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تأثير التجويع والاظلام والضوء المستمر على البروتينات الكلية والتجزوءات البروتينية في سيرم دم سحلية كالسيد أوسيلاتي

خديجة حسن

تناول البحث دراسة تأثير التجويع والاظلام والضوء المستمر لمدة ٦٠ يوم على البروتينات الكلية والتجزوءات البروتينية في سيرم دم سحلية كالسيد أوسيلاتي·

وتم تقدير البروتينات الكلية والتجزوءات البروتينية باستخدام طريقة البيوريت ، طريقة التحليل الالكتروفور يتي (الفصل الكهربي للبروتينات المختلفة)، وذلك باستخدام أفلام الاجاروز·

وتم تقدير التغيرات الكمية في محتوى البروتينات الكلية، والتجزوءات البروتينية وهي على وجه التحديد: الالبيومينات ، ألفا جلبيولين ، بيتا جلبيولين ، جاما جليبولين في سيرم دم السحلية قبل وبعد التعريض للتجويع والاظلام والضوء المستمر لمدة شهرين متتابعين ·

وقد أظهرت النتائج عدم وجود اختلافات نوعية في التجزوءات البروتينية في سيرم دم السحلية نتيجة لتعريضها للتجويع والاظلام والضوء المستمر لمدة ٦٠ يوما ، بيد أنه وجد اختلافات كمية واضحة في هذه التجزوءات نتيجة لهذه التغيرات الفسيولوجية ·

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EFFECT OF STARVATION, DARKNESS AND CONTINUOUS LIGHT ON TOTAL PROTEINS AND PROTEIN FRACTIONS IN BLOOD OF SERUM OF THE LIZARD, CHALCIDES OCELLATUS

(With One Table & 5 Figs.)

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SUMMARY

The effect of starvation, darkness and exposure to continuous light for 60 days on total proteins and protein fractions in blood serum of the lizard, Chalcides ocellatus was investigated.

Total proteins and protein fractions were determined applying the Biruet method, and horizontal zone electrophoresis on agarose slide, respectively. Quantitative changes in total proteins and protein fractions namely: albumins, alpha globulin, beta globulin and gamma globulin in the serum of the lizard before and after exposure to starvation, darkness and continuous light were assessed.

The results revealed that no qualitative changes were detected in these protein fractions, however marked quantitative changes in the serum of the lizard were recorded after the exposure to such environmental conditions.

INTRODUCTION

Daily events in the life of a reptile as well as the prevelant environmental conditions influence the blood serum levels of proteins. Several workers, i.e. DESSAUER and FOX (1964); MASAT and MASACCHIA (1965); HAGGAG, et al. (1966); KMETOVA and PAULOV (1966), MASAT and DESSAUER (1966), MASAT and DESSAUER (1968) and GANS (1970) studied the changes taking place in some reptiles under certain environmental conditions. However, the effect of such conditions, namely: starvation, darkness and continuous light on total proteins and protein fractions in blood serum of Chalcides ocellatus is not yet available in the literature. Therefore, this investigation was conducted.

MATERIALS and METHODS

a. Materials:

The lizard, Chalcides ocellatus, was used in this study. Fifty adult lizards obtained from a local supplier, each weighing 12 g. (on the average) were designated for this investigation. Experimants were carried out in November 1985. The lizards were divided into five groups, ten lizards each, considering the initial weights to be as close as possible in all groups. Such groups were subjected to different environmental conditions for 60 days, namely: Group I- starvation and continuous electric light, Group II- starvation in sand in normal light, Group III- starvation without sand in normal light, Group IV- starvation and continuous darkness, and Group V- was kept as control.

b. Methods:

The blood samples were collected from unanesthetized animals in the morning by decapitation and collecting the sample into a centrifuge tube. Blood was allowed to clot at room temperature and then chilled throughly in the refrigerator. After coagulation, blood was centriguged at 3000 rev/min for 15 minutes and the serum formed was kept in the refrigerator for the analysis. The serum total proteins content was determined applying the Biuret method (VARLEY, 1969). On the other hand serum protein fractions were separated and identified applying horizontal zone electrophoresis on agarose slide (HASSAAN, et al. 1984). Densitometry of the stained film was performed with the DCD-12 digital computing densitometer (Beckman Instrument Company), fitted with 520 mm, interference filter. Gaussian curves were constructed for each protein fraction.

