

Preliminary Study of Hematological Parameters in Herzegovinian Donkey

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Abstract

Herzegovinian donkey is a very important animal resource of Bosnia and Herzegovina. There have been no works attempted at determining the normal values of hematological parameters of Herzegovinian donkey. For this reason, the objective of the present study was to investigate some hematological parameters in Herzegovinian donkey. The research was performed on 30 apparently healthy donkeys (18 female and 12 male) of ages from 1 to 20 years. Blood samples (3 ml) were obtained by jugular vein puncture (*Vena jugularis externa*) in the vacuum tubes with EDTA. The mean value of hematocrit was 29.19%, hemoglobin concentration 10.6 g/dl, mean corpuscular hemoglobin concentration 36.33 g/dl, white blood cells $9.33 \times 10^9/L$, granulocytes ($10^9/L$) $5.45 \times 10^9/L$, granulocytes (%) 59.47%, lymphocyte/monocyte ($10^9/L$) $3.89 \times 10^9/L$, lymphocyte/monocyte (%) 40.53% and platelet cells $148.97 \times 10^9/L$. Parameters were determined using an automated analyzer IDEXX QBC VET AutoRead. Data were analyzed by SPSS V 15. All hematological parameters (except platelet cells) were consistent with the recommended reference ranges for donkeys, and the values found in literature so far. Platelet cells values were much lower than in the literature for the other donkey breeds and the recommended reference ranges for donkeys. The slight differences found between our results and those reported in the previous works confirm the need for further studies to investigate the reference values of hematological parameters of Herzegovinian donkey. This work is a contribution to the study of hematological parameters of Herzegovinian donkey, and we expect these data to be applied to the further studies.

Keywords

Hematology – donkeys – reference values

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Introduction

Donkeys have been close companions to humans for the millennia, and have been used as working animals all over the world (11). The Herzegovinian donkey is a very important animal resource of Bosnia and Herzegovina (B&H) (Figure 1). Up to now no information is available about breeds or numbers of animals in B&H. The Herzegovinian donkey is a donkey of small size. The colour varies from grey to brown. It is estimated, that about 100 animals still exist. The reservation for endangered animals located in Buhovo near Mostar, is under construction (7).

Worldwide interest for welfare and health of donkeys is constantly increasing because of their current popularity as companion animals and their use for recreational purposes, sport activities, work, onotherapy, and, to a lesser extent, for meat and milk production (8). Despite this, information regarding the health monitoring and diagnosis in donkeys are rare. Hematologic data are largely used for diagnosis. Often, the results obtained in donkeys are compared with

that of horses although some differences exist so that the results cannot be considered valid (11, 14).

Laboratory aids are used extensively in making diagnosis of diseases, preventive medicine and as management tools. In interpreting the laboratory test results of an individual, the clinician usually compares the observed values with reference values. The hematological values obtained abroad may not be fully applicable under local conditions because these are influenced by multiple factors including breed, and environmental and management differences. Some variations also exist in the results between the laboratories using different reagents, methods and instruments (6).

Hematological parameters of donkeys have been investigated including endangered Hassawi Ass (1), Ragusana donkeys from Sicily – Italy (2), working donkeys of Ethiopia (3), Catalan donkey (4), donkeys from North-Western Nigeria (5), apparently healthy donkeys from Pakistan – Faisalabad city (6), mixed breed donkeys from Italy (8), donkeys from Ethiopia – Addis Ababa (9), donkey



Figure 1. Herzegovinian donkey- foal (Photo: Rukavina D.)

from Constanta district (10), working donkeys from central Ethiopia (12), endangered Balkan donkey breed (13), Domestic Balkan donkey (15) and donkeys from Nigeria – Sokoto state (17).

However, there have been no works attempted at determining hematological parameters of Herzegovinian donkey. That is why the objective of this preliminary study was to investigate the values of some hematological parameters in Herzegovinian donkey.

Material and Methods

The study area comprises Western Herzegovina. Blood samples were collected in August, 2010.

