## Statistical Analysis of Biochemichal Liver Profil of *Ursus arctor* in Albania

**Veterinary Medicine**

**Keywords:** mean, normal distribution, kurtosis, skewness, percentage.

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### Abstract

In this study, we have made the biochemical examination of liver, with biochemical analyzer Cobas for 18 bears (n = 18) of the race Ursus arctor. For all the results we have executed the statistical evaluation by using the computer program SSPS17 version. From the basic features we have evaluated the main characteristic: the mean, standard error of mean, standard deviation, variance, mode, skewness and kurtosis different percentiles. Also we have used box plot for graphical presentation of different percentiles and histogram of distribution of the data and plot of Normal distribution of these data. The statistic biochemical indicators of liver show a general value about meridians values for GPT, GOT, GGT, and TP. The deviations from meridian values were noted only for CK. The variations in indicators of CRP condition the physiological, age and breeding conditions. The variations in glucose values highlighted the diversity of conditions in captivity breeding bears.

## 1. Introduction

The Brown bear (*Ursus arctos*) actually is part of the disappearance animals list and in Albania is classified specie protected by law. Based on the state statistics, the number of the *Ursus arctos* that live at the Albanian territory is approximately 300 animals, (Alexandros A. Karamanlidis, 2009). Taking into consideration the non adequate management of wild fauna, the habitat change as a result of human intervention in forest, the reduction of food due to forest burning and the killing or captivity for commercial purposes and poverty in rural areas the number of the *Ursus arctos* is significantly reduced, (Servheen, C. 1990). Also in the reduced number have affected and the movement of the population in the previous prohibited areas, use of the heavy industry in these areas and the rabies disease in some northeastern areas of the country, (Laçi, D., *et al*. 2013). Another bad widespread phenomenon in the rural areas is and the bear captivity used for commercial purposes. Based on these changes in the rural areas, a considerable number of bears result to be in captivity and very bad feed it, (Nelson, R. A., *et al*. 1983).

## 2. Materials and methods

The blood samples were collected from the cephalic vein into evacuated heparin containers. Samples were kept cool and dark until they were transferred to the laboratory where plasma was prepared by centrifugation and frozen within 8 hr of sampling. The biochemical examination of

the serum was made in Tirana Petlife Hospital and with automated Cobas MIRA examiner and the reagents were produced from Biosistems SA Costa Brava, Barcelona-Spain, (Jamnicky, B., *et al*., 1987). The certified quality system is in accordance to EN ISO 13485 and ISO 9001 standards. We have analyzed Gamma-Glutamiltranferasa (IFCC), Bilirubin (Diazotized sulfanilic), Alaline aminotrasferase (IFCC), C-reactive protein (uricase\peroxidase), Aspartat aminotrasferase, glucose and CK. The Tiletamine-zolazepam (Zoletilt: Virbac International, Carros Cedex, France) was administered in a solution of 200 mg/ml at a dosage of 5–10 mg/kg of body mass. The blood samples are taken carefully and in a short time, not more than 10 min. After sampling, the plasma samples were analyzed immediately for biochemical parameters in the Petlife Hospital Laboratory, (Hellgren, E. C., *et al*. 1993). The animals were grouped by age to compare plasma biochemistry parameters in sexually immature individuals (young, 6 yr), bears in their prime reproductive period (middle-aged, 6–13 yr), and older bears (>13 yr), (Schroeder, M. T. 1987).

All statistical analyses were performed in the SSPS System Version 17 for Windows, (G. Bohm, 2010).

## 3. Results and discussion

The statistical summary characteristics for biochemical indicators of conceived functional liver test presented in the table.

| | Range | Minimum | Maximum | Mean | | Std. Deviation | Skewness | | Kurtosis | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| GOT_Ul | 122.00 | 14.00 | 136.00 | 51.5000 | 7.30845 | 31.00711 | 1.338 | .536 | 2.203 | 1.038 |
| CRP_mg/dl | 2.62 | .08 | 2.70 | .8044 | .16066 | .68161 | 1.563 | .536 | 2.530 | 1.038 |
| GPT_Ul | 74.00 | 8.00 | 82.00 | 29.9444 | 5.43979 | 23.07908 | 1.090 | .536 | .082 | 1.038 |
| GGT_Ul | 35.00 | 2.00 | 37.00 | 14.6111 | 2.35444 | 9.98905 | .530 | .536 | -.380 | 1.038 |
| GLU_mg/dl | 72.00 | 14.00 | 86.00 | 49.3333 | 4.01631 | 17.03975 | .153 | .536 | .616 | 1.038 |
| CK_Ul | 70.20 | 14.20 | 84.40 | 30.8406 | 4.74048 | 20.11217 | 1.699 | .536 | 2.123 | 1.038 |
| TPRO_gl | 9.60 | 78.80 | 88.40 | 83.6861 | .66222 | 2.80958 | .051 | .536 | -.894 | 1.038 |

