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Upregulation of Il-10 and Il-12 upon QX Vaccine in Broilers

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Abstract---The present study has been designed to investigate of infectious bronchitis virus (IBV).is a widely distributed poultry disease that has large economic impact on poultry industry. Infections of the respiratory, reproductive, and renal systems are caused by IBV. The avian immune system is capable of activating mucosal, humoral, and cell-mediated immunity in response to future antigen exposure. Currently, live attenuated and killed vaccines are used to control IBV infection; however, the emergence of new IBV variants with rapidly evolving genetic variants raises the risk of outbreaks in intensive poultry farms. The study has been conducted on Two hundred broilers from (Breed: Rose, Origin: Belgium) were brought from ALGhadeer Hatchery–Wasit during the period extended from July, 2021 to March, 2022. The chicks were divided randomly into 4 groups namely 1st, 2nd, 3rd, and 4th group. Each group consisted of 50 birds and housed in 4 separated rooms about 200 meters distance far between them. Blood samples (2 ml) collected from jugular vein from 18 chicks selected randomly from each group. The result showed that IL-10 levels at 17days of age were significantly different ($p < 0.05$) between the groups, which is high in QX (40.42 ± 2.88) and significant lower in not vaccinated (10.008 ± 2.73), in a comparison with Mass120 (20.53 ± 5.19) and 4/91 (13.56 ± 4.83), it has been seen that QX vaccinated group recorded the highest Abs titers followed by IBVMass120, 4/91 and the lowest group was that of control group, The result showed that the total IL12 count at 17days of age was significantly different ($p < 0.05$) between the groups, which is high in QX (15.39 ± 1.30) and significant lower in not vaccinated (5.55 ± 1.24), in a comparison with Mass120 (8.53 ± 1.95) and 4/91 (6.62 ± 1.82), it has been seen that QX vaccinated group recorded the highest Abs titers followed by IBVMass120 ,4/91 and the lowest group was that of control group.

Keywords---Broilers, IL-10, IL-12 and QX Vaccine

Introduction

Avian Infectious Bronchitis (AIB) is a highly contagious viral disease that affects chickens and is caused by the avian corona virus. It is characterized by respiratory symptoms and is of major economic relevance to the poultry industry. (Saif et al., 2008; Ennaji et al., 2020). Although effective vaccines are available for AIB and applied as a routine procedure in commercial poultry production, the virus has a tendency of frequent mutations (Legnardi *et al.*, 2020). Killed vaccines are more expensive but confer good protection, which are maintained over a long time (Cavanagh, 2003; Bijlenga *et al.*, 2004). Since antigenic variation can induce failure of the vaccination processes due to the difference of antigenic structures between vaccinal and wild viruses (Jackwood and Saif, 1987; Kibenge et al., 1988; Cao et al., 1998; Van den Berg, 2000). In Iraq, the first time isolation of IBV was by Abbas (1987) that propagation the IBV in the allantoic sac at (9-11) days of hatch embryonated eggs and showed teratogenic changes like curling and dwarfing of embryo, while the isolation and characterization of IBV from broiler chicken was carried out by Al-Husairaji, (2005). Vaccine failure may partially contribute to that we used imported vaccine which are different from the existed strains serotypes in Iraq. Consequently, this may emerge new variant strains of IB viruses. the effect of those vaccines in strains (Massachusetts H120, 4/91, QX) was studied on some immune organs like bursa of Fabricius and as well as the pathological effects of those vaccines and trachea were studied.

Method

Materials and methods

Experimental chicks:

Two hundred broilers from (Breed: Rose, Origin: Belgium) were brought from ALGhadeer Hatchery – Wasit. The chicks were divided randomly into 4 groups namely 1st, 2nd, 3rd, and 4th group. Each group consisted of 50 birds and housed in 4 separated rooms about 200 meters distance far between them. Blood samples (2 ml) collected from jugular vein from 18 chicks selected randomly from each group; all birds were vaccinated as follows.

1. 1st Group: 50 birds were given live vaccine (IBV-mass120 vaccine) by spraying at day 7.
2. 2nd Group: 50 birds were given live vaccine (IBV-4/91 vaccine) by spraying at day 7.
3. 3rd Group: 50 birds were given live vaccine (IBV-QX vaccine) by spraying at day 7.
4. 4th Group: 50 birds were not vaccinated with any vaccines (control).

We performed IL10 and IL12 test on all groups by ELISA device at 15 days old. After sacrificed the chicken at 15 day.

Blood Collection

Proper sample collection procedures, serum harvest and serum sample storage (4°C for up to four days or -20°C for longer periods) are needed to provide reliable test results.

Statistical analysis

Data were analyzed using statistical package for the social science (SPSS) software computer program, version 27 (IBM Corp., IBM SPSS Statistics for Windows, Version 27.0, Armonk, NY: IBM Corp. Chicago, USA).

