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Electrolyte and hormone profile of Doom pigs of Assam of different age groups

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Abstract

A study was carried out to find out the electrolyte and hormone profile of different age groups of an indigenous pig locally called Doom of Assam, India. A total of eighteen Doom pigs of different ages from Livestock Research Station, Mandira, Assam Agricultural University were taken for the study. Group I consisted of 0-2 months (pre-weaning) old piglets and group II consisted of pigs of 2-5 months (weaned) old pigs and group III consisted of 8 months and above (adult) pigs. Electrolytes were estimated spectrometrically using commercially available kits and hormones were estimated by Radio immuno assay (RIA) I-125 gamma counter. From the assay it was concluded that the electrolytes potassium, calcium, phosphorus, chloride and magnesium had an increasing trend with increase in age.

Keywords: Doom pigs, electrolytes, hormones, plasma

1. Introduction

Doom is an indigenous local pig available in Assam, India. The behaviour of this pig is very alert to the social happenings. The population of indigenous pig is locally available only in Assam. The population of the Doom pig is decreasing and so the pork of this pig is not available commercially though people prefer to take their meat because of its taste. The blood biochemical profile is an index for the health status of animals. The normal hematological and blood biochemical indices have been found to be influenced by sex, growth rate, diet, stage of gestation or lactation, feeding method and management practices or season ^[1, 2]. It is very necessary for a veterinarian to know the details of all the normal blood biochemical parameters so as to enable to diagnose any deviations of the same in the presence of diseases and provide therapeutic drugs. There is no literature pertaining to any biochemical profile of Doom pig. So a study was designed to find the electrolyte and hormone concentration of Doom pigs at different age groups. The findings of the present study can be used as a baseline data in examination of the pigs as well as in diagnosis of various production and / or metabolic diseases in Doom pigs, which can facilitate management system and averting economic losses.

2. Materials and methods

2.1 Ethical approval: Prior approval from the Institutional Animal Ethics Committee was obtained for blood collection of the animals for the study.

2.2 Experimental design: A total of eighteen clinically healthy Doom pigs of different ages from Livestock Research Station, Mandira, Assam Agricultural University were taken for the study. The animals were given ad libitum access to balanced full ration feed in compliance with the production standards. Blood for analysis was taken from random selection of animals and they were divided into three groups. Group I consisted of piglets of 2 months of age (pre-weaning), group II consisted of pigs of 5 months of age (weaned) and group III consisted of 8 months old pigs (adult) and each group consisted of six animals each.

2.3 Biochemical assay

Blood was collected early morning before feeding by venipuncture of the anterior vena cava from 2 to 5 months old piglets and from ear vein from adult pigs using a 18 gauge hypodermic needle fitted to a Vacuumtainer-Leur adapter and evacuated tubes. Whole blood was collected into 5ml Vacuumtainer tube containing (EDTA) as the anti-coagulant. Plasma was separated from the blood in by centrifugation at 3,000 rpm for 20 min. Electrolytes (Na, K, Ca, P, Mg and Cl) were estimated spectrometrically using commercially available kits.

2.4. Hormonal assay

The hormones tri-iodothyronine (T₃), tetra-iodothyronine (T₄) concentration in plasma were estimated by radio immunoassay (RIA) I-125 gamma counter [3]

2.5. Statistical analysis

Mean values ± standard error [SE] for the concentrations of various electrolytes and hormones was calculated for the two groups of animals [4].

3. Results

The concentration of plasma electrolytes viz. plasma Na, K, Cl, Ca, Pi and Mg and hormone viz. T₃, T₄ and cortisol are presented in Table 1 and 2 respectively. It was observed that the mean serum sodium concentration was 178.44, 152.25 and

146.45 mmol/lit at 2, 5 and 8 months respectively. The mean potassium concentration was 5.14, 4.35 and 3.75mmol/lit at 2, 5 and 8 months and ranged from 1.98- 4.98, 2.76- 5.97 and 3.15- 6.65 mmol/lit respectively. The mean serum calcium value was observed to be 11.59, 10.32 and 12.26 mg/dl and ranged from 8.09 - 14.98, 7.34- 14.98 and 9.76- 15.98 at 2, 5 and 8 months respectively. The mean phosphorus concentration was found to be 6.36, 6.17 and 8.49 while it ranged from 4.34- 8.87, 3.53- 10.52 and 5.21- 11.81 mg/dl respectively at 2, 5 and 8 months. The mean chloride concentration were 117.57, 107.74, 105.55 mg/dl and magnesium concentration were 2.16, 2.55 and 2.84 mg/dl at 2, 5 and 8 months respectively. The electrolytes potassium, calcium, phosphorus, chloride and magnesium had an increasing trend with increase in age.

