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Morphometric characterization of horses (*Equus caballus*) in different age groups

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Abstract

The objective of this study was to investigate morphometric variation of horse in different age groups. Body measurements and weight were taken on 30 horses (geldings). The horses were divided into two age groups namely, Group-I (7.53 ± 0.36 years) and Group-II (13.06 ± 0.55 years) respectively. The mean values of Group-I and Group-II horses were found as 18.93 ± 0.17 and 18.94 ± 0.21 cm for left metacarpus circumference, 20.63 ± 0.19 and 20.73 ± 0.23 cm for left metatarsal circumference, 162.01 ± 0.99 and 169.53 ± 1.23 cm for girth circumference, 150.33 ± 0.77 and 149.46 ± 1.19 cm for withers height, 152.1 ± 1.00 and 150.23 ± 1.29 cm for body length, respectively. In this research, there was no statistical significant difference in any of the parameters except girth circumference in between the age groups. It can be concluded that horses reach to adult growth body size after 4 years of age. Within the parameters considered, the homogeneity of investigated material was found, which could indicate stable growth of morphometric traits. However, the tendency of morphometric traits for homogenous but unstable growth was also observed.

Keywords: Horse, Body measurement, Age group

1. Introduction

Horses of undefined breed do not come under any breeder union which would provide reports about these horses. At the present time this group is the most numerous in the entire population of horses. The present situation in horse breeding has demanded elaboration and knowledge of horses of undefined breed [1].

The measurement of the various anatomical parts of the animal as a criterion for evaluating the conformation of horses has a long history. The conformation scoring of horses serves useful pieces of information for breeder which is not replaceable with other examination. Morphometric measurements are successfully used to develop equid body weight related equation [2]. Thus, early body early body measurements of the horse can be used for prediction of the size of the adult horse [3].

Body measurements of horses could be useful to show their characteristics and general body conformation and can be effectively used for many aims such as, to compare between normal and abnormal growth, to evaluate and compare breeds, and to increase performance in sports.

The main aim of the present study was to take body measurements and calculated relative body weight by using formula. Also, we wanted to study the possibility of body weight estimation based on body measurements. The purpose of this paper is to report estimates of body parameters for growth characteristics of horse.

Materials and methods

The study was carried out in Nagpur, Maharashtra. There were total 30 (geldings) undefined breeds of horses were used for present work. The horses were divided into two age groups namely, Group-I 5 to 10 years (7.53 ± 0.36) and Group-II above 10 years (13.06 ± 0.55) respectively. Age group was determined by dentition formula described by Dyce *et al.* [4] and the approximate body weight of horse was estimated by using formula Carroll and Huntington [5]. The approximate body weight of horses were recorded in Group-I and Group-II 306 to 382 kg (336.11 ± 5.16) and Group-II 308 to 408 kg (363.44 ± 0.55 kg) respectively. The Five morphometric traits were measured on each animal. The parts were measured, 1. Left metacarpus circumference; measured at 1/3 of the height of the upper metacarpal bone, at its thinnest point [6], 2. Left metatarsus circumference; measured at 1/3 of the height of the upper

metatarsal bone, at the thinnest point ^[6], 3. Girth circumference, measured as body circumference just behind the forelegs; 4. Withers height (WH), measured from the ground to the top of the withers; 5. Body length (BL), measured from point of the shoulder to the tuber ischii (Fig. A). A graduated measuring stick was used for the height measurements, the length and circumference measurements were done using a flexible tape. Each dimension was recorded in centimeter. Means and standard errors of the body measurements were calculated. The data was analyzed statistically by using SPSS software as per standard methods ^[7].

Results and discussion

The means and standard error of the 5 body measurements for the different age groups are presented in Table 1. As indicated the age factor was not significant for all traits. The mean values of Group-I and Group-II horses were found as 18.93 ± 0.17 and 18.94 ± 0.21 cm for left metacarpus circumference. There were no significant statistical differences in the metacarpus circumference of horse between the groups. These findings were in agreement with those reported by Pinto *et al.* ^[8] in Stallions and Mares. The average left metatarsus circumference in Group-I and Group-II was recorded as 20.63 ± 0.19 and 20.73 ± 0.23 cm respectively. The average value did not show significant difference between the age groups. Komosa and Purzyc ^[9] also recorded similar observations in Konik and Hucul horses.

The average girth circumference in Group-I and Group-II was recorded as 162.01 ± 0.99 and 169.53 ± 1.23 cm respectively.

The average values showed significant difference in between the age groups. The present findings are in agreement with those reported by Martinson *et al.* ^[2] and Komosa and Purzyc ^[9]. The average value of withers height in group-I and group-II was recorded as 150.33 ± 0.77 and 149.46 ± 1.19 cm respectively. There were no significant differences between the age groups. Similar findings were reported by Tocci *et al.* ^[10] and Hacan and Akcapinar ^[11].

The average value of body length in Group-I and Group-II was recorded as 152.1 ± 1.00 and 150.23 ± 1.29 cm body length, respectively. Similar types of observations have been reported by Martinson *et al.* ^[2] and Vlaeva *et al.* ^[12].

Metacarpus circumference and metatarsal circumference were slightly lower in Group-I and withers height and body length were slightly higher in Group-I animals. Significant differences were found for girth circumference. The reason for these differences could be caused by environmental factors (husbandry, nutrition, climate, stud farms condition) However, our values were generally lower than the values reported by Yelmez and Ertugrul ^[13] as front cannon circumference (20.1 ± 0.18 cm), girth circumference (193.3 ± 0.43 cm), height at withers (164.1 ± 0.64) and body length (167.03 ± 0.72) in Thoroughbred horses in turkey. This is indicative of the small breed as compared to Thoroughbred. It can be concluded that different parameters of the body measurement considered, the homogeneity of investigated material was found, which could indicate stable growth of morphometric traits and also observed the tendency of metric traits for homogenous but unstable growth.

Table 1: Body measurements of different age groups in adult horses

Variable in cm	Group-I	Group-II	Significant level
cannon girth at left front leg	18.93 ± 0.17	18.94 ± 0.21	NS
cannon girth at left rear leg	20.63 ± 0.19	20.73 ± 0.23	NS
Heart girth circumference	162.01 ± 0.99^a	169.53 ± 1.23^b	Significant
Withers height	150.33 ± 0.77	149.46 ± 1.19	NS
Body length	152.1 ± 1.00	150.23 ± 1.29	NS

NS-non-significant

Different letters in the same row mean significant at $P < 0.05$



Fig. A: Morphometric measurement of horse

1. Metacarpus circumference
2. Metatarsus circumference
3. Girth circumference
4. Withers height
5. Body length

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