

Dept. of Animal Medicine,
Faculty of Vet. Med., Assiut University,
Head of Dept. Prof. Dr. I.S. Abdallah.

ELECTROPHORETIC PATTERN OF BLOOD SERUM PROTEINS IN SINGLE HUMPED CAMELS "CAMELUS DROMEDARIUS"

(With 3 Tables & 2 Figs.)

By

ALI EL-SEBAIE

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نمط التحليل الكهربى للزلال فى مصل دم الجمال
وحيدة السنام

على السباعى حسين

أجرى البحث على أربعين من الجمال - المصرية وحيدة السنام - إشمئلت البحث على عدد ٢٥ رأس من الذكور وه ١ رأس من النوق . أجرى الفحص الأكلينيكي - على كل الجمال وأشمئلت البحث فقط على الأفراد السليمة صحياً . وكانت متوسطات تركيز الزلال الكلى فى ذكور الجمال ٨٨.٢٥ جم / لتر بينما كان التركيز الكلى للزلال فى النوق ٨٩.٠٦ جم / لتر . وأفادت النتائج كذلك أن تركيز مشتقات الجلوبيولين (الفا ، بيتا ، بيتا٢ ، والجاما) فى الذكور ٤٦.٩٨% ، ٢٢.٦٢ ، ٢٢.٥٢ ، ٤.٨٩% ، ١٢.٨٩% و ٧.٩٥% على التوالي فى حين كانت قيمة مشتقات الجلوبيولين فى النوق ٢١.٥٥% ، ٢٠.٤٨% ، ٢١.٦٢% ، ١١.٥٧% و ٦.٨٤% على التوالي . وقد أكد التحليل الإحصائى إنه لا توجد فروق معنوية فى قيم مشتقات زلال الدم بين ذكور وإناث الجمال .

SUMMARY

Forty dromedary camels of both sexes (25 male and 15 female) were included in this study. All camels were healthy and selected after careful clinical examination. Blood samples were collected and serum total proteins and protein electrophoresis were estimated. Mean values of total serum protein in healthy male and female camels were 88.25 ± 3.32 g/L and 89.06 ± 3.99 g/L respectively, serum protein electrophoresis was determined using agarose - film. Mean values of serum Albumin, B_1 , α_1 , β_2 and γ - globulins in healthy male camels were $46.98 \pm 1.95\%$, $23.63 \pm 4.86\%$, $8.53 \pm 1.92\%$, $12.89 \pm 2.62\%$ and $7.95 \pm 1.03\%$ respectively. In female dromedary camels the mean values were $55.21 \pm 4.02\%$, $20.48 \pm 1.88\%$, $6.21 \pm 1.31\%$, $11.57 \pm 2.20\%$ and $6.84 \pm 0.90\%$ respectively. No significant differences in the values of electrophoretic parameters were observed between male and female dromedary camels.

INTRODUCTION

Camelidae "dromedary and bactrian" are hardly animals which well adapted physiologically and anatomically to survive in harsh conditions. The dromedary is mostly found in arid or semi-arid desert countries in northern Africa and Arabia. The world population

of dromedary was approximately 15 million, out of them 90,000 camels were populated in Egypt (FAO-WHO- OIE- animal health year book)*. Reviewing the available literature indicated that, the number of dromedaries has declined dramatically in the last 30 years, where their functions as a source of power has given away to mechanization (HIGGINS, 1984). The dromedary is an economic feeder, which can uniquely survive in the desert as a net producer of milk, meat and other byproduct from natural resources which might otherwise be unusable, the camel of Africa and Arabia may also serve as a wealth reserve and form an important part of social structures of many nomadic people (HIGGINS, 1984).

The ability of the camel to live for long periods without drinking is one of the best known characteristics of the animal, in the arid areas the dromedary can subsist on vegetation that can not be utilized by other domestic animals. NEWMAN (1979) reported that the dromedary on free range will keep eating beyond its immediate needs and if conditions are good, a 500 kg camel could lay down up to 200 kg of fat in its hump, this would assist in supporting it through a period of shortage of grazing.

