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STUDY OF THE DEFICIENCY OF SOME ELEMENTS AND SOME VITAL VARIABLES IN CAMEL'S BLOOD

Aiman Mohammed Baqir Al-Dhalimy[1], Ammar Abdulhasan Aldhalemi[2*], Murtadha Abdulhasan Aldhalemi[3] and Ghadeer Sabah Bustani[4]

[1]Faculty of Pharmacy, University of Alkafeel, Najaf, Iraq.
[2*,3]Department of Food Science, Faculty of Agriculture, University of Kufa, Najaf, Iraq.
[4]Department of Physiology and Pharmacology, Faculty of Veterinary Medicine, University of Kufa, Najaf-Iraq.

Abstract

The research was conducted on 75 healthy and 55 anemic camels diagnosed with iron deficiency to establish serum iron, total iron binding capacity (TIBC), unbound iron binding capacity (UIBC), transferrin saturation (TS %), copper and cobalt levels. The regular (40 males and 35 females) and anemic (24 males and 27 females) groups in Najaf governorate- Iraq, all aged 1-15 years. Blood samples were collected were collected from the jugular veins into plain tubes and the separate sera was used for calculating the parameters tested. Result showed that the means in normal and anemic camels were as follows; Serum iron concentration was (13.5 ± 0.35) µmol/L and (9.2 ± 0.31) µmol/L respectively, TIBC (85.1 ± 1.8) µmol/L, (109.2 ± 2.1) µmol/L respectively, UIBC (70.5 ± 1.2) µmol/L, (98.2 ± 1.8) µmol/L respectively, TS% (12.7 ± 0.3)% , (6.9 ± 0.5) % respectively, serum copper (12.2 ± 0.4) µmol/L, (7.5 ± 0.23) µmol/L respectively and serum cobalt (2.9 ± 0.14) µmol/L and (2.4 ± 0.25) µmol/L respectively. Morever, serum iron, TS % and copper decreased significantly ($P<0.05$). While, the serum TIBC and UIBC of anemic camels increased significantly ($P<0.05$) compared to normal control. In both groups the concentrations of cobalt were more or less close. Reference mean values of specific biochemical parameters at clinically normal and anemic camels with significant differences between them are recorded in the present data.

Key words: Serum Iron, TIBC, UIBC, TS%, Copper, Cobalt, Camels.

Introduction

Domesticated camels are economically important for many countries, used for, meat, milk, a large industry and transport, in some Arab countries (J.P. Dubey & R.K. Schuster 2018). The 2009 FAO statistics reported approximately 58,000 camels in Iraq (Omer, 2011). The meat of camel is a good source of protein that contains around (20-23%), in some areas Camel meat is the highest conception between meats، different types (W.B. Chaouch, *et al.,* 2018). As well as good concentrations of vitamins (especially vitamin B complex), essential amino acids, polyunsaturated fatty acids (PUFA) and minerals compared to other red meats, camel meat is considered to be a valuable meat source for human health, on the other hand, camel meat was commonly used in traditional medicine to treat hyperacidity, hypertension, pneumonia ,respiratory diseases ,while in the world's semi-arid and arid countries the camel meat is regarded as an important product, it is the least studied meat among other red meats, Since desert areas the Camels are considered the most useful animals for the humans, they are used it for processing, transportation, leisure and agricultural work (Khezrian, A., & Shahbazi, Y. 2018). Camel products differ in some biochemical and anatomical properties and also physiological ways from other mammals (Chafik, A., *et al.,* 2019).

