

Hematological and biochemical changes following Ivermectin treatment in mange infested goats

Batool Kathem Habeeb

Coll. of Sci. / Univ. of Baghdad

email: batool_kathem98@yahoo.com

(Received 2 June 2014, Accepted 10 August 2014)

Abstract

The aim of the present study was to describe the clinical features of mange and to evaluate the effectiveness of Ivermectin in treatment of affected goats referring to hematological and biochemical aspects. For this purposes local 180 female goats (does) kept in Farm Animal-College of Veterinary Medicine-Baghdad University were examined. Their ages were (1-2) years and had a mean average weight of (27.50 ± 2.25) kg. Thirty-six goats out of 180 were infested with mange. Other 36 was chosen from the herd and regarded as a control group. The infested group received Ivermectin 1% injected by subcutaneous route at a dose rate of 0.2 mg/kg B.W., in a single dose, while the control group received none. Blood samples were collected aseptically via jugular vein puncture at zero time, as well as 28 days post-Ivermectin treatment. Results indicated that the causative agent was *Sarcoptes scabiei var caprae* with a percent of 20% which were noticed on the muzzle, ears, neck, face, shoulder and back. White blood cells (WBCs) were increased in the untreated goats compared with the treated goats after 28 days of the experiment. Red blood cells (RBCs), hemoglobin (Hb) content and packed cells volume (PCV) increased significantly ($p < 0.05$) at four weeks after the commencement of treatment. Total protein, albumin, globulin, bilirubin and glucose were significantly decreased ($p < 0.05$) in untreated group compared with treatment and control groups. In conclusion, the treatment goats were much more active and had gone back to feed with the absence of lesion after 28 days post-treatment beside retaining the hematological and biochemical parameters to nearly normal values.

Key words: Mange, Ivermectin, hematological, biochemical, goats.

التغيرات الدموية والكيموحيوية بعد العلاج بعقار الافرمتكين للماعز المصابة بالجرب

بتول كاظم حبيب

كلية العلوم / جامعة بغداد

الخلاصة

هدفت الدراسة الحالية الى معرفة العلامات السريرية للجرب في الماعز وتأثير العلاج بعقار الافرمتكين للحيوانات المصابة مع التطرق الى المعايير الدموية والكيموحيوية. اجريت الدراسة على قطيع اناث من ماعز محلي مكون من (180) حيوان تابع الى حقل كلية الطب البيطري - جامعة بغداد. تراوحت اعمار الماعز من (1-2) سنة وبمعدل وزن (27.50 ± 2.25) . بلغ عدد الحيوانات المصابة بالجرب (36) حيوان من مجموع (180) حيوان ، وتم اختيار (36) حيواناً سليماً من باقي القطيع حيث عدت مجموعة سيطرة . عولجت المجموعة المصابة بعقار الافرمتكين 1% بجرعة مفردة (0.2) مليغرام \ كغم من وزن الجسم حيث حقن تحت الجلد، بينما لم يستعمل اي شيء لمجموعة السيطرة. جمعت نماذج دم من الوريد الوداجي في الوقت (صفر) وكذلك في يوم 28 بعد العلاج . اشارت النتائج الى ان مسبب الجرب كان من نوع (*Sarcoptes scabiei*) وبنسبة 20 % حيث لوحظ على مناطق المخطم والاذان والرقبة والوجه والكتف والظهر. اظهرت كريات الدم البيض زيادة في المجموعة المصابة قبل علاجها بالمقارنة مع اليوم (28) بعد العلاج. اما كريات الدم الحمر وخضاب الدم وحجم كريات الدم المضغوطة فقد سجلت اختلافاً احصائياً معنوياً بنسبة ($p < 0.05$) حيث انخفضت في الحيوانات قبل العلاج وعاودت الارتفاع لغاية اليوم 28 بعد العلاج. كذلك سجلت نفس المشاهدات بالنسبة للبروتين الكلي و

الالبومين والكلولين واللبيروبين والسكر. يستنتج مما سبق أن الحيوانات المعالجة عاودت نشاطها وتناولها العلف بصورة طبيعية مع اختفاء الجرب بعد (28) يوماً كما ان المعايير الدمية والكيموحيوية عاودت الى القيم المقاربة للطبيعية. الكلمات المفتاحية: الجرب، الافرمكتين، المعايير الدمية ، الكيموحيوية ، الماعز .

