BLOOD PRESSURE IN DOGS ACESSED AT VETERINARY HOSPITAL OF UNIVERSIDADE ESTADUAL DO NORTE FLUMINENSE DARCY RIBEIRO

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Resumen

El presente estudio evalúa la presión de la sangre en los perros a través del método oscilométrico y correlaciona los resultados obtenidos en esta medición con los siguientes parámetros observados en los animales: edad, sexo, raza, tamaño, frecuencia cardíaca, sodio (NaCl) y potasio (K). Se utilizaron 50 perros de diferentes edades, razas, géneros y tamaños, en el Hospital Veterinario de la UER, en la ciudad de Campos dos Goytacazes, Río de Janeiro, Brasil. Para verificar la correlación de la presión arterial entre las variables edad, sexo, raza, tamaño y frecuencia cardíaca se utilizaron las pruebas de Fisher y la prueba de Chi-Cuadrado ($\chi^2$), con un intervalo de confianza del 95%, a través del software de SAS. Después de la medición de la presión arterial, se observó que el 40% de los perros presentó hipertensión.

Palabras clave: ritmo cardíaco, oscilométricos, potasio, sodio

ABSTRACT

The present study aimed to evaluate blood pressure in dogs, through oscillometric method and to correlate the results obtained in this measurement with the following parameters observed in the same...
animals: age, gender, breed, size, heart frequency, Sodium (NaCl) and Potassium (K) concentration. There were utilized 50 dogs of various ages, breeds, genders and sizes, attended in UENF’s Veterinary Hospital, in the city of Campos dos Goytacazes, Rio de Janeiro, Brazil. To verify the correlation between blood pressure and the variables age, gender, breed, size and heart frequency were used Fisher's Exact Test and Chi-Square Test ($\chi^2$), with a 95% confidence interval, through the software SAS. After the blood pressure measurement, it was observed that 40% of the analyzed dogs presented systemic blood hypertension. It was performed the comparison between blood pressure and the verified parameters and there was not significantly association between the blood pressure and the analyzed variables. Therefore, age, gender, breed, size and heart frequency did not constitute determinants for blood pressure alteration in dogs, at the studied population, at the city of Campos dos Goytacazes.

**Keywords**: Heart Rate, Oscillometric, Potassium, Sodium

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**INTRODUCTION**

Blood pressure is defined as the pressure exerted by the blood against the internal surface of an arterial vessel. From a hemodynamic point of view, the blood pressure can be defined as the product of cardiac debit versus the peripheral vascular resistance (Camacho and Mucha 2008; Guyton and Hall 2006; Forster-Van Hijfte 2002). The blood pressure is pulsatile, suffering continuous alterations during all the cardiac cycle. The systolic blood pressure (SBP) is defined as the higher rate of the blood pressure, registered at the peak of systoles. The diastolic blood pressure (DBP) is the lower rate of blood pressure, registered at the end of the diastole. The mean arterial pressure (MAP) is the average arterial pressure, during a cardiac cycle, and is the major determinant of tissue perfusion (Loução 2008).

Tilley and Goodwin (2002) have categorized the blood pressure in different groups, establishing, this way, parameters for its clinical evaluation: the normal characteristics are given as systolic blood pressure between 110 and 120 mmHg and diastolic blood pressure between 70 and 80 mmHg.

The measurement of blood pressure in dogs in clinical routine is very relevant, since it constitutes the diagnostic exam for systemic arterial hypertension. This disease compromises the dog’s quality and life expectation, once it injuries some organs as brain, heart, kidneys and eyes, which is called “target-organs lesions”. Convulsions, myocardial hypertrophy, proteinuria and sudden blindness are the main manifestation associated to systemic arterial hypertension (Tilley and Goodwin 2002;
The epidemiologic variation in canine species represents obstacles to the standardization of blood pressure rates and should be considered at measurement occasion. Many studies that correlate variables such as age, gender and breed to the blood pressure are controversial, and in Veterinary Medicine is still inconclusive if a low-sodium, potassium-rich diet could influence the blood pressure, as occurs in humans (Brown et al. 2007). Besides, the role of physical parameters such as the correlation of cardiac frequency and blood pressure in dogs is still few known, being necessary more studies on this field (Brown et al. 2007).

