

College of Veterinary Medicine and Animal Production Khartoum North,
Sudan University of Science and Technology Sudan

NORMAL VALUES OF SOME SEROCHEMICAL PARAMETERS IN MALE AND FEMALE GERMAN SHEPHERD DOGS IN SUDAN

(With One Table)

By

SHADIA A. Omer

(Received at 17/11/2008)

SUMMARY

This work was undertaken to investigate gender-related variations in normal serochemical values of German Shepherd dogs in the Sudan and to establish overall reference values for these parameters in this breed. The studied animals were 22 males and 22 females. Serum concentration of total protein, albumin, glucose, cholesterol, triglycerides, creatinine, urea, uric acid, and the activity of the enzymes ALT, ALP and AST were tested. Gender had no significant effect on the studied parameters, except of the activity of the enzyme AST. The overall means and range of the investigated values were calculated, compared and discussed with other researchers results in dogs.

Key words: *German shepherd dogs, blood chemistry, enzymes*

INTRODUCTION

Dog is a domestic animal which is a faithful companion to man in rural or urban areas .The German shepherd breed originated in Germany .It was introduced by individuals in Sudan for the purpose of guarding. The police dogs unit was established in 1967 with 6 German shepherd dogs; dogs. German shepherd dogs have been used for police work like tracking criminals, detecting and holding of suspects, detection of narcotics and explosives. They achieve this work by their keen sense of smell.

Blood biochemical constituents are very important for the assessment of animal health and nutrition. An extensive research was found in the literature for canine normal blood chemistry (Rutenbach

and Joubert 1988; Strasser *et al.* 1993; and Jensen and Aaes 1993). In Sudan, published data concerning canine normal blood chemistry seems to be scarce, so this work was undertaken to compare blood normal biochemical constituents of male and female German shepherd dogs under Sudan conditions.

MATERIALS and METHODS

1. Animals:

This study was undertaken during the wet hot season of the year 2008. It involved twenty two male and twenty two female German shepherd dogs belonging to the Police Directorate for Dogs at Khartoum. All the animals were healthy on clinical examination, and had an average age of 4-5 years, all the females were non pregnant and non lactating. The animals were housed individually in kennels and were fed imported dog food (Besterly Senior- The Netherland).

2. Blood sampling and analysis:

Blood samples were collected from the cephalic vein without anti coagulant. Blood for determination of serum glucose concentration was collected in vials containing sodium fluoride. Serum was harvested by centrifugation of the blood at 2500 rpm. for 15 minutes. Serum concentration of total protein (TP), albumin(Alb), glucose, cholesterol, triglycerides, creatinine, urea, uric acid, and the activity of the enzymes alanine aminotransferase (ALT), alkaline phosphatase (ALP), and asparate aminotranferase (AST) were determined by colorimetric method, using a spectrophotometer (Unicam - 8625 UV) with commercial kits (Linear Chemicals Ltd .Spain)

3. Statistical analysis:

All the data were presented as means±standard deviation. The main effect was the sex. Comparison between the means was performed by student's t test as described by Gomez and Gomez, (1984). Overall means and range were calculated.

RESULTS

Table 1: Normal values of some serochemical parameters in male and female German Shepherd dogs in Sudan

Parameters	Male M \pm SD	Female M \pm SD	Overall M \pm SD
T P (g/dl)	8.06 \pm 0.17 7.8 - 8.4	8.07 \pm 0.16 7.8 - 8.4	8.06 \pm 0.16 7.8 - 8.4
Alb (g/dl)	4.09 \pm 0.15 3.9 - 4.4	4.15 \pm 0.17 3.9 - 4.6	4.12 \pm 0.16 3.9 - 4.6
Glucose (mg/dl)	115.36 \pm 6.37 103 - 126	113.27 \pm 7.08 102 - 128	114.32 \pm 6.74 102 - 128
Cholesterol (mg/dl)	136.23 \pm 4.66 129 - 142	136.64 \pm 4.41 130 - 148	136.43 \pm 4.49 129 - 148
Triglycerides (mg/dl)	115.36 \pm 6.37 103 - 126	113.64 \pm 6.34 102 - 128	114.5 \pm 6.34 102 - 128
Creatinine (mg/dl)	1.19 \pm 0.14 1 - 1.5	1.25 \pm 0.15 1 - 1.5	1.22 \pm 0.15 1 - 1.5
Urea (mg/dl)	28.23 \pm 2 25 - 35	28.05 \pm 1.05 26 - 30	28.14 \pm 1.58 25 - 35
Uric acid (mg/dl)	2.30 \pm 0.21 2 - 2.8	2.21 \pm 0.22 1.8 - 2.7	2.26 \pm 0.22 1.8 - 2.8
AST (U/L) activity level	29.55 \pm 1.22 28 - 32	32.09 \pm 3.08* 28 - 40	30.82 \pm 2.7 28 - 40
ALT (U/L) activity level	9.18 \pm 1.26 7 - 12	8.59 \pm 0.96 7 - 10	8.89 \pm 1.15 7 - 12
ALP (U/L) activity level	82.05 \pm 1.29 80 - 84	81.73 \pm 1.39 80 - 84	81.89 \pm 1.33 80 - 84

