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Original Research

Effect of Experience on Adrenocortical and Thyroid Responses of Arabian Horses to Gymkhana Games

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ABSTRACT

Gymkhana is an equestrian event consisting of speed pattern racing and timed games for riders on horses. The aim of the study was to evaluate the effects of gymkhana competition on total cortisol and total and free iodothyronine changes in 23 Arabian purebred horses, by taking into account the effects of previous sport experience on gymkhana riding events. Compared with pre-competition values, an increase of total cortisol concentration has been observed in experienced horses at 30 minutes ($P < .001$) after exercise and in inexperienced horses both at 5 minutes ($P < .05$) and at 30 minutes ($P < .01$) after exercise. Compared with pre-competition values, an increase of total triiodothyronine (T_3) concentration has been observed in experienced horses at 5 minutes ($P < .05$) after exercise. Data obtained showed that gymkhana riding events induced differential adrenocortical and thyroid responsiveness according to previous experience of sport horses. Hence, cortisol and iodothyronine patterns may provide additional information for the monitoring of gymkhana riding performance.

1. Introduction

Gymkhana games are a variety of games that can be used to help riders from beginners to advanced learn horsemanship. Gymkhana exercise is one of the most popular equestrian events in which sport horses are currently used. The types of western show activities and of performance horses can be categorized in many different ways. The spectrum of western show horses is represented by cutting and reining horses, ream roping and steer wrestling horses, barrel racing and gymkhana horses, and western pleasure and trail show horses. There are significant differences in horse conformation and body type depending on the performance disciplines.

Gymkhana requires speed and agility over a short course. In general, control of the horse and of oneself in the saddle is an added benefit of learning to play these games. Typical conformation is of the “sprint horse” type, with many of these horses acquired from Arabian horse tracks.

These physical activities are represented by both anaerobic and aerobic work, requiring maximal muscular contractions and motor ability for a very short time.

Previous studies in Quarter Horses have examined the effects of western riding events on adrenocortical and thyroid functions, by taking into consideration circadian variations and the effects of training [1,2].

It is well known that cortisol is considered as marker of psychophysical stress in horses [3], and that exercise induces significant modifications of cortisol levels [4–8].

Cortisol levels are also considered as physiological markers for evaluating training states in warmblood horses [9] and for performance diagnosis in Thoroughbred horses during and after standardized exercise tests (SET) on a treadmill [10] and on the track [11].

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Thyroid hormones are needed by every cell in the body and regulate everything from metabolic processes to organ function, especially after competitive and noncompetitive show jumping [5,7,12], and their changes were related to exercise intensity [13]. Thyroid hormone changes seemed to be not dependent on pretraining status in Quarter Horses under resting conditions [1], and no significant differences were observed in basal thyroid hormones in Thoroughbred with good or poor performance [14].

On this basis, the purpose of this study was to evaluate the effects of experience on total cortisol and total and free iodothyronine changes to gymkhana competition in Arabian horses.

2. Materials and Methods

2.1. Animals, Sample Collection, and Physiological Measuring

A total of 23 healthy Arabian horses (group I, nine trained experienced horses; group II, 14 trained inexperienced horses) of different gender (12 females and 11 males) and age (13 horses, 7 ± 2 years old; 10 horses, 10 ± 2 years old) were studied. The different genders and ages were equally represented between the two groups.

Trained experienced horses were submitted to conventional training for gymkhana riding, once a week for four consecutive weeks. Trained inexperienced horses were submitted to the same conventional training for gymkhana riding only once a week before gymkhana games. After a warming-up of 5-minute walking, the training protocols were represented for both groups by conventional exercise on the track for 45 minutes (15 minutes walking, 10 minutes trotting, 5 minutes galloping, and 15 minutes trotting and galloping). The gymkhana racetrack and related obstacles were showed in Fig. 1. According to the number of exercise obstacles and the different ability of adult riders, experienced horses belonged to *Pro* category, with 14 exercise obstacles, and *Semipro* category, with 11 exercise obstacles, except 4, 5, and 10 exercise obstacles. Inexperienced horses belonged only to *Junior* category with nine exercise obstacles, except 1, 4, 5, 10, and 13 exercise obstacles; in this category, the riders' age was <16 years. Both groups completed the racetrack within 3–4 minutes. Only riders were well advised to know the general difficulty of gymkhana track just before starting the gymkhana games.

