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Hemoglobinuria induced by excessive mustard oil cake feeding in a buffalo: A case report

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Abstract

Nutritional hemoglobinuria is an important metabolic disorder of high-producing dairy buffaloes and is commonly associated with hypophosphatemia, oxidative damage to erythrocytes, and dietary factors. A seven-year-old pregnant buffalo presented with coffee-colored urine for three days. Hematological examination showed mild anemia (hemoglobin: 7 g/dL, PCV: 21%, TEC: 5 million/ μ L), while serum biochemical analysis revealed hypophosphatemia (inorganic phosphorus: 3 mg/dL). Blood smear examination was negative for hemoparasites. The animal had a history of excessive mustard oil cake consumption (approximately 20-25 kg over 10 days), suggesting nutritional hemoglobinuria due to oxidative hemolysis induced by cruciferous plant constituents. Treatment with intravenous sodium acid phosphate, ascorbic acid, antihistamines, and supportive hematinic therapy, along with withdrawal of mustard oil cake from the diet, resulted in complete clinical recovery without recurrence.

Keywords: Buffalo, cruciferous plants, nutritional hemoglobinuria, mustard oil cake

1. Introduction

Nutritional hemoglobinuria is an important metabolic disorder of high-producing dairy buffaloes, particularly during late pregnancy and the early postpartum period. The condition is characterized by acute intravascular hemolysis, resulting in hemoglobinemia, hemoglobinuria, anemia, weakness, and a marked decline in milk production ^[1]. Although its exact pathogenesis remains incompletely understood, persistent hypophosphatemia is considered the principal predisposing factor. Other contributing factors include deficiencies of trace minerals such as copper and selenium, oxidative damage to erythrocytes, and the consumption of cruciferous plants containing haemolytic and oxidative compounds ^[2]. The cruciferous (brassica) group plants fed in large amount for prolonged period results in its toxicity. Hemoglobinuria is the first and the most striking sign of this toxicity ^[3].

2. Materials and Methods

2.1. Case history and laboratory tests

A seven year old buffalo case in village-Shakhwa, Block-Bithan, Samastipur, Bihar was affected with coffee-coloured urine discharge since 3 days (Figure 1). The animal was three months pregnant and had calved seven months prior to presentation. Appetite, rumination and defecation was normal, body temperature was within range but mucus membrane was slightly pale. It had an unusual history of feeding with large amount of mustard oil cakes, approx. 20-25 kg within last ten days as informed by the owner. Haemtological, biochemical and microscopic blood smear examination was performed.

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Fig 1: Buffalo with coffee-coloured urine discharge

2.2. Treatment

Treatment consisted of intravenous sodium acid phosphate (50 mL every 12 hours for three doses), intravenous ascorbic acid (5 mg/kg once daily for seven days), and antihistamines. Supportive therapy was done with injection - vitamin B-complex, iron sorbitol and folic acid combination and copper, cobalt and iron containing oral hematinics. It was suggested to stop feeding mustard oil cakes to buffalo for few days. The animal responded favourably to treatment, with complete clinical recovery and no subsequent complications.

3. Results and Discussion

Hematological test revealed mild anemia with haemoglobin concentration 7 mg/dL, PCV- 21% and TEC-5 millions/ μ L. Biochemical test of serum showed decreased inorganic phosphorus concentration (3 mg/dL). Microscopic blood smear examination was negative for hemoparasite. There was no recent parturition in the animal. The buffalo had history of excessive mustard oil cakes feeding from few days. So the history and lab tests suggested nutritional cause behind hemoglobinuria. Mustard oil cake contains glucosinolates and S-methyl cysteine sulfoxide (SMCO), which are metabolized by microorganisms in the rumen into oxidative compounds. These oxidants injure the membranes of red blood cells (RBCs), causing extensive intravascular hemolysis [4]. Cruciferous plants contain saponins which causes hemolysis by increasing surface tension of RBCs [3]. Treatment included supplementation with phosphorous, copper, cobalt and iron to manage hypophosphatemia and anemia [5]. Ascorbic acid was given to manage oxidative stress associated damage to erythrocytes [6].

4. Conclusion

This case demonstrates that excessive feeding of mustard oil cake can precipitate nutritional hemoglobinuria in buffaloes, particularly in the presence of hypophosphatemia. A detailed dietary history, supported by hematological and biochemical investigations, is essential for accurate diagnosis and differentiation from infectious causes of hemoglobinuria. Early phosphorus supplementation, antioxidant therapy, and appropriate supportive treatment, combined with immediate correction of the feeding regimen, can lead to a favorable clinical outcome.

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Author's Contribution

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Conflict of Interest

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5. References

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