Introduction

Mange is a contagious skin disease, affecting domestic and wild animals causing skin damage characterized by marked hyperkeratosis with lesions usually starting on the head and neck also cause weight loss, irritation and death in severe cases (1). Mange is caused by different types of mites which tunnel within the skin of infested animals to suck blood, lymph, cause sores, scabs and predispose the animal to infection which spreads quickly without proper treatment and prevention (2, 3). The disease is more in young, stressed, malnourished, immuno-compromised goats than adults and can be rapidly transmitted through direct contact with carrier animals and overcrowding animals in pens (4, 5). Goats particularly are infested by 4 types of mites each morphologically distinct from the other however, with overlapping clinical presentations (6). Diagnosis can be made tentatively by the clinical signs and definitively on the demonstration of the infesting mite in skin scrapings (7). Ivermectin is a broad spectrum anthelmintic and has been reported to have activity and excellent potency against many immature and mature nematode, arthropod and ectoparasites, such as *Sarcoptic*, *Psoroptes* mange of ruminant, horses as well as dogs. Because of its potent anti-parasitic activity, therapeutic subcutaneous dosage of Ivermectin is low (0.2 mg/kg) in most animal species. Higher dosages produce CNS depression, listlessness, ataxia and recumbency in animals (8). This study is assigned to describe the occurrence, the clinical features of mange and their effect on blood and biochemical parameters and to evaluate the role of Ivermectin treatment of mange in goats.

Materials and methods

1. Location of study area:

The research was conducted at the Teaching and Research Farm of College of Veterinary Medicine-Baghdad University (in Abograb)

during an outbreak of mange in goats in June 2013.

2. Sampling and parasitological examination:

For diagnosis of mange type, samples were collected by clipping the hair, scraping the active lesion of the mange with scalpel until blood oozing was seen. The samples were collected in sterile Petridishes. Then the scraped material were immediately processed in the veterinary laboratory according to (9) in which, a few drops of 10% potassium hydroxide was added to the sample and allowed to stand for 30 minutes. A drop of the sediment on a slide with cover slip was examined under the microscope for the presence of mites. The obtained species of mites were identified morphologically.

3. Animals:

A herd of 180 local breed goats. Thirty-six goats were infested with mange. The animals were aged between (1-2) years (all females). They had a mean average weight of 27.50 ± 2.25 kg. Animals grazed under natural conditions and fed concentrate.

4. Experimental design:

The goats were randomly allocated into two groups as follow:

A. The first group (treatment group): this group consisted 36 infested goats which were received Ivermectin[®] (Ivomec 1% Germany) injected subcutaneously in a (single dose) in hairless area at a dose rate of 0.2mg/kg body weight.

B. The second group, 36 apparently healthy goats was chosen from the remaining 144 goats. This group serve as a control group (no any treatment was used).

Blood samples were collected under aseptic condition through the jugular vena-puncture for both hematologic and serum biochemical evaluation. Collection was made at the onset of the study and then four weeks post-Ivermectin therapy. Ten milliliters of blood was drawn and placed in two sterile test tubes (5ml of each). The first tube containing EDTA for hematological evaluation which

included white blood cells count (WBCs), red blood cells count (RBCs), hemoglobin (Hb) and packed cells volume (PCV). In contrast the second tube without EDTA which was subjected to centrifugation at 3000 rpm for five minute to separated blood from serum which kept immediately in refrigerator at 4C° for the biochemical parameters which included the total protein, albumin, globulin, bilirubin and glucose (10).

Data analysis:

All the values were expressed as mean (M) \pm standard error (SE). The hematological and serum biochemical values were evaluated independently by using general linear models of analysis of variance (ANOVA). The probability p-value <0.05 was considered significant (11).

Results

The results cleared that out of 180 inspected goats, 36 (20%) were found to be infested with mange. Clinical signs associated with mite infestation revealed inappetance, alopecia, pruritus with marked crusting of the skin. Severely affected animals were often in poor body condition due to reduced feed intake. Laboratory examination of skin scraping reflected that the ectoparasite identified on the goats was *Sarcoptes scabiei var caprae* (fig. 1). Of 36 goats with lesions at the time of treatment, 12 were classified as medium infestation while 19 goats showed extensive lesion. In the remaining 5 goats the lesions covered most

Table 1: Hematological values of infested goats prior to and 4 weeks post Ivermectin treatment (Mean \pm SE).