Many trials have been done to study the haematology and biochemical composition of blood in camels (SCHALM, *et al.* 1975, GAUTHIERPILTER and DAGG, 1981), special attention was focused on serum proteins because their concentration represents the balance between biosynthesis and catabolism or mechanical loss KANEKO and CORNELIUS (1971).

Habitat, ambient temperature, climate, food, working load and management are considered constant influences on the metabolism in camels (HIGGINS and KOCK, 1984), special load is involved in protein metabolic pathway, where the important role was played by protein as a major source of nutrition (SCHALM, *et al.* 1975).

In veterinary practice, under many diseased conditions serum protein assay was considered a diagnostic tool to approach a correct diagnosis. Due to lack of reports on serum proteins specially those dealing with electrophoretic assay, in camel. It is aimed in this study to throw some light on the electrophoretic pattern of serum protein in healthy dromedary. Also, special attention was paid to study the influence of sex.

MATERIAL and METHODS

Forty healthy camels "*Camelus dromedarius*" of both sexes (25 males and 15 females) were included in this study.

Age ranged from 4-10 years. Camels used were scattered in areas surrounding Assiut and belonging to farmers. Feeding and water supply for individuals were to major extent similar. A minor degree of variation in feeding system between individual farmers was observed.

Clinical examinations were carried out. Clinically healthy individuals were only selected and included in this study.

* Higgins (1984) camels in health and disease.

ELECTROPHORETIC IN CAMEL BLOOD

Blood samples

Blood samples for serum separation were collected from jugular vein in clean, dry and sterile centrifuge tubes. Blood serum was separated according to the ordinary methods of haematology. Serum total proteins was determined using test kits supplied by "Boehringer Mannheim, W. Germany" and measured spectrophotometry at wave length of 546 nm using computerized spectrophotometer, vis/uv pyenicum/phillips Model. 8800 Phillips/England.

Serum protein electrophoresis

For serum protein fractionation 0.8 ul of freshly separated serum to the sample wells of agarose film was pipetted using hamilton syringe. The film was then processed for approximately 35 minutes using 95 ml of universal barbital buffer (pH 8.6) in each chamber of cell (Corning electrophoresis unit England). For the completion of the electrophoretic separation, the film was placed in 200 ml. of amido-black 10 B-working stain solution and then rinsed in 20 ml. of 5% acetic acid clearing solution using magnetic stirrer operating for 30 seconds. The film was then completely dried for 20 minutes, allowed to cool at room temperature then washed in 5% acetic acid clearing solution to clear the excess stain prior to drying for one minute with agitation. It is transferred to a second stirrer stain dish containing clean 5% acetic acid solution, rinsed again for one minute, until the excess stain is removed and dried for 15 minutes.

Densitometry of stained film was performed with computerized scanner (Bender & Hobein GMBH, W. Germany) with this densitometer values of protein fractionation according to optical density were automatically plotted in relative values and also in g/dl.

RESULTS

Camels used in this investigation were subjected to careful clinical examination, only the healthy ones were included in this study. Mean values of serum total proteins in healthy male and female camels were 88.25 ± 3.32 g/L and 89.06 ± 3.99 g/L respectively.

Results of serum protein electrophoresis in healthy male camels were presented in table (1) and fig. (1). Mean values for albumin α , B_1 , B_2 and γ -globulin were $46.98 \pm 1.95\%$, $23.63 \pm 4.86\%$, $8.53 \pm 1.92\%$, $12.89 \pm 2.62\%$ and $7.95 \pm 1.03\%$ respectively, while results of blood serum protein electrophoresis in healthy female camels were illustrated in table (2) and fig. (2) and mean values for albumin α , B_1 , B_2 and γ -globulin were $55.21 \pm 4.02\%$, $20.48 \pm 1.88\%$, $6.21 \pm 1.31\%$, $11.57 \pm 2.20\%$ and $6.84 \pm 0.90\%$ respectively.

DISCUSSION

Determination of serum proteins and the interpretation of their specific profiles involved methods of great importance in clinical chemistry. In veterinary practice serum profiles have specific diagnostic aids in many of diseased conditions such as liver cirrhosis, carcinomas, liver fluke infestation and many of viral and bacterial diseases (KANEKO and CORNELINS, 1981).