Face of these problems, the present study aim to evaluate the blood pressure in dogs assessed at Veterinary Hospital of the Universidade Estadual do Norte Fluminense Darcy Ribeiro (UENF), as well as to establish a correlation between the obtained results and the following parameters verified in these animals: age, gender, breed, size, cardiac frequency and serum levels of Sodium ($\text{Na}^+$) and Potassium ($\text{K}^+$).

MATERIALS AND METHOD

Animals: For this study, were utilized 50 dogs of different ages, genders and breeds, attended at the UENF’s Veterinary Hospital, in Campos dos Goytacazes. A record (supplement) was used in the aim to conduce the steps of the experiment. While the owner was questioned, the dog had the opportunity of recognize the ambience, aiming stress reduction and, thus, avoid false results regarding blood pressure.

Measurement of blood pressure: The method used to measurement of blood pressure was the oscillometric method (PetMap®, Ramsey Medical Inc). This process consists in an automatized system for detection and processing of the pressure oscillation signs incoming from the cuff. With this system, the occlusion cuff is inflated in a pressure above the maximum systolic value and, next, slowly deflated in gaps of 5 to 10 mmHg, while the microprocessor measures and calculates the mean of the resultant amplitudes on the pressure oscillation, according to Ware (2006). It was selected the most appropriate cuff to the anterior appendix and adjusted below the elbow articulation (humerus-radioulnar), according to usage PetMap® recommendations, which are at the fabricant’s manual – Ramsey Medical, 2009. The preferred member accessed was the right member, due its major proximity to the right atrium, in accordance with the directions of the consensus statements for diagnosis, treatment and monitoring of systemic arterial hypertension in dogs and cats, from the American College of Veterinary Internal Medicine (ACVIM) (Brown et al 2007).
In the present study, admeasurement of blood pressure was performed eight (08) times, in sequence, before the final results were obtained for systolic, diastolic and mean pressure, according to the instructions from the fabricant’s manual for usage of PetMAP® and following the recommendations of the consensus statements for diagnosis, treatment and monitoring of systemic arterial hypertension in dogs and cats, from the American College of Veterinary Internal Medicine (ACVIM) (Brown et al, 2007).

Biochemical Samples: For the blood collection, were performed trichotomy, asepsis with 70% ethanol and cephalic venipuncture, being used sterile hypodermic needles (25 x 7 mm) and 5 mL syringes. It was used the left member for the collection, in the aim to avoid hemoconcentration and, thus, false results at the serum sodium-potassium biochemistry. In smaller dogs, it was performed jugular venipuncture as alternative, when the standard procedure was not possible. After the collection of 5.0 mL of total blood, the samples were packed in siliconized blood collection tubes with serum clot activator, gel separator (Vacuette®). Following, the samples were identified and transported to the Clinical Pathology Sector from the Animal’s Clinical and Surgical Laboratory (CCTA) at UENF. For the measurement of the Sodium and Potassium serum levels, it was performed a 1.26x10^4 g centrifugation, for 5 minutes, to obtain the serum and its posterior freezing at – 20°C. The samples were processed using biochemical reagents sets.

Statistical Analysis: The results herein obtained were statistically analyzed through Fisher’s Exact Test and Chi-Square Test ($\chi^2$), with a 95% confidence interval, using the software SAS.

RESULTS

None of the 50 dogs analyzed did presented values that were compatible with hypotension, 60% of them presented themselves normotensive and 20% presented values that were compatible with hypertension (Table 1).

<table>
<thead>
<tr>
<th>Results</th>
<th>Oscillometric Method for BP measurement (PetMap®)</th>
<th>Quantity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypotensive</td>
<td>0 (0%)</td>
<td></td>
</tr>
<tr>
<td>Normotensive</td>
<td>30 (60%)</td>
<td></td>
</tr>
<tr>
<td>Hypertensive</td>
<td>20 (40%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

By analyzing the data and ranking the animals by age (≤ 2, 2 to 6 and >6), there were no statistically significant differences in dogs blood pressure, in comparison to the different age sets (Table 2).
**Table 2.** Risk evaluation related to age front the blood pressure in dogs assessed at the Veterinary Hospital of UENF.

