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Serum biochemical profile of indigenous pigs in Tamil Nadu

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Abstract

Indigenous pigs occupies an unique position in our animal genetic resource. Blood samples were collected from apparently healthy indigenous pigs (20 nos) from different parts of Tamil Nadu to study serum biochemical parameters. The overall mean for Creatinine (mg/dL), Blood Urea Nitrogen (BUN) (mg/dL), Total Protein (TP) (g/dL), Albumin (g/dL), Alanine amino transferase (U/L), Aspartate amino transferase (U/L), Alkaline Phosphatase (U/L), Calcium (mg/dL), Phosphorous (mg/dL) and Glucose (mg/dL) were 1.58 ± 0.09 , 19.43 ± 0.99 , 6.95 ± 0.11 , 3.59 ± 0.06 , 73.9 ± 4.41 , 24.55 ± 1.69 , 331.2 ± 19.07 , 8.11 ± 0.18 , 6.12 ± 0.20 and 117.05 ± 7.85 respectively. There is no significant difference among sexes in all the serum biochemical parameters analyzed. This study was carried out to present a baseline values of serum biochemical parameters for indigenous pigs of Tamil Nadu. These data provide valuable information for investigators using indigenous pigs as models in biomedical studies and useful physiological data for veterinarians and livestock producers.

Keywords: Serum Biochemistry, Indigenous Pigs, Tamil Nadu

Introduction

Blood plays an important role of transporting nutrients to every cell of our body and fulfills the regulatory, protective and homeostatic functions in mammals (Nasyrova *et al.*, 2006) ^[1]. Serum biochemical profile is one of the important indicators of health and disease in both human beings as well as in animals and have been used routinely as a tool in diagnosis, treatment and prognosis of diseased animals (Talebi *et al.*, 2005) ^[17]. Indigenous pigs has an unique place in our animal genetic resource. Mostly they have been reared in scavenging system rather than intensive system. They are the main source of income for the rural community and it also helps in improving their economic status. Rearing indigenous pigs in Tamil Nadu has increased in the recent past. They are widely distributed in all districts of Tamil Nadu. The total indigenous pig population in India is 7.84 million and it is 1.53 million in Tamil Nadu. Now-a-days pigs are used for research and transplantation studies. Reference values for serum biochemical values will help in valid interpretation for health status and also for those who use indigenous pigs as a research model. Determination of blood profiles reflects the physiological responsiveness of the animals to its internal and external environment. Change in blood parameters is also an important tool to access the level of stress due to environment and nutritional factors (Mmereole *et al.*, 2008) ^[10]. Total protein, globulin and albumin are indicators of adequacy of protein in terms of quality and quantity in the diet (Adekayode O. Sonibare *et al.*, 2014) ^[11].

Materials and methods

Blood were collected from apparently 20 healthy indigenous pigs from different parts of Tamil Nadu to study the normal serum biochemical profile of indigenous pigs of Tamil Nadu. Venipuncture of anterior vena cava was carried out for the collection of blood. Blood was collected in a pro coagulant vacutainers. The serum biochemical parameters *viz.*, Creatinine, Blood Urea Nitrogen (BUN), Total Protein, Albumin, Alanine amino transferase, Aspartate amino transferase, Alkaline Phosphatase, Calcium, Phosphorous, Glucose were estimated by automated serum analyzer (A15 biosystems). The animals were grouped into two different groups *viz.*, males and females comprising of 10 animals in each group.

Results and discussion

The mean serum biochemical parameters of 20 indigenous pigs were presented in table I and the mean serum biochemical profile for male and female were presented in table II. There is no significant difference among sexes in all parameters studied.

The mean value of Creatinine (mg/dL) is 1.58 ± 0.09 ranged from 0.95 to 2.49 similar to the findings of Jazbec *et al.*, (1990)^[6] and Pratt *et al.*, (1985)^[13] however a higher value was reported in Vietnamese potbellied pigs (Brockus *et al.*, 2005)^[2].

The mean value of BUN (mg/dL) is 19.43 ± 0.99 ranging from 10.84 to 32.57 which is higher than the value reported in Vietnamese potbellied pigs (Brockus *et al.*, 2005)^[2] and lesser than the values of domestic swine (Jazbec *et al.*, 1990; Kaneko *et al.*, 1997; Radostits *et al.*, 2000; Friendship *et al.*, 1984; Pratt *et al.*, 1985, and Schmidl *et al.*, 1985)^[6, 7, 15, 5, 13, 16]

The mean value of total protein (g/dL) is 6.95 ± 0.11 ranging from 5.6 to 7.7 which is lesser than the Vietnamese potbellied pigs (Brockus *et al.*, 2005)^[2] and improved indigenous NIGERHYB pigs (Adekayode *et al.*, 2014)^[11]. The results were in agreement with the findings of Schmidl *et al.*, (1985)^[16] and Friendship *et al.*, (1984)^[5].

