

Haematobiochemical and Mineral status in Chegu Pashmina goats of Himachal Pradesh

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Abstract

Chegu goat is a rare breed of goat which produce finest and warmest fibre called pashmina. The true breeding tract of these goats is confined to the cold desert region of Lahaul-Spiti and Kinnaur districts in Himachal Pradesh. A total of 30 chegu pashmina goats reared in five villages of these districts having height between 3500 and 4200 metres above mean sea level, were included in the present study. Blood and faecal samples were collected from these animals. Hematological examination revealed mean haemoglobin values as 11.46 ± 0.27 gm%, packed cell volume as 36.3 ± 0.147 % and total erythrocytic count as $21.57 \pm 0.35 \times 10^6/\mu\text{l}$. Plasma mineral analysis reflected mean levels of Calcium as 10.14 ± 0.412 mg/dl, Phosphorus levels as 6.356 ± 0.40 mg/dl, Magnesium as 3.50 ± 0.14 mg/dl, Iron as 2.13 ± 0.06 ppm, Copper as 0.88 ± 0.05 ppm, Zinc as 0.06 ppm and Cobalt as 0.03 ppm. On biochemical examination, the mean values of AST were found to be 90.67 ± 2.396 U/l, Total protein 8.06 ± 0.23 gm/dl, Blood urea nitrogen as 25.58 ± 1.71 mg/dl and Creatinine as 1.24 ± 0.07 mg/dl. Faecal examination revealed mild infection with *Coccidia spp.*, *Trichuris sp.* and *Strongyle spp.* in 11 animals. There is no record of haemato- biochemical and mineral profile of these goats reared under natural conditions and the above values can serve as the baseline values for future studies.

Key words: Chegu goats, Hematology, Biochemistry, Mineral, Parasitic

The total Livestock population in the country is 535.78 million (20th Livestock Census, 2019) showing an increase of 4.6 % whereas the Goat population is 148.88 million showing an increase of 10.1 % over the previous Livestock Census in 2012. The total Goat population in Himachal Pradesh is 11.08 lacs comprising of two breeds viz. Gaddi and Chegu goats. Chegu goats produce a finest and warmest natural fibre called “Pashmina” (Fig. 1 and 2). The true breeding tract of these goats is confined to the cold desert region of Lahaul-Spiti and Kinnaur area in Himachal Pradesh having a height > 3200 meters from mean sea level. These areas experience harsh dry climate characterized by wide temperature fluctuation, ranging from -40°C (winters) to 30°C (summers), very low precipitation and hypoxia. The pashmina producing goat breed Chegu is a special livestock breed that has adapted to the harsh agroclimatic and agro-pastoral conditions. A large amount of metabolites related to various metabolic and biochemical processes circulate in body e.g. glucose, proteins (albumin, globulins), triglycerides, enzymes (ALT, AST), bilirubin, creatinine, BUN etc. These substances and metabolites are present within a particular range in healthy animals and any deviation from the normal value denotes disease. Though the studies have been carried out in adult Chegu goats

stationed at Palampur, but the study on the Chegu goats in their natural breeding tract has not been done earlier. Till date no scientific study has been carried out to record the baseline values of most of blood parameters in them. Hence the present study was undertaken to determine the haemato- biochemical and mineral levels of Chegu Patina goats in their natural breeding tract.

Materials and Methods

The present study was undertaken on Chegu pashmina goats living in their natural breeding tract in two Districts of Kinnaur and Lahaul Spiti. Animals from a total of 5 villages were selected which included Village Hango in District Kinnaur and 4 villages viz. Hurling, Kibber, Langcha (Fig.3) and Tingret in District Lahaul and Spiti. Routine clinical observations (body temperature, heart rate, respiration rate and mucous membrane examination) were recorded. About 2 ml of blood was collected for haematological examination in EDTA whereas heparinised blood samples were collected for biochemical and mineral estimation (Fig. 4). The blood samples were analyzed for Haemoglobin (Hb), Packed cell volume (PCV), Total erythrocytic count (TEC), Total leucocytic count (TLC) and Differential leucocytic count (DLC) by using standard methods (Benjamin, 1985). The blood biochemical analysis for plasma enzymatic

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activity of Alanine aminotransferase (ALT), Aspartate aminotransferase (AST), Plasma glucose, Total plasma protein, Total bilirubin, Blood urea nitrogen (BUN) and Plasma creatinine were estimated using Microlab 300 Clinical Chemistry Analyser (by Merck Limited, Mumbai). In addition, 5 grams of faecal sample was collected for detection of any endoparasites by qualitative examination and floatation technique.

Results and Discussion

The area (MSLH > 3200 meters), where the Chegu pashmina goats are reared in Himachal Pradesh, is difficult to access. Hence, no comprehensive scientific intervention has been done, so far, to record the reference values of their various body parameters. A few authors (Kumar *et al.*, 2000, Sharma *et al.*, 2005 and Chauhan *et al.*, 2010), however, placed on record, mean values of some hemato-biochemical parameters of these animals, but, with a wide variations, that too, in goats maintained at a totally different climatic conditions and at a very low lying area (MSLH 1200 meters). Hence, true picture of various parameters, in this rare species of pashmina goats is still lacking with regard to high altitude areas.