Animals

The study was carried out on 30 Herzegovinian donkeys (18 female and 12 male) of ages from 1 to 20 years. Apparently healthy donkeys owned by the farmers were sampled.

Hematological measurements

Blood samples (3 ml) were obtained by jugular vein puncture (*Vena jugularis externa*) in the vacuum tubes with ethylenediaminetetraacetic acid (EDTA). The hematocrit (Hct) (%), hemoglobin concentration (Hb) (g/dl), mean corpuscular hemoglobin concentration (MCHC) (g/dl), white blood cells (WBC) ($\times 10^9/L$), granulocytes (Grans) ($\times 10^9/L$), granulocytes (Grans) (%), lymphocyte/monocyte (L/M) ($\times 10^9/L$), lymphocyte/monocyte (L/M) (%), and platelet cells (Plt) ($\times 10^9/L$) were determined using an automated analyzer IDEXX QBC VET AutoRead.

Statistical analysis

Data were entered into Microsoft Excel spread sheet and statistical calculations were performed using the Statistical Package for Social Sciences, SPSS V 15 (SPSS Inc., Chicago, IL, USA). All parameters were reported as the mean, standard deviation (SD), maximum and minimum range.

Results

Some hematological parameters in Herzegovinian donkey were investigated in this preliminary study. Results of the analyzed hematological parameters and reference ranges for

donkeys (16) are shown in Table 1. All data are expressed as the mean, standard deviation, and the lowest and highest values are reported. A total of nine hematological parameters were measured. Most hematological parameters were within the recommended reference ranges for donkeys. The mean value of MCHC was slightly above the recommended reference range. The values of Plt were much lower than the recommended reference ranges for donkeys. A very low values of Plt were measured in ten animals.

Discussion and conclusion

In recent years, many countries have established the normal reference values for hematological parameters for their local animal breeds (12). The hematological values obtained abroad may not be fully applicable under local conditions because these are influenced by multiple factors (6).

To the best of our knowledge, no data regarding the hematological values in Herzegovinian donkey have been provided to date. Thus, the need for the reference ranges for the hematological parameters in Herzegovinian donkey becomes evident. In the present study, preliminary results of some hematological parameters were provided. All parameters investigated in our research were reported as the mean, standard deviation (SD), maximum and minimum range.

According to Veronesi et al. (14), in the small population the lowest and highest values represent the best estimates of the 2.5 and 97.5 percentiles. Hematology has been widely used to provide information about the disease status, performance problems and fitness in equine species. Age, sex and breed as well as physical exercise may affect the results of hematological values (6). In the present study, all hematological parameters (except Plt) were within the recommended reference ranges for donkeys (16).

Values of Hct and Hb are used in the assessment of metabolic profile of animals (18). The mean value of Hct detected in our study was similar to that from Caldini et al. (2) research on Ragusana donkeys from Sicily (Italy) (28.5%) but lower than that reported in the previous studies on donkeys (30.28 – 37.5%) (4, 8, 13, 15). Results for the mean value of Hb obtained in our study were similar to that from Etana et al. (3) research on donkeys from Ethiopia (10.84 g/dl) and Vučićević et al. (15) research on domestic Balkan donkey (10.43 g/dl). On the other hand, in Gul et al. (6) research on donkeys from Pakistan, the mean value of Hb was lower (9.01 g/dl) than the one we detected. In other studies on donkeys, the mean value of Hb was higher than that reported in our study (11.4 – 12.28 g/dl) (1, 2, 4, 5, 8, 10, 12, 13). Results of Hb value obtained in the present research support the hypothesis of Zakari et al. (18) that values of Hb are lower in the summer.

