – December, 2018. The data used for the study were obtained from clinic record books and files in the Avian Clinic of Ahmadu Bello University Veterinary Teaching Hospital (ABUVTH), Zaria. Every reported poultry disease outbreak reported and diagnosed as ND in the clinic was considered as a “case”. Diagnosis of ND was majorly by history of the case, clinical manifestations observed by the clinicians and post mortem lesions of carcasses of affected birds. Other information such as age of birds, types of bird, production system, nutritional statuses, sex, concurrent diagnosis and differentials were also considered. The season in Zaria were categorized as Pre-dry season (October to December), Dry season (January to March), Pre-rainy season (April to June) and Rainy season (July to September) (Sa’idu *et al.*, 1994).

Data Analysis

The data was summarized into tables with respect to the frequency of prevalence of ND and other poultry disease according to month, year and season using descriptive statistics. Frequencies and Percentage of prevalence were used to present the data and the data were analysed by Chi-square. The Chi-square was determined using Graph Pad

prism version 5.03 and 95 % confidence interval was used, the results with $p < 0.05$ was considered significant.

RESULTS AND DISCUSSION

Out of total of 1768 cases of poultry disease diagnosed in poultry clinic of ABUTH, 754 cases (42.6 %) were confirmed as ND within the five-year period (January 2014 to December, 2018). Table 1 shows the yearly prevalence of ND outbreaks with the year 2014 having the highest prevalence (14.82 %) and year 2018 having the lowest prevalence (3.90 %). The chi-square value (54.95) showed that there was statistical significance ($P = 0.0001$) based on yearly prevalence of ND. This simply means that the year has effect on prevalence of occurrence of ND. Poor management practices by the farmers such as inability of poultry farmers to consistently maintain standard biosecurity and hygienic condition of farms as well as lack of well-equipped veterinary laboratory may be the contributing factors for the high prevalence of ND in 2014. The 14.82 % prevalence recorded in this study was lower when compared to the 43.9 % reported by Aliyu *et al.* (2014), who did a ten-year retrospective study (2002-2011) of Newcastle disease and other poultry diseases diagnosed at the Poultry Clinic of Ahmadu Bello University Veterinary Teaching Hospital (ABUVTH), Zaria, Kaduna, Nigeria). This could be attributed to the increase awareness of the disease by poultry farmers, as well as increased sensitization of poultry farmers to report any clinical cases of poultry diseases to nearest veterinary clinic. The lowest prevalence of 3.90 % recorded in the year 2018 could probably due to on and off participation of farmers in poultry practices, hence the low cases reported to the clinic.

Table 1: Yearly Prevalence of ND Cases Reported to the Avian Clinic of ABUVTH from January 2014- December 2018

Years	ND cases	Non-ND cases	Sum of cases	Prevalence (%)
2014	262	277	539	14.82
2015	189	193	382	10.69
2016	128	327	455	7.24
2017	106	131	237	6.00
2018	69	86	155	3.90
Total	754	1014	1768	

Chi square = 54.95 ($P = 0.0001$)

Keys: ND cases: Newcastle Disease cases; NON-ND: Non Newcastle Disease cases; ABUVTH: Ahmadu Bello University, Veterinary Teaching Hospital

Table 2 shows the monthly prevalence of ND cases with the highest prevalence observed in the months of March and June with the prevalence of 4.64 % and 4.98 % respectively. The chi-square value (33.12) showed that there was statistical significance ($P = 0.0005$) based on monthly prevalence of ND. This simply implies that, there was an association between the months of the year and outbreak of ND. The high prevalence recorded in March and June is slightly in agreement with the reports of Abdu *et al.* (2005a) and Adamu *et al.* (2009), who reported highest prevalence in March and October, suggesting high risks at these periods but disagrees with the reports of Saidu *et al.* (2006), Sadiq *et al.* (2011), Olabode *et al.* (2012) and Aliyu *et al.* (2014), where they reported peak outbreak of ND during the months of October,

November, December, and June respectively. The extreme hot weather in Zaria around the month of March may be a factor that induces stress on the birds thereby suppressing their immunity and subsequently becoming susceptible to ND. The low outbreaks recorded in December, may be as a result of decreased population of birds due to slaughtering, as this is a month of festivity and therefore reducing number of reportable cases.

