

Detection of Anaemia in Some Ruminant Species in Alkhalis City of Diyala Province, Iraq

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ABSTRACT

This study was designed to evaluate the prevalence of anaemia in ruminants (cattle, sheep and goat) from Alkhalis Province of Diyala, Iraq. Sixty nine blood samples (5 mL/animal) were collected from jugular vein of ruminant animals by anticoagulant, heparin containing disposable syringe. The collected blood samples were kept in ice container and analyzed within 24 h at physiology laboratory of the College. The results showed that the prevalence of anaemia was 34%, 27% and 11% in sheep, goat and cows, respectively. There was significant decrease in all haematological parameters studied, *i.e.*, Hb, PCV %, MCV and RBC count in all the ruminant species studied, however in cows MCH and MCHC although decreased numerically but statistically non significant.

Keywords: Anaemia, Cattle, Diyala province, Goat, Prevalence, Sheep.

Ind J Vet Sci and Biotech (2024): 10.48165/ijvsbt.20.1.26

INTRODUCTION

Anaemia is a serious global public health problem that particularly affects young children, menstruating adolescent girls and women, and pregnant and postpartum women. Anaemia is a condition in which the number of red blood cells or the haemoglobin concentration is lower than normal. Anaemia may be caused by several factors: nutrient deficiencies through inadequate diets or inadequate absorption of nutrients, infections (e.g. malaria, parasitic infections, tuberculosis, HIV), inflammation, chronic diseases, gynaecological and obstetric conditions, and inherited red blood cell disorders. The most common nutritional cause of anaemia is iron deficiency, although deficiencies in folate, vitamins B12 and vitamin A are also important causes (Sanyal *et al.*, 2013; Soundarya and Suganthi, 2016; Ismael and Al-Samarai, 2019). Anaemia in ruminants is an abnormal condition characterized by the decrease of the haematocrit (Packed Cell Volume, PCV), the mass of erythrocytes (Red Blood Cells, RBCs) and/or haemoglobin.

Anaemia is classified as haemolytic, haemorrhagic or anaemia caused by the decreased production of erythrocytes; the first two categories are characterized by a regenerative response. Immune-mediated haemolytic anaemia has also been reported in ruminants. The reduced production of erythrocytes can be caused by deficiency of vitamin B12 or iron, as well as by chronic diseases. Pathologic conditions of bone marrow like inflammatory or neoplastic cells infiltration and hypoplasia or aplasia of bone marrow are related to reduce production of erythrocytes (Katsogiannou *et al.*, 2018). There are two types of anaemia according to the response of bone marrow: the bone marrow increase red blood cell production when the body exposed to bleeding and haemolysis, this type is called regenerative anaemia;

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How to cite this article: Ismail, Muna Muhammed (2024). Detection of Anaemia in Some Ruminant Species in Alkhalis City of Diyala Province, Iraq. *Ind J Vet Sci and Biotech*. 20(1), 123-125.

Source of support: Nil

Conflict of interest: None

Submitted 29/08/2023 **Accepted** 25/09/2023 **Published** 10/01/2024

while when there is abnormality in bone marrow or in kidney erythropoietin production the anaemia is called non-regenerative anaemia (Grimes and Fry, 2015). The objective of this study was to evaluate the prevalence of anaemia in ruminants of seven cities of Iraq.

MATERIALS AND METHODS

Sixty nine blood samples (5 mL/animal) were collected from jugular vein of different ruminant animals of either sex (cattle n=18, sheep n=29 and goat n=22) by disposable syringe containing anticoagulant (heparin) during November and December 2021 from seven different cities of Alkhalis province (Altahuella, Hibhib, Altamor, Alsndia, Alsharqia, Aljdida, Alaswad, Albasta). For determination of anaemia haematocrit (PCV), haemoglobin (Hb), RBC counts, the mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were determined by employing standard routine manual procedures in practice.

The data were analyzed by using 't' test to examine the level of significance by the method of Steel and Torri (1988).

