

The effect of aqueous extract of different parts (head, body and total antigen) of tick *Boophilus annulatus* on some biochemical parameters (Total protein, albumin and globulin) in the serum of local Rabbits

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Abstract

This study was conducted to investigate the effect of oral administration of aqueous extract from different parts (head, body and whole) of ticks of the species *Boophilus annulatus* in local rabbits to evaluate the total serum protein, albumin and globulin concentration.

The result showed significant increase of total protein in all groups of rabbits which administration the antigens of head, body and whole of ticks antigens compare with control group. Whereas the result showed a significant increase in the Albumin concentration in group body antigen compare with control and group that given head antigen. while there is no significant difference between the group that given body extract and group that given a whole antigen in the albumin concentration. Also this study showed a significant increase in globulin concentration in group that given whole antigen and group that given head antigen compare with control, and group that given whole antigen compare with group that given body antigen.

Introduction

Ticks have great veterinary importance compared with other ectoparasites. Ticks consume large quantities of host blood during their prolonged attachment period (7-14 days), which may be extended depending on the tick species and unique host association. (1), Ticks are obligate hematophagous ectoparasites of vertebrate hosts. They transmit viral, bacterial and protozoal diseases. In many regions of the world, ticks are the most important vectors of life threatening diseases of human and animals (2). The bovine tick, *Boophilus annulatus* is a bloodsucking ectoparasite that causes severe production losses in the bovine industry. The average tick burden causes an annual weight loss of 0.7 kg/tick. With the huge number of ticks infesting cattle and other livestock animals, the subsequent effect on beef production is a reduction of hundreds of millions of kilograms Peruear (1) and transmitting pathogens to other animal species such as *Babesia bigemina*, *B. bovis* and *Anaplasma marginale* in West and Central Africa, Asia and certain parts of Southern Europe (2).

A successful host-parasite relationship is in a balance between limiting the host defense and the ability of the parasite to modulate, evade or restrict the host response and could enhance the ability of the tick to obtain a blood meal and facilitate pathogen transmission (3)

External parasitic infestation by *B. annulatus* causes severe health problems in livestock that may be accompanied by a decrease in some blood biochemical parameters, blood trace elements and mineral level (4) Changes in some hematological parameters (erythrocyte count, mean cell volume, hematocrit, hemoglobin concentration, leukocyte counts, serum albumin and globulin concentration, total serum protein) in animals with ticks infestation were reported (5) .While concentration of serum globulins increased in infested Guinea pigs with hard tick (Ixodidae) (6).

The aim of this study was to assess the effect of oral administration of aqueous extract from different parts of *Boophilus annulatus* on the level of total serum protein, albumin and globulin concentration in serum of rabbits.

Materials and Methods

This study was conducted on 32 healthy local rabbits, weighting from 1500-2000 g, Animal, were housed in separated cages under controlled condition of temperature $25 \pm 1^\circ\text{C}$. The standard laboratory feed given to the control and experimental groups of animals that contained the same quantity of daily calories and protein. The aqueous extract from different parts of ticks were prepared according to (7).

Experimental design

- The exposed parts of ticks were immersed in phosphate buffer saline (PBS) pH 7.2 to make suspension.
- Animals were uniformly divided into 4 groups. Each group consisted of 8 animals. First group serves as control dosage with 0.1ml from phosphate buffer saline while the second group dosage with 0.1ml from head extract suspension ,third group dosage with 0.1ml from body extract suspension and fourth group dosage with 0.1ml from whole tick extract suspension.
- Collection of blood samples: the blood samples were collected by cardiac puncture technique after 21 days. Five ml blood from each rabbit was collected in plain test-tubes, serum was separated from blood and kept immediately in refrigerator at 4°C .
- Total protein and albumin were measured by color metric by using spectrophotometer according to (8), using (Biolabo kits) while the globulin was determined mathematically by subtraction of serum albumin from serum total proteins level .

Statistical Analysis

The data obtained were expressed as Means and Standard Error (SE) and subjected to statistical

analysis using one-way analysis of variance (P<0.05) (ANOVA) (9).

Results and discussion

The results in table (1) showed a significant increase (p<0.05) of total protein (7.70±1.05, 9.13±0.64, 9.13±0.64) in all experimental groups (head, body and whole) respectively antigens compare with control group (5.38±0.44).

