



Clinical study of Rickets in buffalo calves

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Abstract

Rickets has its necessary for sucking buffalo calves, which are related to lame and recumbency, so we conducted the present study in Basrah during the period from September 2021 to March 2022. It subjected calves to close clinical examination. Blood samples with anti-coagulant tubes were collected from buffalo calves to estimate serum calcium, phosphorus, and vitamin D3 concentration. The results revealed no significant difference in vital signs in affected calves. The main clinical signs reported that rickets in the present study included; enlargement of joints especially the swelling of the metaphysis of metacarpus and metatarsus bones, abnormal curvature of long bones, abnormal sternal position, and prolonged recumbence. There was a significant decrease ($P < 0.05$) in the serum concentrations of calcium, phosphorous, and vitamin D3 of diseased buffalo calves to control, farther there was a non-significant slight change in calcium/phosphorus ratio ($P \geq 0.05$). The unweaned buffalo calves in Basrah can be affected by Rickets, the disease manifested clinically by bending limbs and swelled joints with the most recumbency time.

Introduction

Rickets is an illness of young, growing calves, also produced by imbalances of dietary calcium, phosphorus, and vitamin D (Hodnik et al., 2020; Ahmadi & Mohri, 2021). The etiology of the diseases was important to preventing exposure to ultraviolet rays in winter and spring and for those animals kept in dark, damp, and cold rooms (Hernigou et al., 2019). The principal function of vitamin D is to maintain serum calcium and phosphorus concentrations in a range that supports cellular processes, neuromuscular function, and bone ossification (Gröber et al., 2013; Dittmer & Thompson, 2011).

So the affected calves will suffer from bone pain, stiff gait, swelling in the metaphyses, difficulty in rising, bowed limbs, and sometimes pathologic fractures (Uhl, 2018; Babazadeh et al., 2022). The clinical features involve all the major limb joints (El Khasmi & Faye, 2019; Holick, 2017).

The diagnosis of the disease depends on the clinical manifestation and predisposing nutrient deficiencies (Kumari & Kumar, 2014; Carpenter et al., 2017). It's very important to differentiate rickets in buffalo calves from other diseases by blood and biochemical analysis for vitamin D and minerals levels (Huo & Shen, 2020; Ali and Al-Amery, 2013). radiographs of long bones, and bone biopsies will help confirm the diagnosis (Alsaad et al., 2017). Treatment comprises the correction of dietary imbalances and sufficient exposure to sunlight (Kumari & Kumar, 2014; Andrews et al., 2004).

The present study aimed to diagnose rickets in buffalo calves in Al-Qurna, north of Basrah.

Methods and materials

The buffalo calves aged 1-3 months were used, and their owners presented them at the AlQurna veterinary clinic north of Basrah. We divided animals into two groups; the first of

six buffalo calves showed clinical exhibition and the second of six buffalo calves showed within normal limits, during the period from September 2021 to March 2022. It subjected all calves to clinical examination according to (Jackson and Cockcroft, 2002).

Blood samples without anti-coagulant tubes were collected from diseased animals to estimate the serum calcium, phosphorus, and vitamin D3 concentration as in (Kaneko et al., 2008). Used boditech, Korea for Vit D. The comparison

of present results was done according to standard results (Hansen et al., 2003). Statistics by use of mean, standard error, and student test of SPSS version 16.

Results and discussion

The vital signs value of diseased calves was within normal limits except there was rapid respiration reported in four calves, but there were no significant differences ($P \leq 0.05$) as in Table (1).

Table 1. The vital signs values of diseased and control animals.

	No.	Body temperature C°	Respiratory rate /min	Pulse rate /min
Diseased	6	38.88±0.31	29.16±3.29	49.16± 4.92
Control	6	38.75±0.15	21.33±1.33	51±3.60
t-test value		0.712	0.052	0.770

Mean±SE

The levels of serum phosphorus, calcium, and vit D3 (4.7±0.61, 8.63±0.22 and 24.83±3.00) mg/ml were lower than the control group (6.23±0.19, 12.08±0.07 and

57.33±6.05) mg/ml respectively which have significant changes ($P < 0.05$) as in table (2). The ratio of calcium and phosphorus was 1: 0.54±0.08 which was slightly increased than the control 1: 0.51±0.01, with non-significant importance ($P \geq 0.05$) as in Table (2).

Table 2. Serum concentrations of calcium, phosphorus and vitamin D3 in diseased animals (mg/ml)

	No.	Phosphorus	Calcium	Ca:P ratio	Vitamin D3
Diseased	6	4.7±0.61	8.63±0.22	1: 0.54±0.08	24.83±3.00
Control	6	6.23±0.19	12.08±0.07	1 : 0.51±0.01	57.33±6.05
t-test value		0.040	0.000	0.759	0.001

Mean±SE

The main clinical signs revealed that most affected calves cannot stand, they stay for a long period in the sternal position. And if they were forced or aided to stand appeared curved limbs from large bones; metacarpus and metatarsus bones and swelling of joints, especially for metatarsal and metacarpus joints (Fig. 1 & 2).



Fig. 1 Show fore limbs of buffalo calf with abnormal curvature for metacarpus bones and enlarge carpal joints



Fig. 2 Show hind limbs of buffalo calf with enlarged metatarsal joints and some evedent of curved metatarsal bons

Rickets is a disorder affecting the skeleton of growing animals, its primary causes are insufficient dietary phosphorus or calcium, and it is usually seen in young, weaned, also growing calves (Uhl, 2018; Miller & Imel, 2022).

The vital signs value of diseased calves was seen at normal limits except the rapid respiration which was reported in four calves, these results agreed with Constable et al. (2017) that rickets started with bone bending in young growing calves and then with no obvious vital signs changes (Andrews et al., 2004), but in an advance age of affected calves may show difficult respiration which related to defective chondral junctions of ribs (Elgazzar & Elgazzar, 2004) which was related to osteomalacia (Babazadeh et al., 2022; Holick, 2017).

The main clinical signs reported in diseased animals include enlargement of joints especially in swelling of the metaphysis of metatarsal bones, abnormal curvature of long bones, irregular heartbeat, rapid respiratory rates, abnormal sternal position, and prolonged recumbency, these results agreed with (Roche and Berry, 2006). The dietary deficiencies of calcium, phosphorus, and vit D result in defective mineralization of the osteoid and cartilaginous matrix of developing bones, as well as there is persistent and continued growth of hypertrophic epiphyseal cartilage, and increasing the width of the epiphyseal plate (Uhl, 2018; Constable et al., 2017). Moreover, the poorly calcified spicules of diaphyseal bones and epiphyseal cartilage yield normal stresses, resulting in the bowing of the long bones and broadening of the epiphyses with apparent enlargement of the joints (Huynh, 2023). Otherwise, the rapidly growing animals with changed diets will be first affected because of their higher requirement of specific nutrients (Constable et al., 2017), which may be related to in lack of ultraviolet solar irradiation of the skin (Roche and Berry, 2006).

The other cause of rickets in the present study may be associated with a slight increase in the calcium/ phosphorus ratio of affected animals, owners may offer milk and forage for their buffalo calve, which may reduce calcium absorption, while phosphorous absorption not affected (Soetan et al., 2010; Penido & Alon, 2012).

Ethical Considerations

Animal care and handling procedures followed the guidelines of the Ethics Committee on the Use of Animals in Experiments, according to the College of Veterinary Medicine, University of Basrah, 2022.

Conflict of Interest

There was no conflict of interest.

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