**Tab 1.** Statistical indicators for liver parameter.
[a] calculated with grouped data.
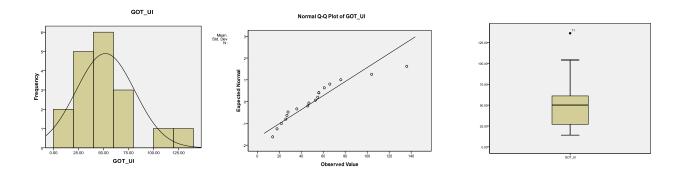[b] exist a multiple mode, is shown smaller moda.
[c] the rates are calculated with grouped data.
[d] the lower limit of the first interval or upper limit of the last interval are not known. These rates are not determined.
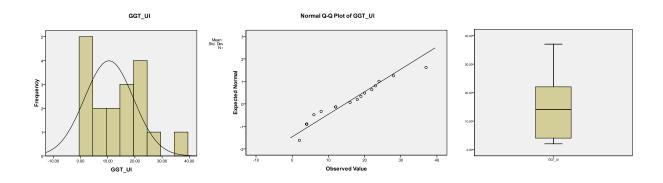
The boxplot of GPT/UI allows us to show that the small values are very close to the median. We believe that these values are directly affected by ways of breeding and age. We have not possibility to identify significant deviation in the level of this enzyme because the most of bears have approximately the same age. In addition, age variations of bears involved in the study justify the small values deviations around meridians. Also in terms of captivity, the feeding with plants justifies the small differences of enzyme values around meridians, (Cicnjak, L. *et al*., 1987).
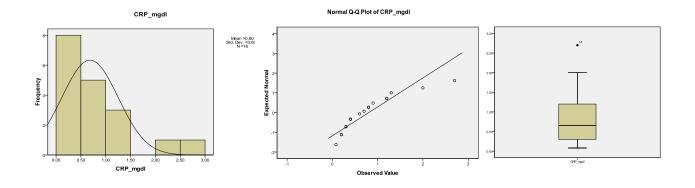


Even for values of GOT in the most of them we can see the distribution about meridianes. In difference, comparing with the distribution of GPT, for GOT value we can see two breakaway values.
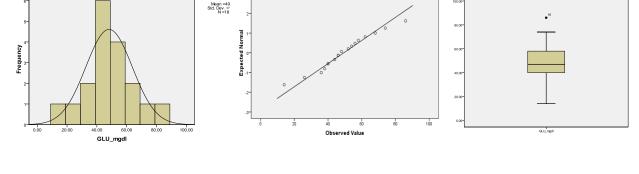
By approximation of the factual values with normal curve and the boxplot we can say that two separate values have not significantly affect in the normal distribution of this indicator. The GGT value as how they are disseminated around meridianes distribution between GPT values (worse) and GOT values (better).

The great value of GGT_UI (bear with no. 11) does not influence to much on the normal distribution of this indicator. The exclusion of a sample is related to its specifications such as age and specific pathological condition.
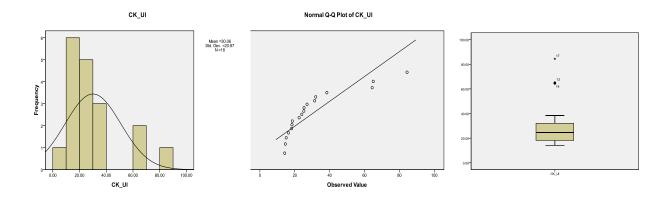


The two values of Crp_mg/dl that give a significant deviation from normal distribution tell us that the bears have very diverse conditions. To some of them that appear larger deviations from the norm, at the time of taking blood, were noted inflammation problems. The inflammation reflected degree is in relation to the level of deviation from the norm.
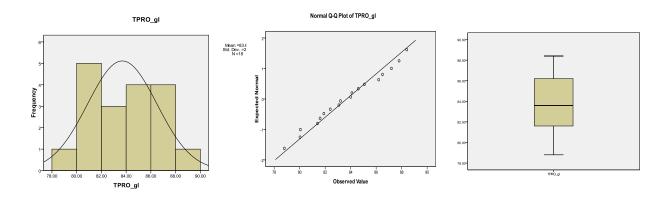


The boxplot and the graph of the avoiding factic value from the normal GLU_mg/dl indicate that we do not have values to deny the value of normal distribution of this indicator.