DISCUSSION

Table (1) shows the concentration of serum metabolites and enzymes activity in healthy male and female German shepherd dogs under Sudan conditions. No significant differences were found between the two sexes regarding the serum concentration of all the studied biochemical parameters and the activities of the enzymes ALT and ALP. This accords with the findings of Shiel *et al.* (2007) and Kuhl *et al.* (2000). The latter reported sporadic differences of minor clinical evidence between the two sexes. Many researchers reported variation in canine serum metabolites with the breed (Kuhl *et al.*, 2000), age (Harper *et al.*, 2003), nutrition (Swanson *et al.*, 2004) activity (Rovira *et al.*, 2007) and environmental conditions (Rautenbach and Joubert, 1988). So the results of this work accords with their findings, as the animals of this study were of the same breed, of comparable age and weight, fed the

same diet, kept under similar environmental conditions and leading the same life style. Males showed significantly higher ($p < 0.05$) AST activity than the females. Nevertheless both values are within the range reported by Tvedten (1981).

The mean value for TP as shown in Table (1) is higher than those reported by Vajdovich *et al.* (1997) (6 g/100 ml), and by Zubcic *et al.* (2008) for Croatian sheep dog (6.1g/100 ml). On the other hand, the range for TP and albumin of the current study are comparable with that reported by Swenson (1993). The mean and range of glucose for German shepherd dogs under Sudan condition are higher than that reported by Stephenson (1997) (76-120 mg/100ml) and by Rovira *et al.* (2007) (74-100 mg /100ml) for resting agility dogs. The high glucose concentration observed in this study may be due to the stress induced by the blood sampling process. Stress induced hyperglycemia, has been reported in man Sherwin *et al.* (1980) and in cats Plier *et al.* (1998), also it may be a postprandial hyperglycemia as the blood was withdrawn about an hour after the morning meal.

Although the cholesterol values of German shepherd dogs (Table 1) are within the range reported by Rovira *et al.* (2007) and Tvedten (1981), the maximum value of this investigation for cholesterol was much lower than their corresponding values (367 mg/dl) and (269 mg/dl) for resting agility dogs and a reference value for unspecified breed respectively. This variation may be attributed to the diet as Swanson *et al.* (2004) reported that dogs fed on plant based diets have lower cholesterol levels than those fed on animal based diets, but they did not decrease from the baseline, Pasquini *et al.* (2008) claimed that breed, age and gender have to be put into consideration when interpreting cholesterolemia values. Lower triglycerides range than that obtained in this investigation was reported by Rovira *et al.* (2007) and Tvedten (1981) (43-106 mg/dl) (20-112mg/dl) for resting agility dogs and a reference value for unspecified breed respectively. A comparable triglyceride range to this work was found by Stephenson (1997). Pasquini *et al.* (2008) stated that breed, age, gender and diet do not prove to be important in the evaluation of triglycerides values of canines.

Creatinine is a by-product of normal muscle metabolism associated with the animals muscle mass and physical activity. The minimum value in this study is higher than that of (Zubcic *et al.*, 2008; and Stephenson 1997) but their high limit is comparable to the maximum of the current work. This variation may have been caused by variation in the tested animals age, body weight or physical activity.

Urea mean values of this study are comparable with that reported by Zubcic *et al.* (2008) for Croatian sheep dogs and by Stephenson (1997). Uric acid is formed as a result of catabolism of dietary and endogenous purines. In the dogs, except of the Dalmatian dog, it is not excreted in urine. Uric acid concentration range of this work is higher than that of Clarenburg, (1992).

Although the mean values for AST and ALP activities for German shepherd dogs in Sudan, as in the table, are higher than the values reported by Rovira *et al.* (2007) for resting agility dogs and Zubcic *et al.* (2008) for Croatian sheep dogs, yet they lie within their reported range. On the contrary their mean values for the activity of the enzyme ALT are higher than that of this study.

