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PK Kawareti

M.V.Sc. Scholar, Department of Veterinary Anatomy and Histology, Nagpur Veterinary College (Maharashtra Animal and Fishery Sciences University, Nagpur), Nagpur, Maharashtra, India

NC Nandeshwar

Associate Professor, Department of Veterinary Anatomy and Histology, Nagpur Veterinary College (Maharashtra Animal and Fishery Sciences University, Nagpur), Nagpur, Maharashtra, India

SB Banubakode

Associate Professor, Department of Veterinary Anatomy and Histology, Nagpur Veterinary College (Maharashtra Animal and Fishery Sciences University, Nagpur), Nagpur, Maharashtra, India

S Ganguly

Associate Professor, Department of Veterinary Microbiology, Arawali Veterinary College (Affiliated to Rajasthan University of Veterinary and Animal Sciences, Bikaner), N.H. – 52 Jaipur Road, V.P.O. Bajor, Sikar, Rajasthan, India

Correspondence**PK Kawareti**

M.V.Sc. Scholar, Department of Veterinary Anatomy and Histology, Nagpur Veterinary College (Maharashtra Animal and Fishery Sciences University, Nagpur), Nagpur, Maharashtra, India

Podometry in Equine (*Equus caballus*)

PK Kawareti, NC Nandeshwar, SB Banubakode and S Ganguly

Abstract

The present study was conducted on eight thoroughbreds of horse hoof. In the present study, the measurements of hoof were taken: solar length, solar width and toe length. From this measurement were recorded in centimeter for both fore limb and hind limb hooves. The mean and standard error (SE) values were calculated in addition to hoof index and toe index values obtained. For hoof of fore limb, right and left hoof solar length was 12.31 ± 0.38 , 11.92 ± 0.26 cm respectively, solar width was 11.81 ± 0.33 , 11.68 ± 0.37 cm respectively, the toe length was 8.46 ± 0.22 and 8.28 ± 0.14 cm respectively, while in case of right and left hooves of hind limb hoof solar length was 11.81 ± 0.36 , 11.57 ± 0.47 cm respectively, solar width was 10.77 ± 0.36 cm, 10.6 ± 0.33 cm respectively and the toe length 8.42 ± 0.26 and 8.52 ± 0.18 cm respectively. The study indicated that hoof index can serve as an anatomical basis for identification of left and right hooves of forelimb. In case of toe index did not show significant difference in values.

Keywords: Horse, Hoof, Forelimb, Hind limb, Podometry

Introduction

The horse (*Equus caballus*) is a quadruped animal belonging to a group of mammals. The hoof podometry is of tremendous importance in the equine practice in animals mostly maintained for racing and game events. The hoof is an important component of equine movement apparatus and inappropriate hoof balance may lead to foot pathology and lameness. The hoof is the horny covering of the distal end of the digit [1]. Thoroughbreds are lately maturing breeds with an admixture of Arabian horses or ponies. Hooves constitute an important element of horse conformation and thus influence horse usability. The hoof width to chest circumference ratio is the best measure of hoof size in relation to body size [2]. Different functions and biomechanics of the fore and hind limb bring on the differentiation of the hoof capsule form. The forelimbs are more burdened carrying the horses head and neck. Although some clinical studies have highlighted the importance of foot conformation as a risk factor for musculoskeletal injury [3]. The aim of this study was to define differences between front and hind hooves in dimensions. We focused on possible differences within forelimb and hind limb hoof of horse.

