The Influence of Age on Hematologic Values in Arabian Fillies, Yearling and Mares above 5 Years Old

Noha Y. Salem[1], Shimaa G. Yehia[1], Mohamed A. El-Sherif[1]

[1]Departement of Internal Medicine and Infectious Diseases, Faculty of veterinary Medicine, Cairo University,Cairo, Egypt.

Corresponding author email: nemovet2011@gmail.com

Abstract

Normal hematologic parameters of great importance, however age may influence these values of a given breed. This study directed to investigate consequence of age on hematologic parameters of healthy Arabian fillies, Yearling and mares. Sixty four Arabian femalesclinically and apparently healthy were involved in this study (25) fillies, (27) yearling and (12) Mares, hematologic parameters were investigated. Significant reduction in PCV, HB, Neutrophil and MCV were observed in fillies and yearling when compared to adult mares.Age appears to have a significant effect on hematologic parameters in Arabian horses. It was important to determine mean hematologic parameters in different age groups to help establish the difference between health and disease.

Key word: Fillies, Yearling, Arabian Mares, Hematology, Health.

Introduction

In Egyptian culture, horses especially Arabian bloodline are valuable and respectable animals, the tendency to keep them in a good health is a necessity, horse health is revealed on its hematologic parameters, ability to determine underline problems can be simply intensified by awareness of normal parameters. In equine industry, Arabian horses played asignificant role in creation and development of plentiful equine breeds (Knill et al. 1969; Gill et al. 1986; Altinsaat 2008). Egyptian bloodline is the combination of strains of pure, unquestionable and desert legacy. However, of genetic and immense importance, the purity of the Egyptian Arabian is not the only grounds for their preservation (Lewis 2008).

Hematologic profile is an essential tool in medicine; it helps with clinical diagnosis, establishing the metabolic status of horse and assessment of general health disorders (Ricketts1987; Lassen and Swardson 1995; Feldman et al. 2000).

Hematologic profile of equine in general,have characteristic features, the splenic contraction occurs during excitation leads to relative polycythemia, also foals below 9 months have a lower PCV and MCV compared to adult horses (Parry 2009).

Arabian horses usually described as "hot-blooded" beasts, those animals found to have a higher RBCs, PCV and HB content related to other breeds (Jain 1986; Grodin and Dewitt 2010). Age-related changes in humoral and cellular response may affect total and differential leucocytic count (Cebulj-Kadunc et al. 2003).

Normal hematologic reference values for a given breed fall into wide range (Hodgson and Rose 1994), however, certain factors are implicated; age, gender and training methods greatly influence blood parameters variations (Weiss and Wardrop 2010)

Hematological values for horses and quite a few particular horse breeds are accessible (Harvey and Hambright, 1985; Lassen and Swardson 1995; Riber et al., 1995; Cebulj-Kadunc et al. 2002; Altinsaat2008; Weiss and Wardrop 2010), yet, available data regarding Arabian breed is still scarce.

The objective of the currentinvestigation was to determine the hematological parameters in healthy Arabian fillies, yearling and Maresabove 5 years oldto future aid in establishment of the variance between health and disease conditions in Arabian horses in further studies

Materials and Methods

Hematologic parameters of 64 horses were determined, normal healthy animals from reputable Arabian horse ranches were selected in this study and divided according to age into 3 groups (Table 1). Samples were taken from privately owned female Arabian horses in Giza Governorate, Egypt(Rabab farm for

Arabian horses, Selim farm, Al-Safenat farm and Sakkara country club). The study was performed in the period between 31-Janurary, 2015 till 23-May, 2016. The foals were allowed to nurse from their dams till 5 months of age. Average weight of foals below one year was (100-150Kg), yearling (200-300 Kg) while adult mares were (450-500 Kg). All animals were vaccinated against EHV-1, EHV-4 and EIV at 6 month of age and booster dose given after 21 days and repeated annually using "Fluvac Innovator®".

