International Journal of Medical, Pharmacy and Drug Research (IJMPD)
[Vol-6, Issue-2, Mar-Apr, 2022]
ISSN: 2456-8015
https://dx.doi.org/10.22161/ijmpd.6.2.3

Peer-Reviewed Journal

Newcastle Disease in Poultry, its diagnosis, prevention and Control Strategies

Abdul Samad[1], Muhammad Hamza[1], Ayesha Muazzam[1], Areeb Ahmer[1], Sania Tariq[1], Muhammad Junaid Shahid[2], Waseem Akram[1], Muhammad Zain Kaleem[1], Afeen Javaid[1]

[1]Faculty of veterinary and Animal Sciences MNS University of Agriculture 25000, Multan, Pakistan.
[2]Department of Zoology, BZ University Multan, Pakistan
Email: buzdarabdulsamad@gmail.com

Received: 27 Jan 2022; Received in revised form: 25 Feb 2022; Accepted: 03 Mar 2022; Available online: 11 Mar 2022

Abstract

Newcastle disease (ND) is a major cause severe illness in poultry birds and other wild species of bird, harshly effecting the poultry industry by mortality of many birds in result becoming cause of loss of industry. ND is very common in Asia especially Pakistan, India and Bangladesh. The cause of this disease is a virus which belongs to family Paramyxoviridae named as Avian avulavirus 1.It has different strain which is categories on the basis of their virulence. In this study we describe the new castle disease and its causes, prevention and cure as well as vaccines and immunization procedures, and also describe how can we recover our birds through different methods. Because the industrious, social, financia1, communal, and environmental situations that enable endemicity of poultry in Pakistan and other developing countries of world, furthermost of the difficulties and control methods are explained here. As we know there is no specific treatment we gave a method to minimize mortality due to ND we increased the quantitative life by adopting some measures.

***Keywords*— Newcastle disease, Immunization, Evolution, Disease control.**

I. INTRODUCTION

Newcastle or ND is a contagious disease of avian group which infect hen and other species of poultry [1]. Some signs of this disease are Greenish Diarrhea, Nervous and respiratory problems. Severity of virus will depend upon the strain and immunity of bird [2]. Incubation period have 2-15 days[3].

II. CAUSE OF DISEASE

NDV belongs to the family named as Paramyxoviridae sub family avulavirus [4]. It is RNA virus. NDV is classified in to three groups on the basis of Virulence [5]

- Lentogenic(Less virulent)
- Mesogenic(higher virulent then Lentogenic
- Valogenic (Higher virulent than both of above)

Velogens and mesogens are also called virulent NDV as Lentogenic is less virulent areas where vaccination with live vaccine was practiced less case were reported [6]. NDV have high mortality and high morbidity rate [7]. Most of mortality occur due to poor respiration dehydration and anorexia. Virulence of virus, immunity of specie will decide how much sever disease [8]. Mostly chickens are effected by the virus while water fowl are least effected by the NDV [9].

III. EFFECT OF DIFFERENT STRAINS OF VIRUS ON BIRDS

A. Lentogenic: Effect on lungs, Mild respiratory signs, Illness, Effect young birds, 5 to 10% mortality [10]. Mesogenic: Nervous signs and 50-98% Mortality [11] : Virus effects Gut and 100% Mortality [12].

IV. SPREADING OF DISEASE

ND commonly effect Asia, Africa, and some countries of North and South America [13]. Some other countries as USA and Canada, there is no strains of ND as they control ND by destroying those birds which are effected by the New castle disease virus [14]. Commonly Pigeon and other imported birds are commonly effected by NDV and they would be also source of spreading Velogenic and mesogenic [15]. Some birds like water fowl are infected by low virulence. If bird is infected with low virulent strain of virus it will minimize the production of bird [16]. Virus can be transmitted through air, nasal discharges, and feces of poultry birds [17]. Virus can be transmitted in egg so it would be vertically transmitted disease as virus may also present in the egg which is laid by the chicken and after hatching it would affect young chicken [18]. NDV can transmitted in chicken by food and water which are contaminated by the virus as disease is contagious so it may transfer through birds to birds [19]. Feces of infected bird is also the source of the virus. Movement of contaminated persons in the shed may cause spreading of NDV in the shed [20].