RESULTS and DISCUSSION

The effect of starvation, darkness and continuous light on total proteins and protein fractions in blood serum of Chalcides ocellatus are represented in table 1 and Figs. (1-5). The data revealed that the serum total proteins (STP) recorded 39.5 g/l in control animals, while albumins and total globulins accounted for 45.08% and 54.89%, respectively. However, in group (1) the STP nad albumins markedly increased, whereas the total globulins sharply dropped. Rather similar trend was recorded in group (2). However, in group (3) total proteins content was increased accompanied by a slight increment and decrement in albumins and total globulins, respectively. Meanwhile, an apposite trend was recorded in group (4).

On the other hand, it is note-worthy that both α globulin and γ -globulin were sharply depressed to 0.02% and 0.03% in group 2 and 3, respectively, which means that a rather marked sharp hypoglobulinaemia in these fractions took place. Such findings are in good agreement with those reported by KMETOVA and PAULOV (1966); MOSAT and DESSAUER (1966), NEWCOMER and CRENSHAW (1967) in pseudemys, emydine turtles and South American tortoises, respectively.

Moreover, the data revealed that the blood serum of the lizard, Chalcides ocellatus is a rich source of evidence on the ways in which they have adapted on metabolic challenges. The wide evolutionary divergence of the three major groups of living reptiles (turtles, crocodiles and squamates including Chlcides ocellatus) is emphasized by blood chemistry. Major structural differences exist between albumins and globulin fractions of these three groups of reptiles. According to GANS (1970) blood composition of one group of the Reptilia often responds to a physiological event quite differently from that of another group, reflecting marked differences in metabolic potentials. Meanwhile, variations in the structure and concentration of plasma albumin and total globulins appear to correlate with metabolic rate and diving physiology.

Furthermore, the effect of starvation on the serum albumin and total globulins in the studied lizard coincides with the corresponding data reported by TONGIANI (1971) in the golden hamster. HAGGAG, et al. (1966) found that starvation of the lizard, varanus greseus Daud., during hibernation period seemed to be responsible for decrease in blood proteins.

Table (1)

The effect of starvation, darkness and continuous light on total proteins and protein fractions in the serum of the lizard, Chalcides ocellatus

Animal group*	Total proteins g/L.	Albumine %	Globulins %			
			∝	B	γ	Total
group 1	46.0	64.00	24.98	5.79	5.20	35.97
group 2	43.0	56.96	0.02	28.95	14.07	33.04
group 3	43.0	48.04	24.38	27.57	0.03	51.98
group 4	48.0	35.55	9.15	33.41	21.87	64.43
group 5	39.5	45.08	30.38	14.54	9.97	54.89

* group (1) Starvation and continuous electric light.
group (2) Starvation in normal light in sand.
group (3) Starvation without sand in normal light.
group (4) Starvation and continuous darkness.
group (5) Control.

Besides, LATNER (1975) reported that the degree of hypoalbuminemia usually exceeds that of the frequently coexisting hyperglobulinemia, which coincide with the data obtained in the present investigation. Decrease in plasma albumin is of practical significance in several physiological disorders KLEINER and ORTEN (1966). One of the most important functions of albumin is the maintenance of the colloid pressure of the blood plasma. Meanwhile, the common pattern of the effect of starvation and continuous darkness was hypoalbuminemia and hyperglobuminemia, the latter due usually to increase in γ -globulin. Moreover, according to DANISHEFSKY (1980) protein starvation results in a sharp decrease in albumin production and consequently in lowered plasma albumin levels. The data obtained herein supported such finding.