Iron deficiency remains the world's most severe and widespread nutritional condition. During the period 1995-2011 we notice a decrease in the deviations of the concentrated value of hemoglobin, meaning that anemia has decreased relatively (Blanco-Rojo, R. & Vaquero, M.P. 2019), But the figures indicated by the World Health Organization in this regard are still overwhelming (WHO) (Blanco-Rojo, R. & Vaquero, M.P. 2019). The most prominent nutrients in developing countries that are noticeable are the level of iron in the blood as a clear indication of the variance in hemoglobin concentrations

***Author for correspondence :** E-mail : ammara.aldhalemi@uokufa.edu.iq

and consequently the levels of anemia in these countries. Comparison between diseases that afflict people globally, we find that anemia and iron deficiency in the blood are the most influencing people, as it is prominent in the age groups of women of childbearing age to reach the proportion of one-third, as are all children for the age groups (6-59) months, so it is considered as a global epidemic (Blanco-Rojo, R. and Vaquero, M.P. 2019). Copper is one of the important and auxiliary elements in many necessary interactions of the body, especially enzymatic ones, which relate to metabolic processes. Therefore, it is considered essential, but the necessary amount of it is 100 mg. (Moraes *et al.,* 2009) found in milk , eat and in Seafood the highest Cu concentrations found in fresh shrimp at (4.736 mg/kg ww) and cuttlefish (3.148 mg/kg ww) followed by mackerel (2.094 mg/kg ww), scad (1.756 mg/kg ww), sardine (1.724 mg/kg ww) and anchovy (1.092 mg/kg ww) (Olmedo *et al.,* 2013). Cobalt is an essential element necessary for the formation of vitamin B12 (hydroxocobalamin); however, excessive administration of this trace element produces goiter and reduced thyroid activity is found in fish (0.0049/kg), Vegetables (0.0061 mg/kg) and (Potatoes 0.0088 mg/kg) as found in green leafy vegetables, such as broccoli and spinach. cereals, such as oats (Barceloux and Barceloux, 1999). Cobalt have catalyzed reactions, such as the synthesis of methionine, the metabolism of purines and folates, and the formation of methylmalonic acid in succinic acid (Benramache and Benhaoua, 2012). Therefore, the aim of this study was to detect the deficiency of iron, Copper, Cobalt and some vital variables in Camels blood.

Materials and Methods

Blood samples from 75 clinically normal camels (40 males and 35 females) and 55 clinically suffering from anemia (24 males and 27 females) in Najaf governorate-Iraq were collected into plain tubes. Normal camels (males and females) were divided into juvenile and young adults aged 1-5 years and adults aged 6–15 years (Shawaf *et al.,* 2018). The blood was centrifuged at 3000 rpm for 5-10 minutes (Abdelrahman *et al.,* 2019). The separate sera were specifically used to measure the biochemical parameters that were tested. The serum iron, copper and cobalt were calculated by flame atomic absorption spectrophotometers (Asli *et al.,* 2020). While, TIBC was measured according to colorimetric method by (Al-Dhalimy and AL-Hadithy 2016). On the other hand, TS% and UIBC were calculated according to the following formula: TS% = serum iron / TIBC × 100 and UIBC=TIBC-Serum iron (Al-Dhalimy and AL-Hadithy, 2016).

Data were analyzed using graph pad prism 8 (Berkman *et al.,* 2016). Testing of least significant differences (LSD) was used to assess differences among groups. Data were statistically analyzed using one-way ANOVA for the variance. Moreover, significant means were compared by t-test at level ($p < 0.05$).

Results and discussion

Result showed that means values in normal and anemic camels were as follows: serum iron concentration was (13.5 ± 0.35) µmol/L in normal, (9.2 ± 0.31) µmol/L in anemic , TIBC (85.1 ± 1.8) µmol/L in normal, (109.2 ± 2.1) µmol/L in anemic, UIBC (70.5 ± 1.2) µmol/L in normal, (98.2 ± 1.8) µmol/L in anemic, TS% (12.7 ± 0.3) % in normal, (6.9 ± 0.5) % in anemic, serum copper (12.2 ± 0.4) µmol/L in normal, (7.5 ± 0.23) µmol/L in anemic and serum cobalt (2.9 ± 0.14) µmol/L in normal, (2.4 ± 0.25) in anemic.

There were a significant ($P<0.05$) decreases in serum iron, TS% and serum copper, with a significant ($P<0.05$) increase of TIBC and UIBC in anemic camels compared to that of normal camels. While, there was no significant difference in serum cobalt for both groups Fig. 1- A and B.