Our results of the mean value of MCHC were similar to the results on donkey breeds previously reported by Laus et al. (8) (36.3 g/dl), Mot et al. (10) (35.93 g/dl) and Simenew et al. (12) (36.8 g/dl). Caldini et al. (2) reported higher MCHC values for Ragusana donkeys from Sicily (40.6 g/dl). The mean value of MCHC in our study was higher than those reported in the other studies on donkeys (31.5 – 35.2 g/dl) (1, 3, 4, 9, 13, 15). In the equides, significant increases

Table 1. Reference ranges for donkeys, mean, standard deviation ($\pm$ SD), minimum and maximum ranges of hematological values in Herzegovinian donkey

Parameter	Reference ranges for donkeys (16)	Mean	$\pm$ SD	Minimum	Maximum
Hct (%)	28 - 47	29.19	4.85	21.9	39.5
Hb (g/dl)	9.5 - 16.5	10.6	1.77	7.8	14.5
MCHC (g/dl)	32 - 36	36.33	0.64	34.2	36.8
WBC ($\times 10^9/L$)	5.4 - 15.5	9.33	4.24	0.8	15.7
Grans ($\times 10^9/L$)	2.2 - 12.1	5.45	2.87	0.5	11.7
Grans (%)	23 - 85.1	59.47	16.33	29	94
L/M ($\times 10^9/L$)	1.8 - 8.6	3.89	2.47	0.3	7.7
L/M (%)	19 - 78	40.53	16.33	6	71
Plt ($\times 10^9/L$)	160 - 584	148.97	119.85	7	477

in MCHC were obtained in the summer than in the winter and spring (18). Our results of higher MCHC level and lower Hb level may be explained by the season and climate conditions of sampled donkeys.

The mean value of WBC obtained in our study was similar to that from Caldini et al. (2) research on Ragusana donkeys from Sicily ($9.83 \times 10^9/L$) and Gul et al. (6) research on donkeys from Pakistan ($9.75 \times 10^9/L$). Garba et al. (5) and Mot et al. (10) found lower mean values of WBC ($7.2 \times 10^9/L$ and $6.37 \times 10^9/L$, respectively). Mean values of WBC reported in the literature for other donkeys mostly ranged from $10.17 \times 10^9/L$ to $17.8 \times 10^9/L$ (1, 3, 4, 8, 9, 12, 13, 17). According to Al-Busadah and Homeida (1), the differences in leucocyte counts may be altered by factors such as age, nutritional status, pregnancy and lactation.

The mean value of Grans ($\times 10^9/L$) detected in our study was similar to Garba et al. (5) research on North-Western Nigeria donkeys ($4.9 \times 10^9/L$) but lower than the mean value reported for endangered Balkan donkey breed ($10.5 \times 10^9/L$) (13). Results for the mean value of L/M ($\times 10^9/L$) detected in our study were higher than those found for North-Western Nigeria donkeys ($2.2 \times 10^9/L$) (5) but lower than those reported for Catalanian donkeys ($5.3 \times 10^9/L$) (4) and endangered Balkan donkey breed ($6.2 \times 10^9/L$) (13). Gul et al. (6) and Mot et al. (10) reported slightly higher mean values of L/M (%) (43.47% and 42.85%, respectively) than those detected in our study.

The values of platelets found in this study were much lower than the values reported in the previous studies on donkeys ($208.77 - 281.15 \times 10^9/L$) (2, 3, 4, 8, 12, 13, 15) and the recommended reference ranges for donkeys (16). The difference in platelets may be due to bio-variation in breed and environmental conditions, not elucidated in the present study. Because platelets play an important role in physiologic and pathologic processes of inflammation, tumour metastasis, haemostasis, wound healing and host defence (18), the need for future studies becomes evident. Generally, minor differences detected in the values of observed hematological parameters could be due to breed, differences in geographical, physiological, season and climate conditions of sampled donkeys as well as nutritional factors, management and sample size.

Also, differences in hematological parameters could be attributed to different reagents, methods and used instruments.

