قسم الأمراض الباطنة والمعدية
كلية الطب البيطرى ـ جامعة الزقازيق
رئيس القسم : أ.د / يحيى عبد الحميد

دراسة لأسباب اصابات الجهاز التنفسى فى الجمال وعلاقتها ببعض العناصر الخلوية والكيميائية فى الدم

صبحى المغاورى ، محمد عقيلة*، محمود عزت*، حسام الدين العطار**

بالرغم من أن الجمال تعتبر من أهم أنواع الحيوانات فى مصر (حيث تستخدم كوسيلة للمواصلات فى الصحراء وفى انتاج اللحوم ونقل البضائع) الا أن النتائج المسجلة منها سواء فى الحالات المرضية أو الطبيعية تعتبر نادرة جدا .

تقوم هذه الدراسة على تحديد بعض الأسباب البكتريولوجية والطفيلية لالتهابات الجهاز التنفسى فى الجمال واختيار أنسب أنواع العلاج لها مع دراسة ما تسببه هذه الاصابات من تغيرات فى العناصر الخلوية والكيميائية للدم والمصل . وقد وجد أن أهم أنواع البكتريا المسببة لاصابات الجهاز التنفسى فى الجمال هى ستافيلوكوكس اوريس ستافيلوكوكس سيترس ، ستربتوكوكس ابيد يمكس ، سيد وموناس أرحينوزا ، أيشريشيا كولاى وقد وجدت زيادة فى النسبة الاجمالية لكرات الدم البيضاء بصفة عامة مع زيادة نسبة الكرات الحمضية فى الحالات المصابة بالديدان الرئوية وزيادة فى نسبة الكرات المتعادلة النوعية فى حالات الاصابة البكتيرية ووجد أيضا نقصا ملحوظا فى نسبة الكالسيوم فى حالات الاصابة البكتيرية فقط ، وقد تبين أيضا نقص فى عنصر البروتينات الكلية والألبيومين والجلوبيولين والحديد والسكر فى الدم فى كلا النوعين من الاصابة بينما زاد نشاط خمائر الفوسفاتيز القلوى والترانس أمينيز فى حالات اصابة الجهاز التنفسى بأى من السببين .

وقد استخدم بنجاح عقار السيتارين (باير) والتيراميسين ١٠٠ (فايزر) فى علاج الاصابة التنفسية بالديدان الرئوية والبكتيرية بأنواعها على التوالى .

---

* قسم الميكروبيولوجيا ـ كلية الطب البيطرى ـ أدفينا
** قسم الأمراض الباطنة والمعدية ـ كلية الطب البيطرى ـ بنها

Dept. of Medicine & Infectious Deasease,
Faculty of Vet. Med., Zagazig University,
Head of Dept. Prof. Dr. Y.M. Abdel Hamid.

AETIOLOGICAL STUDY ON RESPIRATORY AFFECTION IN CAMELS AND ITS RELATION TO HAEMATOLOGICAL AND BIOCHEMICAL CHANGES

(With 5 Tables)

By
S. EL-MAGAWRY; M. OKELA*; M. EZZAT* and H.M. EL-ATTAR**

(Received at 18/10/1985)

SUMMARY

This work was carried out to investigate the parasitological and bacteriological causes of respiratory diseases in camels, as well as, the drug of choise used for treatment in both. The blood parameters revealed leucocytosis in both the parasitic and bacterial types, with significant eosinophilia in the former case and significant neutrophilia in the latter. The biochemical analysis showed significant lowered calcium in serum of the bacterial infection, while serum total proteins, albumin and globulin, iron and blood glucose levels significantly dropped in both bacterial and verminous causes. On the other hand, serum enzyme activities exhibited high values in both affections. On isolation, the most prevalent causes were Staph. aureus, Staph. citrus, Strept. zoo-epidemicus and Pseud. areugenosa. as microorganisms, while Dictycaulus larvae as a parasitic causes.

Citarine and Terramycin 100 were used for treatment of verminous and bacterial affections, respectively.

