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Research Article

Status of Trace Mineral Deficiency in Sheep and Goat in Kashmir Valley

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ABSTRACT

The aim of the present study was to evaluate the prevalence of trace mineral deficiency in sheep and goat in Kashmir valley. For this purpose fifty three blood samples from cross bred sheep and thirty five blood samples from cross bred goats were taken. The samples were analyzed for trace minerals by atomic absorption (AAS) spectrophotometer and prevalence was calculated. The average prevalence of copper deficiency in sheep and goat was observed to be 43.39% and 45.71%, respectively. Overall prevalence of iron deficiency in sheep and goat was 18.86% and 20.00%, respectively. Overall prevalence of zinc deficiency in sheep and goat was observed to be 33.93% and 40.00%, respectively. The average prevalence of cobalt deficiency in sheep and goat was observed to be 22.64% and 20.00%, respectively. Higher prevalence of copper followed by zinc, cobalt and iron deficiency was found in sheep and goat. From the present study it is clear that lower production and poor performance of sheep and goat in Kashmir valley may be attributed to the trace mineral deficiency. Hence supplementation with mineral supplements may be recommended.

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INTRODUCTION

Small ruminant production represents the principal economic output, contributing a large share of the income of farmers in many parts of Asia and Africa (Ben Salem and Smith, 2008). Trace mineral deficiency affect production and performance of sheep and goat (Xin et al., 2011; Lengarite et al., 2012). Mineral deficiencies are common in sheep and goat grazing poor quality pastures and reared under traditional system (Sowande et al., 2008; Kawas et al., 2010; Xin et al., 2011). Trace mineral deficiency is not recognized easily, especially in small ruminants as deficiency exists in flocks in subclinical form and affect fertility, growth rate and wool yield (Vázquez–Armijo et al., 2011). Trace mineral deficiency also causes ill thrift, abortion, placental retention, death of lambs, reduction in immunity, increased susceptibility to bacterial and parasitic infections (Suttle, 2010).

In India trace mineral status of different states has been studied (Gupta et al., 2008; Singh, 2009) and status of deficiency has been evaluated (Sharma et al., 2003; Sharma *et al.* 2006). Such study is lacking in Kashmir valley where small ruminants form an important part of rural economy. Hence the present study was carried out to study the prevalence of trace mineral deficiency in sheep and goat and accordingly devise the strategies to prevent the occurrence of deficiency.

MATERIALS AND METHODS

A total of 53 cross breed sheep and 35 cross breed goats were randomly selected for the survey purpose from three districts (Budgam, Pulwama and Srinagar) of Kashmir valley. All the selected animals were females in the age group of 1–3 year, grazing in same pastures and reared under similar managemental conditions.

Blood samples were collected by jugular vein puncture, 3ml in tubes without any anti–coagulant for harvesting serum. The separated serum samples were stored at –20°C for pending analysis of minerals.

Copper, iron, zinc and cobalt were estimated by atomic absorption spectrophotometry after digesting the serum samples by the procedure of Kolmer et al. (1951). AAS (Model No. AAS 4141) manufactured by Electronic Corporation of India (ECIL), Hyderabad was used in present investigation. Data collected from this study were analyzed as per the method described by Snedecor and Cochran (1994) for mean and standard error. Prevalence is calculated by dividing no. of deficient animals with the total no. of animals in an area and expressed in percentage (Marchevsky, 1974).

Table 1: Showing number of blood samples collected from three districts of the Kashmir valley.

Districts	Block	Sheep	Goat
Budgam	Chadoora	10	11
	Chrari–sharief	8	3
	Khansahab	3	2
Pulwama	Pulwama	10	5
	Pampore	9	2
	Kaka Pora	3	3
Srinagar	West–zone	2	3
	South–zone	5	4
	Central zone	3	2
Total		53	35