Results

Analysis of IL-10 levels in tested groups of broilers

The result showed that IL-10 levels at 17days of age were significantly different ($p < 0.05$) between the groups, which is high in QX (40.42± 2.88) and significant lower in not vaccinated (10.008± 2.73), in a comparison with Mass120 (20.53± 5.19) and 4/91 (13.56± 4.83), it has been seen that QX vaccinated group recorded the highest Abs titers followed by IBVH120, 4/91 and the lowest group was that of control group as showed in fig.1.

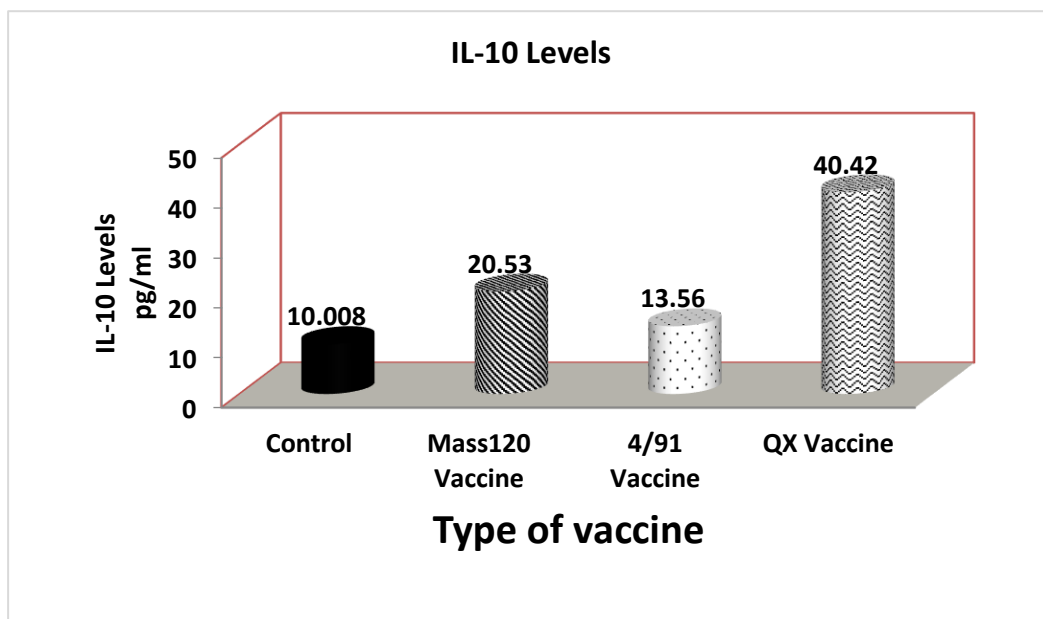


Figure 1: IL-10 Levels upon three different IB vaccines. Total of three groups of broilers 50 birds/each group were vaccinated with the studied IB vaccines (MAS 120, 4/91, QS) at 1wk age. Then serum were collected after 10 days for 18 samples from each group, samples were collected randomly. Serum IL-10 levels

pg/ml were detected using capture ELISA technique and data shown represented the level of regulation of the interleukin.

Analysis of IL-12 levels in tested groups of broilers

The result showed that the total IL12 count at 17days of age was significantly different ($p < 0.05$) between the groups, which is high in QX (15.39 ± 1.30) and significant lower in not vaccinated (5.55 ± 1.24), in a comparison with Mass120 (8.53 ± 1.95) and 4/91 (6.62 ± 1.82), it has been seen that QX vaccinated group recorded the highest Abs titers followed by IBVH120 ,4/91 and the lowest group was that of control group as shown in fig.2.

