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Research Article

HAEMATOLOGICAL AND SERUM ENZYME PROFILE OF NEONATAL HAMPSHIRE PIGLETS

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Abstract: The present study was undertaken to study haematological and serum enzyme status of neonatal Hamshire piglets in first week of postnatal life. Eight numbers of apparently healthy Hampshire piglets, irrespective of sex were utilized. They were divided into two age groups of 0 day and 7 days, consisting of four animals in each group. One millilitre (1.0 mL) of blood was sampled from the anterior vena cava (vena cava cranialis) into sterile vacutaner beakers with disodium salt ethylene diamine tetraacetic acid (EDTA) as an anticoagulant for hematological analysis. Three millilitres (3.0 mL) of blood was sampled from the anterior vena cava. The WBC, neutrophil and haemoglobin counts were significantly lower (P<0.05) in 7 day old piglets. However, monocyte, basophil, MCHC and THR counts were significantly higher (P<0.05) in 7 day old piglets. The average RBC count was significantly lower (P<0.01) in 7 day old piglets. The lymphocyte, MCV and HCt counts were significantly higher (P<0.01) in 7 day old piglets. The SGPT and SGOT levels were significantly (P<0.05) higher in 7 day old piglets as compared to 0 day old piglets. Data generated may be of use to monitor the health of neonatal piglets.

Keywords: Haematology, Serum biochemical, Neonatal piglet

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Introduction

Pre-weaning piglet mortality continues to be a major economic loss to the farmers. In modern pig production most significant losses occur in suckling and weaned piglets [1, 2]. Most of the pre-weaning mortality occurs within 72 hours after birth. Mortality ranging from 8-10% of piglets during suckling is considered to be normal [3]. Furthermore, 60-80% of total mortalities in the perinatal period occur during the first three days of life [4-6]. The main reasons for losses are infectious diseases, inadequate nutrition, inadequate management and rearing [3,7]. Additionally, malnourished nursery pigs may also suffer from periweaning failure to thrive syndrome (PFTS) and therefore may show no signs of respiratory, systemic, or enteric diseases, but may have lower feed intake and become increasingly debilitated after weaning [8]. Some nursery pigs may suffer from fever, dyspnea, and weight loss. Hematological indices aid in the diagnosis, treatment and prognosis of many diseases [9]. Monitoring herd health via hematological indices may signify some diseases, even though the animals may not be exhibiting clinical signs of disease [10]. A deviation from normal hematological values can give an indication of how the environment is affecting the nursery pig's physiology [10]. In view of the above, the present investigation was conducted to evaluate the health of piglets on first week of postnatal life by determining haematological indices and two most clinically important serum enzymes.

Materials and Methods

For the investigation, twelve numbers of apparently healthy Hampshire piglets irrespective of sex were selected from the ICAR-AICRP/MSP on pig, College of Veterinary Science, AAU, Khanapara, Guwahati. The body weight at birth of the piglets was range between 1.2 to 1.4 Kg and the piglets were dependent on mother's milk only. They were divided into two age groups of 0 day and 7 days, consisting of six animals in each group. From each animal, 5ml of blood was collected from anterior vena cava using 20 gauges needles.

The blood was collected in vacutainers separately for haematological analysis and enzymatic study. One millilitre (1.0 mL) of blood was transferred into sterile vacutainer with disodium salt ethylene diamine tetraacetic acid (EDTA) as an anticoagulant for hematological analysis. The remaining 4 ml of blood was kept in the vacutainer without anticoagulant for separation of the serum to be used for enzyme analysis. Hematological parameters were analyzed with the Serono-Baker Diagnostics System 9000+ (Inc. Cascade Drive, Allentown, Pennsylvania 18103, USA) automatic analyzer. The enzyme activity was determined in serum using ready to use kit. The results were then analyzed statistically using suitable statistical method as per Snedecor and Cochran [11].

Results and Discussion

The Mean ± SE of different haematological parameters of 0 and 7days old Hampshire piglets have been presented in [Table-1]. In the present study the different parameters of the blood were in the normal range as compared with the adult pig. The WBC, neutrophil and haemoglobin counts were significantly lower (P<0.05) in 7 day old Hamshire piglets. However, monocyte, basophil, MCHC and THR counts were significantly higher (P<0.05) in 7 day old Hamshire piglets. The average RBC count was significantly lower (P<0.01) in 7 day old piglets. This might be due to piglet anaemia which develops from the first week of postnatal life as the experimental animals did not given iron injection. The lymphocyte, MCV and HCt counts were significantly higher (P<0.01) in 7 day old Hamshire piglets. The higher in lymphocyte counts might be due to exposure of antigen which activates the lymphocyte by the higher age group animals. The present findings were closely resembled with the findings of Buzzard *et al*. [12] and Ventrella *et al*. [13] in nursery pig. The serum glutamate pyruvate transaminase (SGPT) level was observed in 0 and 7 days old Hampshire piglets and is presented in [Table-2]. The serum glutamate pyruvate transaminase (SGPT) level in the present investigation in 0 and 7 day old Hampshire piglets were 37.80 ± 0.62 U/L and 40.10 ± 0.59 U/L.

