

## **Evaluation of Haematological parameters in sheep infested with ticks in Sulaimani region**

Aram Ahmad Barznji\* Shadan Hassan Abdullah\*\*Mohammed Abdul-Aziz Kadir\*\*\*

College of Vet. Medicine, Sulaimani\* College of Vet. Medicine, Sulaimani\*\* College of Medicine, Kirkuk\*\*\*

### **Abstract**

The study was carried out during summer months in the year 2012 in Sulaimani governorate to evaluate the effect of tick infestation on hematological parameters of sheep. Ticks were collected from 71 out of 128 sheep and preserved in 70% alcohol for identification. Blood samples were collected from jugular vein into tubes containing anticoagulant for estimation of hematological parameters.

Two species of ticks were identified; they were *Hyalomma anatolicum anatolicum* and *H. marginatum*.

The total red blood cells, packed cells volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration and platelets count were in infested sheep significantly lower than non-infested ones. Although the hemoglobin and mean corpuscular volume values in infested sheep were lower than normal non-infested sheep but it was statistically not significant. The total white blood cell count was significantly higher in infested sheep than non-infested ones.

**Key Words:** Hematology, sheep, ticks, Sulaimani

### **Introduction**

Sheep maintain a valuable economic and ecological niche in this country. There are several factors affecting the production potential of livestock. Tick infestations not only lower the production of animals but also transmit a number of important protozoa, viruses and helminthes in both humans and animals (Gray and Potgieter, 1982; Vredevoe, 2007; Irshad *et al.*, 2010). There are several genera and species of Ixodidae of veterinary importance namely, the genera *Boophilus*, *Rhipicephalus*, *Amblyomma*, *Haemophysalis*, *Hyalomma*, *Dermacentor* and *Ixodes* (de la Fuente and Kocan, 2003). Ticks of the genus *Hyalomma* are well known vectors of viruses and avid parasites of human. The considerable length of *Hyalomma* mouthparts provokes a painful bite, one of the most important diseases transmitted by *Hyalomma* ticks is Crimean-Congo Hemorrhagic Fever (CCHF), of which *Hyalomma marginatum* is the main vector (Estrada-Pena and Jongejan, 1999).

Eichler (1966) revealed the greatest numbers of ticks found in spring and in summer on sheep were *Hyalomma detritum*, *Rhipicephalus bursa*,

*Boophilus annulata*, *Dermacentor marginatus* occur in the north of Iraq, and are common only in winter in animals that are housed at night. Mustafa (2006) observed different ticks

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such as *Hyalomma anatolicum*, *Rhipicephalus bursa*, *R. sanguineus* and *Boophilus annulatus* in Sulaimani governorates, North Iraq, while Omer *et al.* (2012) found *R. bursa*, *R. turanicus* and *Hyalomma* spp. from sheep and goats in Dohuk governorate. Mustafa (2011), studied the distribution of ticks in sheep in three different zones in Sulaimani governorate, by examining 2525 sheep, the prevalence rate of infested sheep in all zones was 11.8%, he found *Hyalomma anatolicum anatolicum*, *H. marginatum*, *Rhipicephalus turanicus* and *R. sanguineus*.

The study was planned to identify the hard ticks that infest Karadi sheep and investigate its effects on some haematological parameters.

### **Materials and Methods**

The study was carried on karadi sheep in Sulaimani governorate, during summer months (July, August and September) in the year 2012. A total of 128 sheep were examined thoroughly for the presence of ticks on different parts of the body such as head, face, neck, brisket and tail. Tick samples were collected from each sheep with the help of forceps without damaging the body parts and preserved in 70% alcohol. The identification of ticks was based on morphological features according to Soulsby (1982) and Walker, *et al.* (2003) using a dissecting microscope and magnifying hand lens. Identified ticks referenced by Department of Biology, College of Science, Salahaddin University, Erbil-Iraq.