The result of the present study indicated significant differences between healthy and anemic values that confirm the finding by (Hussain *et al.,* 2016 and Zaher *et*

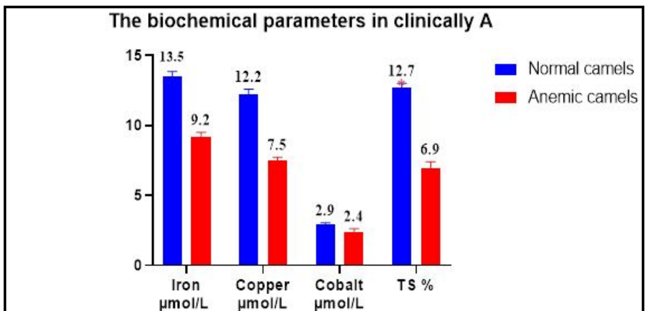

Figure 1 - A biochemical parameters in clinically normal and anemic camels
- Means ± SEM .
- Refers to the presence of significant (P<0.05) differences.

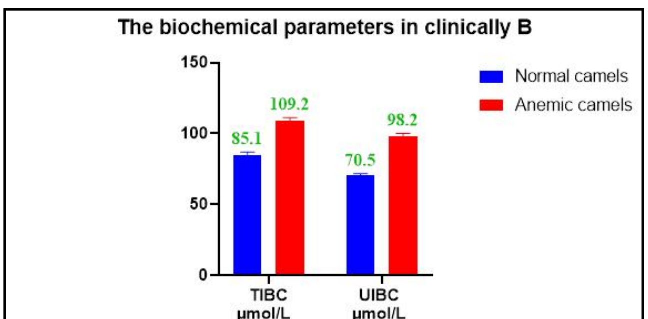

Figure 1 - A Biochemical parameters in clinically normal and anemic camels
- Means ± SEM.
- Refers to the presence of significant (P<0.05) differences.

al., 2017). However, the TIBC and UIBC were significantly higher in iron deficient anemic animals due to the increase of the transferrin molecules which was essential for iron transport from storage sites (Anode, 2019). Moreover, high TIBC confirm the findings by (Rajabian *et al.,* 2017 and Razavian 2017) of high TIBC in low serum iron. Also, the UIBC increased in iron deficiency anemia due to the increase of the transferrin binding site unbound with iron (Razavian 2017 and Mohammed *et al.,* 2019). While, the TS% decreased in iron deficiency anemia may indicate that the binding site of transferrin was unsaturated (Golbeck *et al.,* 2019).

Serum iron revealed significant increase in researches (Zaher *et al.,* 2017 and Jalali *et al.,* 2018) and non-significant increase reported by (Hayajneh *et al.,* 2018 and Stasiak *et al.,* 2018) in comparison with the findings of present study. Moreover, there were 64% of our data lower than the narrow range reported by (Anode, 2019). There were 80% of our values less than the range documented by (a-Faye and Bengoumi 2018). Furthermore, the range of this study located within the extended lower and upper limits of the range by (b-Faye and Bengoumi 2018).

Serum TIBC of this work was significantly higher than that reported by (Rajabian *et al.,* 2017 and Anode., 2019). However, serum UIBC of the present study showed a significant increase compared with studies by (Sanaa *et al.,* 2015). Serum TS% outcome of the present work was lower than that reported by (Stasiak *et al.,* 2018).

Many authors have been studied Serum copper in both sexes and age groups. Zaher *et al.,* (2017) reported higher values, (Hassan *et al.,* 2020) recorded low values and a non-significant difference by (Sanaa *et al.,* 2015) in comparison with present study. Lastly, serum cobalt was a significantly lower (Meena *et al.,* 2017), a significant increase (Elhiber *et al.,* 2017) in comparison with our findings.

However, the specific biochemicals studied evaluated in both sexes in normal and anemic with the similar findings to the above-mentioned relevant groups independent of any subdivision Fig. 2 and 3 (A and B).

