

Fluctuations in Haemato-Biochemical Parameters in Organized and Farmer Flock of Goat Under Infestation of Lice

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Abstract: Parasites causes the economic wealth loss of any country and also the health of the animals the parasites are of two types viz. ecto and endo parasites. In ectoparasites ticks and lice are major while in endoparasites mites are included. Considering all these facts present investigation has been planned. This study evaluated the haematological and biochemical response of ticks captured in two different environmental reared goats such as organized and farmer flocks. The experimentally infected goats showed lower Hb, PCV, TEC, Neutrophil and MCHC values in the first three weeks of study but naturally infested groups showed higher values than the experimentally infected groups. Biochemical parameters viz. total protein and globulin were found higher a day 21 in experimental lice infected goats but albumin, A/G ratio, glucose, bilirubin and AST were considerably lower during 7 and day 21 in the experimental group when compared to naturally infected goats. There was no alteration in total protein, globulin, bilirubin and ALT between experimental and natural lice- infected goats but the A/G ratio was significantly higher in experimental lice infested goats. Anemia in lice-infested goats and attribute it to prolonged blood looses and loss of essential nutrients and oxidative stress which induce RBC damage and anemia. It is due to oxidative stress and biotransformation.

Keywords: Fluctuations, farmer flock, organized flock, hematology, biochemical, goats, lice

I. INTRODUCTION

Ticks, lice and mites infestation are a common cause of anaemia and skin disorders and reason for consultation in small animal practices. Ticks, lice and mites cause irritation and wounds in sheep as well as goats [1]. External parasites infestation cause health problem in livestock that may be accompanied by a decrease in some blood biochemical parameters, blood trace elements and mineral level [2].

Blood parameters of haematological and biochemical of the animal exposed to both ectoparasites revealed significant differences [3].

However, Blood is the fluid connective tissue flowing in the circulating system and carrying oxygen to all the tissues and removing carbon dioxide from the kidney [4]. Moreover, biochemical parameters such as protein, glucose, urea etc. are also important constitute of the body and responsible for various metabolic processes [5]. Many researchers have been done more work on haemato-biochemical parameters but there is no work on organized and farmer flock. Any fluctuations in the blood and biochemical parameters cause severe complications. Considering all these facts present investigation has been carried out to find out changes in haemato-biochemical parameters in organized and farmer's flock of goat under infestation in lice.

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II. MATERIALS AND METHODS

Study Area: The study was carried out in the division of animal health, central institute for research on goats, Makhdoom, Farah, Mathura, U.P. and India from July 2004 to February 2007.

Animals: The present study was planned for the fluctuations in haematological and biochemical parameters of lice infestation in organized farms of Jamunapari and Barbari goats maintained at Central Institute for Research on Goats, Makhdoom, Farah, Mathura and farmer's flock of goats. The general topography of the institute area is mostly undulating with a difference of up to 5-6 meters between the low-level land and top. The geo-climatic conditions, as per the report of the National Bureau of soil survey and land use planning points to the alluvial nature of the Jamuna belt and the ecology of this region boarding arid conditions. The Jamunapari breed was found in Chambal ravines and kept for meat and milk, whereas the Barbari is medium-sized and is reared for meat production owing to its high proficiency. The management of institute flocks involves grazing/browsing for 6-8 hrs daily and supplementary feeding with concentrate. Goats were housed in shades, (one for each breed/flock) during inclement weather. Farmers keep their goats in open coral made up of thatched huts.

Chemicals: The chemicals were procured by Sisco Research Laboratories Pvt. Ltd, Mumbai. All the chemicals/reagents used were of analytical grade. Biochemical Kits were purchased from Span Diagnostics Ltd, Surat, India.

Equipments: BOD Incubator (Toshiba, Japan), Biochemical Analyzer (Nexgen), Desiccator, Centrifuge, Sahli's Haemoglobinometer, Wintrobe haematocrit tubes, Pasture pipette, Centrifuge machine, Hemocytometric chamber.

III. HAEMATO-BIOCHEMICAL STUDIES

Natural Infection of Lice: Haematological estimation in blood serum of naturally infected goats with lice was conducted to know the systemic effect of ecto-parasites on infested animals. The blood was collected from lice-infested goats (6 No.) respectively from the village flocks of goats and organized flocks and analyzed for haematoma-biochemical parameters.

