



Original Research

Prevalence of Tarsal Diseases in Champion Mangalarga Marchador Horses in the Marcha Picada Modality and Its Association With Tarsal Angle



Kate Moura da Costa Barcelos^{a,*}, Adalgiza Souza Carneiro de Rezende^a, Marianna Biggi^b, Ângela Maria Quintão Lana^a, Suzana Maruch^a, Rafael Resende Faleiros^a

^aAnimal Science and Veterinary Clinic and Surgery Departments, School of Veterinary, Federal University of Minas Gerais, Belo Horizonte, Minas Gerais, Brazil

^bAnimal Science and Veterinary Clinic and Surgery Departments, Royal Veterinary College Hawkshead lane, North Mymms, UK

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ABSTRACT

Mangalarga Marchador (MM) is a native Brazilian breed of “gaited” horses. Orthopedic lesions and conformation might affect the sport career of these animals. The aims of this study were to evaluate the tarsal angle and the prevalence of tarsal disease in healthy MM horses that had classified in the top seven positions at the 33rd National Mangalarga Marchador Breed Show in 2014. Fifty horses were included. Horses in category I were presented at hand and aged between 18 and 34 months; horses in category II were presented ridden and aged between 41 and 58 months. The tarsal angle was measured using an arthrogoniometer; lateromedial and dorsopalmar radiographs were taken and analyzed. Of the included horses, 70% had radiographic lesion, the most common disease was osteoarthritis of the distal tarsal joints. Radiographic lesions were detected in 65.38% of the horses in category I and in 75% of those in category II. The mean tarsal angle was $136.5 \pm 4.90^\circ$, which indicates that high-performance MM horses in marcha picada contests have small tarsal angle. The prevalence of radiographic lesions among horses with tarsal angles $\geq 140^\circ$ and $\leq 139^\circ$ were compared. Male animals whose tarsal angle was equal to or above 140° were significantly more likely to have radiographic changes in the tarsus ($P = .0218$). It was concluded that the prevalence of tarsal diseases in MM horses in marcha picada contests is high and that osteoarthritis of the distal intertarsal and tarsometatarsal joints are the most common.

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1. Introduction

Brazil holds the fourth largest horse herd in the world [1], and Mangalarga Marchador (MM) is a native Brazilian breed of “gaited” horses. The Brazilian Association of Mangalarga Marchador Horse Breeders (*Associação Brasileira dos Criadores do Cavalo Mangalarga Marchador*—ABCCMM) is the largest single-breed association in Latin America. MM is the fastest growing breed in

Brazil with 542,000 animals and 8,650 breeders, the breed is also present in Germany, United States, Canada, Italy, and Argentina [2]. Owing to the market constant expansion, these animals have started competing at increasingly younger ages.

The “marcha” is a highly smooth gait for the rider; it is a four-beat gait, with no suspension phase that intersperses moments of triple support and moments of diagonal or lateral support. This type of gait has two distinct variants (sub-types) within this breed, called “Marcha Picada” and “Marcha Batida”. The “marcha picada” is when the horse spends more time in the lateral and triple supports, and the “marcha batida” is when the horse spends more time in the diagonal support. These animals are also capable of performing walk and gallop gaits.

* Corresponding author at: Kate Moura da Costa Barcelos, Animal Science and Veterinary Clinic and Surgery Departments, School of Veterinary, Federal University of Minas Gerais, 6627, Antônio Carlos Ave, Campus Pampulha 31270-901, Belo Horizonte, Minas Gerais, Brazil.

E-mail address: katebar@terra.com.br (K.M. da Costa Barcelos).

The animals start competing in hand at 15 months and ridden from 39 months of age. High scores in the shows are obtained by a combination of conformation of the horse and evaluation of the gait; the assessments vary based on age, gender, and type of gait (*marcha picada* or *marcha batida*). The animals usually begin training at a very young age, and they are subjected to a strenuous exercise including many regional competitions throughout the season. To qualify for a nationwide contest, they must have been champions in at least one regional horse show. Thus, all animals qualified to the national show have high sports performance because they undergo a hard training and selection process.