Males serum iron was significantly higher (Asli *et al.,* 2020), non-significantly higher (Ali *et al.,* 2019) nearly similar (Hassan *et al.,* 2018) in comparison with male's iron serum of the present study. On other hand, serum iron in females of our findings was close to the values recorded by (b- Faye and Bengoumi, 2018). While, (Zaher *et al.,* 2017 and Anode., 2019) reported a significantly higher iron serum compared to this study.

Serum copper in males was higher (Eltahir *et al.,* 2016 and Hassan *et al.,* 2018) and no significant differences (Al-Dhalimy and AL-Hadithy 2016) compared with our results. On the other hand, serum copper in females was higher (Durrani *et al.,* 2017), lower (Narnaware *et al.,* 2017) and close (Faye *et al.,* 2018)

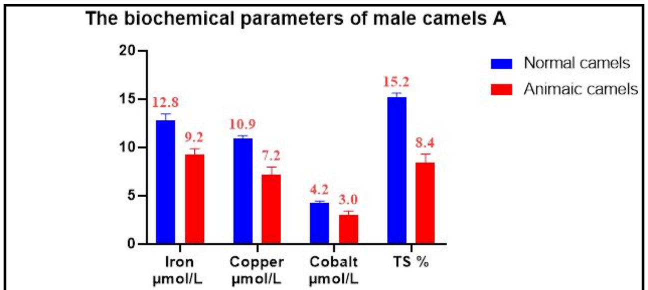

Figure 2 - A ; biochemical parameters of male normal and anemic camels;
- Means ± SEM .
- Refers to the presence of significant (P<0.05) differences.

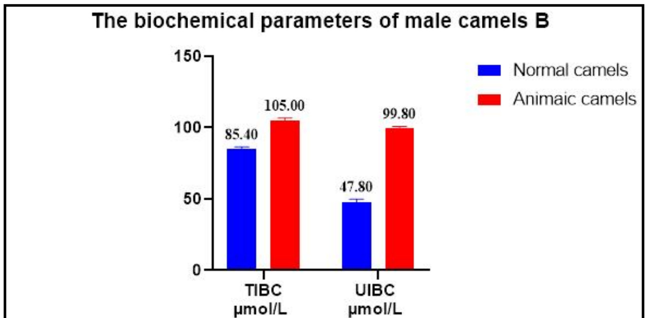

Figure 2 - B ; biochemical parameters of male normal and anemic camels;
- Means ± SEM.
- Refers to the presence of significant (P<0.05) differences.

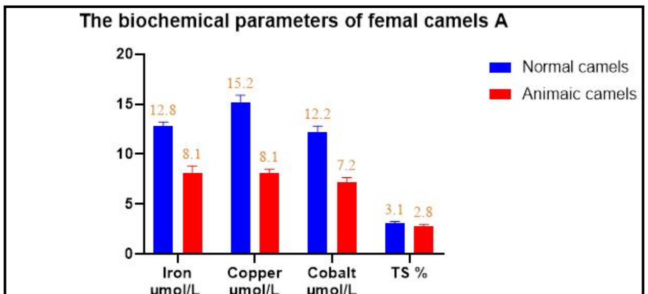

Figure 3 - A ; biochemical parameters of femal nrmal and anemic camels;
- Means ± SEM.
- Refers to the presence of significant (P<0.05) differences.

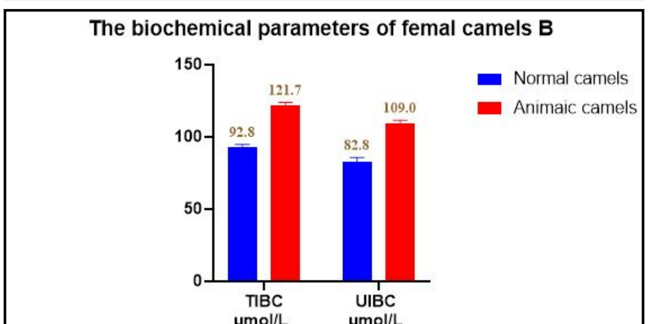

Figure 3 - B ; biochemical parameters of femal normal and anemic camels;
- Means ± SEM .
- Refers to the presence of significant (P<0.05) differences.

to our findings.