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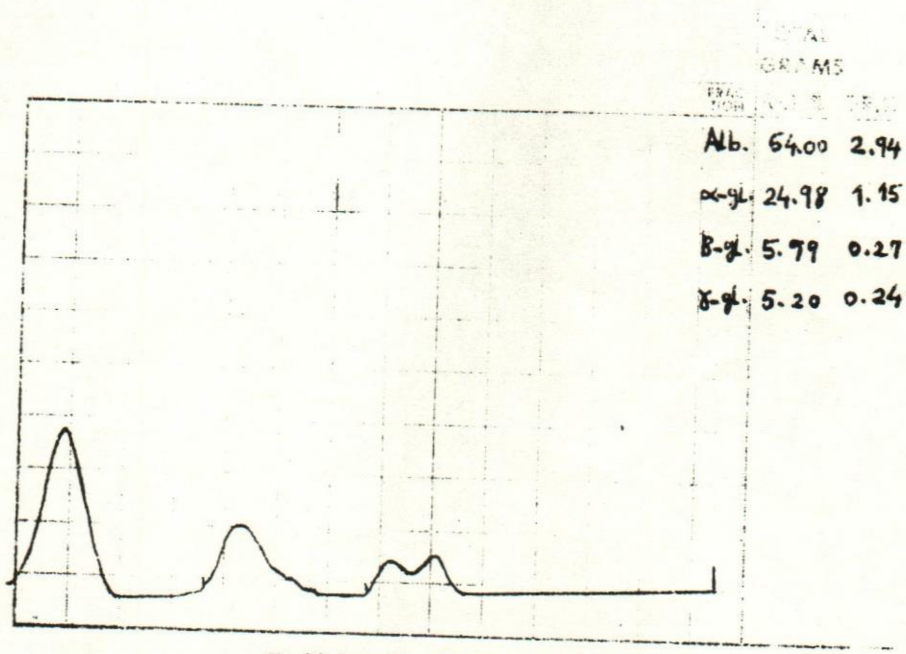

Fig. (1): Starvation and continuous electric light.

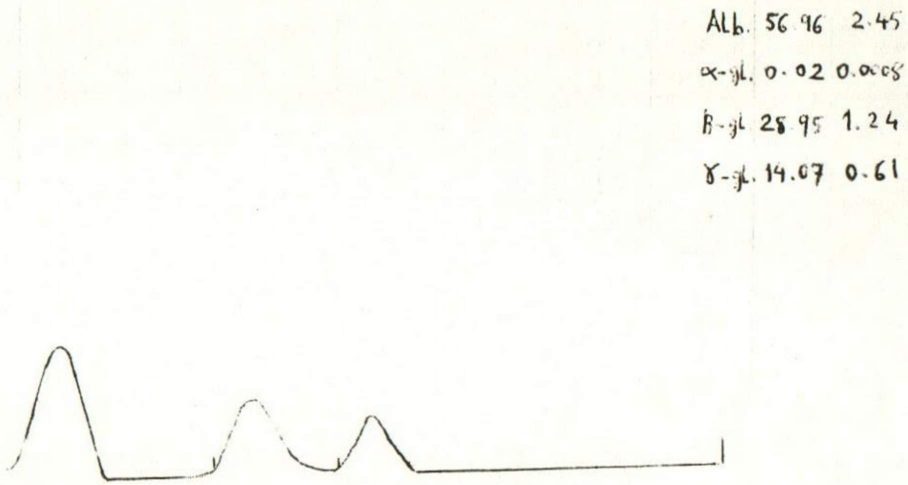

Fig. (2): Starvation in normal light in sand.

