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Changes in serum biochemical constituents of large white Yorkshire pigs after swine fever vaccination

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Abstract

The study was conducted to determine the effect lapinized Swine fever vaccine on serum constituents of Large White Yorkshire pig. Twelve healthy Large White Yorkshire piglets were selected and vaccinated against Swine Fever. Blood samples were collected on 0 day (the day before vaccination) and 30th, 60th and 90th day of post-vaccination. The different serum biochemicals namely, total protein, albumin, globulin, creatinine, uric acid, calcium (Ca), inorganic phosphorus (P) and serum glutamate oxaloacetate transaminase (SGOT) and serum glutamate pyruvate transaminase (SGPT) were estimated following standard protocol. Data generated from the study were analyzed statistically. Certain serum constituents showed an increasing trend on the successive days of post-vaccination. The peak concentration of all the serum constituents was found on 60th day of post-vaccination. However, the increased concentration of serum constituents was within the normal range. A significant difference was observed in the concentrations of total protein, globulin, creatinine, serum glutamate oxaloacetate transaminase, serum glutamate pyruvate transaminase in the different days of post-vaccination.

Keywords: Biochemical constituents, large white Yorkshire, swine fever vaccine, post-vaccination

1. Introduction

In developing countries like India, livestock farming has been considered to be the lifeline of agricultural economy. Pig rearing plays an important role in the different community and tribes of North Eastern states of India. India produces 4.2 million tons of meat annually but the availability of animal protein is only 8.3 g per head per day against a minimum requirement of 15 g per head per day as per the recommendation of Indian Council of Medical Research (1). But this unique industry has been threat very frequently by both bacterial and viral diseases. Among these, Classical Swine Fever is an economically important contagious viral disease of swine and is regularly vaccinated in many herds. Classical Swine Fever is an Office International des Epizooties (OIE) list A disease and is present in most of the parts of the world causing substantial economic damage to the pig industry (2). Variations in blood parameters have been reported in animals due to several factors such as altitude, management, feeding level, age, sex, breed, health status, exogenous administration of drugs, diurnal and seasonal variation, ambient temperature, and physiological status of the animal. The hematological and serum biochemical differences may be associated with variations in environment, breed, physiological status, etc. (3). However, perusal of literature reveals scanty information on the effect of swine fever vaccination on different biochemical parameters. Therefore, the present study was designed to elucidate the effect of lapinized swine fever vaccine on different serum constituents in Large White Yorkshire pigs.

2. Materials and Method

2.1 Animals and sample collection: A total of 12 healthy Large White Yorkshire piglets of 2 months age were selected and maintained in standard nutritional and managemental conditions throughout the period of study. The animals were vaccinated against Swine Fever using lapinized swine fever vaccine at the dose rate of 1 ml subcutaneously. Blood samples were collected from ear vein on 0 day (the day before of vaccination) and 30th, 60th and 90th day of post-vaccination for biochemical analysis.

2.2 Serum biochemistry: The non anticoagulated blood samples were kept at room temperature for 1 hour to ensure complete clotting. Then, the serum was separated from non-

anticoagulated blood samples by centrifugation at 2000g for 10 min. The serum samples were stored at -20 °C until analyzed. In the serum, total protein, albumin, globulin, uric acid, creatinine, calcium (Ca), inorganic phosphorus (P), serum glutamate oxaloacetate transaminase (SGOT) and serum glutamate pyruvate transaminase (SGPT) levels were estimated. Analysis was carried out using commercial test kits (Crest Biosystems, Coral Clinical Systems, Goa-403202, India) using UV Spectrophotometer.

2.3 Statistical analysis: Analysis of variance was performed to determine the presence or absence of significant differences in the analytical variables among different groups using GraphPad PRISM version 5.0 statistical software package and the differences between the different post vaccinated days were tested by Tukey's multiple comparison test.

3. Results and Discussions

In the present study, effect of Swine Fever Vaccine on serum constituents in Large White Yorkshire Pigs was analysed; the data have been presented in the Table 1. The mean total serum protein level reached a maximum on 60th days of post vaccination and then declined gradually on 90th day of post vaccination. A significant increase in serum total protein concentration in post vaccination period was recorded in cattle vaccinated for Foot and Mouth Disease in the earlier studies (4, 5). There was a rise in total serum protein level in cross-bred calves after Foot and Mouth disease and Haemorrhagic Septicaemia vaccination (6). In the present study, a significant ($P<0.05$) variation in the concentration of serum total protein during post vaccination period was observed which might be due to an increase in the level of γ -globulin of the vaccinated pig (7) as well as due to increase over-all transaminase activity (8). The increase in γ -globulin levels after swine fever vaccination was reported by earlier worker (9) which might be attributed to the increase in the total serum protein concentration in the vaccinated pigs. However, the changes observed in albumin did not comply with the previous findings (10). On the other hand, an increment of albumin observed in the study was in agreement with the results previously detected in post vaccinated animals (11). A significant increase of serum albumin was also recorded in cross-bred female calves after Foot and Mouth disease vaccination (5). In our present study, no significant difference of serum albumin concentration on the different

