International Multidisciplinary Research Journal 2012, 2(2):49-51
ISSN: 2231-6302
Available Online: http://irjs.info/

INTERNATIONAL MULTIDISCIPLINARY RESEARCH JOURNAL

Electrolyte (Na, K, Cl, Ca, Pi and Mg) profile of Zovawk pigs of Mizoram, India in different age groups

Prava Mayengbam*, T.C. Tolenkhomba, M. Ayub Ali, P. Saikia, N. Shyamsana Singh and L. Hmar

College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih Aizawl-796014, Mizoram, India

Abstract
A study was carried out to find out the electrolyte profile of different age groups of an indigenous pig locally called Zovawk of Mizoram, India. The plasma Na and Cl were not influenced by age. The plasma concentration of Na was found to be in higher ranges while that of K was in lower range. Adult pigs had higher K ($P<0.05$) and Ca ($P<0.05$) than pre-weaning piglets and growers. Pi was higher in growing pigs ($P<0.05$) than in pre-weaning piglets and adults. Piglets had lower Mg ($P<0.05$) than the growers and adults. As revealed by the electrolyte profile this type of pig seems to have slight deviations in their electrolyte balance from other pigs.

Keywords: Electrolytes, Zovawk pigs, plasma.

INTRODUCTION

Zovawk is an indigenous local pig available in Mizoram, India. Looking into their behavior this pig is very alert to the social happenings. The population of indigenous pig locally available only in Mizoram is relatively less in the Aizawl, the capital city of Mizoram state. Because of this reason the pork of this pig is not available commercially in the city though people prefer to take their meat because of its taste. Apart from the meat supply but also from the conservational point of view for the indigenous germplasm the Zovawk pig has recently got the importance to increase its population in the state. Zovawk pigs attain a body weight of about 4.27±0.36 and 3.61±0.27 kg for males and females respectively [1]. It attains puberty at the age of about 2.5 months of age when they are of about 4.5 kg body weight which is a very peculiar characteristic. The first farrowing occurs at the age of about 9-10 months when they attain a body weight of about 40 kg.

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 [2, 3]. Since these pigs are comparatively of small sizes it becomes 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 this particular type of pig. 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 Zovawk pigs, which can facilitate management system and averting economic losses.

Received: Dec 07, 2011; Revised: Jan 15, 2012; Accepted: Feb 12, 2012.

*Corresponding Author

Prava Mayengbam
College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih Aizawl-796014, Mizoram, India

Tel: +91-9436354255; Fax: +91-389-2361748
Email: dr_prava@rediffmail.com

MATERIALS AND METHODS

Animals and blood sampling

The study was carried out in Zovawk pig of Mizoram reared in the Livestock Farm, College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih, Aizawl, Mizoram, India. The study comprised of three different groups, pre-weaning group (1 month old), grower group (2.5 months old) and adults (12-14 months old) and each groups comprised of 12 animals of either sexes. The piglets were kept with the mother till the weaning of the piglets on 56th day thereafter they were given grower diets. The adult female pigs were in the first parity and the adult males had given 1st service. Blood samples were collected by puncturing anterior venacava in Lithium-Heparin coated tubes.

Electrolyte estimations

Plasma was separated from whole blood by centrifugation at 3000 rpm for 20 min immediately after collection of blood. All the parameters viz. sodium (Na), potassium (K), chloride (Cl), calcium (Ca), phosphorus (Pi) and magnesium (Mg) were analyzed in the plasma. The plasma electrolytes were estimated by using diagnostic kits from M/s Crest Biosystems, India by following standard protocols *viz.* Na by colorimetric method (4, 5), K by colorimetric method (6,7), Cl by Thiocyanate method (8,9), Ca by OCPC method (10, 11), Pi by Molybdate U.V. method (12, 13), and Mg by Calmagite method (14) by using a UV-Vis Spectrophotometer (Chemito-Spectroscan 2600).

Statistical analysis

Data were analyzed by using the standard procedures of Snedecor and Cochran [15] to evaluate the effect of age on plasma electrolytes.

RESULTS

The concentration of plasma electrolytes *viz.* plasma Na, K, Cl, Ca, Pi and Mg are presented in Table 1.

Table 1. Effect of age on plasma electrolyte profile of Zovawk pig

Partameter (s)	Pre-weaning	Grower	Adults
Sodium (mmol/l)	192.84 ± 5.00	191.14 ± 3.60	197.76 ± 5.61
Potassium (mmol/l)	3.26 ± 0.16[a]	3.49 ± 0.14[a]	4.13 ± 0.18 [b]
Chloride (mmol/l)	106.87 ± 7.20	93.94 ± 0.72	97.49 ± 0.96
Calcium (mg/dl)	8.33 ± 0.54[a]	7.42 ± 0.36[a]	11.35 ± 0.51[b]
Phosphorus (mg/dl)	3.88 ± 0.19[a]	4.96 ± 0.12[b]	4.10 ± 0.17[a]
Magnesium (mg/dl)	1.88 ± 0.02[a]	3.03 ± 0.29[b]	2.54 ± 0.16[b]

Values are mean ± SEM of 12 animals; Values in the same row carrying different superscripts differ significantly at P<0.05.

The plasma concentration of Na and Cl of Zovawk pigs in the present study were not influenced by age. The plasma K remained stable up-to grower stage and thereafter increased significantly (P<0.05) in adults. Similar to K, the plasma Ca concentration did not change up-to the grower stage which however increased significantly (P<0.05) in adults (Table 1). The grower pigs had significantly higher Pi (P<0.05) than the pre-weaning pigs as well as the adults while the pre-weaning and adults pigs had similar plasma Pi (Table 1). The Mg concentration of Zovawk pigs increased significantly (P<0.05) from pre-weaning period to grower stage and became stable in adults (Table 1).