ALI EL-SEBAIE

Screening the present data of serum total proteins in dromedary camels it has been appeared that the mean values in both healthy male and female camels (88.25 g/L and 89.06 g/L) lied within the range reported after (HIGGINS and KOCK, 1984, and YOSSEF, et al. 1986). Moreover, there were no marked differences between the mean values of the serum total protein in dromedary camels and those of other bovine species (EL-SEBAIE, et al. 1988).

On the other hand the mean value of serum albumin in male dromedary camel was 46.98±1.95%, while in female group the mean value was 55.21±4.02%. It has been noticed that a lower concentration of serum albumin in male than camels (Table 3). However, data obtained after HIGGINS and KOCK (1984) showed a lower concentration in the mean values of serum albumin than those obtained in the present study.

Further informations could be collected from screening the present data that the mean values of globulin fractionation α_1 , B_1 , B_2 and γ -globulin showed no significant difference in between male and female dromedary camels Table (3). Also the mean values of different fractions are would be predicted.

It could be concluded that the serum protein electrophoretic pattern in dromedary camel were similar to great extent to those of bovine serum (EL-SEBAIE, et al. 1988). Additional information could be observed that no significant difference in electrophoretic pattern of serum protein between male and female.

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ELECTROPHORETIC IN CAMEL BLOOD

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Table (1)

Serum total protein and serum protein electrophoresis in healthy male camels

| | T. protein g/L | Albumin % | globulin % | | | |
|----|-------------------|--------------|------------|----------------|----------------|----------|
| | | | α | B ₁ | B ₂ | γ |
| 1 | 88.60 | 47.8 | 23.3 | 5.9 | 12.7 | 10.3 |
| 2 | 90.45 | 46.4 | 25.8 | 7.3 | 13.2 | 7.3 |
| 3 | 85.30 | 47.0 | 20.2 | 9.4 | 14.7 | 8.3 |
| 4 | 87.10 | 47.2 | 22.6 | 12.6 | 12.6 | 8.0 |
| 5 | 93.20 | 53.1 | 22.6 | 6.2 | 10.7 | 7.4 |
| 6 | 91.30 | 46.9 | 23.4 | 8.8 | 13.3 | 7.6 |
| 7 | 89.14 | 48.5 | 24.9 | 5.8 | 13.9 | 6.9 |
| 8 | 90.18 | 48.8 | 24.7 | 5.7 | 13.8 | 7.0 |
| 9 | 88.60 | 47.3 | 23.8 | 5.8 | 14.5 | 8.6 |
| 10 | 90.10 | 46.1 | 24.5 | 6.4 | 15.6 | 7.4 |
| 11 | 94.13 | 44.9 | 21.6 | 9.1 | 14.5 | 9.9 |
| 12 | 85.10 | 48.1 | 22.8 | 10.3 | 10.5 | 8.3 |
| 13 | 84.20 | 49.2 | 24.3 | 6.4 | 10.3 | 9.8 |
| 14 | 88.65 | 46.8 | 27.1 | 10.1 | 8.1 | 7.9 |
| 15 | 86.30 | 49.1 | 22.8 | 9.3 | 12 | 6.8 |
| 16 | 82.10 | 45.5 | 21.9 | 10.7 | 14.2 | 7.7 |
| 17 | 87.20 | 46.3 | 23.4 | 9.6 | 14.3 | 6.4 |
| 18 | 83.80 | 48.2 | 24.6 | 8.4 | 10.9 | 7.9 |
| 19 | 91.10 | 43.8 | 25.2 | 10.3 | 13.9 | 6.8 |
| 20 | 90.60 | 46.9 | 22.6 | 9.8 | 12.3 | 8.4 |
| 21 | 88.50 | 45.9 | 23.1 | 8.3 | 15.4 | 7.3 |
| 22 | 86.18 | 44.9 | 25.4 | 11.2 | 10.1 | 8.4 |
| 23 | 82.20 | 46.1 | 22.3 | 8.4 | 14.8 | 8.4 |
| 24 | 88.60 | 48.2 | 22.6 | 9.5 | 10.5 | 9.2 |
| 25 | 93.70 | 44.2 | 25.3 | 8.1 | 15.6 | 6.8 |
| X | 88.25 | 46.98 | 23.63 | 8.53 | 12.89 | 7.95 |
| SE | 3.32 | 1.95 | 4.86 | 1.92 | 2.62 | 1.03 |