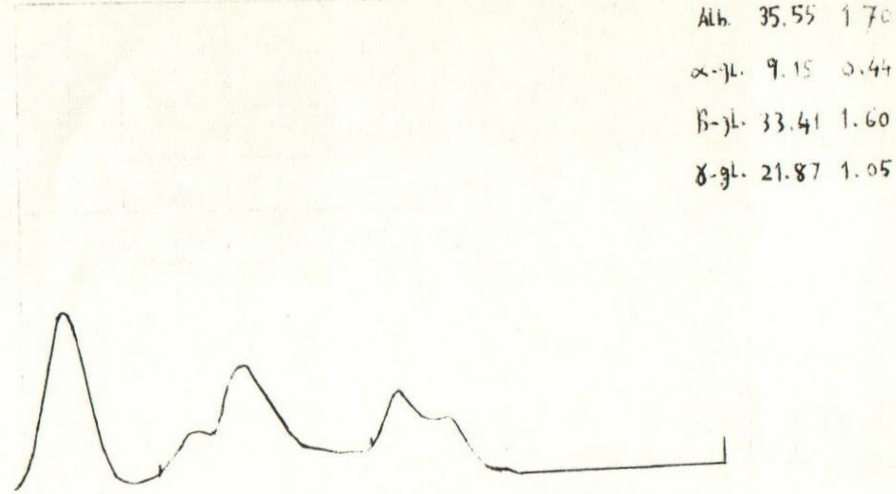

Fig. (4): Starvation and continuous darkness.

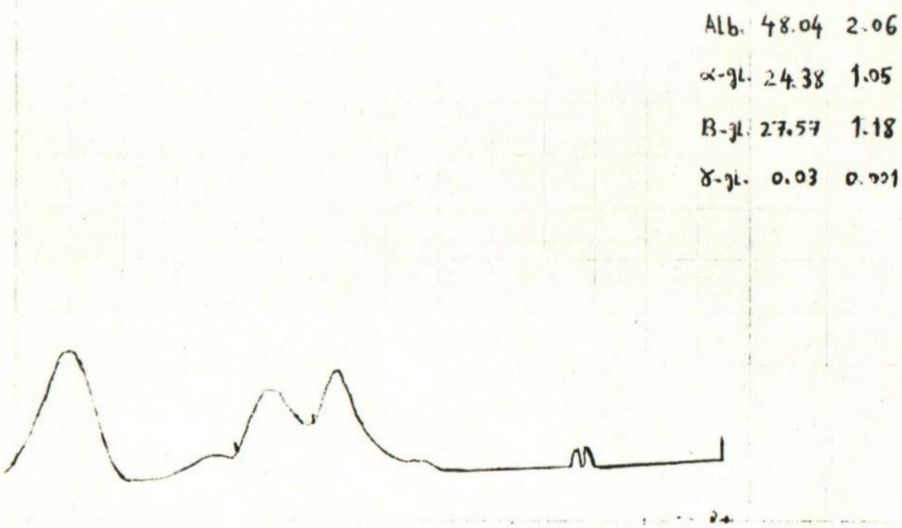

Fig. (3): Starvation without sand in normal light.

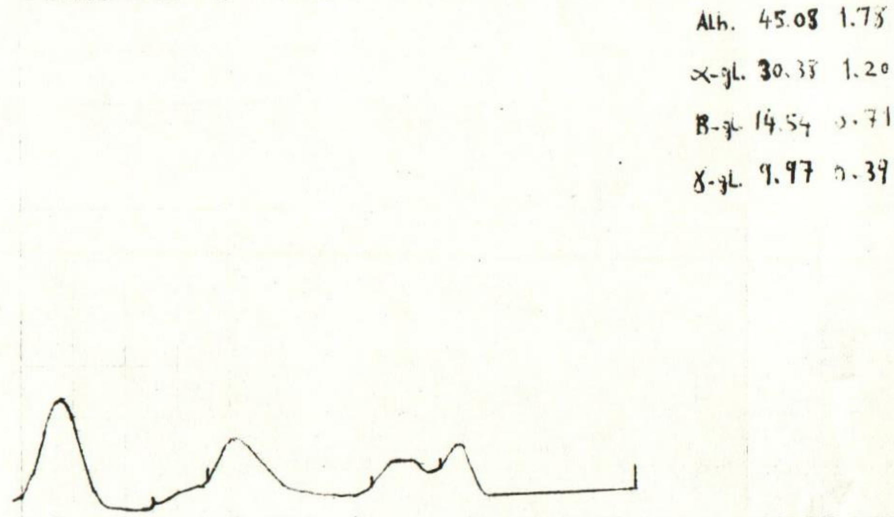

Fig. (5): Control.