INTRODUCTION

In Egypt, camels are considered as one of the most important group of the livestock forming the resources of the country. They are used mainly as draught animals in the villages and as a mean of transport in the desert areas. Besides, its meat, bones, milk, hair and hide are popularly utilized.

Despite the immense amount of data concerning respiratory infections in farm animals reported in the literature, there are no available ones concerning these infections in camels, except parasitic bronchitis that had been described by many investigatores (POIT BEY, 1890; SOLIMAN, 1958; EZZAT, 1962 and EL-MAGAWRY, 1983).

Therefore, this work was caried out to ascertain the aetiology of these infections in camels, as well as the effect of each causative agent on the blood biochemistry and cytology, before and after specific treatment.

---

* Dept. of Microbiology, Fac. of Vet. Med., Edfina, Alex. Univ.
** Dept. of Medicine & Inf. Dis., Fac. of Vet. Med., Banha, Zagazig Univ.

MATERIAL and METHODS

A total of 40 camels were used in this study. Thirty of them were baught from Imbaba market and transported to Arab El-Sanagra village, Abo-Hammad, Sharkia. These animals exhibited cough, nasal discharge and/or depression on the second day of transport, while the rest 10 camels were apparently normal and used as a control. The age of these camels was varied from 1 to 6 years old, while their weights varied from 250 to 350 kg. B.Wt. Clinical signs were recorded and faecal samples were collected in special containers for parasitological examination after MONNING (1962), while for bacteriological examination, collected nasal swabs were inoculated into 1% sterile glucose broth (as transport and enriched medium), incubated at 37°C for 24 hours and then inoculated on the following media plate: (Difico) nutrient agar, 5% sheep blood agar, McConkey agar, and Sabauroud's agar. The incoulated plates were incubated at 37°C for at least 24-72 hours. Growing colonies were picked up, purified by inoculation on nutrient broth and then subcultured on selective media and the isolates were identified according to the colonial morphology and pigment production, morphology by Gram's stain, as well as the biochemical characters. Gram positive cocci were classified to species according to WILSON and MILES (1964), MERCHANT and PARKER (1976) and GRUICKSHANK, et al. (1973). On the other hand the Gram negative bacilli were differentiated according to BREED, et al. (1975), COWAN and STEEL (1965).

Concerning the sensitivity test, the culture under test was inoculated onto probe nutrient agar incubated at 37°C for 24 hours. The growth was washed using sterile saline and the concentration of the microorganisms were adjusted to have final concentration of 10 /ml. using plate count agar. One ml. from the adjusted solution was spread on the surface of sensitivity agar plates and left to dry in the incubator (30 min.). After drying, antibiotic discs aseptically distributed on the surfaces of the plates and reincubated at 37°C for 24 hours. The sensitivity test was read by calculating the diameter of inhibition zone arround each disc.

Citrated blood was collected for determination of blood picture including haemoglobin content (Hb), erythrocytic and leucocytic counts (RBSs & WBCs) and packed cell volume (PCV), as well as, differential leucocytic count according to SONNENWIRTH and JARETT (1980).

For estimation of glucose, blood sample from each animal was collected in a vial containing oxalate-flouride salts. Estimation was performed at the same day by the method of FOLIN and WU (1920). Serum samples (free from haemolysis) were taken from these camels for estimation of total proteins, albumin & globulin; calcium; inorganic phosphorus (IP); magnesium; alkaline phosphatase (AP); SGOT and SGPT according to the methods of Biuret method (WEICHSELBUM, 1946); DRUPT (1974); GINDLER and KING (1972); FISK and SUBBAROW (1925); DENIS (1922); KIND and KING (1954) and REITMAN & FRANKEL (1957), respectively.

Affected camels were treated according to the causative agent, either by Citarine injectable sol. (Bayer) in a dose rate of 7 ml./100 kg. body weight S/C, and reexamined after 7 days or Terramycin 100 soln. (Pfizer) according to recomended dose for 3 successive days; and collected blood samples after 7 days.

RESULTS

The clinical signs in 10 of affected camels indicated respiratory insufficiency including cough, which was deeper and paroxysmal, particularly during night with extended head and neck, and frothy saliva from the commissures of the mouth, but rectal temperature was within the normal range (varied from 35.4°C to 36.1°C). Faecal examination for these individuals proved Dictycaulus larvae sp. infestation and larvae were collected by Baerman's apparatus.