Table 1: Haematological values of some anaemic ruminants

Parameter	Status	Cow	Sheep	Goat
Hb (g/dL)	Anaemic	7.3±0.707 ^A	8.2±0.139 ^A	5.1 ±0.130 ^A
	Non anaemic	13.4±0.121 ^B	12.9±0.850 ^B	11.6±0.478 ^B
PCV (%)	Anaemic	22.0±0.403 ^A	24.0±0.447 ^A	15.3±0.392 ^A
	Non anaemic	40.2±0.412 ^B	34.4±0.220 ^B	33.8±0.145 ^B
RBC (×10 ⁶ /μL)	Anaemic	4.9±0.222 ^A	8.0±0.411 ^A	7.0±0.190 ^A
	Non anaemic	8.2±0.192 ^B	10.0±0.398 ^B	12.0±0.212 ^B
MCV (fL)	Anaemic	44.8±0.791 ^A	30.0±0.397 ^A	21.8±0.199 ^A
	Non-anaemic	48.7±0.697 ^B	34.4±0.211 ^B	28.1±0.322 ^B
MCH (pg)	Anaemic	14.8±0.325 ^A	10.2±0.502 ^A	7.2±0.455 ^A
	Non-anaemic	16.3±0.422 ^A	12.9±0.612 ^B	9.6±0.501 ^B
MCHC (g/dL)	Anaemic	33.1±0.531 ^A	34.1±0.333 ^A	33.3±0.491 ^A
	Non-anaemic	33.5±0.209 ^A	37.5±0.400 ^B	34.3±0.388 ^B
Prevalence of anaemia		2/18 (11%)	10/29 (34%)	6/22 (27%)

Mean ±SEs bearing superscripts (A, B) differ significantly ($p < 0.05$) between anaemic and non-anaemic animals.

RESULTS AND DISCUSSION

The results of the present study depicted in Table 1 revealed that all the ruminants species examined suffered from anaemia.

Haematological Parameters of Cattle

Out of 18 cattle examined, anaemia was found only in 2 animals showing an overall prevalence rate of 11%. The mean packed cell volume (%), red blood cell count ($\times 10^6 / \mu\text{L}$), haemoglobin (g/dL) and MCV were significantly lower in anaemia than normal cattle (Table 1), at the same time there was no significant reduction in MCH and MCHC level. Our results corroborated with the reports of Minnat *et al.* (2016) and Gaston *et al.* (2021), where a significant decrease in RBC, PCV and Hb of infected or toxic cattle was recorded as compared to healthy ones.

Haematological Parameters of Sheep and Goats:

The data presented in Table 1 revealed that Hb, PCV %, RBC, MCV, MCH and MCHC were found to be significantly lower in anaemic sheep and goats as compared to normal sheep and goats. On the basis of haematological study there was 34% and 27 % prevalence of anaemia in sheep and goat, respectively. Our results in sheep and goats agreed with significant decrease in all haematological parameters of anaemic sheep in Baghdad (Singh *et al.*, 2017; Ali *et al.*, 2020), goat of South Africa (Jegade *et al.*, 2015; Squire *et al.*, 2016; McManus *et al.*, 2020; Mpofu *et al.*, 2020; Monau *et al.*, 2020) and of Giza (Hassan *et al.*, 2019). In the present study anaemic conditions might be due to the heavy parasite infestation because most of these animals revealed respiratory and nervous clinical signs.

The findings of the present study revealed that the highest prevalence of anaemia was in sheep followed by goats and less common in cattle. The type of anaemia in sheep and goats was microcytic hypochromic, while in cattle

it was microcytic normochromic. As per Hb levels, there was sub-clinical hypochromic anaemia in sheep and goats.

