

Levels of five elements in the serum of cats in Baghdad city

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Abstract

The aim of this survey was to measure the levels of copper, Iron, Magnesium, Zinc and Phosphorous in cats in Baghdad city. Samples were collected from fifty seven cats of different living conditions and different sexes. The overall results (mean \pm standard error) were 19.553 $\mu\text{mol/L} \pm 1.486$ for Copper, 20.612 $\mu\text{mol/L} \pm 1.934$ for Iron, 1.374 mmol/L ± 0.067 for Magnesium, 11.946 $\mu\text{mol/L} \pm 1.351$ for Zinc and 4.527 $\mu\text{mol/L} \pm 0.458$ for Phosphorus. All values were within the international ranges except for Phosphorus was higher.

Keywords: Copper, Iron , Magnesium , Zinc, Phosphorus , serum.

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مستويات خمسة عناصر في مصل دم القطط في مدينة بغداد

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الخلاصة

إن الهدف من هذا المسح قياس مستويات النحاس، الحديد، المغنيسيوم، الزنك والفسفور في مصل دم القطط في مدينة بغداد. جمعت العينات من سبعة وخمسين قطة سائبة ومنزلية ومن كلا الجنسين. أظهرت النتائج لكل القطط (المعدل \pm الخطأ القياسي) للنحاس 19.553 مايكرو مول/ لتر ± 1.486 ، وللحديد 20.612 مايكرو مول/لتر ± 1.934 ، بينما كانت 1.374 ملي مول/ لتر ± 0.067 للمغنيسيوم، 11.946 مايكرو مول/ لتر ± 1.351 للزنك، وكانت 4.527 مايكرو مول/ لتر ± 0.458 للفسفور. كل معدلات العناصر كانت ضمن المديات العالمية ماعدا عنصر الفسفور كان أعلى.

الكلمات المفتاحية: نحاس، حديد، مغنيسيوم، زنك، فسفور، مصل دم.

Introduction

The researches on cats are scarce in Iraq. In a review by Hasso (1) only 26 pathogens in cats were confirmed, out of which 24 were parasites, Later in an update review(2) only 3 pathogens were added. A pioneering research on non infection agents on the blood of only 15 cats was recorded by Hassan(3). A leading research on 152 cats to record many hematological and biochemical values was done by (4). The value of selenium in cats was measured (5). Due to the scarcity of researches on cats in Iraq, the main aim of this survey was to measure some elements that were not measured previously as magnesium, Zinc and phosphorus along with some elements measured previously.

Materials and Methods

The aim of the research was to determine the standard levels of 5 trace elements (Cu, Fe, Mg, Zn and P) in serum of cat in Baghdad city in Iraq. This research began at 1/9/2015 until 1/3/2016 (six months).

- **Research Animal:** In the research 57 mature cats (more than 1 years old) were used, The age of cat was measured by dentation (6). The cats divided into two groups according to living type and sex: Home cats 29 cats (16 male and 13 female) and

Stray cats 28 cats (14 male and 14 female). The sick and weak cats were excluded in this research (Table 1).

Table (1) Show the numbers of home and stray cats with both sexes (male and female)

Sex	Home cats	Stray cats
Male	16	14
Female	13	14
Total	29	28

To perform the general examination, a special comfortable cage made from iron and BRC net at $25 \times 25 \times 60$ Cm with a key to close it. It is the same cage used to hunt stray cats. To take blood sample from cats it would be anesthetized by putting it in the closed cage then push 10 ml of Anestane[®] (Halothan 100% BP stabilizing 0.01 thymol). Anestane[®] (Al- Hekma company, Jordan) Anestane is considered the most safety type of anesthesia without leaving any change in blood and its constituents for 1-2 hours (7, 8, 9). It is difficult to find a big vein in cat under anesthesia so we chose the Jugular vein to take blood samples (10). Blood sample taken as following: The middle to lower part of Jugular vein area was sterilized by cotton wetted with Alcohol 70%. Sterile syringe 5ml at gauge 23G was inserted and filled with blood. Draw the blood in dry, clean test tube 10ml, close tightly and left in room temperature at rest for 1 hour. When coagulation process is completed leaving yellow serum above coagulation cells, centrifuge the tube for 5 min. at 3000 RPM. Draw the serum slowly in small plastic tubes and freeze them at -20 C^0 . The levels of trace elements were determined by using spectrophotometer (colorimetric) with kits for each one (kits: LTA, Human Gesellschaft B Fur Biochemic Und Diagnostica mbH, Germany). Statistical analysis was done by using computer (Microsoft excel) to show mean, significant variance deviation, and standard error (11, 12).

