

Chapter 1

ABSTRACT

A 9 months old male Jamuna Pari goat weighing about 35 kg was presented with the history of chronic ingestion of grain, recumbency and off-fed. Signs of incoordination, lateral recumbency with opisthotonus posture were identified during the clinical examination. The goat found to be responded promptly with thiamine indicated that, the goat was suffering from polioencephalomalacia. After diagnosed tentatively similar treatment was continued along with dextrose saline (10ml/kg intravenously) and found to be recovered after 4 days.

Key words: Polioencephalomalacia, goat, opisthotonus, thiamine

Chapter 2

INTRODUCTION

Thiamine deficiency or polioencephalomalacia (PEM) is a frequent metabolic illness and an important neurological disease process in goats characterized by neuromuscular abnormalities. This condition can be either acute or sub-acute. Adult and juvenile animals are both at risk of having the disease. Animals under high nutritional management, such as feedlots or animals on lush pasture fed with highly concentrated rations are more likely to have PEM (Anuradha *et al.*, 2010). It can occur due to the deficiency of thiamine and could affect many species of ruminants and contributes to substantial economic loss to livestock industry (Sivaraman *et al.*, 2016).

In normal ruminal environment, the bacteria and protozoa in the rumen generate thiamine (vitamin B1) that plays an important role in carbohydrate and amino acid metabolism and supplying the energy in nervous system and muscle. Any alteration in the ruminal environment will impair thiamine production by natural microorganisms, enhance thiamine breakdown, or prevent thiamine from working correctly can cause nerve weakness and partial paralysis of muscle. (Maxwell., 1980).

In sub-acute acidic rumen that is ruminant with high grain feed, thiamine which is generated in the rumen is destroyed by thiaminases produced by *Bacillus* sp. and *Clostridium sporogenes*, as well as decreased thiamine uptake by transporters (Xiaohua *et al.*, 2018). As a result of lower level of thiamine resulting the decreases synthesis of carbohydrates causes the low level of carbohydrate in blood level. (De Sant'Ana, *et al.*, 2010). Thus, thiamine deficiency causes a reduction in the availability of carbohydrates in blood as well as to the brain's neurons which is required as an energy source for nerve function. Carbohydrate deficiency produces changes in the nervous system's mode of action as well as neuronal death (Mohanambal *et al.*, 2017).

In the metropolitan area of Chattogram most of the goats are usually rear in an intensive system. They offered an excessive amount of grain feed to their animals because of their availability and low level of roughages due to its scarcity. However, due to this feeding practices, animals are suffering from subacute ruminal acidosis, which may cause thiamine deficiency and ultimately the polioencephalomalacia. Some affected cases remain unnoticed due to lack of knowledge and delayed diagnosis. Some acutely affected animals die due to inaccurate diagnosis and ultimate wrong treatment resulting in significant economic losses of farmers and the country. Moreover, to the best of our knowledge no report has been documented on the diagnosis and treatment of polioencephalomalacia in goats in Bangladesh. Therefore, this case report may would help the clinician for the proper diagnosis and accurate treatment of polioencephalomalacia in goats.

Chapter 3

MATERIALS AND METHOD

Case description and clinical history:

A 9 months old male Jamuna Pari goat was attended in Rahamatganj area, Chattogram with the history of weakness, loss of appetite and lateral recumbent for last 24 hours on 18th June 2021. The history of intake of excessive concentrate and decrease amounts of roughages were also revealed during cross questioning. The animal was not dewormed and no previous treatment was taken.

Clinical examination:

On clinical examination, the rectal temperature and respiratory rate were found normal. The patient became lateral recumbent with opisthotonus posture and started paddling movement. When the patient was turned and positioned on the other side of the lateral recumbency, it tried to roll back to the same posture with its head tilted upwards.

Laboratory examination:

For further confirmation and differential diagnosis, a total of 4 ml blood was collected from the jugular vein of the buck with the sterilized syringe. Two ml was stored in a sodium citrate tube (without heparin) for serum analysis and remaining 2 ml blood was stored in a sterilized tube containing dipotassium ethylenediaminetetraacetic acid for CBC analysis, labeled carefully and sent to biochemistry and physiology lab.



Figure 1. Lateral recumbent position in goat (top left), Head tilted upward in goat (top right), Health checkup after recovery (bottom left)

Diagnosis:

A presumptive diagnosis of polioencephalomalacia was made on the basis of clinical history and characteristics clinical signs. Initially, the animal was treated with thiamine hydrochloride (Thiason, Jayson Pharmaceuticals limited, 10 ml vial) at 20mg/kg body weight intramuscularly and dextrose normal saline (10ml/kg) intravenously and was observed intensively. After 2 hours of the parenteral administration of medicine the health condition of the animal found improving such as the goat was able to stand without support and the intensity of nervous signs were disappearing gradually. The animal was under observation for 4 more days with continuing the similar treatment.

The Blood biochemical values revealed that, there were reduction of calcium, glucose and total protein compared to the normal range. Phosphorus and magnesium level found in normal range (table 1).

Table 1: Blood biochemical value before treatment

Name of the test	Results	Normal ranges
Calcium	7.01mg/dl	9.0-11.6mg/dl
Phosphorus	4.63mg/dl	3.7-9.7mg/dl
Magnesium	2.09mg/dl	2.1-2.9mg/dl
Glucose	38.15mg/dl	48-76mg/dl
Total protein	3.75g/dl	6.1-7.5g/dl

On haematological analysis, all blood parameters were found to be normal in range (table 2)

Table 2: Blood examination report before treatment

(Estimation are carried out by celtec alpha)

Name of the test	Results	Normal ranges
Heamoglobin	9.7	8-12gm%
ESR (wintrobe method)	0.0	0mm 1hr
Total count		
Total count of TEC	8.9	8-18(million/cumm)
Total count of TLC	13.0	4-13(thousand/cumm)
Differential count of WBC		
Lymphocytes	55	50-70%
Neutrophils	35	30-48%
Eosinophils	5	1-8%
Monocytes	5	0-4%
Basophils	0	0-1%

Though the thiamine concentration could not measure due to lack of facilities, response to treatment with thiamine somehow proves that, the animal was primarily suffering from thiamine deficiency with other minor metabolic disorders. Therefore, after analyzing clinical history, clinical signs, laboratory findings and response to treatment with thiamine, the animal was tentatively diagnosed as having polioencephalomalacia.