V. CLINICAL SIGNS

Watery discharge from eyes, Conjunctivitis, Cough and rales, Sneezing, Gasping, Low egg production, Change in egg color and shape, Greenish diarrhea, Paralysis of leg and wings later droopy wings and lameness, Higher rate of Mortality and morbidity, Swelling of Head and torticollis neck and spasms [21,22,23].

LESIONS:

Prominent lesion are usually seen in valogenic Newcastle disease [24]. Pinpoint hemorrhages on proventriculus gland [25]. Egg like hemorrhage are usually seen.Conjusted Lungs, Hemorrhage on cecal gland, Ovaries Testes Kidneys are badly effected [26].

VI. MATERIAL AND METHODS

HOW TO FIND OUT DISEASE

Hemoglutination test [27], Postmortem PCR, Virus can be isolated by Cloacal Swab and then can be tested [28]

A. Control:-

In this research we will tell you have we can control the prevalence of New castle disease as above detail show that new castle disease is very dangerous which may also cause high mortality rate [29,30]. So we can control the spreading of new castle disease by adapting following measures There two methods to control the disease

Vaccination and Biosecurity Management [31]

B. Vaccination

Vaccination of ND through live vaccine should be done as it will prevent the ND [32]. There would two dose must in order to provide immunity to the bid [33].

BIOSECURITY MANAGEMENTS

- We should follow the strict rule for bio security.
- No one from outside should enter in the shed.
- Use sanitized equipment.
- Always use one time needle and sanitized needle while doing vaccine.
- Disinfectant should use.

VII. METHOD

The study was collected in farm situated at Navab Pur Multan. In this study we use three methods in order to control ND. We made three groups of chicks

Group A We rear 30 chicks Supporting Therapy done

Group B We rear 30 chicks only use multi vitamins.

Group C We rear 30 chicks Flushing, Multivitamins and Supporting therapy

Fig. 1 Recovered chicks from ND

VIII. RESULT

In Group A only 3 chicks remain alive after 14 days

In Group B 7 chicks remain Alive after 14 days

IN group C 13 chicks remain Alive after 14 days

IX. CONCLUSION

By adopting above mentioned technique we can minimize the mortality rate and by following control measures we can save our flock from ND.

ACKNOWLEDGEMENT

All Authors acknowledge the effort done by Abdul Samad Undergraduate student of Faculty of veterinary and Animal

Sciences MNS University of Agriculture 25000, Multan, Pakistan

REFERENCES

[1] Sá E, Silva M, Susta L, Moresco K, Swayne DE. Vaccination of chickens decreased Newcastle disease virus contamination in eggs. *Avian Pathology*. 2016;45:38–45. doi: 10.1080/03079457.2015.1112876.

[2] Rue CA, Susta L, Cornax I, Brown CC, Kapczynski DR, Suarez DL, King DJ, Miller PJ, Afonso CL. Virulent Newcastle disease virus elicits a strong innate immune response in chickens. *Journal of General Virology*. 2011;92:931–9. doi: 10.1099/vir.0.025486-0.

[3] Rehmani SF, Wajid A, Bibi T, Nazir B, Mukhtar N, Hussain A, Lone NA, Yaqub T, Afonso CL. Presence of virulent Newcastle disease virus in vaccinated chickens in farms in Pakistan. *Journal of Clinical Microbiology*. 2015;53:1715–1718. doi: 10.1128/JCM.02818-14.

[4] Rauw F, Gardin Y, Palya V, Anbari S, Lemaire S, Boschmans M, van den Berg T, Lambrecht B. Improved vaccination against Newcastle disease by an in ovo recombinant HVT-ND combined with an adjuvanted live vaccine at day-old. *Vaccine*. 2010;28:823–833. doi: 10.1016/j.vaccine.2009.10.049.

[5] Rao MS, Raj GD, Manohar BM. An in vitro and in vivo evaluation of the virulence of Newcastle disease virus and vaccines for the chicken reproductive tract. *Avian Pathology*. 2002;31:507–13. doi: 10.1080/0307945021000005888.