However, the biochemical tests estimated in both age groups of normal and anemic camels revealed significant differences except in cobalt Fig. 4A and 5A.

The present work showed close values in all age groups of studied biochemical parameters in healthy dromedary camels. While, a significant difference between normal and related anemic groups except in cobalt findings. Although, many researchers reported different age groups in males and females which already compared with appropriate group of this study.

However, the serum iron of the present study was in agreement with the (Elhiber, 2017 and Asli *et al.,* 2020) how documented that serum iron was not affected by sex or age.

The differences in the concentration of serum biochemicals in clinically normal camels of this study compared to other researchers can be attributed to one or more of the following: type of feed and breeding, lack of scientific feeding program, season, sex or perhaps genetic factors (Ibrahim., 2018).

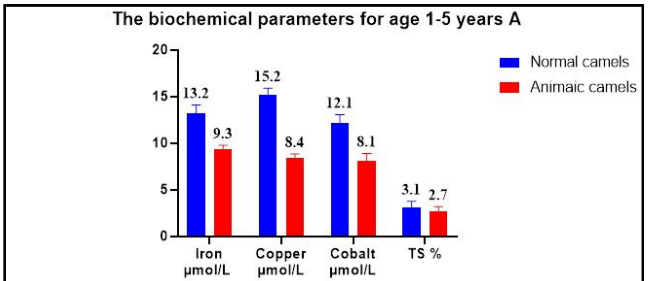

Figure 4 - A ; Biochemical parameters in age 1-5 years of normal and anemic camels;
- Means ± SEM .
- Refers to the presence of significant (P<0.05) differences.

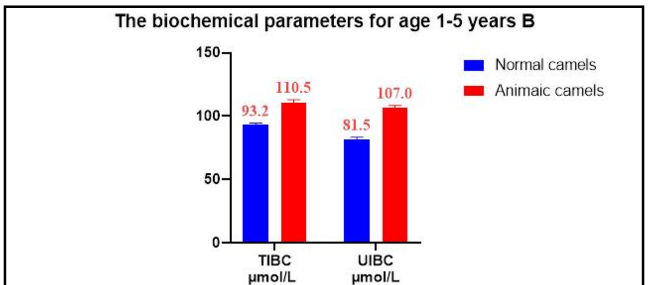

Figure 4 - B ; biochemical parameters in age 1-5 years of normal and anemic camels;
- Means ± SEM .
- Refers to the presence of significant (P<0.05) differences.

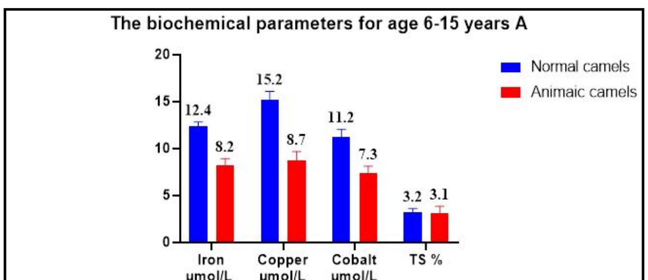

Figure 5 - A ; biochemical parameters in age 6-15 years of normal and anemic camels;
- Means ± SEM .
- Refers to the presence of significant (P<0.05) differences.

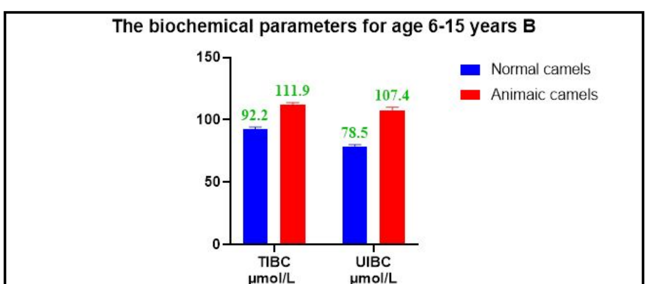

Figure 5 - B ; Biochemical parameters in age 6-15 years of normal and anemic camels;
- Means ± SEM .
- Refers to the presence of significant (P<0.05) differences.

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