Table 3 shows the seasonal prevalence of ND cases. The pre-rainy season (April-June) had the highest prevalence (12.33 %), followed by rainy season (July-September) with prevalence of 12.22 %. From the chi-square value (4.698) showed that there was no statistical significance ($P < 0.05$) based on seasonal prevalence of ND. This simply means that

the season has no relationship with the outbreak of ND. The environmental stress condition of these periods of the year was likely to be the main reason that potentiate and worsen the occurrence of ND at these periods. The high prevalence in the pre-rainy season could also be due to the fact that most farmers in Zaria restock their farms in this period as reported by Abdu *et al.* (1985). This leads to the introduction of new birds from uncertain sources such as contaminated hatchery units, therefore favoring outbreak of the disease in poultry houses. Also, high prevalence of ND may be as a result of inability of farmers to adequately vaccinate against the disease, or when the quality of vaccines is being compromised or lack of proper storage when cold chain not maintained. The ND virus survives better in cool environment, hence the survivability is increased in pre-rainy and rainy season, which increases chances of infecting birds.

The weather of the rainy season makes birds cluster together for warmth, this increases contact between birds which is the major method of transmission.

The findings in this study is contrary to the reports made by Sa'idu *et al.* (1994) and Halle *et al.* (1999) on the seasonality of ND, where they revealed that the highest prevalence of the disease occurs between pre-dry season and dry season (October to March), possibly because of the cold weather with high wind velocity (Abdu *et al.*, 1992). This finding disagrees with the results of Aliyu *et al.* (2014) who reported that ND is more likely to occur in pre-dry and dry season than in rainy season.

Table 2: Monthly Prevalence of ND Cases Reported to the Avian Clinic of ABUVTH from January 2014- December 2018

Months	ND cases	Non-ND cases	Sum of cases	Prevalence (%)
Jan	57	37	94	3.22
Feb	51	106	157	2.88
Mar	82	72	154	4.64
Apr	58	99	157	3.28
May	72	112	184	4.07
Jun	88	105	193	4.98
Jul	79	122	201	4.47
Aug	75	102	178	4.24
Sep	61	91	152	3.45
Oct	58	80	138	3.28
Nov	44	62	106	2.49
Dec	28	26	54	1.58
Total	754	1014	1768	

Chi square = 33.12 (P = 0.0005)

Keys: ND cases: Newcastle Disease cases; NON-ND: Non Newcastle Disease cases; ABUVTH: Ahmadu Bello University, Veterinary Teaching Hospital

Table 3: Seasonal Prevalence of ND Cases Reported to the Avian Clinic of ABUVTH from January 2014- December 2018

Months	ND cases	Non-ND cases	Sum of cases	Prevalence (%)
Dry season (Jan-Mar)	190	215	405	10.75
Pre-rainy season (Apr-Jun)	218	316	534	12.33
Rainy season (Jul-Sept)	216	315	531	12.22
Pre-dry season (Oct-Dec)	130	168	298	7.35
Total	754	1014	1768	

Chi square = 4.698 (P<0.05)

Keys: ND cases: Newcastle Disease cases; NON-ND: Non Newcastle Disease cases; ABUVTH: Ahmadu Bello University, Veterinary Teaching Hospital

In conclusion, ND is still a major threat to poultry industry in Nigeria. The ND is more likely to occur in pre-rainy season and rainy season than in dry season. The outbreaks are present on a yearly basis and depend on the season and factors earlier mentioned. It is recommended to administer anti-stress before these periods in order to protect the birds from the disease. Farmers should be properly educated on appropriate periods to stock their farms and consistently maintain standard biosecurity and hygienic condition of farms. Also, they should adhere strictly to recommended vaccination regimen, as well as increased sensitization of poultry farmers to report any clinical cases of poultry diseases to nearest Veterinary Clinic.

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Author Contribution

Muhammed S.M. and Usman M.A. designed the work, extracted the data and wrote the draft manuscript. Sani N.A, Idris S.Y and Wakawa A.M did the data analysis and participated in the draft manuscript. All authors have approved the final manuscript.

Conflict of Interest

The authors declare that they do not have any conflict of interest.

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