Table 1: Reference range and age-related changes in hormones in Doom pigs of Assam

Parameter	Group I		Group II		Group III	
	Mean	Range	Mean	Range	Mean	Range
Sodium (mmol/lit)	146.45	112.54-195.54	152.25	135.97-176.45	178.44	159.76-196.98
Potassium (mmol/lit)	3.75	1.98- 4.98	4.35	2.76- 5.97	5.14	3.15- 6.65
Calcium (mg/dl)	12.26	9.76- 15.98	10.32	7.34- 14.98	11.59	8.09 - 14.98
Phosphorus (mg/dl)	6.36	4.34- 8.87	8.49	5.21- 11.81	6.17	3.53- 10.52
Chloride(mmol/lit)	117.57	98.54- 134.98	107.74	78.11- 128.76	105.55	77.23- 134.98
Mg(mg/dl)	2.16	0.53- 2.91	2.55	1.73- 2.91	2.84	1.73- 3.81

The T₃ concentration were 1.95±0.5, 1.92±0.3 and 1.74±0.17 while the T₄ concentration were 49.12±3.2, 52.22±5.6 and 61.2±5.1 mEq/lit in pre weaning, weaned and adult pigs respectively. The T₃ concentration was found to be highest in the pre youngest pigs while T₄ concentration was highest in the adult pigs. Thus T₃ decreased with age while T₄ increased with age.

Table 2: Reference range and age-related changes in hormones in Doom pigs of Assam

Parameter	Group I	Group II	Group III
T ₃ (mEq/lit)	1.95±0.5	1.92±0.3	1.74±0.17
T ₄ (mEq/lit)	49.12±3.2	52.22±5.6	61.20±5.1

4. Discussion

The plasma concentration of Na in Doom pigs increased significantly ($P < 0.05$) after weaning. Our reports correlates with previous reports that Na concentration increased significantly after weaning [5]. They reported the concentration of Na as 192.84 ± 5.00, 191.14 ± 3.60 and 197.76 ± 5.61mmol/L in pre weaning, grower and adult pigs respectively. But some workers reported vice versa [6]. The mean K concentration in the present study was similar with other pigs of previous reports [5]. They [5] reported the concentration of K as 3.26 ± 0.16, 3.49 ± 0.14 and 4.13 ± 0.18 b mmol/L in pre weaning, grower and adult pigs respectively. Presence of higher K in adults than in young ones is in contrast to the reports that K concentration declined after weaning [5]. These differences might be a process of adaptation changes [5]. The plasma Cl concentration of Doom pigs is almost similar with Cl concentration of Zovawk pigs, a local breed of Mizoram [5]. They reported a concentration of 106.87 ± 7.20, 93.94 ± 0.72 and 97.49 ± 0.96 mmol/l in pre weaning, grower and adult pigs respectively. The concentration of Ca, P and Mg are in the ranges as reported for other pigs [7, 8]. In our study adult pigs had Ca levels lower than the young ones which is in parallel with the reports of previous workers [7] but some worker [5] reported in contrast to our reports that blood Ca is higher in adults as compared to

young ones. The presence of slightly lower Ca concentration during the grower stage might be indicating imbalance in Ca concentration due to the increasing demand of the mineral for skeletal and muscular growth which are at the peak during this phase unlike before the weaning or in the adults [5]. It is also likely that the grower pigs had higher P which by mass action lowered the Ca levels. In our study we observed a higher P concentration in weaned pigs which is in parallel with previous workers [5]. Presence of higher P level in growers may be due to the higher requirement of P during growing stage for teeth and skeletal development. The maintenance of this higher P during the growing stage was possible due to the influence of growth hormone as it increases renal phosphate absorption [7]. In the present study the plasma Mg was lower in pre-weaning pigs as compared to other pigs and was also reported by some workers [5]. The Mg homeostasis is a result of balance between intestinal absorption and renal excretion with additional regulation by the adrenals, thyroids and parathyroid glands. However no endocrine gland exerts a primary regulatory role on plasma Mg [5]. It is therefore difficult to cite any probable cause for low Mg in pre-weaning pigs of the present study. It is possible that total dependency of these piglets on the mother's milk might have caused this effect.

The thyroid gland is involved in the regulation of growth, development, adaptation and productivity of farm animals [8, 9]. The level of thyroid hormone synthesis regulates the rate and the direction of metabolic events, determines their physiological optimum [10]. A number of authors [11] have investigated the relationship between productive traits of pigs and the tension of thyroid hormone synthesis. The T₃ and T₄ are two principal thyroid hormone for assessing thyroid functions. Both thyroid hormone levels compare favorably with the normal range of values found in domestic pigs and suggesting an adequate thyrometabolic status in the study animals.

5. Conclusion

The results of the present study indicate that locally available indigenous pig of Assam has variation in the plasma

concentration of electrolytes and hormones with age. Further detailed investigations however are required for complete hormonal profile along with different physiological states in order to find out exact causes of these variations.

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