



DAILY RHYTHM OF VITAMIN D AND OF THE CALCIUM AND PHOSPHATE IN HORSE.

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Objectives

Calcium and phosphate are very important minerals for horse. They are the most abundant minerals in the body, making up 70% of the total mineral content. However their homeostatic system, in the horse, differs in many aspects from that of most mammalian species and it is still unknown which mechanisms are responsible for their control in equine serum blood. The presence of circadian rhythms in blood concentration of calcium and phosphate has been well established in human and these rhythmic variations may have significant physiological effects. The aim of the present study was to determine daily rhythms in blood serum of calcium, phosphate and 24,25-(OH)₂-D₃, 25-(OH)-D₃ (calcidiol) and 1,25-(OH)-D₃ (calcitriol) in the horse.

Methods

5 Sella Italiana show jumpers, females, aged 8 years, clinically healthy, traditionally trained and kept in the same rearing conditions were used. The animals underwent, for 30 days prior to the experiment, the same daily activity pattern (stabled in single box artificially lit and fed at 12.30 and 17.30). After these 30 days on each subject blood samples were collected, every 4 hours for two days (starting at 08.00), by means of jugular catheter. On each individual sample were assessed serum concentration of: calcium and phosphate, by means photometric test, and of 24, 25-(OH)₂-D₃, 25-(OH)-D₃ and 1,25-(OH)-D₃, by means of HPLC determination. Given that intragroup variance was not significant, data statistical elaboration was carried out on mean values of samples taken at different time-points 4 hours apart. A trigonometric statistic model was applied to these values to describe analytically the periodic phenomenon through the individuation of the main parameters which characterise it: Mesor, expressed in the conventional units of the relative parameter considered with fiducial limits at 95%, Amplitude (A), expressed in the same unit as the relative Mesor, Acrophase (ϕ), calculated with the single Cosinor method expressed in hours, with confidence interval at 95%.

Results

The application of the periodic model allowed us to point out, throughout the time series studied in two days, the periodic pattern of the calcium, phosphate and calcidiol (tab. 1). A circadian pattern was showed for calcium with almost coincident acrophases at 15.00 (09.28-20.32) for the first day and at 15.48 (13.08-18.28) for the second. For phosphate acrophases were coincident at 14.32 (10.32-18.32). For calcidiol acrophase were at 14.16 (12.56-15.36) for the first day and at 15.12 (12.00-18.24) for the second.