

Haematological Studies on Adult Jerboa (Jaculus jaculus) from Saudi Arabia

Abdul Aziz A. Al-Saleh and Mohammad A. Khan Department of Zoology, College of Science, King Saud University, Riyadh, Saudi Arabia.

The blood of 20 males and 20 females of adult jerboa, *Jaculus jaculus*, has been examined. It was found that the erythrocyte and leukocyte counts, haemoglobin content, packed cell volume (haematocrit) and other blood elements are significantly higher in the female than in the male. The differential leukocyte count showed a higher lymphocyte percentage. The mean size of the red blood cell was $6 \,\mu\text{m}$ while that of neutrophils, eosinophils, basophils, and monocytes was $9-12 \,\mu\text{m}$, but the lymphocytes were smaller.

Blood and its constituents are responsible for most physiological as well as pathological conditions in animals. Normal blood values of most mammals have been estimated (Scarborough 1937; Gardner 1947; Halman 1955; Reda and Hathout 1957; Mays 1969; Vaida *et al.* 1970; and Upcott *et al.* 1971), with the exception of the Arabian lesser jerboa, *Jaculus jaculus*.

In the present study the blood picture of the Arabian jerboa is determined.

Materials and Methods

Jerboas were captured by hand, at night over a period of three months (March-May) from an open desert area of Al-Kasab, a small village 200 km northwest of Riyadh, Saudi Arabia. They were kept in cages with sand bedding and were fed on fresh lettuce leaves. The animals were weighed using an electric balance (Mettler PL 1200). Preweighed containers with perforated covers were used for weighing

them. Adult jerboas, which were identified by the absence of sutures on the metatarsal bones (Happold 1970) were used for our experiment.

Twenty males and 20 females were killed and blood was collected individually from the carotid artery in small glass tubes containing disodium EDTA as an anticoagulant. The red blood cells (RBC) and white blood cells (WBC) were counted using a haemocytometer. The differential leukocyte count was estimated from freshly prepared blood films, stained with Leishman's stain and not less than 100 cells were counted per slide. The haemoglobin (HGB) content was determined by Sahli's haemoglobinometer and the erythrocytes as well as the different leukocytes were measured using an eyepiece micrometer. The above experiments were also confirmed by the aid of Coulter Counter.

Results

The average weight of an adult male jerboa was 50 g while that of an adult female was 60 g. The average amount of blood collected from each individual male and female was 1.8 and 1.5 ml per animal, respectively. Figure 1(A), (B) and (C) represents a general view of RBCs, lymphocyte, and neutrophil. The mean red blood cell size was found to be 6 μ m. The neutrophils were found to be without definite lobulation (Fig. 1(C)). RBC and WBC counts, haemoglobin, haematocrit, and other blood constants were higher in female than in male jerboas (Table 1).

As in the adult rat, the blood of jerboa shows a predominance of lymphocytes while that of man shows an abundance of neutrophils (Rowett 1962). Table 2 shows the range of average percentage of different types of leucocytes in adult male and female jerboas. A generalized comparison of the leukocyte percentage between the two sexes indicates that the neutrophils and monocytes percentages are higher in the female than in the male, while the lymphocytes are lower than in the male but eosinophils and basophils are the same in both sexes (Table 2).

Moreover, the different types of leukocytes were slightly larger in males than in females (Table 3). The red blood cells, on the other hand, were of about the same size in both sexes (Table 4, Fig. 2).

Discussion

The haemogram of laboratory rodents has received much attention (King and Lucas 1941; Russel *et al.* 1951; Didisheim *et al.* 1959; Mayes 1969) while the literature on the hematology of wild ones is rather patchy. In the present study the



Fig. 1. Photomicrographs of a general view of the blood of the adult lesser jerboa, *Jaculus jaculus*; (A) a group of red blood cells, (B) a lymphocyte (arrow), and (C) a neutrophil (arrow).

| Character | | Male | | Female | | |
|-----------|--------------------|-------------|---------|-------------|---------|--|
| | Unit | Range | Average | Range | Average | |
| WBC | $10^{3}/mm^{3}$ | 7.90-8.20 | 8.05 | 10.40-10.60 | 10.50 | |
| RBC | $10^{6}/mm^{3}$ | 4.63-4.78 | 4.70 | 5.80-5.83 | 5.81 | |
| HGB | g/100 ml | 7.20-7.30 | 7.25 | 9.30-9.60 | 9.45 | |
| PCV | % | 18.20-19.50 | 18.85 | 26.00-26.60 | 26.30 | |
| MCV | FL | 40.00-41.00 | 40.50 | 45.00-47.00 | 46.00 | |
| MCH | Pg | 15.30-16.00 | 15.65 | 16.40-16.70 | 16.55 | |
| MCHC | % | 36.90-39.70 | 38.30 | 35.10-36.90 | 36.00 | |
| PLATS | $10^3/\text{mm}^3$ | 185-331 | 208 | 157-377 | 267 | |

| Table 1. | Some haematological | measurements of | of Saudi | Arabian | adult | lesser | jerboa | Jaculus |
|----------|---------------------|-----------------|----------|---------|-------|--------|--------|---------|
| | jaculus. | | | | | | | |

Table 2. The percentage of different types of white blood cells of Saudi Arabian adult lesser jerboa, Jaculus jaculus.