Collection of Blood Samples: The blood samples were collected from the jugular vein as recommended by Benjamin (1986) at day 0, 7, 21 after the complete spread of total ecto-parasites on goats. 10 ml blood from each goat was collected in 2 test tubes, one containing EDTA and the other one without EDTA. For biochemical studies, serum was separated from blood and kept immediately in the refrigerator at 4 °C.

IV. HAEMATOLOGICAL ESTIMATIONS

Haemoglobin: The estimation of haemoglobin was carried out according to the standard method [6-7]. Sahli's hemoglobinometer was used to find hemoglobin by acid haematin method [8].

Packed Cell Volume (PCV): Packed cell volume was determined by wintrobe haematocrite tubes. These tubes were filled with blood with the help of a pasture pipette and centrifuged for 30 minutes at 3000 revolution per minute to note the final reading.

Differential Leukocyte Count (DLC): Thomas leukocyte diluting fluid was used for DLC by following composition
Glacial acetic acid - 2.0ml
Gentian violet (1% aqueous) - 1.0ml
Distilled water - 100ml

The blood smears for DLC were stained with JSB stain, counting was done using the battlement method [9]. The percentage of each type of cell was calculated as under:

Number of cells	X 100
Total number	

V. BIOCHEMICAL ESTIMATION

Glucose: Estimation of blood glucose was done by "Span diagnostic kits" (enzymatic GOD-POD, end point colorimeter, single reagent chemistry [10].

Total Protein: Estimation of total protein was done by "SPAN Diagnostic Kits" as by modified Biuret Method [11].

Globulins: Total protein – Albumin

Albumin: Estimation of albumin was done by "SPAN Diagnostic Kits" by Modified Biuret Method [11].

Aspartate aminotransferase: By 24-DNPH Method [12].

Alanine aminotransferase: By 24-DNPH Method [12].

Bilirubin: As per standard method [13].

VI. RESULTS

Hematological estimation in blood serum of natural infested goats of village flock and goats infected experimentally with lice was done to find out the systemic effect of lice parasite on goats. The hematological parameters estimated were Hb, PCV, TEC, DLC, MCV, MCHC and platelets. The mean values of these parameters recorded in experimentally lice infected group at day 21 and natural lice infested village flock goats were (7.69 ±0.22g/dl), Packed Cell Volume (25.66±0.95%), Total Erythrocyte Count (4.36±0.17x10³/μl), Total Leucocyte Count (9.28±0.12 x10³/μl), neutrophil (41.33±7.61%), eosinophil (1.83±0.30%), lymphocyte (55.16± 7.92%), basophil (0.00±0.00%), monocyte (2.5±0.95%), Mean Corpuscular Volume (58.69±0.85 fl), Mean Corpuscular Haemoglobin Concentration (308.16±14.06gm/l), platelets (2.61±0.09x10⁵/μl) and Haemoglobin concentration (7.79±0.08g/dl), PCV (26.16±1.79%), TEC (4.30±0.27x10⁶/μl), TLC(12.29±1.00x10³/μl), neutrophil(35.00±4.93%), eosinophil (1.83±0.16%), lymphocyte (61.83±4.99%), basophil(0.16±0.16%), monocyte(1.16±0.16%), MCV(60.72±0.81), MCHC (306.46±0.26gm/l), platelets(3.21±0.22x10⁵/μl) respectively (Table 1).

The biochemical parameters in blood serum in naturally infested goats of animals of village flock and goat infected experimentally with lice estimated were total protein, albumin, globulin, A/G ratio, glucose, bilirubin, AST and ALT. The total protein, globulin and ALT in naturally infested village goats on days 7 and 21 infested goats were higher than the non-infested control group of animals. There was no significant difference in total protein, bilirubin and ALT in experimental infected goats as well as naturally infected goats. The A/G ratio was significantly higher (P<0.05) at day 21 in the experimental infected and natural infested village flock goats from the non-infested control group, but the globulin values when compared within the same period were not significantly different (Table 2).

