Vet.Med.J.,Giza.Vol.40,NO.2(1992):115-120.

SOME PHYSIOLOGICAL STUDIES ON THE BLOOD CELLULA ELEMNTS OF CAMEL WITH REFERENCE TO CERTAIN IMMUNOLOGICAL PROPERTIES OF LYMPHOCYTES

BY

NAILA,M.AL-ARFAJ *; K.A. ATTIA** and SOHAIR, Y. SALEH**
* Zoology Dept. Fac. Science,Dammam , Saudi Arabia
** Physiology Dept. Fac.Vet.Med., Cairo Univ.

(Recieved :18.4.1992)

INTRODUCTION

The dromedary or one humped camel (Camelus dromedarius) is one of two species within the genus camelus, the other being the Bacterian or Two-humped camel (Camelus bacterianus). The productive potential of this species and the purposes whith it may serve accomponied with its ability to perform efficiently in harsh environments are compelling reasons for understanding how to make better and more systematic use of this animal resourse. The knowledge recorded about the physiological aspects of camel's blood remained scarce for long period comparing with its importance especially in the regions of thier spreading. Some investigators (Nasr, 1959; Bokori, 1974; Majeed et al. 1980; Hohne and Niepage, 1985 and Yamaguchi, 1987) studied the normal values of the blood picture of camel's blood. However, the imunological role of camel's lymphocytes received little attention.

The present investigation was designed to study the blood picture of dromedary camel including determination of erythrocytic count, haemoglobin concentration, packed cell volume (PCV), erythrocyte sedimentation rate (ESR), total and differential leucocytic count. The effects of secasons (summer and winter) and age on these values were studied. Moreover, immunological studies on camel's lymphocytes were done including separation of camel's lymphocytes, preparation of anti-camel lymphocyte serum in rabbbits and detection of these anti-camel lymphocyte by using erythrocyte sedimentation rate of human blood and agglutination test against camel, human and sheep blood.

MATERIALS AND METHODS

Ninghty-four male camels (Camelus dromedarius) existing in the Eastern Province, Saudi Arabia, were used in this investigation. The animals were divided into 4 groups according to their ages and seasons of sample collections as followes:

(A) Group 1: Camels of ages less than one year to less than 2.5 years in summer.

(B) Group 2: Camels of the same ages but in winter.

(C) Group 3: Camels of ages 2.5-5 years old in summer.

(D) Group 4: Camels of ages 2.5-5 years old in winter.

Blood samples were collected by slaughtering from Al-Dammam slaughter house on EDIA after complete clinical examination of camels to be free from any disease. Freshly prepared blood films were done for differential leucocytic count. Samples were used for erythrocyte count (Schalm et al., 1975), haemoglobin estimation (Soliman and Abdo, 1980). Packed cell volume and erythrocyte sedimentation rate were recorded according to Schalm et al. (1975). Total leucocytic count (Green, 1981) and differential leucocytic count were measured using Giemsa stain (Soliman and Abd El-Moty, 1973). The effects of age and seasons (summer and winter) on these blood parameters were studied. In addition, immunological studies on camel's lymphocytes were done including separation of lymphocytes (Soliman et al., 1975), preparation of anti-camel lymphocyte serum in rabbits (Mansour, 1972, and Soliman et al., 1975). Detection of these anti-camel lymphocyte was performed by studying their effects on ESR of human blood which obtained from adult femals clinically examined to be free from any diseases (Soliman et al., 1975) or by using agglutination test against camel, human and sheep blood (Cruickshank, 1968). Statistical analysis of data was done by using student "t" test (Snedecor, 1961).

RESULTS

Data analysis showed that (Table, 1) the erythrocyte count was increased proportional to age with significant results in winter, but not in summer. In regard to seasons, it was higher in winter than in summer. This was only clear at old ages (more than 2.5 years old). Band cell percentage was higher in summer than winter and also it was clear in camels of ages between 2-5 years old. Other blood parameters showed no significant changes.

The results of the immunological studies revealed that:

(1) Treatment of human blood with anti-camel lymphocyte serum prepared in rabbits produced insignificant increase in ESR of human blood.

(2) Incubation of human blood at 33°C/3 hrs. with the anti-cmel lymphocyte serum produced a significant decrease ($p < 0.1$) in ESR of human blood after 24 hrs in comparison to control group (Table 2).

(3) Agglutination test of anti-camel lymphocyte serum with camel, human and sheep lymphoc-

Table (1): Effect of different ages and seasons on certain blood parameters of dromedary camel.

Blood parameters	Summer		Summer	
	Age/year		Age/year	
	>1 - >2.5	2.5 - 5	>1 - >2.5	2.5 - 5
* R.B.Cs (10^6/mm^3)	9.04 ±0.51 n=8	9.44±0.65 [a] n=3	9.92 ±0.91 [b] n=5	13.38 ±0.25 [ab] n=5
* Hb (gm %)	12.5 ±0.43 n=13	12.6 ± 0.72 n=8	11.9 ±0.68 n=6	12.7 ±0.52 n=6
* PCV (vol. %)	31.0 ±0.90 n=16	31.9 ±0.66 n=13	29.0 ±0.70 n=10	30.9 ±0.80 n=15
* ESR (mm/hr) -1st hr. - 2nd hr.	1.06 ±0.06 2.11 ±0.11 n=9	1.05 ±0.14 2.23 ±0.22 n=11	1.00 ±0.00 2.00 ±0.00 n=8	0.96 ± 0.12 1.89 ±0.14 n=14
* W.B.Cs (10^3/mm^3)	12.52 ±1.23 n=8	13.38 ±2.18 n=3	12.91 ±2.34 n=5	11.96 ±2.51 n=4
* Diff.count.				
- band (%)	0.88 ±0.61 [abc]	4.75 ±1.38 [cd]	0.25 ±0.25 [b]	0.25 ±0.25 [ad]
-Seg. Neul. (%)	65.12 ±2.91	52.5 ±5.74	58.00 ±5.29	59.0 ±8.44
-Esinoph.(%)	0.88 ±0.48	1.00 ±0.41	2.00 ±0.71	1.00 ±0.0
-Basoph.(%)	0.0 ±0.0	0.0 ±0.0	0.0 ±0.0	0.0 ±0.0
-Lymph.(%)	30.87 ±2.81	39.5 ±5.52	38.0 ±5.67	38.0 ±7.80
-Mono (%)	2.25 ±0.65 n=8	2.25 ±0.95 n=4	1.75 ±0.75 n=4	1.75 ±0.63 n=4