Treatment:

The treatment was continued with thiamine (20mg/kg) intramuscularly, dextrose saline (1ml/10kg) intravenously as initially given. Calcium (0.5 ml/kg) and vitamin-mineral preparation (1ml/10kg,) were supplemented intravenously with previous treatment for the elimination of the deficiencies. After 4 days of continuous treatment, the goat was completely recovered.

Chapter 4

RESULTS AND DISCUSSION

Polioencephalomalacia is a non-infectious metabolic disorder of ruminants and is characterized by neurological manifestations (Radostits *et al.*, 2007). In case of this goat, blood was examined for both haematological and biochemical parameters. In hematological investigation, all blood parameters found normally indicate that, the animal was not suffering from any infectious disease. In the contrary, biochemical analysis showed lower than the normal values of calcium and glucose that could be the responsible of neurological disorder of the goat. However, since the goat was positively responsive against thiamine and clinical signs does not match with hypocalcemia as well as hypoglycemia, we can say that, the animal was suffering from thiamine deficiency.

Moreover, According to Radostits *at el.*, the temperature showed normal with other clinical signs including head pressing, recumbency, opisthotonus, an extension of the limb, nystagmus, etc. in polioencephalomalacia in goats are coincide of our findings which indicate that the animal was suffering from PEM.

As the thiamine treatment was given immediate after onset of clinical signs and the animal was very well responsive which is supported by earlier reports where they had reported that, drug of choice for polioencephalomalacia is thiamine hydrochloride at 10 mg/kg BW IV initially and followed by similar doses at 3 hours interval for a total of 5 treatments. When treatment is given within a few hours of the onset of signs, a beneficial response within 1-6 hours is expected, and complete recovery can occur in 24 hours (Radostits *et al.*, 2007).

In delayed diagnosis and treatment, complete clinical recovery might not be possible. In that case, administration of dexamethasone (0.5 to 1 mg/kg BW, I/M) was recommended to decrease edema and inflammation of the brain (Sivaraman *et al.*, 2016).

In the month of September to December, the number of occurrences was higher in case of polioencephalomalacia (Mohanambal *et al.*, 2017). According to Mohanambal *et al.*, Thiamine (Tribivet) was given intravenously BID for 7 days at a dose of 20 mg per kilogram of body weight.

According to Anuradha *et al.*, Thiamine at 10-20 mg per kg body weight, i.e., Inj. Tribivet (Thiamine hydrochloride 50 mg/ml), was given intravenously BID for 2 doses depending on severity and body weight, and then BID intramuscularly till recovery and use Procaine Penicillin at 10000 IU per kg body weight I/M, since the drug is chosen for clostridia sp. The goat under the present study was fed with highly concentrated feed and boiled rice. It could be the potential reason for excessive carbohydrate in the rumen with resultant thiamine deficiency (Deepa.,2020). If the treatment is delayed, the chance of irreversible brain damage may increase. Hence, the treatment should be started from the very first hour of symptoms appearance rather than waiting for laboratory findings. Moreover, due to the lack of confirmatory diagnostic tools, it is essential to diagnose the disease according to response to treatment. In that sense, in this case, treatment with thiamine before the laboratory finding may found some justification to save the life of this goat.

Limitation:

No available facility was found to determine erythrocyte transketolase activate and thiamine level in animal in our laboratory as well as in our country. As a result, we could not determine the level of thiamine in this case to confirm the diagnosis of PEM.

Chapter 5

CONCLUSION

The case study shows that proper diagnosis and treatment, that can save the life of goats that are suffering from polioencephalomalacia. The field veterinary can use the procedure to treat the animal suffering from similar clinical manifestations. This case study helps the poor owner of the goat to offer the treatment of polioencephalomalacia affected goat at a lower cost.

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ACKNOWLEDGEMENTS

All praises are due to the Almighty God, whose blessings have been enabled the author to accomplish this work.

The author expresses his wholehearted senses of gratification, a sincere appreciation to his respected teacher and supervisor **Prof. Dr. Mohammad Yousuf Elahi Chowdhury**, Professor, Department of Medicine and Surgery, Chattogram Veterinary and Animal Sciences University, whose ingenuous and scholastic advice, judicious recommendations, constructive criticism, continuous encouragement and untiring assistance have guided the author from the beginning of inception of intern studies until to the completion of this report.

Prof. Dr. Mohammad Alamgir Hossain, Dean of FVM, and **Prof. Dr. A.K.M Saifuddin**, Director of External Affairs, deserve special gratitude for providing this exceptional internship and research experience to the author.

BIOGRAPHY

I am Shayantan Dutta, son of Samar Chandra Dutta and Kakali Dutta. I passed my Secondary School Certificate (SSC) examination from Chattogram Collegiate School, Chattogram in 2012 and Higher Secondary Certificate (HSC) examination from Hazi Mohammad Mohsin college, Chattogram in 2014. I enrolled for Doctor of Veterinary Medicine (DVM) degree in Chattogram Veterinary and Animal Sciences University (CVASU) Bangladesh during 2015-16 session. I have immense interest to work in the field as a veterinarian and do social work with different organization to improve the condition of our sector.