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RESEARCH ARTICLE

# Hemato-biochemical profiles of Kathiawari horses in and around Junagadh region

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**Abstract :** Normal hematological and biochemical indices were studied in healthy Kathiawari horses of different sex group. All the data showing non-significant difference but total granulocyte per cent and MCHC per cent is found higher in female than male and lymphocyte per cent found higher in male than female horse.

**Key words :** Kathiawari, Horses, Biochemical, Hematological

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## INTRODUCTION

Blood examination is performed for screening procedure to assess general health and the body's ability to fight infection. The complete blood count (CBC) and blood biochemistry is an important and powerful diagnostic tool as components of a minimum database. It can be used to monitor response to therapy, to gage the severity of an illness, or as a starting point for formulation a list of differential diagnosis. However, integration of the data is important for the highest diagnostic yield. Hematological values such as total red blood cell count, packed cell volume, hemoglobin concentration, MCV, MCH, MCHC, total white blood cell count and platelet count and blood biochemical parameters like blood glucose, total protein, albumin, calcium, cholesterol, certain enzymes and trace minerals can be used to

estimate. Hematological and biochemical parameters vary between and within breeds of animals and also depend on locality, environmental condition, heredity and nutritional status. Kathiawari is one of the important breed of horses in India known for its docileness, speed, swiftness and sturdiness. Therefore the objective of this study is to determine the changes in hematological and biochemical parameters of horses in and around Junagadh regions.

## RESEARCH METHODOLOGY

About forty two blood samples from healthy Kathiawari horses were collected from Teaching Veterinary Clinical Complex, Veterinary College, JAU, Junagadh and in and around Junagadh regions. Ten ml of blood was collected from jugular vein of horse in $K_3$EDTA vaccutainer and hematological analysis was done immediate after collection of sample through automatic hemato-analyser (BC-2800VET, Mindrey, China) at Department of Veterinary Physiology. Remaining sample was used for plasma separation for biochemical evaluations. Plasma samples were kept at -20°C till further analysis. Plasma biochemical analysis was done with semi automatic analyser (MICRO LAB-300, Merck, Netherland) by using standard biochemical kits (Merck Diagnostics, Netherland) at Department of Veterinary Pathology. Data was subjected to statistical analysis for finding the significant difference in the values of various haematological and biochemical in both the sexes with the help of unpaired Student's t-test. The analysis was done at 95 per cent level of significance.

## RESULTS AND DISCUSSION

Kathiawari horses are well adapted and domesticated in this agro-climatic zone that's way this breeds are originated from this area only. Due to its popularity and genetic characterization little informations is available on various hematological, biochemical and physiological indices are available. This study is also of great significance as normal values of these indices reported for other foreign breeds of equines cannot be used for this breed because of appreciable differences in these indices due to breed, origin, age sex etc.

Observation values mean±SEM and range of hematological and biochemical parameters presents in Table 1 and 2, respectively.

**Hematological indices:**

Comparative study revealed the among male and female horse all the parameters *viz.*, total WBC, hemoglobin,