Results

The results will be expressed by information of each element including the overall total, sex and kind of living. The value were distributed among the above mentioned parameters as in following tables:

Table (2) Copper levels in the serum of the cats

Cu ($\mu\text{mol/L}$)	Overall Total n=57	Stray cats n=28		Home cats n= 29	
		Female n=14	Male n=14	Female n=13	Male n=16
Range	40.635 - 2.269	40.632 - 5.526	32.703 - 4.914	40.632 - 6.158	40.635 - 2.269
Mean	19.553	21.745	20.111	24.539 a	13.096 b
SD	11.220	10.173	8.652	11.136	12.060
SE	1.486	2.719	2.312	3.089	3.015

*n= number of cats. SD= standard deviation. SE = Standard error. Small letter =There were significant differences under level ($p \leq 0.05$)

Table (3) Iron levels in the serum of the cats

Fe ($\mu\text{mol/L}$)	Overall Total n=57	Stray cats n=28		Home cats n= 29	
		Female n=14	Male n=14	Female n=13	Male n=16
Range	47.8 - 2.238	45.5 - 2.238	46.5 - 2.685	47.8 - 2.506	46.988 - 6.5
Mean	20.612	17.155	15.848	24.077	24.990
SD	14.604	10.706	15.053	18.046	13.299
SE	1.934	2.861	4.023	5.005	3.325

*n= number of cats. SD= standard deviation. SE = Standard error. There were no significant differences between groups under level ($p \leq 0.05$)

Table (4) Magnesium levels in the serum of the cats

Mg (mmol/L)	Overall Total n=57	Stray cats n=28		Home cats n= 29	
		Female n=14	Male n=14	Female n=13	Male n=16
Range	2.437 - 0.304	2.437 - 0.769	1.926 - 0.912	1.9 - 0.617	2.1 - 0.304
Mean	1.374	1.800 a	1.479	1.043 b	1.179
SD	0.508	0.430	0.322	0.402	0.518
SE	0.067	0.115	0.086	0.112	0.130

*n= number of cats. SD= standard deviation. SE = Standard error. Small letter =There were significant differences under level ($p \leq 0.05$)

Table (5) Zinc levels in the serum of the cats

Zn ($\mu\text{mol/L}$)	Overall Total n=57	Stray cats n=28		Home cats n= 29	
		Female n=14	Male n=14	Female n=13	Male n=16
Range	34.038 - 1.27	34.038 - 1.27	16.5 - 1.27	21.674 - 1.274	28.192 - 2.549
Mean	11.946	17.305 a	5.295 b	11.082	13.780 a
SD	10.200	14.212	5.281	6.833	8.914
SE	1.351	3.798	1.411	1.895	2.229

*n= number of cats. SD= standard deviation. SE = Standard error. Small letter =There were significant differences under level ($p \leq 0.05$)

Table (6) Phosphorus levels in the serum of the cats

P (mmol/L)	Overall Total n=57	Stray cats n=28		Home cats n= 29	
		Female n=14	Male n=14	Female n=13	Male n=16
Range	11.907 - 0.662	10.055 - 0.662	7.861 - 0.662	9.923 - 0.662	11.907 - 0.662
Mean	4.527	5.013	2.888	4.529	5.536
SD	3.454	3.033	2.416	3.148	4.447
SE	0.458	0.811	0.646	0.873	1.112

*n= number of cats. SD= standard deviation. SE = Standard error. There were no significant differences between groups under level ($p \leq 0.05$)

There were no significant differences between any groups under level ($p \leq 0.05$) in Iron and Phosphorus result, but there were significant differences between groups under level ($p \leq 0.05$) in the other results as follow: in Copper between male and female of home cats, in magnesium between two female groups that different in living type ,and in Zinc the stray male cats appear significance lower than female and home male though.

Discussion

Since more than one type of rearing was chosen in this study, the values of survey will be discussed with the available data in the literature, i.e. either according to the specific value with the type of rearing or the overall value with it's corresponding value in the literature. For the Copper values the overall range of (40.635-2.269 $\mu\text{mol/L}$) was higher than it's corresponding value of (21.67-2.68 $\mu\text{mol/L}$) as mentioned by (13) whom mentioned that Copper increases by increasing age. The Iron overall rang of this survey was (47.8-2.238 $\mu\text{mol/L}$) which was higher than the rang of (38.5-12.2 $\mu\text{mol/L}$) as mentioned (14) for cats, and may be attributed to differences in the breed between Iraqi and non Iraqi cats. On the other hand the Magnesium mean total values of this survey were (1.374 \pm 0.067mmol/L) which were a little higher than the international values of (0.86 \pm 0.121 mmol/L) as mentioned by (14) which also could to be attributed mostly to the way of living and the feed. Also the overall total mean of Zinc in this survey of (11.946 \pm 1.351 $\mu\text{mol/L}$) was about double that mentioned be (15) (6.652 \pm 1.4419 $\mu\text{mol/L}$) for van cats in Turkey. Such difference are mostly due to the breeds tested for. Kaneko ⁽¹⁴⁾ in his text book did not mention any value for the Zinc element. The

Phosphorus element was also measured in this survey and its mean total value of (4.527 ± 0.458 mmol/L) was more than double the least mean value and about double the high value (2.3571 ± 1.2916 mmol/L) as mentioned by (16). Such great differences could be due to excess of the element in the feed which need to be investigated in the future.

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