Table (1): The effect of administration tick extraction (head, total and body) on serum total protein, albumin and globulin of local rabbit

Parameters	Head	Total	Body	Control
Total protein (g/l)	7.70±1.05 A	9.42±0.55 A	9.13±0.64 A	5.38±0.44 B
Albumin (g/l)	3.65±0.69 BC	4.70±0.56 AB	5.80±0.19 A	3.03±0.38 C
globulin (g/l)	4.05±0.50 AB	5.07±0.44 A	3.33±0.51 BC	2.34±0.13 C

The different litters refer to significant differences between different groups (P<0.05)

The level of total protein is affected by various factors such as age, sex, species, breed, season, disease and its duration (e.g. hepatic, renal and infection with different parasites), body hydration, nutritional and physiological status in livestock (10). In the current study there were highly significant increases in total protein in all groups which may be due to increase in release releasing of tissue specific enzymes and other intracellular proteins secondary to cell membrane disruption caused by parasite (11). The result are agreement with (12) that reported elevated in the level of total serum protein, albumin and globulin in immunized rabbits against *Hyalomma anatolicum anatolicum* ticks.

Similar result was recorded by (13) who found higher total protein and globulin level after a day 21 in experimental tick infested goats. Also the result was supported by (14) (15) and (16) in buffaloes, cattle and sheep respectively.

Synthesis of immunoglobulin in response to infestation may have also contributed to the observed increases in protein concentration (17)

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These high protein and albumin concentrations in tissues may indicate increased protein synthesis due to increased protein demand due to infection and or symptom of cytolysis as the infection progressed. (18) This results demonstrated increase in serum albumin concentration in group body antigen (5.80±0.19) compare with control (3.03±0.38) and group head antigen (3.65±0.69), may be due to the secretion of other hormones like (glucocorticoids, thyroxin) increases during pregnancy as well, as a consequence of increased sex hormone secretion, which in turn intensifies metabolic events in the organism (19) Glucocorticoids improve the mobilization of extra hepatic proteins and transport of amino acids to liver cells (20, 21) .
 In the present study increased serum globulins in group whole antigen (5.07±0.44) and group head antigen (4.05±0.50) compare with control (3.03±0.38) and group whole antigen compare with group body antigen (3.33±0.51) may be explained by stimulation of immune system against the toxic metabolites secreted by ticks. (15 and 22) or by chronic inflammation (23). This results were similar to the (24) that reported hyperglobulinaemia in infested camels with hard tick which could be explained on the basis of the chronic nature of the disease. Elevation in globulin due to enhanced antibody secretion in response to infection would no doubt have contributed immensely to the observed hyperproteinaemia (11).

Mustafa (25) observed significant increasing in the level of globulin in infested sheep with hard tick (Ixodidae). Similar result was recorded by Rechav and Dauth (26) Rechav et al. (27) and Rechav (28) whose found an increase in the level of the globulins in the serum of the rabbits, laboratory animals and cattle respectively and this may by indicates the development of acquired humeral immune responses to *Rhipicephalus* tick, white Springell et al. (29) found that infested animals had apparently lost their ability to adequately replace haemoglobin and plasma albumin, but globulin synthesis was increased presumably because of an immunological response.

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تأثير تجريع المستخلص المائي لأجزاء مختلفة (الراس والجسم والمستضد الكلي) من قراد جنس *Boophilus annulatus* على بعض الصفات الكيموحيوية (البروتين الكلي، الالبومين والكلوبيولين) في الارانب المحلية

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الملخص

صممت هذه الدراسة لمعرفة تأثيرالتجريع الفموي لمستخلص مائي لأجزاء مختلفة (الراس والجسم والمستضد الكلي) للقراد جنس *Boophilus annulatus* على بعض الصفات الكيموحيوية (البروتين الكلي، الالبومين والكلوبيولين) في مصل دم الارانب المحلية. اظهرت النتائج ارتفاعا معنويا في معدل البروتين الكلي في كل المجموعات التي اعطيت (الراس والجسم والمستضد الكلي) مقارنة بمجموعة السيطرة. وكذلك بينت النتائج وجود زيادة معنوية في تركيز الالبومين في المجموعة المعاملة بمستضد الجسم مقارنة بمجموعة السيطرة والمعاملة بمستضد الراس بينما لم يلاحظ وجد فروقات معنوية في تراكيز الالبومين بين معاملات مستضد الجسم والمستضد الكلي. كما وبينت الدراسة وجود زيادة معنوية في تراكيز الكلوبيولين في معاملات المستضد الكلي ومستضد الراس مقارنة بالسيطرة. والمستضد الكلي مقارنة بمستضد الجسم.

