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DIAGNOSING POST PARTURIENT HEMOGLOBINURIA IN GOAT ON THE BASIS OF HEMATOLOGY, SERUM BIOCHEMISTRY AND TREATMENT RESPONSE

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ABSTRACT

Goats are extremely prone to many metabolic diseases including Postparturient Hemoglobinuria (PPH) and due to this disorder milk production and general health of goats get affected. Exact pathogenesis of this condition is yet not known but many risk factors are considered to be involved in hemoglobinuria and dropped serum phosphorus level followed by parturition is considered to be the most important one. In this paper, economic significance of goat, a case report and diagnosis based on hemogram and serum biochemistry report and the best available treatment protocols are discussed.

KEYWORDS

Goat, Hemoglobinuria, Metabolic Disorder, Serum biochemistry, Treatment.

1. INTRODUCTION

Goats are reared as a good source of milk and meat throughout the world especially in the developing countries and due to this reason often called the 'cow of indigent'. Approximately 90% of the total global population of goats is present in the developing countries and 58% of it is present in Asia. Amongst Asian countries, Pakistan, China, India and Bangladesh are the major hosts of the goat population [1]. Pakistan host 74.1 million heads of goats and goat farming is contributing 2.5% in the total national income of Pakistan which is well-depicted by the fact that goats give 717000 tons mutton, 915000 tons milk and 28560000 skins annually [2]. People who are allergic to cow milk use goat milk as a better alternative of cow milk [3]. Goat skin is used to manufacture bags, boots and gloves as these things require soft leather [1]. Significance of goat farming is increasing day by day as an alternate source of income and employment. Along-with employment to the whole family, these animals also give food, money, serve as a saving source and are serve the ceremonial utilization purposes. Goats are extremely prone to many metabolic diseases including Postparturient Hemoglobinuria (PPH) and due to this disorder milk production and general health of goats get affected [4]. Vernacular name of the disease in many parts of Pakistan is "*Rut Mootra*". PPH was first reported in the second half of the nineteenth century in the Scottish cattle after parturition [5]. The disease has been reported in sporadic cases affecting one or two animals in a herd at a time and has also got economic importance due to decrease in milk yield, cost of treatment and high case fatality rates [6].

This condition is characterized by intravascular hemolysis, anemia, hemoglobinuria and hemoglobinemia [7,8]. Exact pathogenesis is yet not known but many risk factors are considered to be involved in hemoglobinuria. Of them, presence of saponins in fodders like barseem, ingestion of cruciferous plants, drinking of cold water, deficiency of phosphorus, copper and selenium and increased level of molybdenum are considered to be important ones [9]. After parturition, the condition of hemoglobinuria is mostly observed in high production animals primarily being contributed by excessive drainage of phosphorus reserves from circulation into the milk [10]. Phosphorus is crucial to maintain the integrity of cell membrane of erythrocytes. At parturition, if there is deficiency of phosphorus in serum, erythrocytes become fragile and start to lyse resulting in hemoglobinuria and haemoglobinaemia [11]. Decreased serum copper level leads to poor activity of superoxide dismutase that protects erythrocytes from oxidative stress. So as a result of depleting copper levels, erythrolysis starts leading to hemoglobinemia and hemoglobinuria [9, 12].

2. MATERIALS AND METHODS

A 3-years old goat was presented to the Outdoor Patient Department (OPD) of Clinical Medicine and Surgery, University of Agriculture, Faisalabad with the primary complaint of passing the reddish urine. History revealed that the goat has parturated three days ago and all the kids were viable. All the vital parameters including temperature, respiration and pulse were normal. The only abnormality revealed upon complete physical and clinical examination was mildly anemic conjunctivae. Tentative diagnosis based on history and clinical findings was made as post-parturient hemoglobinuria (PPH) and differentially diagnosed from Bacillary hemoglobinuria and tick-borne intra-erythrocytic infections as there was no elevation of body temperature and lymph nodes were non-palpable. For confirmatory diagnosis, blood was collected from the juglar vein and put in anti-coagulant added vacutainer and gel-clot vacutainer for complete blood count (CBC) and serum biochemistry, respectively.