On the other hand, the remainder of the affected camels (20) showed severe clinical signs than mentioned before including rise of body temperature (38.1°C to 38.9°C), with increased pulse rate (48 to 55/m.) and respiratory rate (14 to 18/m) as well as, moist painful cough, congested mucous membranes, loss of appetite and cessation of rumination. Moist rales were auscaltated on the chest. Faecal examination of these camels failed to detect larvae of Dictycaulus but bacteriological examination proved their infection with bacterial agents (as shown in Table I).

Table II illustrated the type of the isolated microorganisms in each diseased camel. It is clear from the data that the most prevalent isolated organisms were Staph. aureus, Staph. citrus, Strept. zoo epidemicus; and Pseudo areugenosa.

Table (I)
Incidence of bacterial infection and/or parasitic infestation in samples of affected camels

Number of diseased samples	Parasitic infestation				Bacteriological exam.			
	positive		negative		positive		negative	
	No.	%	No.	%	No.	%	No.	%
30 camel	10	33.3	20	66.6	10	50	10	50

Table (II)
Incidence of various bacterial isolates recovered from individual samples collected from camels

No. of case	isolated microorganisms	No. of case	isolated microorganisms
1	---	11	Strept. zoo-epidemicus
2	Staph. aureus	12	---
3	Staph. aureus	13	---
4	---	14	E.coli + Staph. citrus
5	Staph. aureus	15	Strept. zoo-epidemicus
6	---	16	---
7	---	17	---
8	Staph. aureus	18	Pseudo areoginosa + Staph. citrus
9	Staph. aureus	19	Staph. aureus
10	---	20	---

- No. growth was obtained on the culture media.

Table (III)

Haematological changes in normal and respiratory diseased camels before and after treatment

Group		Erythrocetic parameters				Leucocytic parameters				
		RBCs 10^6/cc³	Hb gm%	PCV %	TLC 10^3/cc³	Differential leucocytic count N	E	B	L	M
Normal camels		8.85 ±0.13	12.05 ±0.13	28.48 ±0.144	12.16 ±0.16	56.4 ±0.13	8.81 ±0.15	0.15 ±0.12	33.08 ±0.14	1.85 ±0.15
Bacterial infection	Before	8.25 ±0.18	11.85 ±0.16	28.62 ±0.18	16.85** ±0.14	61.0** ±0.14	9.12 ±0.19	0.33 ±0.18	30.01 ±0.14	1.28 ±0.2
	After	8.55 ±0.12	12.01 ±0.12	28.45 ±0.12	13.65 ±0.17	58.40 ±0.21	9.20 ±0.21	0.18 ±0.11	30.80 ±0.14	1.53 ±0.1
Lung worm infestation	Before	8.02 ±0.13	11.64 ±0.15	29.01 ±0.12	18.95** ±0.13	53.00 ±0.15	15.45** ±0.15	0.25 ±0.14	30.40 ±0.13	1.02 ±0.1
	After	8.39 ±0.14	11.86 ±0.13	28.12 ±0.18	12.25 ±0.15	54.15 ±0.11	9.25 ±0.19	0.30 ±0.21	35.55 ±0.12	1.85 ±0.1

* Significant (P/ 0.05) N = Neutrophil E = Eosinophils M = Monocytes
** Significant (P/ 0.01) B = Basophile L = Lymphocytes
*** Significant (P/ 0.001)

Table (IV)

Changes in some organic and inorganic constituents of serum and blood in normal and respiratory diseased camels before and after treatment