ALI EL-SEBAIE

Table (2)
Serum total protein and serum protein electrophoresis
in healthy femal camels

| | T. protein g/L | Albumin % | globulin % | | | |
|-----|-------------------|--------------|------------|----------------|----------------|----------|
| | | | α | B ₁ | B ₂ | γ |
| 1 | 91.71 | 55.12 | 19.12 | 5.12 | 11.3 | 8.8 |
| 2 | 96.90 | 53.22 | 21.21 | 8.14 | 11.4 | 5.9 |
| 3 | 87.02 | 50.96 | 19.64 | 10 | 12.6 | 6.8 |
| 4 | 89.49 | 49.3 | 23.1 | 5 | 13.9 | 6.9 |
| 5 | 91.20 | 61.1 | 18.43 | 4.99 | 9.3 | 6.06 |
| 6 | 82.27 | 57.1 | 17.63 | 6.20 | 13.4 | 5.6 |
| 7 | 88.35 | 48.5 | 24.9 | 5.8 | 13.9 | 6.9 |
| 8 | 87.30 | 57.7 | 21.21 | 6.13 | 12.0 | 5.8 |
| 9 | 91.45 | 11.3 | 18.2 | 5.4 | 8.3 | 6.8 |
| 10 | 86.70 | 58.4 | 19.8 | 6.2 | 7.7 | 7.9 |
| 11 | 88.20 | 53.1 | 20.6 | 6.8 | 13.9 | 5.6 |
| 12 | 85.40 | 55.7 | 20.3 | 5.5 | 11.4 | 6.2 |
| 13 | 91.76 | 57.6 | 20.1 | 6.3 | 9.6 | 6.4 |
| 14 | 88.35 | 51.3 | 21.3 | 5.8 | 14.8 | 6.8 |
| 15 | 89.78 | 57.2 | 20.4 | 5.2 | 10.1 | 7.1 |
| X | 89.06 | 55.21 | 20.48 | 6.21 | 11.57 | 6.84 |
| S.E | 3.99 | 4.02 | +1.88 | 1.31 | 2.20 | 0.90 |

Table (3)

Mean values of serum total protein electrophoresis in healthy male and female dromedary camels

| Animals | T.protein g/L | Albumin % | Globulin % | | | | |
|--------------|------------------|--------------|------------|----------------|----------------|----------|-------|
| | | | α | B ₁ | B ₂ | γ | |
| Male camel | X | 88.25 | 46.98 | 23.63 | 8.53 | 12.89 | 7.95 |
| n = 25 | S.E | +3.32 | +1.95 | +4.86 | +1.92 | +2.62 | +1.03 |
| Female camel | X | n.s | n.s | n.s | n.s | n.s | n.s |
| n = 15 | S.E | +3.99 | +4.02 | +1.88 | +1.31 | +2.20 | +0.90 |

X = Mean

n.s = Not significance

S.E = Standard Error

n = Number of Animals

Patient

Male Camel

Date

Proben-Nr.

Station

18.05.85 008

Rel. Werte g/dl
 48,8 43,6
 24,7 21,8
 5,7 5,1
 13,8 12,2
 7,0 6,2

100,0 88,8 66

| Faktionen | Normalwert, rel. % | Normalwert, mg Protein/l |
|----------------------|--------------------|--------------------------|
| Albumin | 57-68 | 39-53 |
| α_1 -Globulin | 2-4,5 | 0,1-0,3 |
| α_2 -Globulin | 5-9 | 0,3-0,7 |
| β -Globulin | 9-13 | 0,5-1,0 |
| γ -Globulin | 10-20 | 0,9-1,6 |

