

ORIGINAL ARTICLE

Daily pattern of some fatty acids in the athletic horse

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Summary

In the sport field, non-esterified fatty acids (NEFA) are important for the physical performance during the aerobic exercise of short intensity and long duration. In man, rat, goat and in the sedentary horse studies on the chronometabolism showed the presence of a circadian rhythm of the plasmatic concentration of NEFA while data for the athletic horse are lacking. To define a chronogram helpful for a specific planning and the differentiation of the training programme in the athletic horse, the circadian pattern of some fatty acids (NEFA, palmitic, stearic, oleic, linoleic and linolenic acids) was studied in five Sella Italiana horses. These horses trained following a daily model of activity consisting of walk, trot, gallop and jump of obstacles of different heights. Blood samples were collected from the jugular vein every 4 h, starting at 08:00 hours, for 2 days to assess the concentrations of total NEFA (by spectrophotometry), palmitic, stearic, oleic, linoleic and linolenic acids (by gas chromatography). ANOVA for repeated measures showed a statistical significant effect of the time of the day in NEFA, oleic and linolenic acids. The application of the periodic model showed the periodic pattern of NEFA, oleic, linoleic and linolenic acids. Acrophases were in the afternoon for all parameters. The results obtained showed a different trend of the circadian pattern of the studied parameters in the athletic horse than in the sedentary one because the physical activity and the post-prandial metabolism acted as zeitgebers.

Introduction

Non-esterified fatty acids (NEFA) are metabolites with a high energetic capacity that competes with glucose because of the similar metabolic use. During the day, there is a 'turning point' of the energetic exchange, when the use of fatty acids is increased and that of carbohydrates is inhibited. The factors that regulate the energetic homeostasis influence the mobilization and the use of NEFA. In the sport field, NEFA are important for the physical performance during aerobic exercise of low intensity and long duration. Several studies on chronometabolism in men (Morgan et al., 1999; Heptulla et al., 2001), rats

(de Gomez Dumm et al., 1984) and goats (Alila-Johansson et al., 2004) showed the presence of a circadian rhythm of the plasma concentration of NEFA. A circadian rhythm of NEFA was shown also in sedentary horses with an acrophase recorded in the morning at about 07:00 hours (Orme et al., 1994). Furthermore, in men, diurnal variations in the ability to metabolize NEFA at the muscle and heart level were demonstrated (Stavinoha et al., 2004). This information is useful for the identification, in men, of an athletic chronoperformance able to optimize the levels of the physical performance and training. Also, the athletic horse presents daily variations of some haematological and haematochemical