For the first time, data of hematological parameters in Herzegovinian donkey are provided in this paper. Most of the hematological values obtained in this study were generally within the recommended reference ranges for donkeys. The values of platelet cells found in this study were much lower than the values reported in previous studies on donkeys and the recommended reference ranges for donkeys. The slight differences found between our results and those reported in previous works confirm the need for further studies to investigate the normal reference values of hematological parameters in Herzegovinian donkey.

It is therefore recommended that subsequent work should be conducted to establish the reference values of hematological parameters in Herzegovinian donkey in line with the appropriate sample size, age, sex, breed and season.

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meloxidolor

5 mg/ml, otopina za injekciju
za pse, mačke, goveda i svinje
meloksikam

20 mg/ml otopina za injekciju
za goveda, svinje i konje
meloksikam



20 ml
OTOPINA ZA
INJEKCIJU

meloxidolor 5 mg/ml

Psi:

- ublažavanje upale i olakšavanje bola u mišićno-koštanim poremećajima
- ublažavanje postleoperacijskih bolova

Mačke:

- ublažavanje postleoperacijskih bolova

Telad i mlada goveda:

- primjena u akutnoj respiratornoj infekciji
- primjena u slučaju proljeva
- ublažavanje postleoperacijskih bolova

Svinje:

- ublažavanje upale i olakšavanje bola u mišićno-koštanim poremećajima
- ublažavanje postleoperacijskih bolova

100 ml
OTOPINA ZA
INJEKCIJU

meloxidolor 20 mg/ml

Goveda:

- primjena u akutnoj respiratornoj infekciji
- primjena u slučaju proljeva
- pomoćna terapija u liječenju akutnog mastitisa
- ublažavanje postleoperacijskih bolova

Svinje:

- ublažavanje upale i olakšavanje bola u mišićno-koštanim poremećajima.
- pomoćna terapija u liječenju puerperalne septikemije i toksemije

Konji:

- ublažavanje upale i olakšavanje bola u mišićno-koštanim poremećajima
- ublažavanje bolova povezanih s kolikama

Preliminarna istraživanja hematoloških parametara hercegovačkog magarca

Sažetak

Uvod i ciljevi

Hercegovački magarac je vrlo važan animalni resurs Bosne i Hercegovine (BiH). Na žalost, tačni podaci o pasmini i broju životinja još uvijek nisu poznati. Hercegovački magarac je male veličine. Boja mu varira od sive do smeđe. Procjenjuje se da oko 100 životinja i dalje egzistira na području naše zemlje.

Globalni interes za dobrobit i zdravlje magaraca u stalnom je porastu. Magarci su vrlo popularne životinje, koje se često drže kao kućni ljubimci, koriste se u rekreacijske svrhe, sportske aktivnosti, za rad te za proizvodnju mesa i mlijeka. Unatoč tome, informacije o zdravstvenom nadzoru i dijagnozi u magaraca su još uvijek rijetke.

Hematološki parametri se široko koriste u dijagnostici bolesti i u preventivne svrhe. U tumačenju rezultata laboratorijskih testiranja obično se upoređuju opažene vrijednosti s referentnim vrijednostima. Hematološke vrijednosti dobivene u drugim zemljama ne mogu biti u potpunosti primjenjive u lokalnim uvjetima, jer pomenute vrijednosti mogu ovisiti od niza faktora, uključujući različitu pasmisku pripadnost, životnu sredinu, kao i različite uvjete uzgajanja i upravljanja. Također, razlike u rezultatima mogu postojati i usljed korištenja različitih reagenasa, metoda i instrumenata. Prema našem saznanju, do sada nije bilo radova u kojima su se istraživale vrijednosti hematoloških parametara hercegovačkog magarca. Iz tog razloga, cilj ovog preliminarnog istraživanja bio je ispitati vrijednosti nekih hematoloških parametara hercegovačkog magarca.