In the current study all the measured parameters are within the normal range of other researchers (Swenson 1993; Stephenson 1997 and Rovira *et al.*, 2007) and this may be attributed to the fact that these parameters have a wide range.

Thus it seems that, the current investigation and the comparisons with other researchers work provided data on the normal concentration of some blood constituents of German shepherd dogs in Sudan. Further work should be done to investigate the effect of the season, age, diet and physical activity of the animals on the different blood biochemical profile.

REFERENCES

- Clarenburg, R. (1992): *Physiological Chemistry of Domestic Animals* Pub.Mosby Year Book St.Louis -Baltimore – London- Sydney.
- Gomez, K.A. and Gomez, A.A. (1984): *Statistical Procedure for Agricultural Research* 2nd ed. Willy and Sons, Inc.
- Harper, E.J.; Hackett, R.T.; Wilkinson, J. and Heaton, P.R. (2003): Age-related variations in hematologic and plasma biochemical test results in Beagles and Labrador Retrievers. *J. Am. Vet. Med Assoc* 223:1436-42.
- Jensen, A.L. and Aaes, H. (1993): Critical differences of clinical chemical parameters in blood from dogs. *Res. Vet. Sci.* 1:10-14.
- Kuhl, S.; Mischke, R.; Lund, C. and Gunzel-Apel, A.R. (2000): Reference values of chemical blood parameters in puppies during the first eight weeks of life.*Dtsch Tierarztl Wochenschr* 107: 438-443.

- Pasquini, A.; Luchetti, E. and Cardini, G. (2008):* Plasma lipoprotein concentrations in the dog: the effect of gender, age, breed and diet. *Jour. of Anim. Physiol. and Anim. Nut.* 92: 718-722.
- Plier, M.L.; Grindem, C.B.; MacWilliams, P.S. and Stevens, J.B. (1998):* Serum fructosamine concentration in nondiabetics and diabetic cats. *Vet. Clin. Pathol.* 27:34–39.
- Rautenbach, G.H. and Joubert, H.F. (1988):* A comparison of health parameters in two different canine populations. Part II: Chemical pathology data. *J.S. Afr. Vet. Assoc.* 59: 135-138.
- Rovira, S.; Munoz, A. and Benito, M. (2007):* Hematologic and biochemical changes during canine agility competitions. *Vet. Clin. Pathol.* 36: 30-35.
- Sherwin, R.S.; Shamoon, H.; Hendler, R.; Sacca, L.; Eigler, N. and Walesky, M. (1980):* Epinephrine and the regulation of glucose metabolism: Effect of diabetes and hormonal interactions. *Metabolism* 29: 1146–1154.
- Shiel, R.E.; Brennan, S.F.; O'Rourke, L.G.; McCullough, M. and Mooney, C.T. (2007):* Hematologic values in young pretraining healthy Greyhounds. *Vet. Clin. Pathol.* 36: 274-277.
- Stephenson, R.B. (1997):* In *Text Book of Veterinary Physiology* p138. 2nd ed. Pub. W.B. Saunders. St Louis Philadelphia London Sydney Toronto.
- Strasser, A.; Niedermuller, H.; Hofecker, G. and Laber, G. (1993):* The effect of aging on laboratory values in dogs. *Zentralbl Veterinarmed* 40: 720-30.
- Swanson, K.S.; Kuzmuk, K.N.; Schook, L.B. and Fahey, J.R. (2004):* Diet affects nutrient digestibility, hematology, and serum chemistry of senior and weanling dogs. *J. Anim. Sci* 82: 1713-1724.
- Swenson, M. (1993):* In *Dukes Physiology of Domestic Animals* 7th Ed. Pub. Comstock Publishing Associates Ithaca – London.
- Tvedten, H.W. (1981):* Hematology of the normal dog and cat. *Vet. Clin. North Am. Small Anim. Pract.* 11: 209-217.
- Vajdovich, P.; Gaál, T.; Szilágyi, A. and Harnos, A. (1997):* Changes in some red blood cell and clinical laboratory parameters in young and old beagle dogs. *Vet. Res. Comm.* 21: 463-470.
- Zubcic, D.; Bedrica, L.; Gracner, D.; Harapin, I.; Fury, M. and Jeremic, J. (2008):* Blood groups, hematology and clinicochemical indicators of indigenous breeds of dog. *ICroatian sheep dog. Vetr. Arhiv.* 78: 141-147.