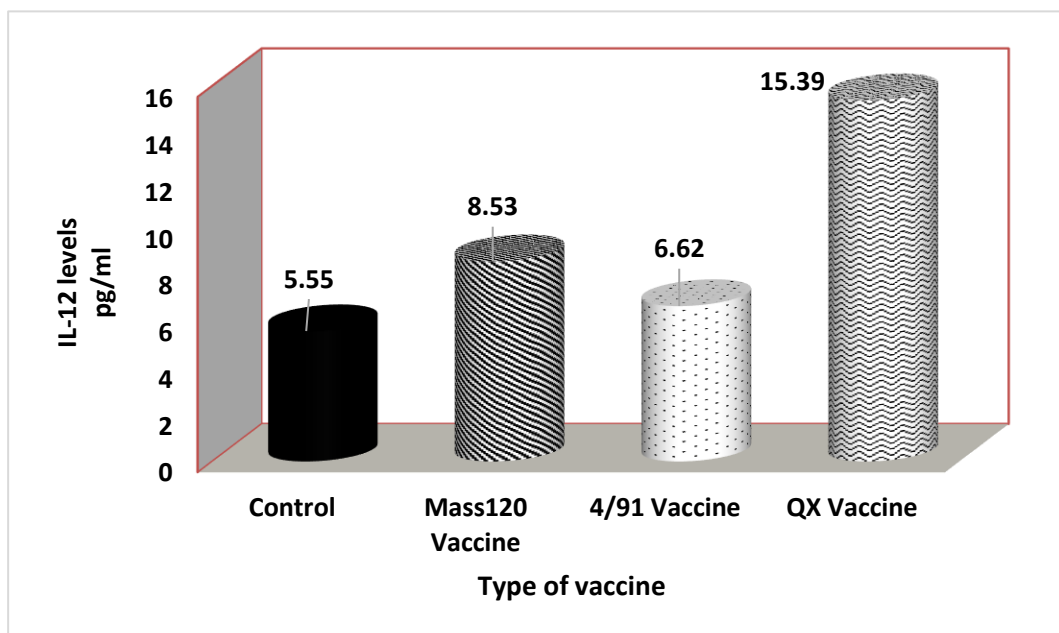


Figure 2: IL-12 Levels upon three different IB vaccines. Total of three groups of broilers 50 birds/each group were vaccinated with the studied IB vaccines (MAS 120, 4/91,QS) at 1wk age. Then serum were collected after 10 days for 18 samples from each group, samples were collected randomly. Serum IL-12 levels pg/ml were detected using capture ELISA technique and data shown represented the level of regulation of the interleukin.

Discussion

Infectious bronchitis (IB) is a highly contagious acute viral disease that causes high morbidity in all ages of chickens and high mortality in chicks less than 6 weeks old (Jackwood, M. W., & De Wit, S.(2013).

Mortality rate varies between 30% and 80% in infected flocks, and is linked to multiple serotypes with different pathogenicity among strains of viral IB. It also depends on the method of virus entry and immune status of the birds, as well as the age of the chicken, time of infection, and the presence of stress or secondary infection (Al-Fadhili , 2014).

The age of infection ranged in agreement with Awad *et al.*, (2014). Infected birds transport the viruses from one place to another; hence wild birds have recently become a source of concern as natural IBV carriers (Han *et al.*, 2011).

Vaccination is the most important way to control the disease. Nevertheless, novel strains of infectious bronchitis (IB) continue to emerge in the field. In order to respond promptly, combinations of existing IB vaccines are frequently tested to see whether they can provide cross-protection (Bru, *et al.*, 2017).

Poultry men usually in Iraq vaccinate their hens before laying using oil adjuvant vaccine mainly IB H120, and revaccinate hens after few months aerosally (Cavanagh and Naqi, 2003 ; Cavanagh, 2007).

The misuse of IBV vaccines makes the evolution and emergence of new IBV strains more difficult. The viral RNA polymerase's poor proofreading capability could be one reason for the creation of new IBV strains. Along with the viral genome, this resulted in a high mutation rate.

AT the study of QX vaccine results of ELISA assay is a convenient method widely used to detect antibody response to IBV infection in broilers flock (Wing *et al.*, 2002).

When conducting an ELISA test on the field level of broiler chickens before and after vaccination, it was found that the highest level of immunity after vaccination was QX vaccine, as well as when conducting an examination at an experimental level that gave the highest level of immunity to QX vaccine This result is in agreement with (Ellis, *et al.*, 2018) and it had a clear effect where the highest titer was given to IL10 as well as IL12.

And it has a clear histological effect on the trachea as well as the bursa of Fabricius after the QX vaccine comparative study between results of vaccinated experimental groups. The results of current study demonstrated presence of significant differences ($P < 0.05$) between vaccinated and control birds against IBVH120, 4/91 and QX vaccinal strains used in this study, it has been seen that QX vaccinated group recorded the highest mean Ab titers followed by IBVH120 and lowest group was that of 4/91 vaccinal strain as compared control group The results of our study were in agreement with others that confirm the biolability of ELISA test as checking procedure for IBV antibody titrations (Momayez *et al.*, 2002).

The results of current study demonstrated presence of significant differences ($P < 0.05$) between vaccinated and control birds against IBVH120, 4/91 and QX vaccine strains used in this study, it has been seen that QX vaccinated group recorded the highest mean Abs titers followed by IBVH120 and lowest group was that of 4/91 vaccine strain as compared control group. Many outbreaks of IBV infections were happened in Iraqi provinces which was diagnosed by ELISA , this was interpreted by importing of unsuitable vaccine strains of IBV that it was not matched with local strains in the country (Abdullah, 2010).

Abdullah (2010) revealed that attenuated live vaccine had risk factor on poultry due to multiple genetic mutations, the control of IBV infection by vaccinations affected by emergence of new serotypes, so the vaccination become invaluable in spite of the symmetric live vaccine is more better than variable in controlling of

the infections, Although, more intensive vaccination programs were done for prophylaxis against outbreaks IBV infections, there is greatest losses in poultry farms which may be due to the outbreaks may be resulted from secondary infections with other causative agents which had isolated from these infections, or the vaccine may increase the susceptibility of the chicks for *E. coli* infections (Almremdhhy, 2010), in additions the biosafety systems may not be applies in poultry farms (Aljoburi., 2012)

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