<table>
<thead>
<tr>
<th>Results 1</th>
<th>Age (years)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤ 2</td>
<td>2 to 6</td>
</tr>
<tr>
<td>Hypertensive</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Normotensive</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>24</td>
</tr>
</tbody>
</table>

1 Diagnostic through Teste $\chi^2$ (p = 0.2950) CI 95%.

During the evaluation considering the size, weight and blood pressure were not verified statistically significant alterations on the blood pressure, according to the analysis presented on Table 3.

**Table 3.** Risk evaluation related to weight and size front the blood pressure alteration in dogs assessed at the Veterinary Hospital of UENF.

<table>
<thead>
<tr>
<th>Results 1</th>
<th>Size</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small (≤ 10Kg)</td>
<td>Medium (10 to 25)</td>
</tr>
<tr>
<td>Hypertensive</td>
<td>11</td>
<td>07</td>
</tr>
<tr>
<td>Normotensive</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>17</td>
</tr>
</tbody>
</table>

1 Diagnostic through Teste $\chi^2$ (p = 0.9922) CI 95%.

In confronting the blood pressure, breed and gender of the analyzed animals, were not verified any significant differences in blood pressure between males and females (Table 4).
Table 4. Risk evaluation related to gender, breed and cardiac frequency front the blood pressure alterations in dogs assessed at the Veterinary Hospital of UENF.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hypertensive</th>
<th>Normotensive</th>
<th>Total</th>
<th>Fisher Exact Test (CI 95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>6 (12%)</td>
<td>7 (14%)</td>
<td>13</td>
<td>p = 0.7443</td>
</tr>
<tr>
<td>Female</td>
<td>14 (28%)</td>
<td>23 (46%)</td>
<td>37</td>
<td>0.5061 &lt; Rr &lt; 3266</td>
</tr>
<tr>
<td>Breed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undefined Breed</td>
<td>8 (16%)</td>
<td>18 (36%)</td>
<td>26</td>
<td>p = 0.2484</td>
</tr>
<tr>
<td>Defined Breed</td>
<td>12 (24%)</td>
<td>12 (24%)</td>
<td>24</td>
<td>0.3618 &lt; Rr &lt; 1.229</td>
</tr>
<tr>
<td>Cardiac Frequency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>19 (38%)</td>
<td>1 (36%)</td>
<td>20</td>
<td>p = 0.4000</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>30 (60%)</td>
<td>0 (24%)</td>
<td>30</td>
<td>0.8591 &gt; Rr &gt; 1</td>
</tr>
</tbody>
</table>

About the variable breed, also there were not found significant differences on blood pressure of undefined breed dogs (52%) and defined breed dogs (48%), that presented a distribution as Pinscher (8.3%), Poodle (37.5%), Yorkshire Terrier (16.4%), Tekel (12.5%), French Bulldog (16.4%) and Pitbull (4.16%).

At the analysis of the ions Sodium and Potassium there were not observed positive correlation between these variables and the blood pressure (Tables 5 and 6).

Table 5. Risk evaluation of Sodium serum levels front the blood pressure variation in dogs assessed at the Veterinary Hospital of UENF.

<table>
<thead>
<tr>
<th>Results¹</th>
<th>Sodiumserumlevels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hyponatremia (&lt;135 mmol/L)</td>
</tr>
<tr>
<td>Hypertensive</td>
<td>4</td>
</tr>
<tr>
<td>Normotensive</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
</tr>
</tbody>
</table>

¹Diagnostic through Fisher’s Exact Test (p = 0.1760) Rr = 1.435 CI 95%: 0.9066 > Rr > 2.273.
Table 6. Risk evaluation of Potassium serum levels front the blood pressure variation in dogs assessed at the Veterinary Hospital of UENF.

<table>
<thead>
<tr>
<th>Results¹</th>
<th>Hypokalemia (&lt; 3,3 mmol/L)</th>
<th>Normokalemia (3,3 ≤ mmol/L ≤ 5,5)</th>
<th>Hyperkalemia (&gt; 5,5 mmol/L)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertensive</td>
<td>0</td>
<td>19</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>Normotensive</td>
<td>0</td>
<td>19</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>38</td>
<td>1</td>
<td>39</td>
</tr>
</tbody>
</table>

¹Diagnostic through Fisher’s Exact Test (p = 1.0000) \( Rr = 1.053 \) CI 95%: 0.9519 > \( Rr >1.164. \)

DISCUSSION

The present study considered “hypotensive” those animals that presented blood pressure below 110/70 mmHg, “normotensive” the animals that presented blood pressure from 110/70 mmHg to 160/95 mmHg and “hypertensive” those animals that presented blood pressure above 160/96 mmHg, according to the parameters adopted by Kallet et al. (1997), Bichard (1998), Stepies (2002), Tilley and Goodwin (2002) and Brown et al. (2007).