**Table 1: Hematological parameters of Kathiawari horses of different sex group (mean ± SEm)**

| Parameters | Male | Female | Overall |
|---|---|---|---|
| N | 14 | 28 | 42 |
| TWBC (x$10^3$/cmm) | 10.47 ±0.82 (7.40 – 13.53) | 10.45 ±0.65 (7.02 – 13.89) | 10.46 ±0.51 (7.18 – 13.73) |
| Lym (%) | 41.81 ±3.20* (29.82 – 53.80) | 32.20 ±2.45* (19.22 – 45.18) | 35.40 ±2.06 (22.08 – 48.72) |
| Mon (%) | 3.86 ±0.49 (2.03 – 5.70) | 4.57 ±0.28 (3.08 – 6.06) | 4.34 ±0.25 (2.71 – 5.96) |
| Gran (%) | 53.42 ±3.21* (41.42 – 65.43) | 62.07 ±2.58* (48.44 – 75.70) | 59.19 ±2.10 (45.58 – 72.79) |
| TRBC (x$10^6$/cmm) | 8.92 ±0.40 (7.42 – 10.42) | 8.80 ±0.51 (6.10 – 11.50) | 8.84 ±0.36 (6.49 – 11.19) |
| Hb (g/dl) | 14.02 ±0.73 (11.30 – 16.74) | 14.32 ±0.79 (10.12 – 18.51) | 14.22 ±0.58 (10.48 – 17.95) |
| PCV (%) | 45.40 ±2.69 (35.35 – 55.45) | 43.04 ±2.50 (29.84 – 56.25) | 43.83 ±1.88 (31.66 – 56.00) |
| MCV (fl) | 51.11 ±2.18 (42.95 – 59.28) | 49.16 ±1.29 (42.36 – 55.97) | 49.81 ±1.12 (42.57 – 57.06) |
| MCH (pg) | 15.74 ±0.56 (13.66 – 17.83) | 16.56 ±0.47 (14.05 – 19.07) | 16.29 ±0.37 (13.90 – 18.67) |
| MCHC (g/dl) | 31.11 ±0.65* (28.68 – 33.55) | 33.96 ±0.79* (29.80 – 38.13) | 33.01 ±0.60 (29.12 – 36.91) |
| RDW (%) | 16.19 ±0.27 (15.17 – 17.20) | 16.59 ±0.26 (15.22 – 17.96) | 16.45 ±0.19 (15.19 – 17.71) |
| PLT (x$10^3$/cmm) | 178.43 ±17.97 (111.19 – 245.66) | 183.57±13.17 (113.88 – 253.26) | 181.86±10.51 (113.76 – 249.96) |

* Indicate significant difference (p<0.05%) among the different sex  Data in parenthesis denotes the range

hematocrit values, monocyte per cent, MCV, MCH, RDW (Red cell Distribution Width) and platelets count was showing non-significant difference but lymphocyte per cent was significant ($p<0.05$) higher in male than female and granulocyte per cent and MCHC was significantly ($p<0.05$) higher in female than male horses.

In comparison to other breeds total RBC, Hb, PCV value range are observed similar with Standardbred horse of Italy (Mariella Jole *et al.*, 2014), Thoroughbred (Lumsden *et al.*, 1980), Taiwan horse (Ju *et al*., 1993) and values mention in standard reference books (Reece, 2005 and Southwood, 2013), but same parameters are showing lower range in Arabian horse (Neamat-Allah and El Damaty, 2016), Lahor working horse (Pritchard *et al.*, 2009), Kathiawari horse (Gupta *et al.*, 2002), Sell Italian horse (Piccione *et al.*, 2008), Criollo horse (Fonteque *et al.*, 2016) and mention in MVM (2016). At sex wise difference, male showing higher values of these indices than female (Gupta *et al.*, 2002). Other indices like TWBC, lymphocyte per cent, monocyte per cent, granulocyte per cent, MCV, MCH, MCHC and platelets ranges showing higher than Standardbred (Mariella *et al.*, 2014), Arabian horse (Neamat-Allah and El Damaty, 2016) and within the range observed with Criollo horse (Fonteque *et al.*, 2016), Thoroughbred (Lumsden *et al.*, 1980) and Lahor working horse (Pritchard *et al.*, 2009). The reason for significant increased in MCHC in female is only indication with higher value of hemoglobin than male. The parameter RDW is to know the health status of animal pertaining to anemic condition and which is always to be determining in CBC with MCV to know the cause and type of anemia. Kathiawari breeds revealed ranges 15.19 to 17.71 per cent indicating least variation in size or volume of RBCs.

**Biochemical indices :**

All the blood metabolites and minerals are showing non-significance differences between male and female horses. The average values of total protein, albumin, globulin and glucose showing higher than Arabian horse (Neamat-Allah and El Damaty, 2016), Sell Italian horse (Piccione *et al.*, 2008), Standardbred (Mariella *et al.*, 2014) and Lahor working horse (Pritchard *et al.*, 2009) but similar range is observed in different breeds like thoroughbred (Lumsden *et al.*, 1980) and in literature (Kaneko *et al.*, 2008 and Southwood, 2013). The values of TP, albumin, total cholesterol and triglycerides were shown maximum in female Kathiawari breed than male groups indicating their varied metabolic requirements in them.