The national horse show takes place once a year and features approximately 1,500-MM horses from all around Brazil. During the “*marcha*” contest, the animals are assessed based on the quality of their movement with the purpose to select the horse that best depict the functionality of the breed. The movement of the pelvic limbs is an important element assessed, so that many breeders and trainers use empirical artifices during training to increase flexion of the hind limbs, particularly of the tarsal joints. In some cases, large weights and chains are used around the pasterns to force the flexion of the hind limbs. This practice is against current concepts of animal welfare and might be the cause of or contribute to the short sport career of these horses.

The cost of raising and training foals with disappointing performances when adults justify the early assessment of physical attitudes with rigorous objective criteria [3]. As the *marcha* is a symmetrical, repetitive, high-impact movement, it might predispose the animals to greater wear of joints, ligaments, tendons, and bones [4].

Conformation of the horse, especially of the hind limbs, is important and is associated with the duration of the animal's competitive life [5,6]. Some authors believe that intermediate tarsal angles, between 155.5° and 165.5°, are ideal to better absorb the shock in the impact stage of the stride and generate greater vertical impulse, whereas angles beyond 165.5° are less effective in absorbing shock, predisposing the animals to developing degenerative joint disease [7]. Angles <155.5° are associated with greater joint flexion during the support phase and may be responsible of compression of the dorsal surface of the tarsal bones [7]; angles <140° are not desirable because is followed by a leaning forward cannon [8,9]. It has been proposed that articular condition may occur secondary to horse conformation [10,11].

Inadequate nutrition program and repetitive overload trauma negatively impact on joint cartilage, leading to developmental orthopedic diseases [12] and in some cases, osteoarthritis of distal tarsal joints [13]. These disorders may be insidious in onset and not be clinically noticeable at their early stages but they can reduce the sporting life of these horses. The aims of this study were to measure the tarsal angle and evaluate the prevalence of tarsal disease in healthy MM horses classified in the top positions in “*marcha picada*” contests at the national horse show. We also wanted to verify association between diseases detected using radiography and tarsal angle of these horses. We hypothesized that horses with tarsal angles <140° are more likely to have radiographic lesions.

2. Material and Methods

This project was approved by UFMG-CEUA's ethics committee under protocol 215/2014. The horses that finished in the top seven positions in the 33rd National Brazilian Horse Show of the MM breed in 2014, held in Minas Gerais State, were included in the study. All horses were considered healthy and lameness free. The *marcha* competition plus the conformation scores calculated the final scores dictated the horse's classification. A panel of five judges and one lameness expert evaluated all horses in both conformation and *marcha* competitions.

A total of 50 horses were included; 26 horses were included in category I (led youngsters), which were presented at hand in the gait trial, and 24 horses in category II (ridden adults). In category I, there were 14 female and 12 male horses, ages ranged between 18 and 34 months. In category II, there were 11 female and 13 male, ages ranged between 41 and 58 months.

A lateromedial and dorsoplantar projections of the left hock were acquired for each horse. This hock was randomly selected for this evaluation. It was not possible to acquire a complete set of radiographs because of limited funding and limited amount of time when the horses could be evaluated during the show. Images were acquired using a portable x-ray machine (Orange 90e) and a digital radiology system (Claro X); exposure parameters were set between 70 and 73 kv and 3.2 mAs.

A trained professional who was unaware of the group which belonged horses and which is an associate of the European College of Veterinary Diagnostic Imaging evaluated the digital radiographs. Horses were excluded if a diagnosis could not be made using these images, and further radiographic projections were required. Radiographic findings were classified based on the type of abnormalities and their severity [14].

The tarsal angle assessment of all horses was performed by a single person after a period of training which assured consistency in the measurements. With the horse positioned squared and on a flat surface, the arthrogoniometer (Fig. 1) was positioned laterally to the left tarsus at the center of the tibiotarsal joint. The arm containing the protractor was aligned with the axis of the tibia, whereas the mobile arm was aligned with the third metatarsal bone [15].

Descriptive statistics were performed for the type of radiographic abnormalities observed. The normal distribution of the data and homoscedasticity of variances were verified, respectively, using Lilliefors and Cochran tests. Analysis of variance and Tukey test were used to compare the mean angles of the experimental groups. Fisher exact test was used to verify possible differences in prevalence of diseases between males and females, between categories, and to verify the association between these diseases and tarsal angle; this was determined considering a minimum angle of 140° [8,9]. All tests used a 5% significance level.

3. Results

Results related to the measurements of the tarsal angle are summarized in Table 1. The mean angle measured was

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