Parameters	Infested group		Control group M \pm SE
	pretreatment M \pm SE	post treatment M \pm SE	
WBCs (10 ³ / μ L)	12.20 \pm 1.03 a	9.50 \pm 0.80 b	8.80 \pm 0.75 b
RBCs (X10 ⁶ / μ L)	4.20 \pm 0.25 a	5.35 \pm 0.12 b	5.60 \pm 0.50 b
Hb (g/dl)	7.50 \pm 0.33 a	10.15 \pm 0.18 b	12.06 \pm 0.26 b
PCV (%)	24.20 \pm 1.36 a	32.00 \pm 3.80 b	35.50 \pm 02.10 b

Mean with different superscripts between columns refer to significant (p<0.05).

of the animal's body. The gross lesions were characterized by pruritus, dermatitis, keratinization, thickening of the skin, exudation and loss of hair and some were bleed. The results of the physical observation of the conditions of the experimental animals showed that the eyes, muzzle, ears, neck, face, shoulder and back were the area's most frequently affected (Fig. 2 a, b and c). Many of these animals were weak and emaciated. After 28 days of treatment with Ivermectin, the skin infested with mange gradually regained integrity. The general condition of all goats had markedly improved with new hair growth and obvious weight gains. Complete recovery was achieved by all goats. Laboratory examinations of skin scrapings after that time were negative for *Sarcoptes scabiei*. The results of the hematological parameters of the infested animals at the onset of the infection as well as 4 weeks post treatment are presented in tables (1). White blood cells (WBCs) prior to treatment was increased significantly (p< 0.05) and reached (12000.20 \pm 1.03) then declined in the treatment goats (9000.50 \pm 0.80) at the end of the experiment which resemble the normal value. Red blood cells (RBCs) counts were (4.20 \pm 0.25) in infested goats and reached (5.35 \pm 0.12) in treatment goats. Hemoglobin (Hb) content in infested goats were (7.50 \pm 0.33) and reached (10.15 \pm 0.18) in treatment goats. This means that both RBCs and Hb were increased significantly (p<0.05) in goats, 4 weeks after

Table 2: Serum biochemical values of infested goats prior to and 4 weeks post Ivermectin treatment.

Parameters	Infested group		Control group M \pm SE
	pretreatment M \pm SE	post treatment M \pm SE	
Total protein (g/dl)	5.53 \pm 00.25 a	7.75 \pm 00.32 b	8.20 \pm 00.57 b
Albumin (g/dl)	2.75 \pm 00.15 a	3.50 \pm 00.18 b	3.80 \pm 00.30 b
Globulin (g/dl)	3.10 \pm 01.70 a	3.85 \pm 01.15 b	4.15 \pm 00.50 b
Bilirubin (mg/dl)	0.85 \pm 00.15 a	0.92 \pm 00.29 b	1.10 \pm 00.00 b
Glucose (mg/dl)	32.50 \pm 0.75 a	37.01 \pm 0.53 b	40.20 \pm 0.12 b

Mean with different superscripts between columns refer to significant (p<0.05).

the commencement of treatment compared with that before treatment. Packed cells volume (PCV) increased ($p < 0.05$) following treatment of goats (32.00 ± 3.80) compared with values obtained prior to treatment of infested goats (24.20 ± 1.36). Data fixed in table (2) reflected the serum biochemical

parameters. Total protein, albumin, globulin, Bilirubin and glucose were found to be significantly different ($p < 0.05$) before and after treatment with Ivermectin. There were lack of significantly ($p > 0.05$) when comparing values of the treatment group with the control group.

Discussion

Results of the present study revealed that *Sarcoptic scabiei var caprae* is the most common identified mite species isolated from all infested goats. Our findings agree with those (12) in Iraqi goats and (13), who recorded that sheep and goats are infested with *Sarcoptes* and *Psoroptes* mites only. Also is in acceptance with the findings reported by (14) in India in human and animals also with (15) in sheep in Iran. During this field study, goats with *Sarcoptic* mange received single dose of Ivermectin which resulted in marked regression of the lesions and protected the animals from this disease. All post-treatment skin scrapings are negative for mange mites for ten months following treatment. The authors (16) explained that the treatment with Ivermectin effectively rid the skin of the infested goats with mange and thereby relieving the treated goats from the adverse effects of the mites especially on the blood. Ivermectin has a major advance in the treatment and control of mange. Advantages over conventional treatment and control procedures include ease of administration, only one treatment is required and treatment is not restricted by seasonal or weather conditions (17). The important clinical signs of the goats infested with mite in the present study included itching and loss of hair and this agree with (18) in pigs and (19) in sheep, whom clarified that the causes of intense irritation and itching is toxins secreted from parasite lead to sensitization of animals. The overall percent of infestation in this study with mange mites in goats is 20%. This prevalence is less to what is reported 30% by (20) in cattle. Prevalence index between 11 and 33% are reported in Nigeria (10) in Red Sokoto Goats and (3) in Ethiopia in small ruminant. These differences might be related to the difference in the species of animals as

