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التغيرات في مكونات الدم الكيمائية عند تجويع الحمير

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حجبت التغذية عن عدد ثمانية حمير حجبا تاما لمدة سبعة أيام مع اعطائها حرية شرب المياه ـ جمعت عينات من الدم يوميا أثناء فترة ماقبل الصيام وفترة الصيام وفترة اعادة التغذية مرة أخرى .

ولقد لوحظ أن بعض مكونات سيرم الدم متمثلة في خميرة الجلوتام اوكسال ترانس امينيز والجلوتام بيروفيك ترانس امينيز ومعدل البروتين الكلي تماثل تلك التي تم الحصول عليها في فترة ماقبل الصيام بينما لوحظ نقصا معنويا في مستوى كلا من الكالسيوم والفسفور وخميرة الفوسفاتيز القاعدية ، بينما لوحظ زيادة في معدل الدهون الكلية واليوريا نتروجين وصبغة الصفراء الكلية ، ولوحظ ـ أيضا ـ تأرجح غير معنوى في معدل الجلوكوز في بعض فترات الصيام .

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BLOOD SERUM BIOCHEMICAL CHANGES IN FOOD STARVED DONKEYS

(With One Table)

By
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SUMMARY

Feed was withheld from 8 donkeys for 7 days with free access water. Blood samples were collected each morning prefasting, fasting and refeeding periods. Serum was prepared and serum constituent were determined. During fasting, serum G.O.T., G.P.T. and total proteins concentration were maintained at or near prefasting values while there is a fluctuation in serum glucose value during the fasting period. Serum phosphorus, calcium and alkaline phosphatase were significantly decrease whereas total lipids, urea nitrogen, total bilirubin were increased during fating period.

INTRODUCTION

The quantitative lack of food or starvation is the biggest problem of the world today. In some areas the problem is seasonal while in other areas it is a problem throughout the entire year. Starvation may also result from inability to prehend, swallow or digest food. During periods of starvtion the process of catabolism continues to supply the substances required for anabolism and to maintain the vital functions, the reserve stores of nutrient contained within the individual are drown upon. Glycogen which is most readily usual substance for energy, is the first to be utilize (ROBBINS, 1962). The fat deposited in the various depots is used next. Then the fat contained within the parenchymatous organs is utilized (BEESON and DERMOT, 1976). If starvation continues, the protein comprising the cytoplsm of the cell is used. Finally, a stage is reached when much protein has been used that the cells of the body are so longer able to perform the functions necessary for maintaining life, and death is the result. In protein deficiency the body gives preference to haemoglobin production over that of the plasma proteins (RUNNELLS et al., 1965). The effect of fasting on blood constituents has been partialy investigated. BAETZ and PEARSON, (1972) observed that, 9 days of fasted ponies resulted decreased concentration of blood urea nitrogen and phosphorus concentration during the fasting period.

BAETZ and MENGLING (1971) reported slight changes in the amount of the free amino acids in pigs fasted for 115 hours. SCHOTMAN and WAGNAAR (1969) reported that with holding feed from healthy poines resulted in hyperlipaemia.

The present study was performed to determine the effect of short period (7 days) starvation on some blood constituent of healthy donkeys.

MATERIAL and METHODS

The present work was conducted on 8 clinically healthy male donkeys aged between 3 - 6 years. They proved to be healthy by clinical examination and examination of their blood and faeces. Animals were put on a constant ration for one month before experiment, composed of 2 kg cotton seed cake with wheat bran and straw per days for each animal. Nlood samples were collected in the morning from the donkeys on the three occasions before the start of starvation and daily during the fasting (7 days) and refeeding periods (7 days). The animal had free access to water during the experiment. The obtained serum samples were subjected to analysis for glucose, urea nitrogen, calcium, phosphorus, alkaline phosphatase, G.O.T, G.P.T total lipids, total protein and total bilirubin. The reagents used for these determinations were supplied by Merk, Dermstadt, W-Germany.