- Values are expressed as mean ± S.E.
- Values having the same letter are significantly different from each other at $p < 0.05$.
- n=number of animals.

Table (2) : effect of anti-camel lymphocyte on the ESR of human blood after incubation of the treated blood

E.S.R	Incubation for one hour/33°c		Incubation for 3 hour/33°c	Normal human blood (o+) (control)
	1 ml human blood + 20 ul rabbit anti camel lymphocyte serum	1 ml human blood + 20 ul control rabbit serum	1 ml human blood + 20 ul rabbit anti -camel lymphocyte serum	
(mm/1st/hr)	15.2 ±2.06 n=5	18.0 ±3.24 n=5	23.8 ±2.87 n=5	17.9 ±1.00 n=5
(mm/2nd/hr)	30. ±2.01 n=6	32.88 ±3.27 n=5	33.1 ±2.96 n=5	32.5 ±3.23 n=6
(mm/24/hr)	45.25 ±1.01 n=6	44.8 ±1.59 n=5	43.6 ±1.63 [(a)] n=5	47.08 ±0.99 n=6

- Values are expressed as means ± S.E.
- " having the same letter are significantiy different from each other at P <0.1
- n = number of animals.

ytes showed clear positive results.

DISCUSSION

The present study showed that the erythrocyte count was increased proportionally to age and it was clear in winter. Those results agree with that of **De-Gruchy et al.** (1978) who recorded differences in erythrocyte count of camels accomponied with differences in their ages. However, and regardless of reasons, the erythrocyte count of camels aged between 1-2.5 years old was higher than that recorded by **Lokhotia et al.** (1964). Moreover, the erythrocyte count recorded in the present study of camels aged (1-5 years old) was higher than that recorded by **Godsian et al.** (1978) for camels of the same age but nearly was simillar to that recorded by **Ateeq et al.** (1984) for camels aged between 1.5-4 years old. **Soliman and Abd El-Moty** (1973) explained the increased number of erythrocytes with age to the anabolic role played by the androgens, pituitary, thyroid, and adrenal hormones on the synthesis of R.B.Cs. in older camel.

The differences in seasons and ages had no effects on the differential leucocytic count of camels except for the percentage of band cells which was higher in summer than in winter within the same age and older than younger ons. These results may be attributed to the increase in the resistance of animals by age and consequently the rate of band cell synthesis increased in old ages. **Jungueira et al.**(1975) reported that during bacterial infection the immature form of neutrophils (band cells) appear in the circulation before the apperance of mature form, thus the increased percentage of band cells during summer may be due to the physiological interaction between the animals and the dusty poluted warm environmental conditions in summer.

The results of immunological studies showed that the ESR of the human blood was not affected by addition of anti-camel lymphocyte serum except after incubation at 33°C/3 hrs. This indicates that both time and temperature were required for neutralization of -globulines present on /R.B.Cs membranes by anti-camel lymphocyte and suggesting the compatability of anti-camel lymphocyte-with human blood. Moreover, the agglutination of RBCs of camels, human and sheep with the anti-camel lymphocyte serum indicate that these sera cause neutralization for the -globulines present on the RBCs membranes of camels, human and sheep. This finding in complete agreement with that of **Soliman et al.** (1975). The compatability between the anti-camel lymphocyte and human lymphocytes (in vitro) may help in the use of the camel lymphocytes or their antibodies to increase or decrease the immunity of the human as occure in the process of tissues or organs transplantation instead of the use of any chemical or radiating substance.

SUMMARY

The present study was planned to clarify some blood parameters of camels including erythrocyte count, haemoglobin estimation, ESR, total and differential leucocytic count. The effects of age and seasons (summer and winter) on these values were recorded. In addition some of the immunological properties of lymphoctes were also studied including separation of lymphocytes, preparation of anti-lymphocyte serum and detection of the prepared anti-lymphocytic serum either by studying their effect on human erythrocyte sedimentation rate or by using agglutination test against camel, humaq or sheep blood. The results revealed that:

1. The RBCs count increased proportional to age and it was higher in winter than in summer. This was clear at old ages (more than 2.5 years old). Band cells percentage was higher in summer than in winter and it was clear in ages between 2-5 year old. Other blood parameters showed no significant changes.

2. The ESR of human blood showed no significant change except after incubation of the human blood at 33°C/3 hrs, it was significantly decreased after 24 hrs.

3. Agglutination test of anti-camel lymphocyte serum using camel, human or sheep lymphocytes revealed clear positive results.

In conclusion, it is clear that there is compatability of camel anti-lymphocyte to the human lymphocytes. This gives us the clear light to-proceed this work and open the gate for the use of camel lymphocytes when tissues and organs implantation are required.

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