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Osteodystrophy Fibrosa in a Goat Kid: Clinical Assessment and Management

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Fibrous osteodystrophy is a mineral based caprine metabolic disease in which bones are resorbed as a result of prolonged hypersecretion of parathyroid hormone. High phosphorus or low calcium in the diet frequently contributes to fibrous osteodystrophy. This was a case of 8 months old kid presented to the Referral Veterinary Polyclinic of ICAR-IVRI with the history of anorexia and prominent bilateral facial swelling. History-taking revealed that owner was regularly feeding wheat bran and barley to the kid in the diet. On clinical examination, goat kid was found to be dull and depressed with rectal temperature lying within the normal reference range. Haematobiochemical analysis exhibited decreased level of serum calcium (7 mg/dl) and increased level of serum phosphorus (8.2 mg/dl). In dorsovental cephalometric radiography, facial bones appeared radiolucent. Treatment of osteodystrophy began with the administration of injection AD_3E at the

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dose of 1 ml I/M for 5 days, injection pheniramine maleate (Avil™) at 1 ml I/M for 5 days, syrup Calcimust™ at 5 ml PO for 5 days and injection Calcium sandoz™ at 10 ml mixed with 200 ml NSS I/V SD and anabolic steroid Nandrolone at 50 mg SD. Concurrently, the owner was advised to immediately stop feeding wheat bran and barley to the kid. After 5 days of the treatment, kid's condition started to improve and uneventful recovery was achieved 14 days post-therapy.

Keywords: Calcimust; radiolucent; metabolic disorder; parathyroid hormone; wheat bran.

1. INTRODUCTION

Osteodystrophy is a broad term used to encompass conditions where bones either fail to develop normally or experience abnormal metabolism despite being mature. Fibrous osteodystrophy is also called as osteitis cystic fibrosa [1]. Osteodystrophia fibrosa is a metabolic disorder in goats caused by inadequate bone mineralization, excessive bone breakdown, and improper bone formation, which results in the buildup of fibrous connective tissue over time as a result of prolonged hyper secretion of parathyroid hormone [2]. The parathyroid gland regulates calcium levels in the body by producing parathyroid hormone (PTH). When levels of ionized calcium in the bloodstream are low, PTH stimulates the breakdown of bone by osteoclasts, leading to an increase in circulating ionized calcium [3]. High phosphorus or low calcium in the diet (Inappropriate Ca to P ratio) frequently contributes to fibrous osteodystrophy [4]. Initially, clinical symptoms include increasing lethargy, challenges with eating and drinking, loss of weight, and a tendency to lie down. The mandible is the bone most prone to displaying noticeable abnormalities, although over time, all bones may be affected. Animals that are affected may exhibit difficulty walking or experience pain, and some may even be unable to stand, as a result of pathological fractures that can spontaneously happen in weakened bones [5]. After being weaned, goats of all breeds and ages are vulnerable to this condition. Diagnosis of the disease is mainly based on haematobiochemical analysis and radiography [6-8]. Treatment is done with calcium supplementation and anabolic steroids [9]. Anabolic steroids have been shown to increase bone density, strength and stimulate the collagen synthesis, thus improved bone matrix formation.

2. CASE PRESENTATION

This was a case of 8 months old kid presented to the Referral Veterinary Polyclinic of ICAR-IVRI with the history of anorexia due to inability in mastication and spontaneous prominent non inflammatory bilateral facial swelling. History-taking revealed that owner was regularly feeding wheat bran and barley to the kid in the diet. On clinical examination we found that, goat kid was found to be dull and depressed with rectal temperature lying within the normal reference range and there was prominent bilateral facial swelling, difficulty in opening the mouth. On the haematobiochemical analysis we found that there was decreased level of serum calcium 7 mg/dl (Normal reference range is 8-12 mg/dl) and increased level of serum phosphorus 8.2 mg/dl (Normal reference range is 4-6 mg/dl). The Ca to P ratio is 1:1.17 instead of normal 2:1 [10] On dorsoventral cephalometric radiography, facial bones were found radiolucent (Fig. 2).

Fig. 1. Prominent bilateral facial swelling

Fig. 2. Facial bones appear radiolucent

3. TREATMENT

Initially the treatment was started with Injection AD_3E at the dose of 1 ml I/M for 5 days, Injection pheniramine maleate (Avil™) at dose of 1 ml I/M for 5 days, Injection Calcium sandoz™ at 10 ml mixed with 200 ml NSS I/V SD, Syrup Calcimust™ at 5 ml PO for 5 days and anabolic steroid Nandrolone at 50 mg SD. It is advised to the owner of goat's kid to stop feeding of wheat bran and barley to the kid, After 5 days of the treatment, kid's condition started to improve and there was uneventful recovery achieve 14 days post-therapy.

4. DISCUSSION

Finally, this case illustrates how dietary imbalances might have a negative impact on the development of fibrous osteodystrophy in goats. Excessive bone resorption caused by a protracted hypersecretion of parathyroid hormone is the condition's hallmark, and high phosphorus or low calcium diets frequently make it worse. In this case, an 8-month-old goat kid fed a diet mainly consisting of wheat bran and barley displayed clinical symptoms compatible with fibrous osteodystrophy. Prompt diagnosis and intervention were essential in managing the condition. Treatment, which included a combination of injectable and oral supplements along with anabolic steroid aimed at correcting metabolic imbalances and promoting bone health, coupled with dietary modification, yielded positive results. Within a short period, the kid's condition showed significant improvement, and complete recovery was achieved within 14 days post-therapy.

5. CONCLUSION

This case report highlights the critical importance of maintaining a balanced diet in preventing metabolic disorders such as fibrous osteodystrophy in goats. The presented case of an 8-month-old goat kid demonstrates how an improper calcium-to-phosphorus ratio in the diet, particularly due to the excessive feeding of wheat bran and barley, can lead to significant bone resorption and clinical signs of osteodystrophy. Timely diagnosis through hematobiochemical analysis and radiographic imaging, combined with appropriate therapeutic interventions including calcium supplementation, anabolic steroids, and dietary adjustments, resulted in a favourable outcome with complete recovery within 14 days.

The findings underscore the need for continued vigilance and education among goat owners and veterinarians regarding the nutritional management of goats to prevent such metabolic disorders. Future implications of this case emphasize the necessity for routine monitoring of dietary components and early intervention strategies to manage and prevent similar cases of fibrous osteodystrophy, ensuring the health and productivity of goats in the long term.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

I hereby declare that no generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

ETHICAL APPROVAL

Animal Ethic committee approval has been collected and preserved by the author(s)

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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