The Ck_U/l indicator show that the intercuartilore values are very close to the median and three great values show as that the range of values for this indicator affect suffcently in removing from the normal distribution. Specific pathological conditions of three bears which result in a large deviations justify departure from the norm. In two of them were identified and muscular injuries.



For TRPO_gl indicator we can say that we have no evidence to accept normal distribution of this indicator.

Besides graphic, to verify normal distribution which derived from actual observed values produced from biochemical analyzes, (Hissa, R., *et al*. 1994), we have also made $\chi^2$ test. The $\chi^2$ or "Suitability of the curve" is made for numerically evaluate of indicators for normal proximity.

In terms of a limited number of measurements (volume of choice is 18) we have divided into 4 equal frequency classes. After data standardization ($zi = \dfrac{x_i - \overline{x}}{S_x}$) were divided in four classes ($-3$, $-0.669$), ($-067.0$), ($0$, $0.67$), ($0.671$, $3$) with distribution N ($0.1$) which contain 25% of values for this distribution.

The criterion formula of $\chi^2$ is:    $\chi^2 = \displaystyle\sum_{i=1}^{4} \dfrac{(P_i - f_i)^2}{f_i}$ has free 1 degree ($4 - 2 - 1$).

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Where: $P_i$ is the frequency of grade observed in i class while $f_i$ is the e frequence in i class.

The theoretical value of $\chi^2(1)$ for the critical value

for the critical value $\alpha = 0.05$ is 3.841 and for $\alpha = 0.10$ is 2.706.

The calculate valeus $\chi^2$ for biochemical indicators mentioned above, are presented in table 2. As shown in this table we have a deviation from the normal distribution security level with 95% for the indicator Mg_mg/dl while the 90% confidence level for indicators GPT, GOT and CK_UI.

| | Chol<br>mg/dl | Trig<br>mg/dl | GOT<br>Ul | CREA<br>mg/dl | CRP<br>mg/dl | GPT<br>Ul | GGT<br>Ul | GLU<br>mg/dl | CK<br>Ul | TPRO<br>gl |
|---|---|---|---|---|---|---|---|---|---|---|
| $\chi2$ | 0.67 | 1.11 | 2 | 0.22 | 2.44 | 2 | 1.11 | 2 | 3.78 | 0.22 |

**Tab. 2.** The avoidance values of indicators in evaluation of the functioning of the liver.

| | GOT_Ul | CRP_mg/dl | GPT_Ul | GGT_Ul | GLU_mg/dl | CK_Ul | TPRO_gl |
|---|---|---|---|---|---|---|---|
| **GOT_Ul** | 1 | 0.211 | .742** | .606** | -0.105 | 0.427 | -0.075 |
| **CRP_mg/dl** | 0.211 | 1 | 0.253 | -0.157 | -0.121 | .653** | 0.318 |
| **GPT_Ul** | .742** | 0.253 | 1 | 0.421 | 0.174 | .491* | -0.121 |
| **GGT_Ul** | .606** | -0.157 | 0.421 | 1 | 0.13 | 0.04 | 0.264 |
| **GLU_mg/dl** | -0.105 | -0.121 | 0.174 | 0.13 | 1 | -0.244 | 0.022 |
| **CK_Ul** | 0.427 | .653** | .491* | 0.04 | -0.244 | 1 | 0.262 |
| **TPRO_gl** | -0.075 | 0.318 | -0.121 | 0.264 | 0.022 | 0.262 | 1 |

**Tab. 3.** Table of the correlations

* the significant correlation in the level of 0.05 with two lines
** the significant correlation in the level of 0.01 with two lines

The values presented in the table show all the specific values correlations among all indicators included in the study to assess the test liver function.

## 4. Conclusions

The statistical analysis of biochemical indices for 18 samples from *Ursus arctor,* held in captivity in Albania, generally showed a value about meridianes values. These values resulted such for: GPT, GOT, GGT, and TP.

The reason for meridiana deviations values of CK were stimulate from muscular injuries. Another variation that was produced was for Crp. The factors that have caused this variation, are: age, physiological condition and nutrition.

The variations in glucose highlight the diversities values of breeding conditions which is normal to be presented in the main power indicator.

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