Higher levels of blood urea and creatinine in female as compare to male groups was observed in this breed as similar observed by Gupta *et al.* (2002). These indices showing similar ranges by different workers in different breeds of horses (Lumsden *et al.*, 1980; Piccione *et al.*, 2008 and Mariella *et al.*, 2014). Among the observed blood minerals Ca and P values are showing higher and Mg showing lower in female than male Kathiawari horses but

**Table 2 : Levels of different blood biochemical parameters of Kathiawari horses of different sex group (mean ± SEm)**

| Parameters | Male | Female | Overall |
|---|---|---|---|
| N | 11 | 20 | 31 |
| TP (g/dl) | 8.06 ± 0.33 (6.98 – 9.14) | 8.21 ± 0.20 (7.32 – 9.11) | 8.16 ± 0.17 (7.21 – 9.11) |
| ALB (g/dl) | 4.45 ± 0.18 (3.86 – 5.05) | 4.61 ± 0.11 (4.12 – 5.09) | 4.55 ± 0.09 (4.03 – 5.07) |
| GLB (g/dl) | 3.61 ± 0.25 (2.78 – 4.44) | 3.61 ± 0.18 (2.82 – 4.39) | 3.61 ± 0.14 (2.82 – 4.40) |
| CRET (mg/dl) | 1.03 ± 0.09 (0.74 – 1.31) | 1.37 ± 0.10 (0.90 – 1.83) | 1.25 ± 0.08 (0.81 – 1.68) |
| BUN (mg/dl) | 25.81 ± 3.20 (15.19 – 36.44) | 29.70 ± 1.72 (22.00 – 37.39) | 28.32 ± 1.59 (19.45 – 37.19) |
| T CHOL (mg/dl) | 86.45 ± 3.63 (74.42 – 98.49) | 95.30 ± 3.08 (81.51 – 109.09) | 92.16 ± 2.46 (78.48 – 105.85) |
| TRIGL (mg/dl) | 26.82 ± 3.16 (16.32 – 37.31) | 33.15 ± 1.78 (25.18 – 41.12) | 30.90 ± 1.67 (21.61 – 40.20) |
| GLU (mg/dl) | 103.36 ± 3.80 (90.78- 115.95) | 99.77 ± 3.76 (82.95 – 116.58) | 101.04 ± 2.75 (85.72 – 116.37) |
| ALT (IU/L) | 35.36 ± 2.71 (26.37 – 44.36) | 32.60 ± 3.11 (18.69 – 46.51) | 33.58 ± 2.21 (21.28 – 45.88) |
| AST (IU/L) | 306.91 ± 15.16 (256.62 – 357.19) | 326.10 ± 16.10 (254.10 – 398.10) | 319.29 ± 11.66 (254.38 – 384.20) |
| Ca (mg/dl) | 9.19 ± 0.38 (7.92 – 10.47) | 9.61 ± 0.24 (8.52 – 10.71) | 9.46 ± 0.21 (8.31 – 10.52) |
| P (mg/dl) | 3.32 ± 0.29 (2.38 – 4.27) | 3.99 ± 0.23 (2.94 – 5.04) | 3.75 ± 0.19 (2.71 – 4.80) |
| Mg (mg/dl) | 2.19 ± 0.38 (0.94 – 3.44) | 1.75 ± 0.15 (1.07 – 2.42) | 1.90 ± 0.17 (0.98 – 2.83) |

Data in parenthesis denotes the range

overall Ca level of this breed observed lower range than other breeds of horses (MVM, 2016; Mariella *et al.,* 2014 and Kaneko *et al.*, 2008) but P and Mg ranges are at par with other breeds. Blood enzymes like AST observed within the range compare to other breeds of horses Arabian horse (Neamat-Allah and El Damaty, 2016), Lahor horse (Pritchard *et al.*, 2009) and Sell Italian horse (Piccione *et al*., 2008) but ALT ranges were observed in higher side in Kathiawari breeds. ALT is not a useful indicator of liver disease in large animals and pigs, due to low enzyme activity in liver tissue of these species.

As very little information is available in literature on hemato-biochemical indices of Kathiawari horses, this work would help the clinician and epidemiologists in proper prognosis and diagnosis of various disease condition, farm managemental and in the treatment monitoring of disease aspects of Kathiawari horses.

**Conclusion:**

Average normal data of hematology and blood biochemistry was evaluated from healthy Kathiawari horses randomly chosen from in and around Junagadh regions among that all the hematological and biochemical parameters are showing non-significance difference between male and female except Lymphocyte per cent, Granulocyte per cent and MCHC per cent. Major haematological and biochemical indices of Kathiawari breed of Indian horses are comparable with other breeds of horse whereas within Kathiawari breed total granulocyte per cent and MCHC per cent is found higher in female than male and lymphocyte per cent found higher in male than female horse.

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