Comprehensive physical examination was performed on the animal to exclude any physical abnormalities, including pulse and respiratory rate, superficial lymphnodes examination, visible mucous membrane, thorax auscultation and the rectal temperature were taken and Giemsa-stained blood films were inspected under the microscope for exclusion of blood parasites (Speirs and Wrigley 1997). Fecal samples were taken and examined for

exclusion of parasitic infestation. Only horses showed no clinical or physical abnormalities were included in this study. Haemocytometric method was used to determine erythrocyte and leukocyte counts. Hemoglobin concentration was assessed by spectrophotometric method. Hematocrit values were evaluated by micro-hematocrit centrifugation. Differential leukocyte counts were determined from smears stained by the Giemsa method. The Erythrocyte indices of MCV and MCHC values were also calculated by appropriate formulas.Blood samples were collected from jugular vein in EDTA-containing tubes; clinical hematology was performed within 2 hours after the sample collection (Weiss and Wardrop 2010).

Calculation of mean ± SE, and data comparison using Student t-test (STATISTICA for Windows, version 5.1., StatSoft, Inc.).

Table (1): obtained samples according to age

Age group	Number
Fillies< 1year	25
Yearling	27
Above 5 years	12
	64

Results and discussion

Mean total erythrocyte, hemoglobin, hematocrit, mean corpuscular hemoglobin concentration and mean cell volume are presented in Table 2 and graph 1. The obtainedresults revealed significant increase in RBCs count in both foals and yearling compared to adult mares, though numbers are within the same range of hot blooded horses (6.8-12.9× $10^6/\mu$ L),cold-blooded horses (5.5-9.5 × $10^6/\mu$ L), and mixed breed horses (6.0-11.3× $10^6/\mu$ L) (Feldman et al., 2000; Giordono et al., 2008).In comparison with other studies, RBCs values showed contradictive results as Altinsaat (2008) found lower RBCs count in both foals and yearling, others found low RBCs count in adult horses especially in 10years or above (Satue et al., 2009).

Significant decrease in both PCV and Hb values in both foals and yearling with adult mare within normal range. It was observed that Hb has tendency to be low in foals below 1 year (Harvey et al., 1984), while Hb and PCV value of mare tends to be within stated range to their peers (11-19 g/dL), though cold blooded horses show decreased Hb value (8-14 g/dL)(Feldman et al., 2000), thoroughbred foals tends to have a higher Hb content compared to its Arabian peers (Weiss and Wardrop 2010). Regarding RBCs indices, MCV showed significant reduction in both foals and yearlings, when coupled with the previous decreased values of PCV; it showed that MCV value tends to increase with age (Stockham and Scott, 2013).MCHC was significantly higher in Yearling when compared withFillies.MCHCin

Fillies,yearlings and Mares was higher compared with the formerly published rates by Altinsaat (2008).However, Cebulj-Kadunc et al. (2002) reported that Arabian foals have slightly higher MCHC compared with Thoroughbred foals but a low value of MCHC compared with Lipizzan foals. Satue et al., (2012) concluded that age, gender, feeding system and season affect the different blood parameters and MCV was significantly lower in spring and summer seasons. Moreover, the decrease in erythrogram may be also attributed to the decline in red cell survival time with age, decrease iron transportation to bone marrow and decrease in erythropoietin hormone stimulation due to increase hemoglobin saturation in red cells (Harvey, 1990).

Erythrocyte and leukocyte counts, and differential leukocyte counts in Arabian horses are presented in Table 2, and graph 2.A significant higher WBCs value was observed in fillies and yearling and slightly decreased in mares, though the all three group were situated in the wide range of normal leucocyte count warm blood horses ($5.6–12.1×10^3/\mu L$ Weiss D.J. and Wardrop K.J. (2010), different factors are associated with WBCs count including stress factors and hormonal status, (Allen et al., 1984, Gill and Rastawicka, 1986). With neutrophils as the predominant cell is adult mare, this increase in neutrophil can be correlated to stress, hormonal status, lactation, environmental conditions

(Feldman et al., 2000). The increase in neutrophil content in adult mare may reveal immune system maturity (Allen et al., 1984). Yearling tends to have a low neutrophil count when compared to thoroughbred counterparts (Mc Load et al., 1951).

Lymphocytes was higher in yearlings while in mare was within normal range, and this agreed with other reports (Gill et al., 1986;Altinsaat, 2008). In previous reports hot blooded horses were 17-68% while cold blooded horses were 15-50% (Feldman et al., 2000)and it appeared to be Arabian foals has higher Lymphocyte count when compared to thoroughbred(26-52%) (Lumsden et al., 1980) with no changes observed in monocytes and eosinophils.