REFERENCES

- Ali Rafid Khalid, Obaid Aula Hassoon, Nawfal Ahmed Jasim, Kareem Mohammad Hamid, & Hasan Mustafa Salah (2020). Haematological investigation of anaemia of local breed sheep in middle of Iraq. *International Journal of Pharmaceutical Research, 12*(2), 907-910
- Gaston Alfaro, Sandra L. Rodriguez-Zas, Bruce R. Southey, Russell B. Muntifering, Soren P. Rodning, Wilmer J. Pacheco, & Sonia J. Moisés (2021). Complete blood count analysis on beef cattle exposed to fescue toxicity and rumen-protected niacin supplementation. *Animals, 11*, 988.
- Grimes, C.N., & Fry. M.M. (2015). Non-regenerative anaemia: Mechanisms of decreased or ineffective erythropoiesis. *Veterinary Pathology, 52*(2), 298-311.
- Hassan, N.M.F., Farag, T.K., Abu El Ezz, N.M.T., & AbouZeina, H.A.A. (2019). Prevalence assessment of gastrointestinal parasitic infections among goats in Giza Governorate, Egypt. *Bulletin of National Research Centre, 43*, 127.
- Ismael Zainab Sharaf, & Al-Samarai Firas Rashad (2019). Effect of *Theileria annulata* infection detected by qPCR technique and some factors on haematological parameters in the Iraqi local cows. *Biochemistry Cell Architecture, 19*(2), 3345-3352.
- Jegade, O.C., Adejoh, A.A., Obeta, S.S., & Olayemi, O.D. (2015). Gastrointestinal parasites of sheep and goats in Gwagwalada area council, federal capital territory, Abuja, Nigeria, with a special reference to sex, breed and age. *Alexandria Journal of Veterinary Science, 46*(1), 170-176.
- Katsogiannou, E., Athanasiou, L., Christodoulouopoulos, G., & Polizopoulou, Z. (2018). Diagnostic approach of anaemia in ruminants. *Journal of the Hellenic Veterinary Medical Society, 69*(3), 1033-1046.
- McManus, C.M., Faria, D.A., Lucci, C.M., Louvandini, H., Alcantra, S., & Paiva, S.R. (2020). Heat stress effects on sheep: are hair sheep more heat resistant? *Theriogenology, 155*, 157-167.
- Minnat, T., Hanash, A., & Ibrahim, W. (2016). Study of clinical, epidemiological and haematological changes of



- heamoparasites infection in cattle of Diyala province-Iraq. *Research Journal of Pharmacy and Biological Chemical Science*, 7, 3094-3102.
- Monau, P., Raphaka, K., Zvinorova-Chimboza, P., & Gondwe, T. (2020). Sustainable utilization of indigenous goats in Southern Africa. *Diversity*, 12(1), 20.
- Mpofu, T.J., Nephawe, K.A., & Mtileni, B.J. (2020). Prevalence of gastrointestinal parasites in communal goats from different agro-ecological zones of South Africa. *Veterinary World*, 13(1), 26-32.
- Sanyal Mahima, Patil Purnima, Jaiswal Ekta, & Deshmukh Aparna (2013). Invited review: Structural and functional diversity of haemoglobin molecule properties amongst different classes and species of animals. *Acta Biologica Indica*, 2(2), 381-387.
- Singh, E., Kaur, P., Singla, L.D., & Bal, M.S. (2017). Prevalence of gastrointestinal parasitism in small ruminants in western zone of Punjab, India. *Veterinary World*, 10(1), 61-66.
- Soundarya, N., & Suganthi, P. (2016). Review on anaemia: Types, causes, symptoms and their treatments. *Journal of Science and Technology Investigation*, 1, 10-17.
- Squire, S.A., Robertson, I.D., Yang, R., Ayi, I., & Ryan, U. (2019). Prevalence and risk factors associated with gastrointestinal parasites in ruminant livestock in the Coastal Savannah zone of Ghana. *Acta Tropicana*, 199, 105-126.
- Steel, R.G., & Torri, J.H. (1988). *Principles of Statistics: A Biometrical Approach*. 2nd edn., McGraw-Hill, New York, p. 693-696.