SHORT COMMUNICATION

Daily rhythm of tear production in normal horse

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Abstract
Objective This study was designed to assess the daily rhythm of tear production in clinically healthy horses, to compare left eye and right eye, and to evaluate the influence of time and gender.

Animal studied For our study 18 horses (nine female and nine male) were subjected to three different light/dark (L/D) schedules: 12/12 L/D cycles, constant light (24/0 L/D) and constant darkness (0/24 L/D).

Procedures In all subjects Schirmer tear tests were performed at 4-h intervals over a 24-h period.

Results A circadian rhythm of tear production was found during the 12/12 L/D period and during constant darkness. Also our results showed a statistical significant difference comparing left eye and right eye, and between gender.

Conclusions Our findings would suggest that the time of tear evaluation is significant in the diagnosis of tear film disorders, and that the difference between the two eyes and the two genders should be taken into consideration during the ophthalmic exam.

Key Words: daily rhythm, Equus caballus, eye, gender, Schimer tear test, tears

INTRODUCTION

The eye, the main source of photic information to the central circadian pacemaker, expresses circadian rhythms in various processes at different levels of organization: from the molecular level (e.g. melatonin synthesis) through the cellular level (retinomotor movements, rod outer segment phagocytosis) to the organ level (intraocular pressure) and the level of the visual system (visual sensitivity).

Tears play an important role in maintaining the health and normal function of the conjunctiva and cornea. Tears help remove foreign matter, provide essential nutrients to the avascular cornea, and contain immunoglobulins, lysozymes, and other proteins important for the defenses of the eye.

Reduction in tear production causes increased corneal inflammation and ultimately damage that may lead to blindness.

Measurement of tear production is an important diagnostic test when deficiency of the lacrimal system is suspected. The tear-producing system is evaluated qualitatively by examination of the surface for moistness and quantitatively by the Schirmer tear test (STT), widely used in both human and veterinary ophthalmology for evaluating aqueous tear production. Studies in humans and dogs described a diurnal variation in tear turnover rate. In the study of other physiological parameters, the pattern of diurnal variation was found to be affected by a number of endogenous and exogenous factors such as age, season, feeding times and fasting, isolation, exercise, electro-magnetic field, change in light intensity and environmental temperature. Normal STT has recently been shown to be affected by age, gender, time of day, season, environmental condition and placement of strips. The purpose of this study was to determine the daily rhythm of tear production in horses subjected to three different light/dark (L/D) schedules, to compare left eye and right eye, and to evaluate the influence of time and gender.

MATERIALS AND METHODS

Tear production was measured using the standard STT, as previously described by Gelatt et al. in 18 seven-year-old, healthy, and ophthalmoscopically unremarkable thoroughbred (nine mares and nine stallions), with a mean body weight of 580 ± 40 kg. Exclusion criteria included ophthalmic disease (including adnexal) or clinical signs attributed to disease states that might affect tear production (endocrine disease such as hypothyroidism and diabetes mellitus). They were housed individually at indoor temperature and humidity (18–21 °C; 50–60 rh%). Ambient temperature and relative humidity for each experimental day were continuously recorded with a data logger (Gemini, Chichester, West Sussex, UK). All