Blood samples were collected from the jugular veins of each sheep with a sterile hypodermic needle and syringe. About 3 mls of blood was collected from each sheep into tubes containing ethylenediamine tetra-acetic acid (EDTA) for estimation of haematological parameters (Coles, 1986). Blood picture was carried according to (Jain, 1986): Total erythrocytes count (RBC), were estimated by hemocytometer, the red cells diluted using isotonic solution Hayem's. Total leucocytes count (WBC), were estimated by hemocytometer using Turke's solution as diluting fluid. The hemoglobin concentration (Hb) estimation was done by acid hematin method (Sahli method). The packed cell volume (PCV), was estimated by Microhematocrit method using a capillary hematocrit tube approximately 7.5 cm in length and having a bore about 1 mm centrifuged in a special speed centrifuge (Micro-Hematocrit, Taiwan). Blood indices were carried according to: The mean corpuscular volume (MCV fl) =  $PCV \times 10 / RBCs \text{ count}$ , The mean corpuscular hemoglobin (MCH pg) =  $Hb \times 10 / RBCs$ , and The mean corpuscular hemoglobin

concentration (MCHC %) =  $Hb / PCV \times 100$  . The platelets count, were done using hemocytometer ammonium oxalate diluting fluid.

Statistical analysis: The student t-test was done to show significant differences in hematological parameters between infested and non-infested sheep (Niazi, 2004).

### Results

In this study, 71 sheep out of 128 were infested with ticks, with rate of infestation being 55.46%.

Two species of *Hyalomma* ticks were identified (*Hyalomma anatolicum* and *H. marginatum*), according to morphological features in sheep.

Table (1) shows the haematological parameters among sheep infested with ticks and non-infested ones. The hematological parameters in sheep infested with *Hyalomma* species were differs significantly ( $P \leq 0.05$ ) in values of total red blood cells (RBCs  $\times 10^6/\mu l$ ), and packed cell volume (PCV%), with mean values of  $7.67 \times 10^6/\mu l \pm 0.08$ , and  $23.65\% \pm 0.35$ , in sheep infested with *Hyalomma* species in comparison to non- infested ones, in which the mean values were  $9.082 \times 10^6/\mu l \pm 0.12$ , and  $27.58\% \pm 0.25$ , respectively. Although the hemoglobin concentration (Hb g/dl)  $9.27 \text{ g/dl} \pm 0.13$  in infested sheep was lower than non- infested ones being  $9.42 \text{ g/dl} \pm 0.13$  but it did not differ significantly.

The mean corpuscular hemoglobin (MCH pg) was  $11.25 \text{ pg} \pm 0.08$  in sheep infested with *Hyalomma* species was significantly lower at  $P \leq 0.05$  than non- infested ones  $11.84 \text{ pg} \pm 0.08$ , and mean corpuscular hemoglobin concentration (MCHC g/dl of RBCs) was  $29.74 \text{ g/dl} \pm 0.59$  in infested sheep was also significantly lower than non infested one  $33.03 \text{ g/dl} \pm 0.48$ , while the mean corpuscular volume (MCV fl)  $30.76 \pm 0.18$  in infested sheep did not differ significantly than non infested sheep  $31.05 \pm 0.20$ . The total white blood cell (WBC  $\times 10^3/\mu l$ ) count in *Hyalomma* species  $10.35 \times 10^3/\mu l \pm 0.41$  was significantly higher than non infested sheep  $9.35 \times 10^3/\mu l \pm 0.27$ . The type of anemia in both tick infestations was indicative by hematological examination and classified as normocytic normochromic.

**Table (1): Hematological changes in Sheep infested with ticks in Sulaimani region-Iraq**

| Parameters | Healthy Animal<br>57 | Infested Animal<br>71 |
|------------|----------------------|-----------------------|
|------------|----------------------|-----------------------|

|                                  | (Mean ± S.E.) | (Mean ± S.E.) |
|----------------------------------|---------------|---------------|
| WBC (x10 <sup>3</sup> /μl)       | 9.35 ± 0.27   | 10.35* ± 0.41 |
| RBC (x 10 <sup>6</sup> /μl)      | 9.08 ± 0.12   | 7.67* ± 0.08  |
| Hb (g/dl)                        | 9.42 ± 0.13   | 9.27 ± 0.13   |
| PCV (%)                          | 27.58 ± 0.25  | 23.65* ± 0.35 |
| MCV (fl)                         | 31.05 ± 0.20  | 30.76 ± 0.18  |
| MCH (pg)                         | 11.84 ± 0.08  | 11.25* ± 0.08 |
| MCHC (g/dl of RBCs)              | 33.03 ± 0.48  | 29.74* ± 0.59 |
| Platelets (x10 <sup>5</sup> /μl) | 2.54 ± 0.09   | 2.21* ± 0.09  |

\*Significant difference at level (P < 0.05) by using t-test

Note: these data are calculated by using SPSS version 15.0 for windows, 2006.