RESULTS

The values for serum constituents of the prefasting, fasting and refeeding periods are shown in table (1). Serum G.P.T., G.O.P. and total protein were mainted at or near prefasting values throughout the fasted period while serum glucose levels are fluctuated in the fasted period. Phosphorus, calcium and alkaline phosphatase values were significantly decreased throughout the fsting period and retained to prefasting values after refeeding. Serum urea nitrogen, total lipids and total bilirbin values were significantly increased during the fast and returned to prefasting values upon refeeding.

DISCUSSION

The present investigation deals with the problem of starvation as an aid to demmstrate the effect of malnutrition or starvation occurring during anoroxia in certain infectious or non infectious diseases. Furthermore the study illustrate the reflection of such condition of such condition on the blood constituents as an aid for the diagnosis of such disorder. it is clear that the starved donkeys maintain the concentration of blood serum transaminases, glucose and total proteins at prefasting values, therefore any change in such blooo constituents must be related to an affection in the animal body resulting to starvation as in certain infectious diseases (BAETZ and PEARSON, 1972).

The significantly decreased alkaline phosphatase concentration (P/__ 0.01) in the fasted donkey is presumed to be caused by the lack of the digestive process during starvation where the main portion of the alkaline phosphatase in serum is derived from the intestinal mucosa (COLES, 1974). This lowered alkaline phosphatase activity preseemably causes the decrease in the blood serum inorganic phosphorus (CORNELIUS and KANEKO, 1963).

The decrease in serum calcium and phosphorus during the fasted period was probably caused by the decrease supply of them from intestine and the continued excretion of both elements in the urine and intestine (KOLB, 1967). The significantly increased serum urea nitrogen concentration (P/__ 0.01) may be explained by the increase protein metabolism and decreased excretion of urea (BAETZ and PEARSON, 1972).

The significantly increased serum bilirubin concentration (P/__ 0.05) during strvation was not large enough to indicate liver damage (MEDWAY, PHILER and WILKINSON, 1969). The increase of bilirubin probably occured for the same reasons that urea nitrogen occure.

The most pronounced change in starved donkeys were lipaemia. These increase of total lipids during the fsting period may be attributed to utilization of fat stores instead of the normally ingested carbohydrate,furthermore hyperlipaemia reflected anorxia and poor prognosis SCHOTMAN and WAGENAAR, 1969).

There is a momentary increase in the blood glucose on the 3rd and 6th days of the fasting. This may be explained on the basis that insulin falls with the fasting that will lead to stimulation of glucogenolysis. The data of the blood glucose after refeeding were considered to be on the opposite side of the insulin theory as stated by LEVINE and HAFT (1970). The sugested stated that following the ingestion of the food the insulin secretion is stimulated and the findings of the blood lucose were reversed.

In conclusion starvation eventially effect the blood serum concentration of phosphorus, calcium, alkaline phosphatase, total lipids, urea nitrogen, total bilirubin change. However the serum concentration of flucose. G.O.T., G.P.T. and total protein were not significantly affected. Finally starvation affects metabolic status causing significant disorders mainfested by increase catabolic process in the animal body.

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Table (1): Serum biochemical changes of 8 donkeys during control, fasting, and refeeding periods