Materijal i metode

Uzorci krvi prikupljeni su u augustu 2010. godine na području Zapadne Hercegovine. Istraživanje je provedeno na 30 hercegovačkih magaraca (18 ženki i 12 mužjaka) od 1 do 20 godina starosti. Krv naizgled zdravih magaraca je uzorkovana. Uzorci krvi (3 ml) su uzeti iz jugularne vene punkcijom u vakuum tube s EDTA. Vrijednosti hematokrita (Hct) (%), koncentracije hemoglobina (Hb) (g/dl), srednje koncentracije hemoglobina u eritrocitima (MCHC) (g/dl), leukocita (WBC) ($\times 10^9/L$), granulocita (Grans) ($\times 10^9/L$), granulocita (Grans) (%) limfocita/monocita (L/M) ($\times 10^9/L$), limfocita/monocita (L/M) (%) i trombocita (Plt) ($\times 10^9/L$) su određene pomoću automatskog analizatora IDEXX QBC VET AutoRead. Statistička obrada podataka je urađena pomoću statističkog paketa SPSS V 15 (SPSS Inc., Chicago, IL, SAD). Svi parametri su prikazani kao srednja vrijednost, standardna devijacija (SD), maksimalni i minimalni raspon.

Rezultati i interpretacija

U ovom preliminarnom istraživanju ispitane su vrijednosti devet hematoloških parametara hercegovačkog magarca. Posljednjih godina, mnoge zemlje su uspostavile normalne referentne vrijednosti hematoloških parametara za svoje lokalne pasmine životinja.

Međutim, podaci o vrijednostima hematoloških parametara hercegovačkog magarca nisu urađeni do sada. Srednja vrijednost hematokrita u našim istraživanjima je iznosila 29.19%, koncentracije hemoglobina 10.6 g/dl, srednje koncentracije hemoglobina u eritrocitima 36.33 g/dl, leukocita $9.33 \times 10^9/L$, granulocita ($\times 10^9/L$) $5.45 \times 10^9/L$, granulocita (%) 5.45%, limfocita/monocita ($\times 10^9/L$) $3.89 \times 10^9/L$, limfocita/monocita (%) 40.53% te trombocita $148.97 \times 10^9/L$.

U ovom istraživanju, svi hematološki parametri (osim trombocita) bili su u skladu s preporučenim referentnim vrijednostima za magarce te u skladu s ranijim literaturnim podacima. Vrijednosti trombocita, uočene u ovom istraživanju, su mnogo niže od vrijednosti nađenih u literaturi, kao i od objavljenih referentnih vrijednosti datih za magarce. Uzrok razlika u vrijednostima trombocita mogla bi biti biološka varijacija pasmine, kao i ekološki uvjeti. Pomenute razlike nisu istraživane u ovom radu. Općenito, manje razlike zapažene u vrijednostima promatranih parametara mogle bi se javiti zbog različite pasminske pripadnost, razlika u geografskim, fiziološkim, sezonskim i klimatskim uvjetima uzorkovanih magaraca kao i prehrambenim faktorima, menadžmentu i veličini uzorka. Također, razlike u hematološkim parametrima mogu se pripisati i različitim korištenim reagensima, metodama i instrumentima.

Glavni zaključci

Po prvi put, podaci o vrijednostima nekih hematoloških parametara hercegovačkog magarca dati su u ovom radu. Većina hematoloških vrijednosti dobivenih u ovom istraživanju bili su u skladu s preporučenim referentnim vrijednostima za magarce. Vrijednosti trombocita u ovoj studiji bile su znatno niže od vrijednosti nađenih u prethodnim studijama rađenim na magarcima te od preporučenih referentnih vrijednosti za magarce. Razlike uočene između naših rezultata i rezultata prethodnih studija rađenih na magarcima potvrđuju potrebu za daljnjim istraživanjima u cilju uspostavljanja referentnih vrijednosti hematoloških parametara hercegovačkog magarca.

Stoga se preporučuje da se daljnji rad treba provoditi u uspostavi referentnih vrijednosti hematoloških parametara hercegovačkog magarca u skladu s odgovarajućom veličinom uzorka, uključujući podatke o dobi, spolu, pasmini, ishrani i sezoni.