Materials and Methods

The present study was conducted on eight thoroughbreds of horses in R & V unit Nagpur. The horses under present study were male gelding maintained under standard management practices. From this study all horses were clinically healthy sound, without lameness. The average age and body weight of horse was 12.57 ± 2.07 years and 437.37 ± 24.42 kg respectively. Biometrical analysis of horses hooves were conducted according to three main measurements: solar length (SL- measured from the center of the toe to the heel buttress line), solar width (SW- measured at the widest part of sole), toe length (TL- from the coronary rim to the centre of the toe on dorsal aspect of hoof) were recorded in centimeter with the help of calibrated wooden scale for both fore limb and hind limb hooves (Figures 1 to 3). The mean and standard error (SE) values were calculated in addition to hoof index ($HI = SW/SL \times 100$) and toe index ($TI = TL/SL \times 100$) values obtained. The data was analyzed statistically by using SPSS software as per standard methods [4].

Results and Discussion

Podometry in equine was tremendous valuable in diagnosis of lameness as it can potentially distinguish between normal and abnormal hoof. The left and right forelimb and hind limb hoof solar length, solar width and toe length are presented in Table 1. The average hoof solar length

of right and left forelimb was 12.31 ± 0.38 cm, 11.92 ± 0.26 cm respectively. The average hoof solar length of right and left hind limb was 11.81 ± 0.36 cm and 11.57 ± 0.47 cm respectively (Table 1). In the present study was showed no significant differences between forelimb and hind limb hoof solar length. Stachurska *et al.* [5] reported that hoof solar length was lower in hind hoof than forelimb hoof in four different breeds of horses. Similar findings were reported by Sampaio *et al.* [6] in undefined breeds of horses and Casanova and Oosterlinck [7] in young catalan Pyrenean horses.

The average hoof solar width of right and left forelimb was 11.81 ± 0.33 and 11.68 ± 0.37 cm respectively. The average hoof solar width of right and left hind limb was 10.77 ± 0.36 cm and 10.6 ± 0.33 cm respectively. The average solar width was significantly differed between forelimb and hind limb hoof. There were no significantly differences between right or left forelimb and hind limb hoof. It was noted that solar width of forelimb greater than hind limbs hoof. Similar findings

were recorded by Stachurska *et al.* [5] in four different breeds of horses, Casanova and Oosterlinck [7] in young catalan Pyrenean horses.

The average toe length of right and left hoof of forelimb was 8.46 ± 0.22 cm and 8.28 ± 0.14 cm respectively. The average toe length of right and left hind limb was 8.42 ± 0.26 cm and 8.52 ± 0.18 cm respectively. There was no significantly difference between average toe length of forelimb and hind limb hoof. These observations are in agreement with the observation reported by Stachurska *et al.* [5] in four different breeds of horses and Sampaio *et al.* [6] in undefined breeds of horses.

The present study was indicated that hoof index can serve as an anatomical basis for identification of left and right hooves of forelimb (Table 2). The hoof index was very useful parameter for identification of the left and right forelimb hoof. In case of toe index did not show significant difference in values.

Table 1: Showing mean \pm SE values (cm) of hoof solar length, solar width and toe length

Variable in cm	Range in cm	Forelimb		Range In cm	Hind limb	
		Right	Left		Right	Left
Solar length	11-14	12.31 ± 0.38^a	11.92 ± 0.26^a	10-14	11.81 ± 0.36^a	11.57 ± 0.47^a
Solar width	10.5-13.5	11.81 ± 0.33^a	11.68 ± 0.37^{ab}	9.2-12.5	10.77 ± 0.36^{bc}	10.6 ± 0.33^c
Toe length	7.5-9	8.46 ± 0.22^c	8.28 ± 0.14^c	7-9.5	8.42 ± 0.26^c	8.52 ± 0.18^c

Values bearing the superscripts within the same row, values with different superscripts letters differ significantly ($p < 0.05$)

Table 2: Podometric index Indices of hoof of horses (on mean basis)

Variable in %	Forelimb		Hind limb	
	Right	Left	Right	Left
Hoof Index	95.93	98.00	91.21	91.57
Toe Index	68.73	69.49	71.32	73.65



Fig.1. Showing measurement of the hoof solar length (AB)



Fig 3: showing measurement of the hoof toe length (AB)



Fig 2: Showing measurement of the hoof solar width (AB)

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