### Discussion

The results of the study in Sulaimani governorate showed that out of 128 sheep, 71 were infested with ticks with rate of infestation being 55.46%.

Two species of ticks were observed; *Hyalomma a. anatolicum* and *H. marginatum*; *H. a. anatolicum* was more common than *Hyalomma marginatum* collected among infested sheep. While Mustafa (2011) found in addition to *Hyalomma a. anatolicum*, *Rhipicephalus turanicus* and *R. sanguineus*, this might be due sample size and period of study. This study was in agreement with those finding by Hawa *et al.* (2000) observed that the *Hyalomma a. anatolicum* is the highly and widely distributed ixodidae, incriminating Iraqi livestock and causing substantial economic loss to livestock development worldwide. *Hyalomma a. anatolicum* is adapted to conditions in dry areas where a constant supply of hosts may not be available. Mustafa (2011); Muhaidi *et al.* (2010) showed that high proportion tick's of *Hyalomma* spp. in farm animal in Anbar province-Iraq.

Nabian *et al.* (2009) indicated that the *Hyalomma a. anatolicum*, *H. asiaticum*, *H. marginatum* and *H. detritum* were present in all zones when studied the distribution of *Hyalomma* species on domestic animals in four zoogeographical zones in Iran, while Abadi *et al.* (2010) identified seven species of Ixodidae, and showed that the *Hyalomma* species were higher population frequencies than other species and high number of *Rhipicephalus sanguineus* collected on sheep and goats 11.84% and no detected on cow and camel in Yazd province, Iran.

The hematological findings in sheep infested with *Hyalomma* species were lower in red blood cells, packed cell volume, hemoglobin concentration, mean corpuscular hemoglobin, mean corpuscular hemoglobin and mean corpuscular hemoglobin

concentration than non infested ones and indicated that the normocytic normochromic type of anemia. While the Tyler and Cowell (1996) and Pfaffle *et al.* (2009) classified the type of anemia as macrocytic normochromic depending on values of MCV, MCHC to lesser extent on (MCH) values in tick infestation.

The higher total leukocyte counts in the infested sheep than non-infested sheep; may be due to inflammation caused by tick bite which leads to migration of white blood cells as a response toward the tick bite.

The lower red blood cell, packed cell volume, hemoglobin concentration and platelets count in infested sheep than non-infested ones is in agreement with that reported with Kumar (2010) in infested goats in India. The finding of this study is also supported by study done on tick infested cross breed cattle (Rajendran and Hafeez, 2003).

It was concluded that two species of genus *Hyalomma* are common in Sulaimani governorate. The PCV, RBC, Hb, MCV, MCHC, MCH and platelets counts were lower while the WBC value was higher in tick infested sheep than non infested ones.

Further studies are recommended to carry on in different parts of the country, to show the effect of tick infestation on hematological and pathological parameters in sheep and other domestic animals.

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تقييم المعايير الدموية في الاغنام المصابة بالقراد في منطقة السليمانية  
ارام احمد محمد البرزنجي\* شادان حسن عبد الله\* محمد عبد العزيز قادر\*\*  
\* جامعة السليمانية /كلية الطب البيطري  
\*\* جامعة كركوك /كلية الطب

#### الخلاصة

اجريت الدراسة في صيف عام ٢٠١٢ في محافظة السليمانية لبيان تأثير اصابة القراد على المعايير الدموية في الاغنام. جمع القراد من ٧١ نعجة من مجموع ١٢٨ غنما وحفظت في ٧٠% من الكحول لتشخيصها وجمعت عينات الدم من الوريد الوداجي في الانابيب الحاوية على مادة مضادة للتخثر لقياس المعايير الدموية .

تم تشخيص نوعين من القراد: *Hyalomma a. anatolicum* و *Hyalommamarginatus*. وظهرت الدراسة ان عدد كريات الدم الحمر وحجم كريات الدم المرصوفة ومتوسط الهيموغلوبين الكرية ومتوسط تركيز الهيموغلوبين الكرية والصفائح الدموية كان معنويا أقل في الاغنام المصابة مقارنة مع الاغنام السليمة، بالرغم من ان تركيز خصاب الدم ومتوسط حجم الكرية كان في اقل الاغنام المصابة من الاغنام السليمة ولكن احصائيا لم يكن هناك فرقا معنويا. اما العدد الكلي لخلايا الدم البيض فكان اعلى معنويا في الاغنام المصابة من الحيوانات غير المصابة.