well as the difference in temperature between these areas also by herd management. The final WBCs counts in the untreated goats are higher when compared with the treated goats and this tends to agree with the reports of (21) in sheep, who found that parasitic infestation usually associate with increased number of eosinophils. The decreased in the levels of WBCs in treated goats reflect the reduction of mange. Higher immune responses after Ivermectin treatment may be related to massive release of antigen due to death of parasite, although the type of immune changes seems to depend on the type of parasite and the host species (22). In our study the treatment group had better responses to feeding and body weight possibly due to the effect of Ivermectin which raised their immunity and this agree with (23). The RBCs, Hb and PCV counts showed significant ($p < 0.05$) differences in infested goat prior to and post Ivermectin injection. Similar findings obtained for West African Dwarf Goats (16). The values of PCV obtained from our study shows the adverse effects of mange on the untreated goats and the positive effect of Ivermectin on goats which resulted in increase the PCV and diminishing the lesion in the day 28 after treatment. In a research in Baladi goats (24) showed that PCV varies from breed to breed and proportionately with serum total protein and this suggests that PCV is beneficial in assessing the protein status. The lower level of RBCs coupled with low Hb values for untreated goats may attribute to decrease food intake and anemia caused by parasitic infestation. Similar finding noticed by (25) who referred that RBCs are responsible for carrying oxygen to the body's tissue, and fewer RBCs in the body results in anemia. The total serum protein, albumin, globulin, bilirubin and glucose are significantly

lowered in infested goats which suggested poor nutritional status. While values of these parameters increased at day 28 after treatment and control groups due to improvement of food consumption. This findings are in agreement with findings of (26) in sheep and (27) in caprine.

In conclusion, administration of single dose of Ivermectin can be eradicated mange in infested goats which regained feeding and health after 28 days post-treatment beside that the hematological and biochemical parameters retrained to its nearly normal values.