None of the dogs used at the present study presented clinical signs compatible with hyperadrenocorticism, renal disease, thyroid disease, diabetes mellitus, hepatic disease, polycythemia, pheochromocytoma, primary hyperaldosteronism or were in usage of drugs such as erythropoietin or steroids, conditions that are known to cause hypertension, according to study performed by Acierno and Labato (2004). The nature of idiopathic hypertension in these animals cannot be determined, however, the relevancy of this disease in dogs is questionable due its rare occurrence, according related by Brown et al. (2007) e Mazzaferro (2010).

Front to the presented questions, we can suggest that the high percentage of hypertensive animals detected in this study (Table 1) may be justified by the stress that animals passed through, due the strange environment, non-familiar, that exposure them to be in contact with person and other animals stranger to their familiarity, the required manipulation to the blood pressure measurement and the “white coat” syndrome, according to Brown et al. (2007), Wernick et al. (2012), even that the recommendations of the consensus statements for systemic arterial hypertension in dogs and cats of ACVIM were observed.

The “white coat syndrome”, first related in human patients, was equally observed in dogs and cats (Kallet et al. 1997; Pickering et al. 2002).
According to Belew et al. (1999), felines that performed multiple visits to the same Veterinary Clinic over one day, where they were submitted to the blood pressure measurement, presented variation in results in each assessment. From the 5th assessment on, the magnitude of the “white coat syndrome” over the blood pressure decreases, but did not disappears.

These increases are also compatible with Loução (2008) studies, that relates the influence of stranger environment, the handling and the animal containment, the measurement technique itself, among other external stimuli, inducing the animals to anxiety and stress, with consequent elevation on the blood pressure by the releasing of catecholamines. According to Ware (2006), some animals present systolic pressure values above 180 mmHg when stressed or anxious. Mercier (2001) highlights that, before to conclude a hypertension diagnosis, it is necessary to consider the animal stress, when may occur an overestimation on the blood pressure values.

In contrast to information above, Brown et al. (2007) describe that, unfortunately, the effects of anxiety over the blood pressure are not predictable, once in stressing situations, some animals present exacerbated increase of blood pressure, while others don’t, and others can present even decrease in blood pressure levels, as the result of the measurement procedure.

The results seen in Table 2 are in accordance with the study realized by Meurs et al. (2000), in which the systolic blood pressure did not presented significant increase in elder apparently healthy dogs. The same author still concludes that systemic hypertension is not an ordinary clinical affection in dogs. However, Bodey and Michell (1996) verified that age was one of the most influent factors in blood pressure determination, in an epidemiological study performed in dogs. Brown et al. (2007) report a slight increase of blood pressure in dogs, ranging from 1 to 3 mmHg/year. Mattos (2012) related significant increase in blood pressure relation between males and female, being higher in male.

In felines, Sparkes et al. (1999) did not observed relevant differences in blood pressure according to the age. However, Scherk (2010) and Graves (2010) affirm that there is an increase in blood pressure in this species, according to the aging of the animals. Bodey and Sansom (1998) described increase in systolic, diastolic and mean blood pressure, in felines over eleven years old. Brown et al. (2007) observed slight increase in blood pressure in this species, from 1.5 mmHg/year. According the same author (2007), the effects of aging over blood pressure are few clear in dogs and cats, although in humans these effects are well characterized.

According to the analysis presented at Table 3, it was not verified significant difference in the comparison between weight, size and blood pressure. Instead, Cabral et al. (2010) related that small size animals tent to present
lower values of systolic, diastolic and mean blood pressure, in comparison with medium and big size animals. However, Ware (2006) affirms that the big and giant size dogs in general present lower values of blood pressure in comparison with those of small size, except the hounds. These ones present, normally, higher blood pressure levels, that may exceed 15 mmHg in comparison with same size breeds (Stepien 2002; Ware 2006; Brown et al. 2007). The values consider normal, for big size dogs, considered of slow metabolism, is 120/65 mmHg and 140/85 mmHg for hounds, which metabolism is accelerated (Bodey and Michell 1996).

