2009年 6A

Efficacy of chicken egg immunoglobulins against transmissible gastroenteritis virus and porcine epidemic diarrhea virus in an experimental infection of newborn piglets

Sa V. Nguyen,
GHEN Corporation Immunology Research Institute, 839-1 Sano, Gifu-city 501-1101, Japan

Porcine epidemic diarrhea virus (PEDV) and transmissible gastroenteritis virus (TGEV) infections are common in pigs. The main clinical symptoms in piglets are diarrhea, vomiting, dehydration, and high mortality rate (30-100%). In Asia, mixed infections of the two viruses are common. Commercial vaccines have been available in some countries but their efficacy has not been well documented. This study examines the effect of chicken egg immunoglobulins (IgY) against the two viruses in an experimental infection of newborn piglets.

Materials and Methods. TGEV and PEDV-specific IgY samples were prepared by immunizing hens with the inactivated virus antigens. One-day-old piglets used in this study came from a swine breeding farm that was free from neonatal diarrhea due to PEDV, TGE virus. The piglets were fed with sterile milk replacers SPF-Lac® (Pet-Ag Inc., Hampshire, IL, USA), and they were kept in separate flat decked holding pens in an isolation room for the whole duration of the experiment. The piglets were orally infected with virulent strains of the viruses and treated with specific or control IgY daily. The clinical response of each piglet was recorded and evaluated in terms of fecal score, body weight gain and mortality. Persons who did not know the treatment condition for each piglet performed fecal scoring. Fecal scoring was done twice per day in the morning and the evening while other observation parameters were done once daily. Fecal consistency score was based on the following index: 0 = normal, 1 = soft consistency, 2 = mild diarrhea, 3 = severe watery diarrhea and death. The cumulative fecal score of each piglet was calculated as the sum total score for the whole examination period. Body weight gain of each piglet was expressed as percentage of weight gain at post-challenge exposure (PE) day 7 compared to initial body weight on PE day 0. For immunohistochemical examination, surviving piglets were sacrificed and intestinal samples were collected at the time of necropsy.

Results. In the TGEV challenge experiment 80% piglets in the control group died while all the piglets in the test group survived though they all had diarrhea. In the PEDV challenge experiment, 75, 100 and 100% piglets in the test groups treated with low, medium and high IgY doses, respectively, survived while all the piglets in the control group died after infection. Other evaluation parameters including duration of diarrhea, fecal score and body weight gain in the test groups also showed dose-dependent effect. Immunohistochemical examination of small intestine samples showed lower virus score in IgY-treated piglets.

Discussions and conclusion. In this study egg immunoglobulins (IgY) specifically prepared against TGEV and PEDV protected newborn piglets against infection with these viruses. The protective effect of IgY was shown not only by higher survival but also by several clinical parameters including duration of diarrhea, fecal score, body weight gain and virus detection in the gut of infected piglets. Given the many advantages of chicken egg immunoglobulins compared to other sources of antibody such as lower production cost, egg immunoglobulins are a valuable tool for controlling TGEV and PEDV infections in newborn piglets. A combination of specific immunoglobulins with sow vaccination can further facilitate the control of these infections.