VII. DISCUSSION

The mean values of these parameters recorded in experimentally lice-infected group at day 21 and naturally lice infested village flock goats were (7.69 ±0.22g/dl), PCV (25.66±0.95%), TEC (4.36±0.17x10³/μl), TLC (9.28±0.12 x10³/μl), neutrophil (41.33±7.61%), eosinophil (1.83±0.30%), lymphocyte (55.16± 7.92%), basophil (0.00±0.00%), monocyte (2.5±0.95%), MCV (58.69±0.85 fl), MCHC (308.16±14.06gm/l), platelets (2.61±0.09x10⁵/μl) and Hb (7.79±0.08g/dl), PCV (26.16±1.79%), TEC (4.30±0.27x10⁶/μl), TLC (12.29±1.00x10³/μl), neutrophil (35.00±4.93%), eosinophil (1.83±0.16%), lymphocyte (61.83±4.99%), basophil(0.16±0.16%), monocyte (1.16±0.16%), MCV(60.72±0.81), MCHC (306.46±0.26gm/l), platelets (3.21±0.22x10⁵/μl) respectively.

Results revealed that Hb concentration, PCV (%), TEC, TLC, neutrophil and platelets were significantly (P<0.05) decreased at day 7 and 21 in experimental infected and natural infested goats of village flock as compared to the non-infested control group of animals. Whereas lymphocyte, monocyte and MCV were significantly (P<0.05) increased in naturally infested goats of village flock and goats infected experimentally at day 7 and 21, then the non-infested control. Statistical analysis of data revealed that there was no significant difference (P<0.05) in PCV, TEC, neutrophil, eosinophil, lymphocyte, basophil and MCHC values among goats natural infested with lice of village flock and experimentally infected goats on day 7 and 21. The Hb concentration was significantly different (P<0.05) at day 7 and 21 in experimentally infected goats when compared with the non-infested control group of animals and it is accordance to previous study. It was further observed that MCHC and platelets count in naturally infested village flock of goats was significantly different [2-3, 14-19].

In lice as far as experimental infection concern Hb, PCV, TEC, TLC, neutrophil, platelets counts were significantly decreased when compared to natural infested animals. Whereas, lymphocytes, monocytes and MCV were significantly higher in naturally infested goats than the experimentally infected goats.

Biochemical parameters like total protein and globulin were found higher a day 21 in experimental tick infected goats but albumin, A/G ratio, glucose, bilirubin and AST were considerably lower during 7 and day 21 in the experimental group when compare to naturally infected goats. There is no alteration in total protein, globulin, bilirubin and ALT between experimental and natural lice-infested goats but the A/G ratio was significantly higher in experimental lice infested goats [14-18].

The biochemical parameters in blood serum in naturally infested goats of village flock and goats experimentally infected with lice revealed that total protein, globulin and ALT at days 7 and 21 were higher than the non-infested control group of animals. Rajendran and Hafeez (2003) [15] reported significant decrease in total protein, albumin while the non-significant difference in albumin, globulin and A/G ratio in ecto-parasitic infection in crossbred cattle [16-19]. From the above results, it is clear that lice infestation causes anaemia and various complication to organize as well as farmer flock of goats. Hence, there is urgent need to produce an herbal formulation for controlling the lice infestation which will be safe, cheap and eco-friendly.

VIII. CONCLUSION

Haemato-biochemical values were studied in all the groups used for the study. Naturally infested groups showed higher values than the experimental infected groups which leads to anaemia and various complications. Anaemia in the lice-infested goats and attribute it to prolonged blood losses and losses of essential nutrients and oxidative stress which induce RBC damage and anemia. Moreover, ectoparasites have been found to release some toxic substances which have been found to cause suppression of erythropoiesis and thus decrease in haemoglobin. In biochemical parameters there was no alteration in total protein, globulin, bilirubin and ALT between experimental and natural lice-infested goats but the A/G ratio was significantly higher in experimental lice-infested goats. It leads to oxidative stress and lack of biotransformation in goats. Hence, this study discovers the harmful effect of lice infestation that can be beneficial for cattle health. This study will help the researcher to uncover the critical areas of organize and farmer flock that many researchers were not able to explore. Thus a new theory on fluctuation in haemato-biochemical parameters may be arrived at.

This study discovers the possible fluctuation in haemato-biochemical parameters in goats. This study will help the researcher to uncover the critical parameters of haemato-biochemical that many researchers were not able to explore

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Table 1: Hematological changes in goats of farmer flock natural infested and organized flock infected experimentally of lice (Mean ± S.E.)