Biochemical Parameters	Before fasting period	Fasting period							Refeeding period						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7
Body temp. (°C)	37.7 ± 0.3	37.7 ± 0.2	37.5 ± 0.22	37.3 ± 0.15	37.1 ± 0.12	36.3 * ± 0.28	36.1 * ± 0.20	36.0 * ± 0.11	36.9 * ± 0.1	36.9 ± 0.2	37.1 ± 0.1	37.3 ± 0.12	37.5 ± 0.12	37.5 ± 0.3	37.4 ± 0.1
Glucose mg/100 ml	85.5 ± 3.9	81.3 ± 4.4	82.7 ± 4.4	86.6 ± 5.5	83.5 ± 5.1	85.5 ± 6.1	86.3 ± 3.3	85.9 ± 4.3	87.8 ± 3.3	86.7 ± 5.5	88.6 ± 6.1	85.6 ± 6.2	85.7 ± 6.6	86.3 ± 3.3	90.3 ± 4.1
Uera nitrogen mg/100 ml	15.6 ± 2.1	17.1 ± 2.1	22.2 ± 1.1	23.2 ± 1.2	25.1 ** ± 3.1	25.1 ** ± 2.1	30.1 ** ± 2.1	29.3 ** ± 1.1	25.3 ** ± 1.2	22.1 ± 1.1	16.9 ± 2.1	16.2 ± 1.2	15.9 ± 2.2	15.1 ± 1.1	15.8 ± 2.1
Calcium mg/100 ml	8.3 ± 1.1	8.0 ± 1.2	7.3 ± 0.8	6.1 * ± 0.9	6.1 ** ± 0.8	5.3 ** ± 0.8	5.3 ** ± 0.8	5.1 ± 1.1	6.1 ** ± 1.2	6.9 ± 0.9	7.1 ± 0.35	7.1 ± 1.1	8.1 ± 1.2	8.3 ± 1.1	8.2 ± 1.3
Phosphorus mg/100 ml	2.8 ± 0.3	2.7 ± 0.2	2.3 ± 0.2	2.0 ± 0.3	1.9 ± 0.3	1.7 ** ± 0.2	1.77 ** ± 0.11	1.83 ** ± 0.12	2.1 ± 0.21	2.1 ± 0.33	2.6 ± 0.31	2.3 ± 0.13	2.5 ± 0.22	2.7 ± 0.11	2.77 ± 0.11
Alkaline phosphatase mu/ml	36.5 ± 3.3	35.6 ± 4.4	35.7 ± 3.1	25.5 * ± 2.9	22.9 ** ± 2.1	20.9 ** ± 3.1	20.8 ** ± 1.1	21.3 ** ± 2.1	25.6 * ± 3.1	28.9 ± 1.1	29.9 ± 2.1	31.9 ± 2.1	36.1 ± 2.1	35.9 ± 2.2	37.1 ± 2.2
G. O. T. Mu/ml	66.6 ± 3.9	65.3 ± 4.1	66.9 ± 5.5	62.4 ± 3.9	65.3 ± 3.9	66.9 ± 5.6	70.1 ± 4.1	66.1 ± 5.5	70.2 ± 4.4	63.1 ± 5.1	66.2 ± 6.6	65.3 ± 3.1	67.1 ± 2.9	70.1 ± 3.9	63.9 ± 6.6
G. P. T. mu/ml	8.6 ± 1.1	9.0 ± 2.1	9.1 ± 3.2	8.9 ± 2.1	8.3 ± 2.2	8.9 ± 3.1	7.9 ± 1.1	8.3 ± 2.2	8.7 ± 3.2	9.1 ± 2.1	8.9 ± 2.1	9.1 ± 1.1	8.9 ± 3.2	10.1 ± 3.2	9.1 ± 1.1
Total lipids mg/100 ml	190.8 ± 11.9	198.9 ± 13.1	200.8 ± 15.5	220 ± 11.1	250.9 ** ± 13.1	250.9 ** ± 15.1	280.8 ** ± 12.1	286.9 ** ± 11.11	280.9 ** ± 12.1	255.9 ** ± 13.0	220.0 ** ± 12	200 ± 13.1	200 ± 13.1	201 ± 11.2	203 ± 13.9
Total protein gm/100 ml	7.3 ± 1.1	7.1 ± 1.2	8.1 ± 1.2	7.3 ± 1.1	7.7 ± 1.1	7.3 ± 0.9	7.5 ± 1.1	8.1 ± 0.9	8.1 ± 1.2	7.7 ± 1.3	7.9 ± 1.1	7.9 ± 1.2	8.1 ± 0.89	8.1 ± 0.9	7.7 ± 1.1
Total Bilirubin mg/100 ml	0.21 ± 0.02	0.24 ± 0.02	0.23 ± 0.03	0.33 * ± 0.03	0.35 * ± 0.01	0.31 * ± 0.03	0.32 * ± 0.02	0.34 * ± 0.03	0.32 ± 0.02	0.31 ± 0.01	0.3 ± 0.02	0.29 ± 0.02	0.22 ± 0.01	0.24 ± 0.01	0.23 ± 0.01

± Standard deviation ** P < 0.01 * P < 0.05