days of post-vaccination was observed which might be due to the use of different strain of the virus for preparation of the vaccine. The highest mean serum globulin level was observed on 60th day of post vaccination. The mean serum globulin increased after vaccination. Our finding is correlated with earlier workers (12) who had reported a significant rise in the levels of serum globulins in cattle after 2nd to 4th week of FMD vaccination. Similar observations of high levels of serum globulins were also reported earlier in vaccinated cattle (13). A significant difference ($P<0.01$) was observed between the different days of vaccination which can be due to an increase in antibody titre of the vaccinated pig.

The maximum concentration of serum creatinine and uric acid was observed on 60th day of post-vaccination. Elevation of the serum creatinine level is an indication of abnormal renal function (14). A significant variation ($P<0.01$) in serum creatinine and uric acid was observed on the different days of post vaccination. However, our values were within the normal range ((9, 15). Uric acid, a metabolic product of purines is an antioxidant which scavenges reactive oxygen radicals in the blood. Vaccination might have increased the free radicals and in order to neutralize that uric acid might have been increased (16).

The maximum concentration of serum calcium and inorganic phosphorus levels were observed on 60th day of post vaccination. No significant differences on calcium and phosphorous level between the pre- and post-immunization period were recorded in the experiment. However, the concentration was within the normal range as per the record of previous worker (17, 18).

The peak activity of serum glutamate oxaloacetate transaminase and serum glutamate pyruvate transaminase was observed on 60th day of post vaccination. There was a significant difference in the serum glutamate oxaloacetate transaminase ($P<0.05$) and serum glutamate pyruvate transaminase activity ($P<0.05$) activity between the different days of post vaccination. Our result is corroborated with the SGOT and SGPT activity reported earlier (19). The increase in SGOT and SGPT level among the different days of post vaccination was due to the triggering action of vaccine for increase synthesis of total protein and for augmenting protein synthesis, transaminase activity has to be increased. The increase transaminase activities were reflected by increase synthesis of protein in immunized animal during post vaccination period.

Table 1: Mean \pm SEM values for selected biochemical parameters in vaccinated Large White Yorkshire pigs (n=12)

Parameters	0 day	30 days	60 days	90 days	p-Value
Total Protein	8.15 _A \pm 0.07	8.57 _B \pm 0.09	8.61 _{BC} \pm 0.13	8.51 _{BC} \pm 0.10	$p<0.05$
Albumin (g/dl)	5.42 \pm 0.02	5.61 \pm 0.05	5.67 \pm 0.08	5.60 \pm 0.08	NS
Globulin (g/dl)	2.68 _A \pm 0.06	2.94 _B \pm 0.04	2.95 _{BC} \pm 0.05	2.85 _{BC} \pm 0.03	$P<0.01$
Creatinine (mg/dl)	1.05 _A \pm 0.09	1.88 _B \pm 0.03	2.02 _{BC} \pm 0.05	1.75 _B \pm 0.03	$P<0.01$
Uric Acid (mg/dl)	0.75 _A \pm 0.09	1.42 _B \pm 0.15	1.66 _{BC} \pm 0.15	1.35 _{BC} \pm 0.15	$P<0.01$
Calcium (mg/dl)	9.07 \pm 0.07	9.13 \pm 0.09	9.24 \pm 0.08	9.17 \pm 0.11	NS
Phosphorus(mg/dl)	4.28 \pm 0.04	4.52 \pm 0.08	4.58 \pm 0.11	4.51 \pm 0.07	NS
SGOT (U/L)	24.36 _A \pm 0.27	25.08 _{AB} \pm 0.24	26.16 _{BC} \pm 0.38	25.81 _{BC} \pm 0.34	$p<0.05$
SGPT (U/L)	18.11 _A \pm 0.23	18.77 _B \pm 0.22	19.37 _C \pm 0.24	18.74 _B \pm 0.18	$p<0.05$

NS= not significant A, B, C= The letter in the same line means significantly different.

4. Conclusions

From the present study, we observed an increasing trend of the different serum constituents such as total serum protein, albumin, globulin, uric acid, creatinine, calcium, phosphorus concentration after vaccination. It can be concluded that the total protein, globulin, creatinine, uric acid, SGOT and

SGPT concentration increased significantly in Large White Yorkshire pigs after vaccination. However, the transient increase in the concentration of different serum constituents was within the reported range which indicates the healthy status of the animal.

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