Group of animals		Inorganic constituents				Organic constituents			
		Calcium mg%	Inorg.P mg%	Magnes. mg%	Iron Ug%	Total protein gm%	albumin gm%	Gloubulin gm%	Glucose mg%
Normal camels		11.88 ±0.19	7.06 ±0.21	4.01 ±0.11	120.4 ±2.15	6.88 ±0.12	3.46 ±0.18	3.42 ±0.11	105.40 ±2.13
Bacterial infection	Before	9.88* ±0.12	6.11 ±0.13	3.88 ±0.14	116.21* ±2.13	4.48* ±0.18	3.83* ±0.19	1.64* ±0.12	88.44* ±2.3
	After	11.01 ±0.13	6.42 ±0.12	3.94 ±0.11	119.40 ±1.12	6.52 ±0.15	3.44 ±0.13	3.08 ±0.13	98.44 ±3.4
Lung worm infestation	Before	10.28 ±0.12	6.08 ±0.15	3.48 ±0.14	114.12* ±2.16	5.22* ±0.05	3.08* ±0.04	2.15* ±0.02	88.84* ±1.42
	After	10.98 ±0.13	6.54 ±0.12	3.98 ±0.19	118.88 ±1.88	6.80 ±0.13	3.44 ±0.11	3.36 ±0.2	99.88 ±0.48

Table (V)
Some changes in serum enzymes and electrolytes of normal and respiratory diseased camels before and after treatment

Group of animals		Serum enzymes			Serum electrolytes		
		Alkaline phosphatase i.u./L	SGPT R.F.U./ml.	SGOT	Sodium m.Eq./L	potassium	chloride m.Eq/L
Normal camels		56.44 ±0.48	13.80 ±0.12	37.80 ±1.28	136.80 ±1.42	5.62 ±0.18	128.0 ±1.0
Bacterial infection	Before	63.88* ±0.98	27.04** ±1.88	44.44** ±1.28	134.49 ±1.23	5.22 ±0.12	126.0 ±1.2
	After	58.24 ±1.28	16.44 ±0.13	39.03 ±1.25	136.01 ±1.24	5.32 ±0.18	128.0 ±1.2
Parasitic infestation	Before	62.82* ±1.24	24.88** ±0.38	42.24** ±1.42	133.48 ±1.47	5.08 ±0.12	127.0 ±1.2
	After	59.42 ±1.62	15.55 ±0.14	38.88 ±0.13	135.52 ±1.23	5.24 ±0.13	127.0 ±1.2

DISCUSSION

Results of bacteriological examination (as shown in tables I & II), revealed that only ten cases were bacteria positive, while the other ten cases were negative. Tewelve bacterial isolates were obtained. Eight cases gave pure cultures and two cases gave mixed cultures. In identificastion 8 isolates out of 12 were classified as Staphylococci, 2 isolates as Streptococci, one isolates as Pseudomonas, and one isolates as E.coli. Staphylococcal cultures were differentiated according to their biochemical reactions into 6 Staph. aureus isolates and 2 Staph. citrus. At the same time, Streptococcal isolates were identified as Strept. zooepidemicus. Concerning the Pseudomonas, isolate was classified as Pseud. areugenosa.

It is worthy to mention that cases which gave Pseud. areuginosa culture and E.coli revealed presence of Staph. citrus organisms which mean a mixed infection.

Regarding the haematological changes, highly significant ($P \leq 0.001$) leucocytosis was recorded in affected camels with neutrophilia in bacterial infection and eosinophilia in verminous bronchitis, while other parameters showed insignificant changes (Table III). These results were supported by the findings recorded previously by WEBER and RUBIN (1958) in cattle, and DOXEY (1971), who stated eosinophilic infiltration was seen in bronchiolar connective tissue, following parasitic infestation and most changes occur in the tissues were due to intense eosinophilic infiltration against eggs and 4th stage larvae.

Concerning the biochemical changes, in the bacterial infection before treatment, there was significant drop ($P \leq 0.05$) in serum calcium, iron, total proteins, albumin, globulin and glucose levels, with significant increase ($P \leq 0.01$) in serum enzyme activities while other parameters showed insignificant changes. These findings were similar to those obtained by EL-ALLAWY, et

al. (1979) in buffalo calves with pneumonia. In camels suffering from lung worm infestation, on the other hand although serum calcium was not affected, there were significant decrease ($P \leq 0.05$) in serum iron, total proteins, albumin and globulin. Highly significant ($P \leq 0.01$) drop in blood glucose level was recorded in both types of affections. The serum enzyme activities had the same pattern as in the bacterial infection (Table IV & V). These results were agreable with those reported by WILSON (1961) in experimental studies on lung worm infestation in lambs and kids.

