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Article Review

Climate Change and its Impact on Some Viral Poultry Diseases

Neven Mohamed Ramzy

Virology department, Ismailia Branch, Animal Health Research Institute, Agriculture Research Center, A.R.C., Dokki, Egypt

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ABSTRACT

Climate change and its impact on some viral poultry diseases Abstract Climate changes is long term naturally or artificial shifts in temperatures and weather patterns. The planet is experiencing a swift rise in temperatures, largely due to the growing levels of carbon dioxide and other gases in the atmosphere, which are mainly produced by the burning of fossil fuels. Consequently, such changes may have impacted on the prevalence of epidemic viral diseases of poultry. Climate changes: temperature, humidity, and other weather-related phenomena affect viruses but they are also part of a complex of environmental and social factors. In addition, climate changes may include farm managements and wild life migration. Vector- and waterborne viral diseases. There is also the possibility of climate-related effects on the emergence of infectious diseases. Among the significant climate changes are the melting of Arctic ice and the occurrence of extreme weather events, which are strongly associated with the transfer of many infectious viral diseases. The most important viral diseases may cause loses in poultry farms are Newcastle, Gumboro, Chicken anemia virus, Infectious bronchitis and pox virus. Therefore, many investigators all over the world have been challenged for studying the impact of climatic changes on the prevalence, incidence, epidemiology and virulence of different viral diseases on poultry. The content of the current review article will be helpful in controlling of poultry viral diseases.

INTRODUCTION

Researchers, healthcare professionals, and public health authorities persist in recognizing and examining climate-related risks to human and animal health **(Yoder, 2018)**. Surveillance, the effects of climate changes, are evident in the poultry farms; it is done every day in tracking diseases. For instance, there are, limited mosquito populations at the moment. A next-generation sequencing approach might facilitate the identification of new viruses in poultry populations. Many infectious viral diseases affecting poultry currently lack effective treat-

Corresponding author: Neven Mohamed Ramzy, Virology department, Ismailia Branch, Animal Health Research Institute, Agriculture Research Center, A.R.C., Dokki, Egypt
Email address: nevenramzy268@yahoo.com
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ments or vaccines, and these conditions are likely to be influenced by climate change.

It is important to remember that illnesses such as Newcastle, Gumboro, Chicken anemia virus, Infectious bronchitis and pox virus were eliminated in the most advanced contemporary countries Prior to the introduction of antivirals through vector control measures, numerous programs had been scaled back or discontinued. **(McLaughlin et al. 2005)**. Therefore, many investigators all over the world have been challenged for studying the impact of climatic changes on the prevalence, incidence, epidemiology and virulence of different viral diseases on poultry.

The important of the current review article will be helpful in controlling of poultry viral diseases. The issue of climate change affects the geographic and seasonal distribution of pathogens and their vectors.

as well as the prevalence have been shown to be influenced by changes in Precipitation, temperature, humidity, and various other climatic factors **(Washington, 2022)**.

Temperature can affect vector populations and their density to some extent; however, it does not have a direct effect on the occurrence of viral diseases. **(Waldock et al. 2013 and Parham et al. 2015).** Viral vectors Temperature has an impact on behavior, as elevated average temperatures are associated with increased activity levels in certain species. **(Shapiro et al. 2017)**. Temperature and precipitation influence the spread of diseases, and the density of insect vectors can fluctuate significantly within a matter of months.

Prevalence and incidence of poultry viral diseases. Environmental factors such as Temperature can accelerate. up the development of both vectors and their pathogens, increasing the risk of human infection **(Walters et al. 2018)**. The impact of stressors, including heat stress and overcrowding, on animal welfare, immune function, and overall performance. are becoming increasing important in poultry production **(Quinteiro-Filho et al. 2010, 2012, Gomes et al. 2014 and Calefi et al. 2014)**.

Vaccination failures and immune organ involution can be attributed to heat stress in broiler chickens. **(Shini et al. 2008, 2010 and Shini & Kaiser, 2009).** Infectious bursal disease (IBD) poses a significant risk to the poultry sector. It has caused significant losses and high mortality due to antigenic variant and hyper virulent strains. The dosage and pathogenicity of the strain, along with the age and breed of the birds. and passive immunity may contribute to mortality.

Infected birds become vulnerable to additional viruses, bacteria, or parasites. because of immunosuppression and antibiotic use. For example, IBV in RT-PCR the virus was detected 50% of the farms. 2 of the 5 positive farms with IBV (but none of the control sheds) had accompanying clinical signs suggesting infectious bronchitis (IB). The only risk factor association (inverse) with IBV prevalence was ambient humidity ($p = 0.05$; $OR = 0.92$).