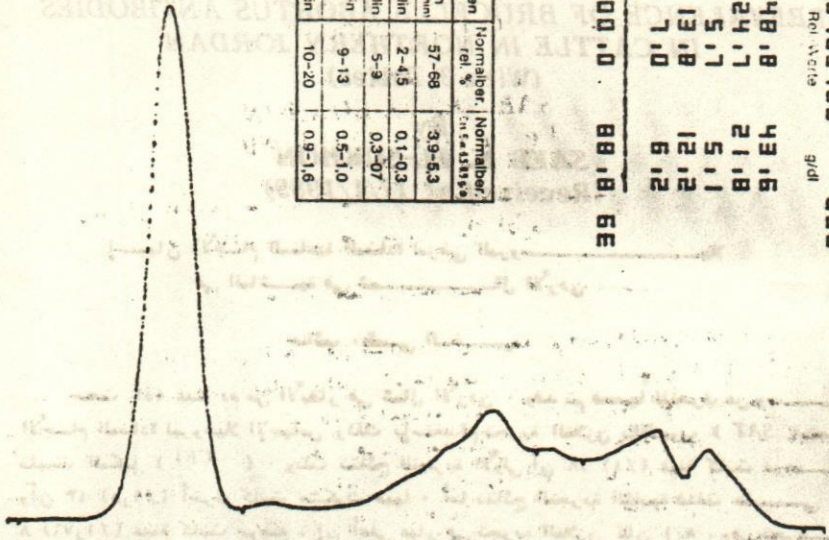


Fig.(1): Electrophoretic pattern of serum protein in male dromedary camel

Dr. VOORN & HORNIG GUMBI
 LINDENWEGENSTRASSE 71
 TELEFON 09341 3414
 JUNKASSTRASSE 8
 TELEFON 09341 3413
 RHEINWEGENSTRASSE 30a
 TELEFON 09341 2187
 MEDIZ. 3. u. 4. OG
 CHEM. 2. u. 3. OG
 TEL. 09341 3413

Patient

Female Camel

Date

Proben-Nr.

Station

18.05.85 007

Rel. Werte g/dl
 48,5 42,9
 1,8 1,5
 23,1 20,4
 5,8 5,1
 13,9 12,2
 6,9 6,0

100,0 88,0 66

| Faktionen | Normalwert, rel. % | Normalwert, mg Protein/l |
|----------------------|--------------------|--------------------------|
| Albumin | 57-68 | 39-53 |
| α_1 -Globulin | 2-4,5 | 0,1-0,3 |
| α_2 -Globulin | 5-9 | 0,3-0,7 |
| β -Globulin | 9-13 | 0,5-1,0 |
| γ -Globulin | 10-20 | 0,3-1,3 |

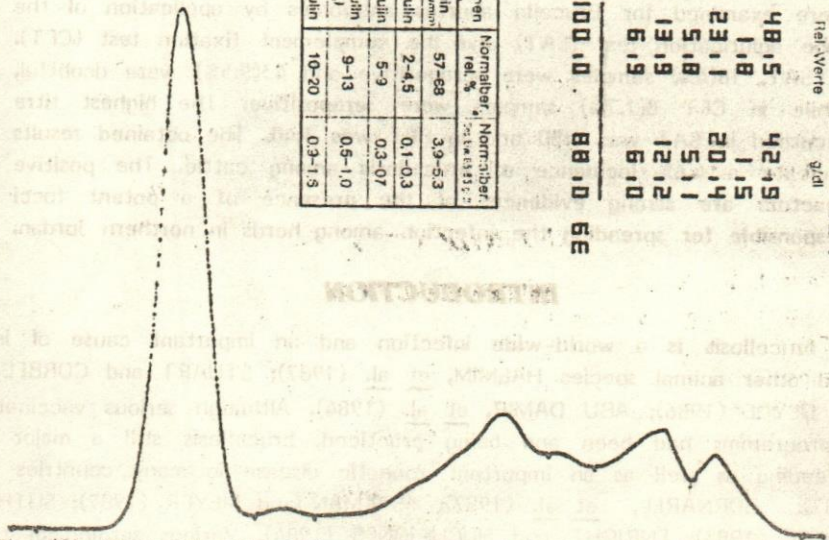


Fig. (2): Electrophoretic pattern of serum protein in female dromedary camel

Dr. VOORN & HORNIG GUMBI
 LINDENWEGENSTRASSE 71
 TELEFON 09341 3414
 JUNKASSTRASSE 8
 TELEFON 09341 3413
 RHEINWEGENSTRASSE 30a
 TELEFON 09341 2187
 MEDIZ. 3. u. 4. OG
 CHEM. 2. u. 3. OG
 TEL. 09341 3413