

Preliminary Studies on Hemato-Biochemical Profiles of Indigenous Free Ranging Donkeys (*Equus asinus*) in and around Hassan, Karnataka, India

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Abstract

The free ranging donkey is a very important animal resource of nomads in and around Hassan district, Karnataka. Donkeys living in the sub-tropical region are subject to the effects of various environmental factors that can alter their physiological and clinical parameters, which is particularly significant in free ranging indigenous donkeys. The physiological ranges of selected hematological and plasma biochemical values of free ranging donkeys were studied with the objective of establishing the reference values. Blood samples were obtained from 10 healthy donkeys reared in extensive farming system by jugular vein puncture in the vacuum tubes with EDTA. Hematological parameters, RBC, WBC, Hb, PCV and biochemical parameters, AST, ALP, ALT, glucose, total protein, albumin, cholesterol urea, creatinine and bilirubin were consistent with the reference ranges for donkeys, and the values found in literature so far. Data generated will be of use as baseline values for blood hemato-biochemical profile of indigenous donkeys under Hassan Agro-climatic conditions.

Keywords: Biochemical, Free Ranging Donkeys, Hematology, Reference Values

Introduction

Donkeys (*Equus asinus*) are one of the ancient domesticated livestock and have been close companions to humans and have been used as working animals all over the world (Blench *et al.*, 2013; Sgorbini *et al.*, 2013). The free ranging donkey is a very important animal resource of nomads in and around Hassan district, Karnataka (Figure 1). The free ranging donkey is a donkey of small size and the colour varies from grey to brown. Coat colour is mainly grey (dorsal surface grey and ventral surface white), and have short hairs. Over the last decades, the population of the indigenous donkeys has been constantly declining due to intensive agrarian production and the socio-economic changes in the rural areas. It is estimated that the current number of donkeys in India is as low as 0.12 million and has decreased by 61.23 % over previous census 2012 (Livestock census, 2019). The total number of donkeys in the Karnataka state as per 2019 census is 0.09 million numbers and there is a 46.11% decrease in number of total donkey population over previous census period (Livestock census, 2019).



Figure 1: Donkeys reared under extensive farming system

Donkeys living in the sub-tropical region are subject to the effects of various environmental factors that can alter their physiological and clinical parameters, which is particularly significant in free ranging indigenous donkeys. Donkeys can tolerate some sub-tropical animal disease and parasites; survive on poor quality feeds and adverse climatic conditions, thereby making their management easy for their owners (Aganga *et al.*, 2000, Swai and Bwanga, 2008). Donkey milk has anti-microbial, anti- allergic and anti-aging properties (Devi *et al.*, 2019). The milk obtained from donkey is used in pediatric medicine because of its hypoallergenic composition mainly due to low casein content (Laus *et al.*, 2015; Devi *et al.*, 2019). Children suffering from IgE mediated inflammation or cow milk protein allergy (CMPA) can find in donkeys' milk an optimal and unique substitute to human milk (Muraro *et al.*, 2002; Monti *et al.*, 2012; Devi *et al.*, 2018). Hemato-biochemical indices are of great diagnostic and prognosis values in veterinary practice. The hemato-biochemical values obtained abroad may not be fully applicable under local conditions because these are influenced by multiple factors including breed, environment and management differences and this strongly signifies determination of these parameters is critically important for each donkey species in every country (Rukavina *et al.*, 2016). Despite the benefits and advantages of keeping donkeys, the research attention given to the species is relatively small, hence; very little has been done to establish reference values on donkeys; (Gupta *et al.*, 1992; Starkey 1994; Blench *et al.*, 2013). In the present study we determined the baseline vital, hematological and biochemical parameters of apparently healthy, free ranging donkeys obtained in and around Hassan district, Karnataka.

Materials and Methods

The study was carried out on 10 apparently healthy donkeys of aging from 2 to 4 years owned by farmers. All animals were reared in extensive farming system (free to graze on pasture) and regularly treated with anthelmintic drug. Blood samples were obtained by jugular vein puncture in vacuum tubes and with ethylene diamine tetra acetic acid (EDTA) 10% for hematology. Immediately after blood collection, samples were transported using icebox with icepack. The red blood cell count (RBC), white blood cell count (WBC) (by the hemocytometer method), packed cell volume (PCV), hemoglobin concentration (Hb), were evaluated as reported by Schalm *et al.* (1975). Mean

corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration were calculated from PCV, Hb and RBC values as per standard procedures (Schalm *et al.*, 1975). Plasma was obtained by centrifugation (2500 rpm, 10 minutes) and stored at -20oC until analyses were performed. All the plasma samples were analyzed for biochemical parameters *viz.* glucose, total protein, albumin, total cholesterol, triglyceride, HDL-Cholesterol, creatinine, urea, total bilirubin, direct bilirubin, alanine amino transferase, (ALT), asparatate aminotransferase (AST), alkaline phosphatase (ALP) level using automated analyzer available; the reagents and kits for analysis were procured from SWAMED India Pvt. Ltd.