Conclusion

Anapparent effect of age on the differenthematologic values in females Arabian horses was found. Awareness of the different blood values of Arabian horses in different age groups help in decreases false diagnosis based on inappropriate hematologic values. As Arabian horses are valued animals in our society, and with general knowledge that horse has an extended age compared to other companion animals, it was important to determine mean hematologic parameters in different age groups to help establish the difference between health and disease.

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الملخص العربى

تأثيرالعمرعلى القيم الدموية في الافراس العربية في الاعمارالمختلفة

الخيول العربية هي حيوانات ذات قيمة عالية ، و الاحتفاظ بها في صحة جيدة هو ضرورة. تم قياس القيم الدموية في 64 من اناث الخيول العربية في الاعمار المختلفة و تم تقسيمهم الي ثلاث مجموعات بناء علي الفئة العمرية و ذلك لدراسة تأثير العمر على صورة الدم الكاملة . وجد تأثير واضح للعمر في القيم الدموية المختلفة في اناث الخيول العربية . الوعي بالقيم الدموية المختلفةللخيول العربية في الفئات العمرية المختلفة يساعد في تحديد الفرق بين الصحة والمرض.

Table (2). Hematologic parameters in in Female Arabian Foals, Yearling and mares above 5 years old (mean±SEM).

Parameter	Fillies (A)	Yearling (B)	Mares (C)
RBCs(10^6xmm^3)	8.04 ± 0.375^{AC}	8.014 ± 0.27^{BC}	6.83 ± 0.27
PCV (%)	29.1 ± 1.29^{AC}	29.478 ± 0.86^{BC}	34.325 ± 0.96
HB (g/dl)	10.20 ± 0.388^{AC}	11.13 ± 0.305	11.56 ± 0.46
WBCs(10^3xmm^3)	9.601 ± 0.79^{AC}	10.382 ± 0.511^{BC}	6.979 ± 0.502
Neutrophils (%)	48.48 ± 3.070^{AC}	45.300 ± 2.05^{BC}	59.517 ± 3.521
Lymphocytes (%)	47.28 ± 3.240	50.59 ± 2.020^{BC}	38.042 ± 3.3775
Eosinophils (%)	1.0 ± 0.172	1.136 ± 0.022	1.30 ± 0.259
Monocytes (%)	2.5 ± 0.3762	2.133 ± 0.372	2.05 ± 0.386
MCV (%)	38.13 ± 1.903^{AC}	37.165 ± 1.4610^{BC}	50.9720 ± 2.01207
MCHC (μμ3)	32.927 ± 1.119^{AB}	39.344 ± 2.017	34.543 ± 0.658

AB= Significant difference between fillies and yearling, AC=Significant difference between fillies and Mares, BC= Significant difference between yearling and mares, with $P \leq 0.05$.
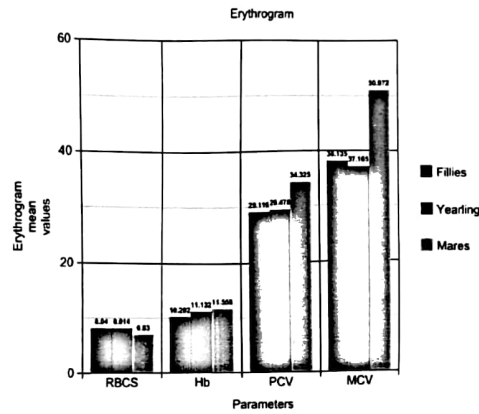
Graph (1). Erythrogram profile in different groups
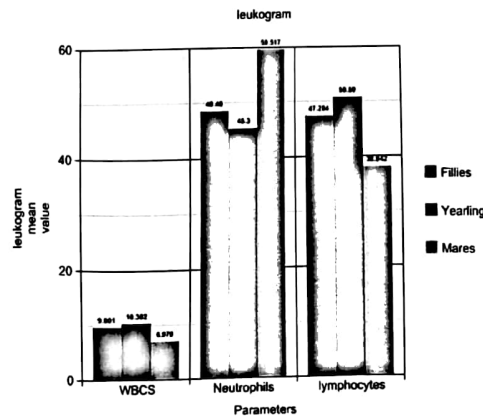
Graph (2). Leukogram in different groups