Parameters	Experimental infection (Organized flock)			Natural infection (Farmer flock)	Control
	Days intervals				
	0 day	7 day	21 day		
Hb. Conc. (g/dl)	9.84 ^c ±0.31	8.23 ^b ±0.18	7.69 ^a ±0.22	7.79 ^a ±0.08	10.43 ^c ±0.27
Packed Cell Volume (%)	29.83 ^b ±1.10	27.0 ^a ±0.44	25.66 ^a ±0.95	26.16 ^a ±1.79	31.16 ^b ±0.94
TEC (x10 ⁶ /μl)	5.23 ^b 0.29	4.56 ^a ±0.08	4.36 ^a ±0.17	4.30 ^a ±0.27	5.53 ^b ±0.26
TLC (10 ³ /μl)	11.24 ^b ±0.61	10.6 ^b ±0.52	9.28 ^a ±0.12	12.29 ^b ±1.00	12.32 ^b ±0.65
Neutrophil (%)	48.66 ^a ±6.66	44.33 ^a ±7.20	41.33 ^a ±7.61	35.00 ^a ±4.93	50.5 ^a ±6.78
Eosinophil (%)	1.50 ^a ±0.22	1.83 ^a ±0.30	1.83 ^a ±0.30	1.83 ^a ±0.16	1.33 ^a ±0.21



Lymphocyte (%)	48.00 ^a ±6.99	52.16 ^a ±7.57	55.16 ^a ±7.92	61.83 ^a ±4.94	46 ^a ±6.70
Basophil (%)	0.00 ^a ±0.00	0.16 ^a ±0.16	0.00 ^a ±0.00	0.16 ^a ±0.16	0.00 ^a ±0.00
Monocyte (%)	1.66 ^a ±0.33	1.50 ^a ±0.22	2.5 ^b ±0.95	1.16 ^a ±0.16	2.16 ^b ±0.16
MCV (fl)	57.43 ^a ±1.89	56.97 ^a ±3.09	58.69 ^a ±0.85	60.72 ^a ±0.81	56.50 ^a ±1.03
MCHC (gm/l)	330.66 ±3.53 ^b	305.16 ^a ±10.02	308.16 ^{ab} ±14.06	306.46 ^a ±0.26	333.50 ^b ±2.09
Platelets (x10 ⁵ /μl)	4.33 ^c ±0.21	2.93 ^b ±0.12	2.61 ^a ±0.09	3.21 ±0.22	4.31 ^c ±0.12

Means with similar superscripts between columns did not differ significantly (P<0.05)

Table 2: Biochemical changes in goats of farmer flock natural infested and organized flock infected experimentally of lice (Mean ± S.E.)

Parameters	Experimental infection(Organized flock)			Natural infection (Farmer flock)	Control
	Days intervals				
	0 day	7 day	21 day		
Total protein (g/dl)	6.23 ^a ±0.12	7.36 ^a ±0.14	7.35 ^a ±0.16	7.45 ^a ±0.17	6.66 ^a ±0.12
Albumin (g/dl)	3.43 ^b ±0.14	2.68 ^a ±0.10	2.93 ^a ±0.09	2.73 ^a ±0.12	3.26 ^b ±0.10
Globulin (g/dl)	2.8 ^a ±0.19	4.65 ^{ab} ±0.17	4.41 ^b ±0.21	4.71 ^b ±0.19	3.4 ^{ab} ±0.19
A/G Ratio	1.26 ^c ±0.15	0.58 ^a ±0.03	0.67 ^{ab} ±0.04	0.58 ^a ±0.04	0.98 ^{bc} ±0.09
Glucose (g/dl)	40.95 ^a ±0.4	40.48 ^a ±0.53	39.43 ^{ab} ±0.54	39.47 ^{bc} ±0.46	39.81 ^c ±0.31
Bilirubin (mg/dl)	0.96 ^a ±0.01	0.97 ^a ±0.03	0.95 ^b ±0.02	0.95 ^b ±0.03	1.01 ^b ±0.01
AST (U/ml)	87.79 ^a ±0.98	62.69 ^a ±0.81	45.60 ^a ±2.97	44.26 ^b ±2.47	87.96 ^c ±0.65
ALT (U/ml)	10.71 ^a ±0.44	10.93 ^b ±0.67	10.71 ^b ±0.44	10.96 ^b ±0.49	9.41 ^b ±0.78

Means with similar superscripts between columns did not differ significantly (P<0.05)