The mean value of albumin (g/dL) is 3.59 ± 0.06 ranging from 3.0 to 4.2 which is similar to the findings of Jazbec *et al.*, (1990)^[6] and lesser than the findings of Forenbacher. S. (1993)^[4], Kaneko *et al.*, (1997)^[7], Radostits *et al.*, (2000)^[15], Friendship *et al.*, (1984)^[5], Brockus *et al.*, 2005^[2] and Adekayode *et al.*, 2014^[11].

The mean value of Aspartate amino transferase (AST) (U/L) is 24.55 ± 1.69 which ranges from 13 to 39 which is lesser than the values reported for Vietnamese potbellied pigs (Brockus *et al.*, 2005)^[2].

The mean value of Alanine amino transferase (ALT) (U/L) is 73.9 ± 4.41 which ranges from 50 to 137 which is higher than the values of Vietnamese potbellied pigs (Brockus *et al.*, 2005)^[2].

The mean value of Alkaline Phosphatase (ALP) (U/L) is 331.2 ± 19.07 which ranges from 209 to 532 which is extremely higher than the Vietnamese potbellied pigs (Brockus *et al.*, 2005)^[2].

The mean value of Glucose (mg/dL) is 117.05 ± 7.85 which ranges from 54 to 206 which is almost identical to the findings of Jazbec *et al.*, (1990)^[6], Kaneko *et al.*, (1997)^[7], Radostits *et al.*, (2000)^[15], Friendship *et al.*, (1984)^[5], Pratt *et al.*, (1985)^[13], Forenbacher. S. (1993)^[4], and Schmidl *et al.*, (1985)^[16] and higher value was reported in Vietnamese potbellied pigs (Brockus *et al.*, 2005)^[2].

The mean value of Calcium (mg/dL) and Phosphorous (mg/dL) is 8.11 ± 0.18 and 6.12 ± 0.20 respectively which is lower than the Doom pigs of Assam (Nath *et al.*, 2017)^[12]. But when compared to Zowavk pigs of Mizoram, the value of Calcium is lower and the value of Phosphorous is higher (Prava Mayengbam *et al.*, 2012)^[14]. These variations may be due to the local agro climatic conditions and local practices of rearing. In this study, the males had higher values than the females except for BUN, Total Protein, Albumin and Phosphorous.

The result from this study indicate that indigenous pigs of Tamil Nadu has variations in serum biochemical profile when compared to other indigenous pigs of the country. However, detailed examination of hormonal profile has to be carried out with various physiological states to rule out the reason for all variations.

Conclusion

Most of them are scavenging in nature, the data obtained can also be compared to other wild species of pig. However, in the present study, blood samples were collected from the indigenous pigs which are maintained in different agro climatic conditions of Tamil Nadu. Screening of health status of animals requires knowledge on the normal baseline data on various physiological parameters. Serum biochemical profiles is one of the important indicators of health and disease status and have been used in disease diagnosis and treatment of many diseases. Reference values for clinical and biochemical parameters are required for data interpretation of health and disease status. They can also act as useful aids to prognosis and may reveal adverse conditions even when the animal did not display obvious clinical signs of ill health. This data can be utilized as reference values for serum biochemical examination of indigenous pig as well as in diagnosis of diseases which will ultimately facilitate in management systems and will avoid economic losses.

Table 1: Mean serum biochemical values of indigenous pigs in Tamil Nadu

Parameters	Minimum value	Maximum value	Mean \pm S.E
Creatinine (mg/dL)	0.95	2.49	1.58 ± 0.09
BUN (mg/dL)	10.84	32.57	19.43 ± 0.99
Total Protein (g/dL)	5.6	7.7	6.95 ± 0.11
Albumin (g/dL)	3.0	4.2	3.59 ± 0.06
Alanine amino transferase (U/L)	50	137	73.9 ± 4.41
Aspartate amino transferase(U/L)	13	39	24.55 ± 1.69
Alkaline Phosphatase (U/L)	209	532	331.2 ± 19.07
Calcium (mg/dL)	6.41	9.98	8.11 ± 0.18
Phosphorous (mg/dL)	4.34	7.47	6.12 ± 0.20
Glucose (mg/dL)	54	206	117.05 ± 7.85

Table 2: mean serum biochemical profile according to sex

Parameters	Mean \pm s.e	
	Male	Female
Creatinine (mg/dL)	1.66 \pm 0.15	1.50 \pm 0.12
BUN (mg/dL)	19.32 \pm 1.75	19.53 \pm 1.06
Total Protein (g/dL)	6.67 \pm 0.17	7.24 \pm 0.11
Albumin (g/dL)	3.63 \pm 0.11	3.56 \pm 0.08
Alanine amino transferase (U/L)	76.4 \pm 7.80	71.4 \pm 4.46
Aspartate amino transferase(U/L)	26.2 \pm 2.50	22.9 \pm 2.28
Alkaline Phosphatase (U/L)	371 \pm 28.39	291.4 \pm 19.42
Calcium (mg/dL)	8.28 \pm 0.30	7.93 \pm 0.21
Phosphorous (mg/dL)	5.87 \pm 0.29	6.36 \pm 0.27
Glucose (mg/dL)	121 \pm 12.86	113.1 \pm 9.56

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