| | | Ma | ale | Female | | |
|------------|------|-------|---------|--------|---------|--|
| Character | Unit | Range | Average | Range | Average | |
| Neutrophil | % | 16-20 | 18 | 18-28 | 23 | |
| Lymphocyte | % | 76-83 | 78 | 66-76 | 71 | |
| Monocyte | % | 2-4 | 2 | 3-5 | 4 | |
| Eosinophil | % | 1-2 | 1 | 0-2 | 1 | |
| Basophil | % | 1-2 | 1 | 0-2 | 1 | |

| Table 3. | Measurement of leukocytes (in micrometers) of Saudi Arabian ad | lult |
|----------|--|------|
| | lesser jerboa, Jaculus jaculus. | |

| | Ma | ale | Female | | |
|--------------|-----------|---------|----------|---------|--|
| Type of WBCs | Range | Average | Range | Average | |
| Neutrophil | 10.5-12.2 | 11.3 | 9.6-11.0 | 10.2 | |
| Eosinophil | 11.2-12.9 | 12.0 | 9.8-11.4 | 10.2 | |
| Basophil | 10.2-11.5 | 10.9 | 8.7-10.0 | 9.4 | |
| Lymphocyte | 6.9-7.9 | 7.4 | 6.3-7.1 | 6.8 | |
| Monocyte | 9.6-11.9 | 10.6 | 9.2-11.4 | 9.9 | |

| jerboa, Jaculus jaculus. | | | | | |
|--------------------------|----------|------|-----|--|--|
| Sex | Range | Mean | SD | | |
| Male | 4.5-11.5 | 6.2 | 1.0 | | |
| Female | 4.0-11.0 | 6.3 | 1.4 | | |

 Table 4.
 Measurement of red blood cell size (in micrometers) of Saudi Arabian adult lesser jerboa, Jaculus jaculus.

haemogram of the Saudi Arabian jerboa has been determined. The average erythrocyte number is higher in females than in males, which agrees with the findings of Rowett (1962) in the rat. However, the erythrocyte number is lower in the jerboa than in the rat, with the consequent lower hemoglobin content, but the size of erythrocytes is similar in both species.

The total number of WBCs in jerboa is about 8000 and 10,000 cells mm³ of blood in the male and female, respectively, which nearly approaches that reported for other rodents (MacNamee and Sheehy 1952; Lord *et al.*, 1954; Rowett 1962; Archer 1965). The percentage of lymphocytes is highest amongst the leukocyte component, which is similar to the findings in other rodents (Scarborough 1937; Reich and Dunning 1943; Gardner 1947; and MacNamee and Sheehy, 1952). The



Fig. 2. Histograms of a group of blood cell size of (A) the adult male and (B) female of Saudi Arabian lesser jerboa, *Jaculus jaculus*.

leukocytes are generally larger in males than in females (Table 3), which might be due to a slight variation in the osmotic pressure of the blood between different sexes. Further work is needed to confirm this suggestion.

References

- Archer, R.K. (1965) Haematological Technique for Use on Animals. Oxford: Blakwell, Oxford.
- Didisheim, P., Hattori, K., and Lewis, J.H. (1959). Haematologic and coagulation studies in various animal species. J. Lab. Clin. Med. 53, 866.
- Gardner, V.M. (1947). The blood picture of normal laboratory animals. A review of the literature. J. Franklin Inst. 243, 77-498.
- Happold, D.C. (1970). Reproduction and development of the Sudanese jerboa, Jaculus jaculus butleri (Rodentia, Dipodidae). J. Zool. Lond. 162, 505-515.
- Holman, H.H. (1955). The blood picture of the cow. Brit. Vet. J. 111, 440.
- King, E.S. and Lucas, M. (1941). A study of the blood cells of normal guineapigs. J. Lab. Clin. Med. 26, 1364.
- Lord, G.H., Todd, A.C., and Kabat, C. (1954). The blood picture of the Muskrat under pentobarbital sodium. Am. J. Vet. Res. 15, 79.
- Mayes, A. (1969). Baseline haematological and blood biochemical Parameters of the mongolian gerbil (*Meriones unguiculatus*). Lab. Anim. Care. 19, 838.
- Reda, H. and Hathout, A.F. (1957). The haematological examination of the blood of normal sheep. Brit. Vet. J. 113, 251.
- Reich, C., and Dunning, W. F. (1943). Studies on the morphology of the peripheral blood of rats. Cancer Res. 3, 248.
- Rowett, H.G. (1962). The Rat as a Small Mammal. London: John Murray.
- Russel, E.S., Neufeld, E.F., and Higgins, G.T. (1951) Comparison of normal blood picture of young adults from 18 inbred strains of mice. *Proc. Soc. Exp. Biol.* 78, 761.
- Scarborough, R.A. (1937). The blood picture of normal laboratory animals. A compilation of published data. Yale J. Biol. Med. 3, 64–272.
- Upcott, D.H., Herbert, C.N., and Robbins, M. (1971) Erythrocyte and leukocyte parameters in newborn lambs. *Res. Vet. Sci.* 12, 474.
- Vaida, M.B., Vaghari, P.M., and Patel, B.M. (1970) Haematological constituents of the blood of goats. Indian Vet. J. 47, 642.

دراسة الدم للجربوع البالغ (جاكيولس جاكيولس) من المملكة العربية السعودية

> عبد العزيز عبد الرحمن الصالح ومحمد عظمة الله خان قسم علم الحيران _ كلية العلوم _ جامعة الملك سعود

لقد تمت دراسة الدم لحيوان الجربوع (جاكيولس جاكيولس) فى كل من ٢٠ من الذكور و ٢٠ من الاناث البالغة وقد دلـــت النتائج على أن عدد خلايا الدم الحمـراء والبيضــاء وكميــة ومكونات دموية أخـرى تكون نسبيا أعلى عند الاناث منها فى الذكور • كما اتضح من عد التباين لخـلايا الدم البيضـاء أن ولقد بلغ قطر خلية الدم الحمراء ٦ ميكروميترات بينما الخلايا المتعادلة والحامضية والقاعدية ووحيدة النواة ذات أقطار متقاربة اليمفاوية يكون عادة أصغـر •