In discordance with this consensus, Bright and Dentino (2002) relate that Irish wolfhounds, big size hounds, present low blood pressure values (systolic pressure 116.0 mmHg, diastolic pressure 69.2 mmHg, mean arterial pressure 87.8 mmHg).

The non-significant differences of blood pressure amongst male and female dogs can be explained by the few relevant effect of gender over the blood pressure dynamics, as related in the literature (Franzén 2007; Sanan and Arslan 2007) (Table 4).

Franzén (2007) performed a study in Cavalier King Charles Spaniel dogs, chronic mitral valve disease patients, whose aim was to evaluate the blood pressure range according to the disease progression. The author observed that in the group of animals with null or minimum development of this valvulopathy, there was no significant difference in blood pressure between genders, while in the other groups that had animals in advanced stage of the valvulopathy, males presented higher values of blood pressure in relation to females.

This analysis allows concluding that the degree of impairment of mitral valve was the determinant factor for the systolic pressure elevation, and there was not influence of gender in this alteration. Similarly, Sanan and Arslan (2007), performing a study that evaluate blood pressure in Kurdish Kangal dogs, did not observed any relevant differences between genders in the analyzed animals. Brown et al. (2007), performing blood pressure studies in dogs, affirm that males present higher blood pressure and intact females, lower values, with range of 10 mmHg, a fact that was not observed in the present study. The variation of blood pressure between genders, observed by Brown et al. (2007), can be suggested by the hypertensive effects of the androgens and hypotensive of the estrogens, fact that was verified in rats and in humans (Reckelhoff et al. 1999; Sullivan et al. 2007).

In analyzing the over cited breeds, it is possible to analyze that the breeds that presented a greater number of hypertensive individuals were Poodle (06 animals / 66.66%) and French Bulldog (04 animals / 44.44%). Nowadays, are unknown in literature studies that standardize the blood pressure values for the companion dogs. However, it is accepted that hound dogs, like Greyhounds and Deerhounds have, normally, high blood pressure, that may
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According to Bodey and Michell (1996), significant differences occur in blood pressure values amongst slow metabolism breeds, like Labrador and Golden Retriever, and accelerated metabolism, like Greyhound and Saluki, being consider 120 mmHg/65 mmHg and 140 mmHg/85 mmHg, respectively. From the absence of blood pressure parameters for Poodles and Bulldogs, it is not possible to affirm that the individuals considered hypertensive in this study are indeed, given the variability in the blood pressure values in relation to the breeds. In felines, there is no influence of the breed over the blood pressure, according to Brown et al. (2007).

In humans, more than 90% of the hypertension cases are of idiopathic etiology. However, in dogs, the primary hypertension is rarely observed (incidence of 2% to 10%), and is a result of the exclusion diagnosis, being more frequent the occurrence of the secondary hypertension, due to chronic renal disease (60% to 90%), hyperadrenocorticism (70% to 80%) and diabetes mellitus (25% to 45%) (Mercier 2001;Stepien 2002; Brown et al. 2007).

Hyperadrenocorticism and diabetes mellitus are considered hypertensive endocrinopathies of ordinary occurrence in Poodles, according to the epidemiologic studies of Mercier (2001) and Gough and Thomas (2006). Some cardiovascular diseases also can bring about systemic hypertension in dogs, and, in Bulldogs, the most frequent findings are ventricular septal defect, subaortic stenosis, pulmonary hypertension and pulmonary stenosis (Ware 2006; Gough and Thomas 2006).

In Poodles, the most ordinary cardiovascular diseases that can predispose to hypertension are Patent Ductus Arteriosus (PDA) and Chronic Mitral Valve Disease (CMVD), being this the most frequent cause of cardiac insufficiency in dogs (Gough and Thomas 2006; Perin et al. 2007).

Sanan and Arslan (2007) highlight in their study the importance of blood pressure evaluation in big breeds, naturally predispose to cardiovascular diseases, and establish standard values to Kurdish Kangal dogs.

Although all these described pathologies cause secondary hypertension in dogs, Poodles and Bulldogs on the present study were clinically healthy, being more plausible to attribute the higher blood pressure values found in individuals of these breeds to other factors, such as idiosyncrasies or stress (Brown et al., 2007).