3. RESULTS

The results of CBC indicated that the hemogram of the animal is depressed with RBC count, hemoglobin concentration and packed cell volume (PCV) 4.9 × 10^6/µL, 8.1 g/dL and 18%, respectively. Other hematological parameters were as under:

Hematological Parameter	Patient Value	Normal Range	Unit
Hemoglobin	8.1	8-12	g/dL
PCV	17	22-38	%
RBC Count	4.9	8-18	$\times 10^6/\mu L$
WBC Count	14.4	4-13	$\times 10^9/L$
Platelets	257	800-1100	$\times 10^9/L$
Neutrophils	50	30-48	%
Lymphocytes	47	50-70	%
Monocytes	2	0-4	%
Eosinophils	1	1-8	%
Basophils	0	0-1	%
Neutrophils	7.2	0.7-6	$\times 10^9/\mu L$
Lymphocytes	6.8	2-9	$\times 10^9/\mu L$
Monocytes	0.3	0-0.75	$\times 10^9/\mu L$
Eosinophils	0.1	0-10	$\times 10^9/\mu L$
Basophils	0.0	0-0.3	$\times 10^9/\mu L$

Serum Biochemistry

Hematological Parameter	Patient Value	Normal Range	Unit
Phosphorus	5.8	4.2-9.1	(mg/dL)
Calcium	10.5	8.9-11.7	(mg/dL)
Copper	0.5	0.52	mg/dL

Serum biochemistry revealed that there was severe drop in serum phorphorus level. However, other electrolytes including copper were within the reference ranges.

4. DISCUSSION

There are a number of different treatment protocols that can be adopted to save the life of the animal and the choice is dependent upon severity of the condition and degree of anemia. In this particular case, 3ml intramuscular administration of taldimfos sodium (New Decaphosphone®) was done for three consecutive days. No fluid therapy was conducted because of depressed hemogram and chances of further hemodilution. Penicilline was administered intramuscularly to control secondary infections and to reduce chances of incidence of mastitis.

In long standing and highly anemic cases, whole blood transfusion is recommended [13]. Intravenous administration of phosphorus rich 60 grams of sodium hydrogen ortho phosphate ($NaH_2PO_4.2H_2O$) dissolved in 5% dextrose solution followed by per-oral administration of the same dose twice a day for three consecutive days has also been proven to alleviate the condition [14,15]. 20% solution of sodium acid phosphate administered intravenously followed by subcutaneous and oral route have been found to recover the animal within three days [16]. As a prophylactic measure to reduce the incidence of PPH, administration of glycerin and removal of cruciferous fodders from the diet of the animals near parturition and replacement of phosphorus rich concentrate are advisable [17]. The successful treatment of 15 buffaloes in the Indian Punjab with administration of 2g of copper sulphate in 500ml of water orally daily for 3-5 days. Copper glycinate @ 1.5mg/kg dissolved in 540 ml of the normal saline solution and administered IV was found very effective in the nutritional hemoglobinuria [18]. A group researchers reported the treatment of PPH in buffaloes by IV infusion of copper glycinate and oral administration of DCP [19]. Some researchers successfully treated a buffalo with supportive therapy and Phosphorus supplementation in the form of injection of sodium salt of 4-dimethylamino-2 methylphenyl-phosphinic acid 0.2 gm (15 ml preparation) twice a day for 3 days and administration of sodium acid phosphate 40.3% weight/volume (w/v) (equivalent to elemental phosphorus 8 % w/v) 50 ml suspensionin 1L normal saline via IV route once a day for 7 days [4]. After the treatment there was improved blood phosphorus levels, TEC, PCV and Hb concentration. Each of these treatment protocols have been shown to possess own pros and cons. In the present case, administration of New Decaphosphon® was found to be highly effective in restoring the serum phosphorus levels in prompt manner and did not account for heavy economical burden on the farmer and laborious in terms of man-power and time.

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