[6] Perozo F, Merino R, Afonso CL, Villegas P, Calderon N. Biological and phylogenetic characterization of virulent Newcastle disease virus circulating in Mexico. *Avian Diseases*. 2008;52:472–479. doi: 10.1637/8276-022908-Reg.1.]

[7] Perozo F, Marcano R, Afonso CL. Biological and phylogenetic characterization of genotype VII Newcastle disease virus from Venezuela: efficacy of field vaccination. *Journal of Clinical Microbiology*. 2012;50:1204–1208. doi: 10.1128/JCM.06506-11. [

[8] Pedersen JC, Senne DA, Woolcock PR, Kinde H, King DJ, Wise MG, Panigrahy B, Seal BS. Phylogenetic relationship among virulent Newcastle disease virus isolates from the 2002-2003 outbreak in California and other recent outbreaks in North America. *Journal of Clinical Microbiology*. 2004;42:2329–2334. doi: 10.1128/JCM.42.5.2329-2334.2004.

[9] Park J, Kim M, Na G, Jeon I, Kwon YK, Kim JH, Youn H, Koo Y. Glucocorticoids modulate NF-κB-dependent gene expression by up-regulating FKBP51 expression in Newcastle disease virus-infected chikens. *Journal of Molecular and Cellular Endocrinology*. 2007;278:7–17. doi: 10.1016/j.mce.2007.08.002.

[10] Pandarangga P, Brown CC, Miller PJ, Haddas R, Rehmani SF, Afonso CL, Susta L. Pathogenesis of new strains of Newcastle disease virus from Israel and Pakistan. *Veterinary Pathology*. 2016;53:792–796. doi: 10.1177/0300985815622972.

[11] Palya V, Kiss I, Tatar-Kis T, Mato T, Felfoldi B, Gardin Y. Advancement in vaccination against Newcastle disease: recombinant HVT NDV provides high clinical protection and reduces challenge virus shedding with the absence of vaccine reactions. *Avian Diseases*. 2012;56:282–287. doi: 10.1637/9935-091511-Reg.1.

[12] OIE (2006). World Animal Health Information Database (WAHIS Interface)-Version 1. World Organisation for Animal Health (OIE). Newcastle disease virus. Jan 2006 - Dec 2006, Brasil. Accessed 7 March 2019

[13] Cardenas Garcia S, Navarro Lopez R, Morales R, Olvera MA, Marquez MA, Merino R, Miller PJ, Afonso CL. Molecular epidemiology of Newcastle disease in Mexico and the potential spillover of viruses from poultry into wild bird species. *Applied and Environmental Microbiology*. 2013;79:4985–4992. doi: 10.1128/AEM.00993-13.

[14] Bwala DG, Fasina FO, Van Wyk A, Duncan NM. Effects of vaccination with lentogenic vaccine and challenge with virulent Newcastle disease virus (NDV) on egg production in commercial and SPF chickens. *International Journal Poultry Science*. 2011;10:98–105. doi: 10.3923/ijps.2011.98.105.

[15] Brown, J.A., Gongora, V., Hartley, D., Oura, C., 2018. A review of eight high-priority, economically important viral pathogens of poultry within the Caribbean region. Veterinary Science. 5, 14. 10.3390/vetsci5010014

[16] Bertran K, Susta L, Miller PJ. Avian influenza virus and Newcastle disease virus. In: Hester P, editor. *Egg innovation and strategies for improvement*. Oxford: Academic Press, New York; 2017. pp. 547–560.

[17] Berhane Y, Hisanaga T, Xu W, Mosos Campos NA, Kehler H, Calderón Parra CP, Pasick J. Characterization of Colombian serotype 1 avian paramyxoviruses, 2008-2010. *Virus Genes*. 2017;53:584–592. doi: 10.1007/s11262-017-1461-z.

[18] Bell, J.G., 2001. A comparison of the different vaccine available for the control of Newcastle disease in village chickens. In: Alders, R.G. and Spradbrow, P.B. ed., PR103, SADC Planning Workshop on Newcastledisease control in village chickens. Proceedings of an International Workshop, Maputo, Mozambique, 6-9March, 2000. ACIAR Proceedings No. 103, 56–60.