Figure 2: Blood collection for hemato-biochemical analysis from free ranging donkeys

Statistical Analysis of Data

Data were entered into Microsoft Excel spread sheet and statistical calculations were performed using the GraphPad Prism version 5.01 (2007). All parameters were reported as the mean, standard deviation (SD), maximum and minimum range.

Results and Discussion

Some hematological and biochemical parameters in free ranging donkeys in and around Hassan were investigated in this preliminary study. Results of the analyzed hematological and biochemical parameters for donkeys are shown in Table 1 and Table 2. All the data is expressed as the mean, standard deviation (SD), maximum and minimum range. A total of seven hematological parameters and 13 biochemical parameters were measured.

Table 1: Results for analyzed hematological parameters (mean \pm SD, range) for free ranging donkeys of Hassan

Hematological Parameter	Mean \pm SD	Range
Red Blood Cells ($\times 10^6/\mu\text{l}$)	6.58 \pm 0.50	5.84 - 7.30
White Blood Cells($\times 10^3/\mu\text{l}$)	9.59 \pm 0.77	8.65 - 10.98
Hemoglobin(g/dL)	12.75 \pm 0.81	11.40 - 13.60
Packed Cell Volume (%)	39.79 \pm 2.11	37.25- 44.00
Mean Corpuscular Volume (fl)	60.68 \pm 4.72	51.03 - 66.44
Mean Corpuscular Hemoglobin (pg)	19.39 \pm 0.77	18.24 - 20.65
Mean Corpuscular Hemoglobin Concentration (g/dl)	32.08 \pm 2.08	29.38 - 36.51

For the first time, data of hematological and biochemical parameters in free ranging donkeys in and around Hassan geographical area are provided in this paper. The hematological and biochemical values obtained elsewhere may not be fully applicable under local conditions because these are influenced by multiple factors and this strongly signifies determination of these parameters is critically important for each donkey species in every country (Rukavina *et al.*, 2016). Most of the values obtained in this study were generally within the recommended reference ranges for donkeys (Simenev *et al.*, 2011; Weiss and Wardrop, 2010). Generally, minor differences detected in the values of observed hematological and biochemical parameters could be due to breed, differences in geographical,

physiological, and climate conditions of sampled donkeys as well as nutritional factors, management, sample size and different methods used.

Table 2: Results of analyzed biochemical parameters, (mean± SD, range) for free ranging donkeys of Hassan

Biochemical Parameters	Mean ± SD	Range
ALT/SGPT (U/L)	14.91 ±0.26	14.2 - 16.33
AST/SGOT (U/L)	280.3±12.13	232.2 - 326.6
ALP (U/L)	340.6±18.14	258.0 - 386. 81
Glucose (mg/dl)	80.5±3.42	70 - 80
Total protein (gm/dl)	6.75±0.72	6.0 - 7.5
Albumin (gm/dl)	2.96±0.29	1.7 - 4.2
Total Cholesterol (mg/dl)	80.6±4.03	23 - 85
Triglyceride (mg/dl)	62.6±9.32	48 - 74
HDL Cholesterol (mg/dl)	46.2±3.34	41 - 49
Creatinine (mg/dl)	0.79±0.08	0.6 - 1.3
Urea (mg/dl)	45.7±4.63	28.17 - 70.16
Total Bilirubin (mg/dl)	0.4±0.03	0.3 - 0.6
Direct Bilirubin (mg/dl)	0.3±0.08	0.6 - 1.3

Hematological Parameters

The hematological values established in this study are consistent with previously published data for donkeys from Nigeria (Garba *et al.*, 2015), mixed breed donkeys of Italy (Laus *et al.*, 2015), Indian donkeys (Gupta *et al.*, 1992), Herzegovinian donkeys (Rukavina *et al.*, 2016) and adult non-descript indigenous donkeys (Legha *et al.*, 2018). It has already been shown that differences in hematological profiles could be attributes to various processing techniques as well as the geographical and nutritional factors (Rukavina *et al.*, 2016).

Plasma Biochemical Parameters

The biochemical values established in this study are within the recommended reference range (Zinkl *et al.*, 1990; French and Patrick, 1995; Jordana *et al.*, 1998; Mori *et al.*, 2003) and consistent with previously published data for donkeys from Nigeria (Garba *et al.*, 2015), mixed breed donkeys of Italy (Laus *et al.*, 2015) and donkeys of Eithopia (Simenev *et al.*, 2011). Comparison of the present results with other reports does not show big variations; and any slight differences may be ascribed to the differences in breed, feeding management systems, seasons of study, sample storage mechanism, sample size, working conditions of the animals, techniques of analyses and reagent types (Simenev *et al.*, 2011).

Conclusion

This work is a contribution to the study of hematological and biochemical parameters of free ranging donkeys, and we expect these data to be applied to the further in a day-to-day clinical activity and research studies. Data generated will be of use as baseline values for blood hemato-biochemical profile of healthy indigenous donkeys under Hassan Agro-climatic conditions.

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Conflict of Interests

There is no conflict of interest.

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