It was determined, based on the limitations of the fully enclosed management systems outlined, that humidity affected the presence of IBV; however, temperature, ammonia, carbon dioxide, oxygen, and litter humidity did not have any impact. Virulence of viral diseases of poultry Clinical manifestation of Infectious bursal disease (Gumboro) virus is dependent on various factors like age, Factors such as the specific strain of the virus, the level of maternal antibody titer, the type of vaccine administered, and the breed of the bird can all play a role. Infected birds exhibit signs of distress, depression, ruffled feathers, loss of appetite, diarrhea, and unclean conditions. feathers after 2-3 days of incubation **(Islam et al. 2012)**.
Chicken anemia viral disease (CIAV) can present in young chicks with diverse symptoms and varying levels of severity **(Davidson et al. 2004).** The infection may lead to stunted growth, elevated mortality rates, anemia, depletion of bone marrow cells, subcutaneous bleeding, and atrophy of secondary lymphatic organs **(Dhama et al. 2008; Schat, 2009).** Additionally, chicken infectious bronchitis (IB) is recognized as a highly contagious respiratory illness. characterized by high mortalities and sever respiratory distress in young chickens. This includes gasping, coughing, sneezing, tra-

cheal breathing and nasal discharge **(Sultan et al. 2004)**. Clinical manifestations of Newcastle (ND) vary according to strains and not pathognomic to the disease.

There are three types of virulence levels: Velogenic strains are associated with nearly 100% mortality and are characterized by visceral hemorrhages. Mesogenic strains exhibit intermediate virulence, presenting respiratory symptoms and a lower mortality rate. In contrast, lentogenic strains have very low mortality rates, with clinical signs primarily affecting young birds. **(Cattoli et al. 2011)**. In backyard chickens that have not been vaccinated.

In some cases, it can be fatal to young or weak birds. The initial lesions look like a whitish blister and appear on the comb, wattles and other areas of the skin. lesions can also occur on the body, legs and sometimes even the soft parts of the beak.

Fowl pox lesions, when in the mouth and throat of an infected bird can lead to difficulty breathing even death **(Butcher et al. 1996)**. Control of viral dieses of poultry Viral diseases are generally spread through contaminated environment They are also affected by climate warming. **(Curriero et al. 2001)**. The use of vaccines or antibodies-containing preparations to provide immune protection against a specific illnesses of poultry is known as immunoprophylaxis. as the following: Active Prophylaxis (Vaccines): An active immunization involves administering a virus preparation that stimulates the immune system to produce its own specific immunity.

Viral vaccines can be made from live, attenuated viruses, dead antigens produced by viruses or through recombinant technology. Immune Response to Vaccines: immune cells are stimulated and antibodies are produced following Vaccinations. Effectiveness of vaccines is measured by the percentage of recipients protected as well as the Period and level of safeguarding. In most cases, viral vaccines produce reasonably durable immunity and protect more than 90 percent of recipients. A passive Prophylaxis involves administering antibodies from a different host that confers immunity.

As a passive prophylactic (and sometimes therapeutic) treatment for contagious viral infections human immunoglobulins are commonly used to protect individuals exposed to a disease that cannot be protected by vaccination. Sanitation and Vector Management: The control of numerous viral diseases is achieved by minimizing exposure to the virus through three primary strategies: (1) eradicating nonhuman reservoirs, (2) eliminating the vectors responsible for transmission, and (3) enhancing sanitation practices. Antiviral Treatment: Antiviral agents can be categorized into three distinct types: (1) virucidal agents that directly deactivate viruses, (2) antiviral agents that impede the replication of viruses, and (3) immunomodulators that enhance the immune response of the host.

Interferons Cells that are infected by viruses, as well as those stimulated by various agents such as double-stranded polynucleotides, have the ability to secrete proteins known as interferons. These proteins serve to safeguard healthy cells against viral infections. The therapeutic use The use of interferon alpha has shown effectiveness in the treatment of various viral infections in humans. Cytokines are substances generated by cells that alter the biological responses of either the same cells or different ones.

CONCLUSION

From the current review article, it could be concluded that Environmental stressors, including extreme temperatures, significantly influence the physiology of rapidly growing broilers. The adaptations these birds must undertake to achieve homeostasis can affect the progression of prevalent infectious diseases. To explore the relationships between the presence of Infectious Bronchitis Virus (IBV) in broilers and various risk factors previously associated with different avian pathogens, binary logistic regression analyses were conducted.

These risk factors include ambient levels of ammonia, oxygen, carbon dioxide, humidity,

and litter moisture. Climate change is expected to modify environmental factors that currently fluctuate across different temporal and spatial dimensions encountered by individual organisms. This suggests that, over the course of evolution, natural selection may influence the diversity of physiological mechanisms that organisms employ to withstand environmental variability, thereby establishing a direct connection between current physiological plasticity and longer-term evolutionary adaptation to climate change. A significant barrier to enhancing our comprehension of the connections between infectious diseases and climate is the insufficient availability of reliable data on disease incidence in numerous regions globally. This information is essential for evaluating the impact of climate on diseases across various locations, verifying model predictions, and monitoring shifts in disease burdens over time.

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