Blood samples were collected from jugular vein before the gymkhana competition, at 9 AM, and 5 and 30 minutes after the racetrack.

2.2. Hormone Analyses

Plasma total cortisol concentrations were analyzed in duplicate through a competitive enzyme assay (EIA; RADIM, Rome, Italy). During the first incubation, sample cortisol competed with the cortisol conjugated to horseradish peroxidase for binding to the specific sites of the antiserum coated on the wells. After incubation, unbound material was removed by aspiration and washing. The enzyme activity, which was bound to the solid phase, was inversely proportional to the cortisol concentration in calibrators and samples, which was evidenced by incubating the wells with a chromogen solution (tetramethylbenzidine) in a substrate buffer. Colorimetric reading was carried out using a spectrophotometer at 450 and 405 nm (Sirio S; RADIM/SEAC Co, Rome, Florence, Italy). The assay sensitivity was 5 ng/mL. The intra- and inter-assay coefficients of variation (CVs) were 5.5% and 6.8%, respectively.

Serum total and free iodothyronine concentrations were determined in duplicate with EIA kits supplied by RADIM. Intra- and inter-assay CVs were 11.4% and 7.3% for T_3, 5.7% and 2.3% for T_4, 11.9% and 4.2% for fT_3, and 9.6% and 6.6% for fT_4, respectively.

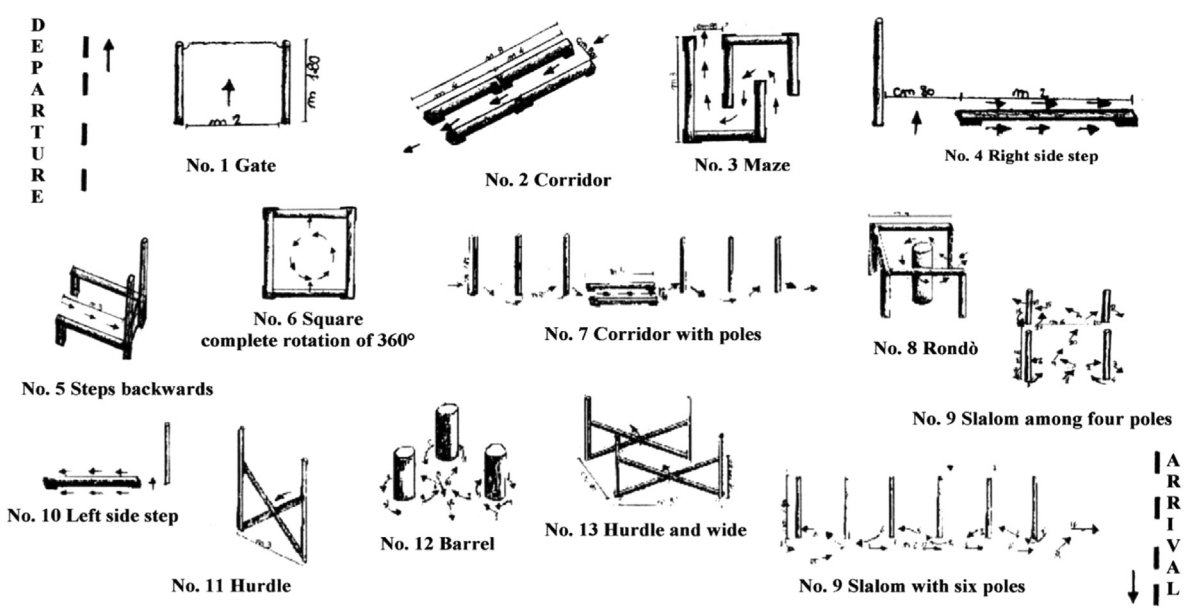

Fig. 1. The race course of gymkhana games.