References

- 1-Bekele J, Tariku M, Abebe R (2011) External parasites infestation in small ruminants in Wolmera district of oromiya region, central Ethiopia. *J. Anim. Vet. Adv.* 10 (4):518–523.
- 2-Chanie M, Negash T, Sirak, A (2010) Ectoparasites are the major causes of various types of skin lesions in small ruminants in Ethiopia. *Trop. Anim. Health Produc.*, 42:1103–1109.
- 3-Sheferaw D, Degefu H, Banteyirgu D (2010) Epidemiological study of small ruminant mange mites in three agro-ecological zones of Wolaita, Southern Ethiopia. *Ethiopia Vet. J.*, 14(1): 31-38.
- 4-Hassanien O E (1994) Control of skin parasites among sheep flocks. M.Sc. Thesis in Vet. Hygiene. Faculty of Vet. Med., Zagazig Univ.
- 5-Naidu M M, Rao D V (1999) Clinical and hematological observations in goats with *Sarcoptic* mange. *Indian Vet. J.*, 76:730-732.
- 6-Zeryehun T, Tadesse M (2012) Prevalence of mange mite on small ruminants at Nekemte Veterinary Clinic, East wollega zone, North west Ethiopia. *Middle – East J. of scientific Res.*, 11(10): 1411 – 1416.
- 7-Hafeez U A, Sindhu Z, Iqbal Z, Jabbar A, Tasawar Z (2007) Prevalence of Sheep Mange in (Pakistan) and Associated Hematological/Biochemical Disturbances. *Inter. J. of Agric. and Biology*, 9 (6):917-920.
- 8-Abdou Kh A, Sharkawy A A (2004) Some toxicological studies on Ivermectin in goats. *Proceeding of the 20 Annual meeting of the Egyptian Society of toxicology.* February 18 – 19, Bibliotheca Alexandria.
- 9-Soladoye A O (2003) Hematological and biochemical parameters of West African Dwarf Goats. *Dept. of Anim. Produc, University of Ilorin, Nigeria*, Pp:1-9.
- 10-Tambuwal F M, Agale B M, Bangana A (2002) Hematological and biochemical values of apparently healthy Red Sokoto goats. *Proceedings of 27th. Ann. Conference. Nigerian Society of Anim. Produc. (NSAP), Nigeria*, Pp: 50-53.
- 11-Steel R G O, Torrie J H (1980) Principles and Procedures of Statistics. A Biometrical approach. 2nd (Ed). McGraw-Hill. New York, USA., P: 633.
- 12-Ahmed W A, Al-Azawi A K, Kadhim F S, Rasool H S (2009) Study of the Mange in Mountain Goats In Iraq. *Al- Anbar J. Vet. Sci.*, 2 (1): 20-24.
- 13-Asghar A, Hassanien O, Alsadi A, Feda H, Fathi S (2011) Prevalence of *Scabies* diagnosed in sheep and goats during Hajj season in Makah. *J. of Agric. and Vet. Sci. Qassim Univ.*, 4 (1): 37-43.
- 14-Mitra M, Mahanta S K, Sen S, Ghosh C, Hati A K (1993) *Sarcoptes Scabiei* in animals spreading to man. *Trop Geogr Med*; 45(3):142-3.
15. Rahbari S, Nabian S, Bahonar A R (2009) Some observations on sheep *Sarcoptic* mange in Tehran province, Iran. *Trop. Anim. Health Produc.*, 41(3):397-401.
- 16-Akomas S C, Obijuru O C, Herbert U (2011) Hematologic and serologic changes following Ivermectin treatment in mange infested west African dwarf goats. *Adv. Enviro. Biology*, 5(9): 2557-2560.
- 17-Cozma V, Suteu E, Cherman C, Losson B (2010) Therapy with Ivermectine and diazinon of *Psoroptic* mange in sheep from Transylvania. *Romania Sci. parasitology*, 11 (2):105-107.
- 18-Davies P R, Moore M J, Pointon A M (1991) *Sarcoptic* mites hypersensitivity and skin lesion in slaughtered pigs. *Vet. Rec.*, 129:520- 523.
- 19-Al naaimi O A, Al-badrani B A (2010) Diagnosis of *Psoroptic* mange in Sheep by modified ELISA test. *J. of Anim. and Vet. Adv.*, 9 (13): 1880-1884.
- 20-Cozma V E, Nagrea O, Cherman C, Sandru D (1999) Treatment of bovine *Sarcoptic* mange. Comparative efficiency Ivermectin and dormectine in mange and myiasis of livestock. *Univ. of Cluj, Romonina*, Pp:51-53.
- 21-Chineme G N, Bida S A, Nauru S (1979) *Sarcoptic* mange of sheep in Kaduna State, Nigeria. *Bull. Anim. Health Prod. Afr.*, 27: 41-45.
- 22-Cooper P J, Schwartz L B, Irani A M, Awadzi K, Guderian R H, Nutman T B (2002) Association of transient dermal mastocytosis and elevated plasma tryptase levels with development of adverse reactions after treatment of onchocerciasis with Ivermectin. *J. Infect. Dis.*, 186: 1307-1313.
- 23-Kuhn C, Lucius R, Matthes H F, Meusel G, Reich B, Kalinna B H (2008) Characterization of recombinant immunoreactive antigens of the scab mite *Sarcoptes scabiei*. *Vet. Parasitology*, 153(3-4):329-37.
- 24-Azab M E, Abdel-Maksourd H A (1999) Changes in some hematological and biochemical parameters during pre-partum and post-partum periods in female Baladi goats. *Small Ruminant Res.*, 34: 77- 85.
- 25-Adejinmi J O, Sadiq N A, Fashanu S O, Lasisi O T, Ekundayo S (2004) Studies on blood parasites

- of sheep in Ibadan, Nigeria. Afri. J. of Biomed. Res, 7:41 – 43.
- 26-Padmaja B, SatishKumar K, Haritha C (2006) Hematological and blood biochemical profile of sheep with mixed endo-parasitic infestation. Indian Vet. J., 83: 634-636.
- 27-Sengupta P P, Basu A K (2008) Hematological changes and clinical manifestation in the experimental caprine *Sarcoptic* mange. J. of Vet. Parasitology, 22: 65-68.