[19] Ayala AJ, Dimitrov KM, Becker CR, Goraichuk IV, Arns CW, Bolotin VI, Ferreira HL, Gerilovych AP, Goujgoulova GV, Martini MC, Muzyka DV, Orsi MA, Scagion GP, Silva RK, Solodiankin OS, Stegniy BT, Miller PJ, Afonso CL. Presence of vaccine-derived Newcastle disease viruses in wild birds. *PLoS One*. 2016;11(9):e0162484. doi: 10.1371/journal.pone.0162484.

[20] Miller PJ, Koch G. Newcastle disease. In: Swayne DE, Glisson JR, McDougald LR, Nolan LK, Suarez DL, Nair V, editors. Diseases of Poultry. 13th ed. Hoboken, NJ: Wiley-Blackwell (2013). p. 89–113.

[21] Panda A, Huang Z, Elankumaran S, Rockemann DD, Samal SK. Role of fusion protein cleavage site in the virulence of Newcastle disease virus. Microb Pathog. (2004) 36:1–10. doi: 10.1016/j.micpath.2003.07.003

[22] Alexander, D.J., Bell, J.G., Alders, R.G., 2004. A technology review, Newcastle disease with special emphasis on its effect on village chickens. FAO Animal production and health book No. 161. Food andAgriculture Organization of United Nations, Rome, 23-63.

[23] Aldous EW, Mynn JK, Banks J, Alexander DJ. A molecular epidemiological study of avian paramyxovirus type 1 (Newcastle disease virus) isolates by phylogenetic analysis of a partial nucleotide sequence of the fusion protein gene. *Avian Pathology*. 2003;32:239–256. doi: 10.1080/030794503100009783.

[24] Aldous E, Alexander D. Detection and differentiation of Newcastle disease virus (avian paramyxovirus type 1) *Avian Pathology*. 2001;30:117–128. doi: 10.1080/03079450120044515.

[25] Ahmed AA, Ma W, Ni Y, Zhou Q, Zhao R. Embryonic exposure to corticosterone modifies aggressive behavior through alterations of the hypothalamic pituitary adrenal axis and the serotonergic system in the chicken. *Hormone Behavior*. 2014;65:97–105. doi: 10.1016/j.yhbeh.2013.12.002.

[26] Afonso CL. Not so fast on recombination analysis of Newcastle disease virus. *Journal of Virology. Sept.* 2008;82:9303. doi: 10.1128/JVI.01231-08.

[27] Afonso CL, Miller PJ. Newcastle disease virus. In: Liu D, editor. *Security sensitive microbes and toxins.* Boca Rato: CRC Press; 2014. pp. 689–698.

[28] Rima B, Balkema-Buschmann A, Dundon WG, Duprex P, Easton A, Fouchier R, et al. ICTV virus taxonomy profile: paramyxoviridae. *J Gen Virol.* (2019) 100:1593-4. doi: 10.1099/jgv.0.001328

[29] Absalón, A.E., Cortés-Espinosa, D.V., Lucio-Decanini, E., Morales-Garzón, A., 2012b. Newcastle disease virus and the use thereof as a vaccine. Patent Request. WO 2012067483

[30] Absalón AE, Mariano-Matias A, Vasquez-Marquez A, Morales-Garzon A, Cortes-Espinosa DV, Ortega-Garcia R, Lucio-Decanini E. Complete genome sequence of a velogenic Newcastle disease virus isolated in Mexico. *Virus Genes.* 2012;45:304–310. doi: 10.1007/s11262-012-0782-1.

[31] Absalón AE, Mariano-Matías A, García LJ, Morales-Garzón A, Toscano-Contreras A, Lucio-Decanini E, Cortés-Espinosa DV. Complete genome analysis of velogenic Newcastle disease virus reference strain "Chimalhuacan": evolution of viral lineages in Mexico. *Virus Genes.* 2014;49:233–236. doi: 10.1007/s11262-014-1082-8.