Table 1. Hematological parameters in Chegu pashmina goats (n = 30)

S. No.	Parameters	Value (Mean ± S.E)
1.	Hb (gm%)	11.46 ± 0.27
2	PCV(%)	36.30 ± 0.14
3	TEC(x 10 ⁶ / cu mm)	21.57 ± 0.35
4	TLC (x 10 ³ / cu mm)	12.52 ± 0.78
5	DLC	
	N (%)	2.33± 1.63 %
	L (%)	68.17± 0.48 %
	M (%)	3.11± 0.21 %
	E (%)	4.88± 0.33 %
	B (%)	0.50± 22 %

The mean values of Haemoglobin, Packed Cell Volume, Total erythrocytic Count and Total leucocytic count were 11.46 ± 0.27 gm%, 36.30± 0.14 %, 21.57 ± 0.35 x 10⁶/ cu mm and 12.52± 0.78 x 10³/ cu mm which were higher than the mean values of above parameters observed by Katoch *et al.* (2013) who observed these as 10.85 ± 0.32 gm%, 30.85± 1.28 %, 16.57 ± 0.47 x 10⁶/ cu mm and 13.68 ± 0.92 x 10³/ cu mm in 20 Chegu goats kept at Palampur (MSLH 1240 metres) in Kangra District of Himachal Pradesh. Sharma *et al.* (2005) also

reported Haemoglobin value in Chegu goats stationed at Palampur, as 9.79±0.23 g/dl with PCV value as 30.85 ± 1.28 % which were almost similar to the present findings. However, the TEC was markedly higher 16.57 ± 0.47 x 10⁶ / cu mm as compared to the mean value of 9.90 ± 0.43 x 10⁶ / cu mm recorded by the above authors. This difference might be because of persistent effect of earlier habitat of higher hills where the atmospheric oxygen concentration was comparatively lower and in response, the goats had higher TEC values along with higher heart and respiration rates which are supposed to occur naturally at higher altitude (Karim, *et al.*, 2010). The TLC value (13.68 ± 0.92 x 10³ /cu mm) was also towards the higher limit but within normal range. The DLC values were within normal range. The mean levels of above parameters were also higher than those observed by Shashank *et al.* (2019) who observed lower mean values of Haemoglobin (9.73 ± 0.01 gm%), PCV (26.59 ± 0.58 %), TEC (11.34 ± 0.01 x 10⁶/ cu mm) and TLC (11.09 ± 0.02 x 10³/cu mm) in goats suffering from gastrointestinal parasitism (Table 1).

Table 2: Biochemical parameters in Chegu pashmina goats (n = 30)

S. No.	Parameters	Values (Mean±S.E.)
1	ALT (IU/L)	37.41 ± 2.90
2	AST (IU/L)	90.67 ± 2.39
3.	Total protein (g/dl)	8.06 ± 0.23
4.	Total Bilirubin (mg/dl)	0.64 ± 0.07
5.	BUN(mg/dl)	25.58 ± 1.71
6.	Creatinine (mg/dl)	1.24 ± 0.07
7.	Glucose (mg/dl)	58.23 ± 2.84

The plasma enzymatic activity of Alanine aminotransferase (37.41 ± 2.90 IU/L), Total protein (8.06 ± 0.23 g/dl), Total bilirubin (0.64 ± 0.07 mg/dl), Creatinine (1.24 ± 0.07 mg/dl) and Glucose (58.23 ± 2.84 mg/dl) were similar to those observed by Katoch *et al.* (2013) who observed the mean values of above biochemicals as 33.38 ± 2.65 IU/L, 8.44 ± 0.33 g/dl, 0.60 ± 0.09 mg/dl, 1.15±0.038 mg/dl and 54.94±2.60 mg/dl respectively. However the mean values of AST (90.67 ± 2.39 IU/L) were markedly higher than the earlier observations (21.00±3.40 IU/L) of Katoch *et al.* (2013). Also the plasma enzymatic activity of Alanine aminotransferase *viz.* 37.41 ± 2.90 IU/L was markedly higher whereas the activity of Aspartate aminotransferase was almost similar *viz.* 90.67 ± 2.39 IU/L to the values reported by Kumar *et al.*, (2000) who recorded corresponding values as



Fig.1: Pashmina fibre in a Chegu coat



Fig. 2: A typical Chegu Pashmina goat



Fig. 3: Langcha village at MSLH 4200 metres

24.88±2.76 IU/L and 101.28±4.39 IU/L in Chegu goats maintained at Palampur (Table 2).

Table 3: Mineral status in Chegu pashmina goats (n = 30)

S. No.	Parameters	Values (Mean ± S.E)
1	Calcium (mg/dl)	10.14 ± 0.412
2	Phosphorus (mg/dl)	6.35 ± 0.40
3.	Magnesium (mg/dl)	3.50 ± 0.14
4.	Iron (ppm)	2.13 ± 0.06
5.	Copper (ppm)	0.88 ± 0.05
6.	Cobalt (ppm)	0.18 ± 0.01
7.	Zinc (ppm)	0.86 ± 0.06

The mean levels of above minerals were in the normal range as per Radostitis *et al.* (2007) indicative of good nutritional status and disease free state of these goats in their natural habitat (Table 3).

Faecal examination by floatation technique revealed the presence of endoparasites in 11 goats (Table 4).

Table 4: Endoparasitic load in Chegu pashmina goats

S. No.	Name of Endoparasite	Number of animals affected
1	<i>Strongyle spp.</i>	6
2	<i>Trichuris spp.</i>	2
3.	<i>Coccidia spp.</i>	3

Faecal sample revealed presence of Strongyle, Trichuris and Coccidian oocysts. A mild load of above parasites was found by direct smear and floatation method. Though the studies on the haematological, biochemical and mineral levels of Chegu pashmina goats has not been carried out earlier in their natural habitat, but the normal levels of above parameters were in conformity to other breed of goats (Radostitis *et al.* 2007). The above baseline values can serve as a reference for further studies in future.

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