DISCUSSION

The plasma concentration of Na in Zovawk pigs varied in a narrow range. The presence of stable plasma Na at different age groups in Zovawk pigs is in contrast to previous reports that Na concentration decreased significantly after weaning [16]. As compared to previous reports of other pigs [17], the Na concentration of Zovawk is in higher ranges. The presence of higher plasma Na is indicative of presence of electrolyte imbalance in the animals. However the pigs subjected for blood sampling were clinically sound and apparently healthy animals. Apart from the presence of high Na there was also presence of lower ranges of K in the present study unlike in other pigs of previous reports [17]. Presence of higher K in adults than in young ones is in contrast to the reports that K concentration declined after weaning [16]. These differences might be a process of adaptation changes. The plasma Cl concentration of Zovawk pigs falls in the ranges reported for other pigs [17].

The concentration of Ca, Pi and Mg are in the ranges reported for other pigs [17, 18]. The adult pigs had Ca levels higher than the young ones which are in contrast to previous reports that blood Ca is higher in young ones as compared to adults [18]. 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. It is also likely that the grower pigs had higher Pi which by mass action lowered the Ca levels. Presence of higher Pi level in growers may be due to the higher requirement of Pi during growing stage for teeth and skeletal development. The maintenance of this higher Pi during the growing stage was possible due to the influence of growth hormone as it increases renal phosphate absorption [18]. In the present study the plasma Mg was lower in pre-weaning pigs as compared to other pigs. 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 [18]. 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 results of the present study indicate that locally available indigenous pig of Mizoram has variation in the plasma concentration of Na and K from other pigs. 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.

REFERENCES

[1] Hmar, L., P. Saikia, L. Thazuali, T.C. Tolenkhomba and A.K. Samanta. 2010. Compendium of National Symposium on Technology Management, Visioning and Upscaling for Accelerating Livestock Production and XVIII Annual Convention of ISAPM, held at College of Veterinary Sciences, Khanapara, Guwahati from 11-13 November, 2010. pp 136.

[2] Brockus, C.W., E.A. Mahaffey, S.E. Bush and W. KruppDespain. 2005. Hematologic and serum biochemical reference intervals for Vietnamese potbellied pigs (*Sus scrofa*). *Comp. Clin. Pathol.* 13(4):162-165.

[3] Klem, T.B., E. Bleken, H. Morberg, S.I. Thoren and T. Framstad. 2010. Hematologic and biochemical reference intervals for Norwegian crossbreed grower pigs. *Vet. Clin. Pathol.* 39(2):221-226.

[4] Maruna, R.F.L.1958. Determination of serum sodium by the magnesium uranyl acetate. *Clin. Chem. Acta.* 2:581-585.

[5] Trinder, P. 1951. A rapid method for the determination of sodium in serum. *Analyst*. 76:596-599.

[6] Sunderman, F.W. Jr. and F.W. Sunderman. 1959. The rapid colorimetric estimation of potassium. *Am. J. Clin. Path.* 29:95.

[7] Terri, A. E. and P.G. Sesin. 1958. Determination of serum potassium by using sodium tetraphenylboron. *Am. J. Clin. Path*. 29:86- 90.

[8] Schales, O and S. Schales. 1941. A simple and accurate method for the determination of chloride in biological fluids. *J. Biol. Chem.* 140: 879-884.

[9] Schoenfeld, F.G. and C.J. Lewellen. 1964. A colorimetric method for determination of serum chloride. *Clin. Chem.* 10: 533.

[10] Bagainski, E.S. 1973. Calcium estimation by OCPC method. *Anal. Biochem.* 18:521.

[11] Gitelman, H. J. 1967. Determination of calcium using o-cresolphthaleine complexone. *Anal. Biochem.*18: 521-522.

[12] Fiske, C. H. and Y. Subbarow .1925. The colorimetric determination of phosphorus. *J. Biol. Chem.* 66: 375-400.

[13] Gomori, G. 1942. Modification of the colorimetric phosphorus determination for use with a photoelectric colorimeter. *J. Lab. Cl. Med.* 27: 955.

[14] Gindler, E.M. and D.A. Heth. 1971. Colorimetric determination with bound "calmagite" of magnesium in human blood serum. *Clin. Chem.* 17: 662.

[15] Snedecor, G.W. and W.G. Cochran. 1989. Statistical methods. Affiliated East-West Press Pvt. Ltd., New Delhi.

[16] Tumbleson, M. E. and P. R. Kalish. 1972. Serum biochemical and hematological parameters in crossbred swine from birth through eight weeks of age. *Can. J. Comp. Med.* 36(3):202–209.

[17] Carlson, G.P. 1999. Fluid, electrolyte, and acid-base balance. In J.J. Kaneko, J.W. Harvey and M.L. Bruss (Eds.), Clinical Biochemistry of Domestic Animals, Harcourt Brace & Company Asia PTE LTD, pp.485-516.

[18] Rosol, T.J and C.C. Capen. 1999. Calcium-regulating hormones and diseases of abnormal mineral (calcium, phosphorus and magnesium) metabolism. In J.J. Kaneko, J.W. Harvey and M.L. Bruss (Eds.), Clinical Biochemistry of Domestic Animals, Harcourt Brace & Company Asia PTE LTD,;/ pp.619-702.