Table-1 Haematological parameters of 0 and 7 days old Hampshire piglets

Parameters	0 day piglet		7 days piglet		Normal Range
	Mean ± SE	Range	Mean ± SE	Range	
WBC (10^3/Cumm)	21.46 ± 1.35	17.2 - 23.5	17.24 ± 1.15*	15.23-19.62	11.0-22.0
Lymphocyte (%)	15.30 ± 1.23	13.2 - 17.36	23.80± 1.54**	20.50- 27.62	35.0- 4.0
Monocyte (%)	1.70 ± 0.92	1.45 - 1.93	3.50 ± 1.19*	2.82 - 5.60	2.0 - 10.0
Neutrophil (%)	82.5 ± 4.89	62.4 – 89.6	72.10 ± 3.56*	56.5 - 75.26	28.0- 62.0
Eosinophil (%)	0.4 ± 0.02	0.2 - 0.6	0.6 ± 0.03	0.4 - 0.8	0.50 - 11.0
Basophil (%)	0.1 ± 0.01	0.07 – 1.2	0.4 ± 0.02*	0.2 - 0.6	0.5 – 1.0
RBC (10^6/Cumm)	5.36 ± 1.02	4.23 – 6.12	2.80 ± 0.56**	2.30 - 4.20	5.0 - 8.0
MCV (fl)	78.8 ± 6.57	62.3 – 82.4	57.9 ± 5.12**	51.4 - 73.6	50.0 - 68.0
HCt (%)	39.5 ± 3.24	26.7 – 42.36	16.2 ± 2.56**	13.0 - 25.0	32.0 - 50.0
MCH (pg)	21.6 ± 2.15	13.3 – 23.4	20.3 ± 1.86	14.45 - 21.4	17.0 - 21.0
MCHC (g/dL)	29.3 ± 1.65	25.4 – 32.75	35.1 ± 1.89*	30.2 – 37.1	27.0 - 40.0
RDW	17.2 ± 1.42	11.8 – 19.6	16.4 ± 1.36	11.4 – 18.5	8.0 - 12.0
Hb (g/dL)	11.6 ± 1.14	9.8 – 14.8	8.7 ± 1.02*	5.7 – 11.6	10.0 - 17.0
THR (10^3/Cumm)	155 ± 5.73	142 - 230	200 ± 6.45*	180 - 356	250 - 750
MPV (fl)	12.1 ± 2.4	9.9 – 19.3	12.0 ± 2.32	9.88 – 18.62	4.0 - 9.0
Pct (%)	0.19 ± 0.03	0.15 – 2.3	0.24 ± 0.04	0.15 – 0.32	-
PDW	10.34 ± 1.34	8.25 – 14.23	11.2 ± 1.68	8.60 – 14.4	6.0 - 10.0

*Significant at 5 % (P < 0.05); **Significant at 1 % (P < 0.01)

Table-2 Serum glutamate pyruvate transaminase level (u/l) of 0 and 7 days old hampshire piglets

Parameters	0 Day piglet	7 Day piglet	't' Value
SGPT	37.80 ± 0.62	40.10 ± 0.59	0.036*

*Significant at 5 % (P < 0.05)

The table indicated that SGPT level was significantly (P<0.05) higher in 7 day old piglets as compared to 0 day old piglets. Mayengbam and Tolenkhomba [14] recorded a lower value in indigenous adult pig of Mizoram. This might be due to variation in breed and age. The serum glutamate oxaloacetate transaminase (SGOT) level was observed in 0 and 7 days old Hampshire piglets and is presented in [Table-3].

Table-3 Serum glutamate oxaloacetate transaminase level (u/l) of 0 and 7 days old hampshire piglets

Parameters	0 Day piglet	7 Day piglet	't' Value
SGOT	60.50 ± 0.80	57.43 ± 0.54	0.023*

*Significant at 5 % (P < 0.05)

The serum glutamate oxaloacetate transaminase (SGOT) level in the present investigation in 0 and 7 day old Hampshire piglets were 60.50 ± 0.80 U/L and 57.43 ± 0.54 U/L, respectively. The table indicated that SGOT level was significantly (P<0.05) higher in 7 days old piglets as compared to 0 day old piglets. Mayengbam and Tolenkhomba [14] recorded a lower value in indigenous adult pig of Mizoram. This might be due to variation in breed and age.

Conclusion

The study thus reports the normal values of haematological indices and some clinically important enzymes, which may be used as reference values for future investigations.

Application of Research: Data generated will be of use to monitor the neonatal health as well as disease diagnosis of the Hampshire pigs.

Abbreviations:

u/l : unit per litre
SGPT : Serum Glutamate Pyruvate Transaminase
SGOT : Serum Glutamate Oxaloacetate Transaminase

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