Regarding post-treatment values of the tested blood constituents in camels with respiratory affection, significant improvement in such values towards the normal levels as well as, general condition and appetite were observed (Table III, IV & V).

REFERENCES

Al-Allawy, T.A.; Mottelib, A.A.; Nashed, S. and Salem, H. (1979): A study of pneumonia in buffalo calves in Egypt. J. Egypt. Med. Assoc., 39, No. 2: 23-28.

Breed, R.; Murray, E. and Smith, N. (1957): Bergey's Manual of Determinative Bacteriology. 7th Ed. Williams and Wilkins Co. Baltmore.

Cowan, S.I. and Steel, K.I. (1965): Manual for Identification of Medical Bacteriology. 2nd Ed. Cambridge Univ. Press.

Cruickshank, R.; Dugiud, J.; Marmton, B. and Swain, R. (1973): Texbook of Medical Microbiology. 11th Ed. The English Language Book Society and Churchill Living Stone, Edinburgh and New York.

Denis, W. (1922): Determination of magnesium in blood plasma. J. Biol. Chem. 52: 411.

Doxey, D.L. (1971): Veterinary Clinical Pathology. 1st Ed. Bailliere, Tindall, London.

Drupt, F. (1974): Colorimetric determination of serum albumin using bromocresol green (B.C.G.). Pharm. Biol. 2: 777.

El-Magawry, S. (1983): Parameters of some blood constituents in normal and diseased camels. Ph.D. Thesis, Fac. Vet. Med., Zagazig Univ.

Ezzat, M.A.E. (1962): Preliminary trial for treatment of verminous bronchitis of sheep and camel in Egypt. J. Arab Vet. Med. Assoc., 22 (3): 207-216.

Fisk, C.H. and Subbarow, Y. (1925): The colorimetric determination of inorganic phosphorus. J. Biol. Chem. 66: 375.

Folin, O. and Wu. H. (1920): A system of blood analysis supplement. I. A simplified and improved method for determination of sugar. J. Biol. Chem. 41: 367.

Gindler, E.M. and King, J.D. (1972): Rapid colorimetric determination of calcium in biological fluids with methyl thymol blue. Amer. J. Clin. Path., 58: 376-382.

Kind, P.E.N. and King, E.J. (1954): Colorimetric determination of alkaline phosphatase. J. Clin. Path., 7: 322.

Merchant, I.A. and Packer, R.A. (1967): Veterinary Bacteriology and Virology. 7th Ed. Iowa State College Press, Ames.

Monning, H.O. (1962): Veterinary Helminthology and Entemology. 5th Ed. Tindall and Cox, London.

Poit Bey (1890): Cited by Ezzat (1962), J. Arab. Vet. Med. Assoc. 22 (3): 207-216.

Reitman, S. and Frankel, S. (1957): A colorimetric method for determination of serum glutamic-oxal-oacetic and glutamic pyruvic transaminases. Amer. J. Clin. Path. 28: 56.

Soliman, K.N. (1958): On the aetiology of parasitic bronchitis in camels. Agr. Res. Rev. 36 (4): 647.

SonnenWirth, A.C. and Jaret, L. (1980): Gradwohld's Clinical Laboratory Methods and Diagnosis. 8th Ed. Vol. 1, C.V. Mosby Company, St. Louis, Toronto, London.

Weber, T.B. and Rubin, R. (1958): The eosinophilic response to infection with lungworm D. Vivip-araus. J. Inf. Dis. 102: 214-218.

Weichselbaum, T.E. (1946): An accurate and rappid method for determination of protein in small amounts of blood serum and plasma. Amer. J. Clin. Path. Tech. Sect. 10: 40.

Wilson, G.L. (1961): Serum protein changes in lambs and kids after to lungworm, D. filaria. J. Parasit., 47: 20.

Wilson, G. & Miles, A. (1964): Topley and Wilson's Principales of Bacteriology & Immunology. 5th Ed. Edwards ARnold. Ltd. London.