Were adopted the following normality parameters of cardiac frequency to rank the animals: 70 to 160 bpm for adult dogs; 60 to 140 bpm for giant breeds; until 180 bpm for toy breed; until 220 bpm for puppies, according to Macintire et al. (2007).
The blood pressure is the product of cardiac debit versus peripheral resistance. Cardiac debit, in turn, is the product of ejection volume versus cardiac frequency. Thus, any alteration in these parameters may interfere on blood pressure (EGNER et al. 2007). Studies demonstrate that new blood pressure measurement must be performed, if at the moment of the admeasurement tachycardia is verified. The accelerate cardiac frequency works as a stress indicator, which alters the systolic pressure due the release of catecholamines (Egner et al. 2007; Guyton and Hall 2006; Franzén 2007).

According to Bodey and Michell (1996), although the cardiac frequency and the systolic blood pressure increase due stress, diastolic blood pressure remains stable. Franzén (2007), performing study in Cavalier King Charles Spaniel dogs, also observed that cardiac frequency did not affected diastolic blood pressure consistently.

Previous studies compared the effects of heart murmur, cardiac frequency and age in systolic blood pressure. Although none of these factors alone has shown relevancy, the significance of age and cardiac frequency was much higher than heart murmur (p = 0.86, p = 0.35 and p = 0.07, respectively) (Franzén 2007).

Were adopted the following values for the serum levels of Sodium and Potassium: $< 135$ mmol/L – hyponatremia; $135 \leq \text{mmol/L} \leq 155$ – normonatremia; $> 155$ mmol/L – hypertonatremia; $< 3.3$ mmol/L – hypocalemia; $3.3 \leq \text{mmol/L} \leq 5.5$ – normocalemia; $> 5.5$ mmol/L – hypercalemia, according to cited in literature (Kerr 2003), for the analysis for Tables 5 and 6.

These ions exert important role in maintenance of blood pressure, once they are responsible for plasma volume regulation through renal mechanisms, thereby changing the cardiac debit and so, the blood pressure (Sagols 2007). Despite this importance in regulation process, in the present study it was not verified significant association between the serum levels of Sodium and Potassium and the blood pressure.

Anderson et al. (1987) observed a non-correlation of Sodium and blood pressure in performing study with dogs. However, the same authors concluded that the fast and reversible development of hypertension in dogs submitted to stressing conditions is mediated by the increase of the total serum levels of Sodium.

Friedman (1990), in turn, found in his study with humans that systolic and diastolic pressure was directly affected by the blood levels of Sodium. Geleijnse et al. (1990) verified that the blood pressure in children was altered by the ingestion of Sodium and Potassium. Studies have demonstrated that Potassium supplemented diets significantly reduce the
blood pressure in hypertensive individuals. However, the recommendation of hyposodic diets for this same objective still remains controversial (Feng et al. 2005; Brown et al. 2007).

According to Biourge et al. (2002), the increase of dogs’ dietary Sodium barely induces to diuresis, but did not affect the systolic blood pressure, that maintains itself inside normality limits (<180 mmHg). Burranakarl et al. (2004), in a study performed in felines, suggested that the dietary supplementation with NaCl did not altered the blood pressure, although have been increased the glomerular filtration. So, it is not conclusive that hypertensive companion animals must be feed with hyposodic diets (Acierno and Labato 2004; Brown et al. 2007).

CONCLUSION

It was observed a high percentage of hypertensive dogs in this study. Being that in the analysis of gender, age, race and size, when confronted with cardiac frequency did not demonstrate risk correlation for alterations in blood pressure for dogs, as well as the serum levels of Sodium and Potassium did not presented a straight correlation with blood pressure.

Limitations were observed in this study, even if the values have been measured in a sequential manner, respecting the guidelines of the consensus statements for diagnosis, treatment and monitoring of systemic arterial hypertension in dogs and cats, from the American College of Veterinary Internal Medicine (ACVIM) (Brown et al. 2007) and the evaluation of systemic blood pressure has been performed promptly, to the occasion of the dog’s consultation in the Veterinary Hospital of UENF.

All applicable institutional guidelines for the care and use of animals were followed.

REFERENCES