RESULTS

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The average prevalence of copper deficiency in sheep and goat of the Kashmir valley was observed to be 43.39% and 45.71%, respectively. Highest prevalence of copper deficiency in sheep was observed in Central zone of Srinagar (66.60%) and lowest in Khan–Sahab and Kaka–Pora (33.33% each). Highest prevalence of copper deficiency in goats was observed in Chrarisharief and Kaka–Pora (66.66% each) and lowest in West zone of Srinagar (33.33%). Overall prevalence of iron deficiency in sheep and goat of the Kashmir valley was observed to be 18.86% and 20.00%, respectively. Highest prevalence of iron deficiency in sheep was observed in Central zone of Srinagar and Pampore (33.33% each) and lowest in Chrari–Sharief (12.50%). Highest prevalence of iron deficiency in goats was observed in Central zone of Srinagar (50.00%) and lowest in Chadoora (18.18%). Overall prevalence of zinc deficiency in sheep and goat of the Kashmir valley was observed to be 33.93% and 40.00%, respectively. Highest prevalence of zinc deficiency in sheep was observed in South zone of Srinagar (80.00%) and lowest in Chadoora and Pulwama (20.00% each). Highest prevalence of zinc deficiency in goats was observed in Chadoora (54.54%) and lowest in Pulwama (20.00%). The average prevalence of cobalt deficiency in sheep and goat of the Kashmir valley was observed to be 22.64% and 20.00%, respectively. Highest prevalence of cobalt deficiency in sheep was observed in Chrari–sharief (37.50%) and lowest in Pulwama (20.00%). Highest prevalence of cobalt deficiency in goats was observed in Pulwama (40.00%) and lowest in Chadoora (18.18%).

Table 2: Prevalence of trace mineral deficiency (%) in Sheep and Goat in various districts of Kashmir valley

Districts	Block	Copper		Iron		Zinc		Cobalt	
		Sheep	Goat	Sheep	Goat	Sheep	Goat	Sheep	Goat
Budgam	Chadoora	4/10(40)	4/11(36.6)	2/10(20)	**2/11(18.18)**	**2/10(20)**	**6/11(54.54)**	3/10(30)	**2/11(18.18)**
	Chrari–sharief	3/8(37.5)	**2/3(66.6)**	**1/8(12.5)**	1/3(33.3)	1/8(37.5)	1/3(33.33)	**3/8(37.5)**	1/3(33.33)
	Khansahab	**1/3(33.33)**	1/2(50)	0/3(Nill)	0/2(Nill)	1/3(33.33)	1/2(50)	0/3(Nill)	0/2(Nill)
Pulwama	Pulwama	4/10(40)	2/5(40)	2/10(20)	1/5(20)	**2/10(20)**	**1/5(20)**	**2/10(20)**	**2/5(40)**
	Pampore	4/9(44.44)	1/2(50)	**3/9(33.33)**	0/2(Nill)	3/9(33.33)	1/2(50)	2/9(22.22)	0/2(Nill)
	Kaka Pora	**1/3(33.33)**	**2/3(66.6)**	0/3(Nill)	1/3(33.33)	2/3(66.66)	0/3(Nill)	0/3(Nill)	0/3(Nill)
Srinagar	West–zone	1/2(50)	**1/3(33.3)**	0/2(Nill)	0/3(Nill)	1/2(50)	1/3(33.33)	0/2(Nill)	1/3(33.33)
	South–zone	3/5(60)	2/4(50)	1/5(20)	1/4(25)	**4/5(80)**	2/4(25)	2/5(40)	1/4(25)
	Central zone	**2/3(66.6)**	1/2(50)	**1/3(33.33)**	**1/2(50)**	1/3(33.33)	1/2(50)	0/3(Nill)	0/2(Nill)
Mean		23/53(43.39)	16/35(45.71)	**10/53(18.86)**	**7/35(20)**	**18//53(33.93)**	**14/35(40.00)**	**12/53(22.64)**	**7/35(20.00)**

Values in the parenthesis indicate prevalence (%).

DISCUSSION

Higher prevalence of copper deficiency followed by zinc, cobalt and iron deficiency in sheep and goat. Present study can be contributed to the higher deficiency of copper, zinc and cobalt in the soil and fodder of this region (Yatoo et al., 2011). Booshan *et al.* (2010) have reported copper deficiency in goats. Copper deficiency causes many ill effects like loss of wool quality, loss of weight, diarrhoea and death in young ones (Radostits et al., 2007; Khan et al., 2007). Humann–Ziehank et al. (2008) have reported zinc deficiency in sheep. Yatoo et al. (2013) have also reported higher deficiency of zinc followed by copper and cobalt in goats. Zinc is essential for normal health, metabolism and immunity (Pavlata et al., 2011).

In our study cobalt deficiency was lower in goats than in sheep. Goats' presumably have similar requirements of cobalt as sheep (Smith and Sherman, 2009) but are less sensitive to cobalt deficiency than sheep (Clark et al., 1987). Lower prevalence deficiency of iron in sheep and goat may be due to the adequate content of iron in forages (Yatoo et al., 2011). Higher deficiency of trace minerals in sheep and goat in urban areas may be related to availability of less and poor quality fodders than the rural areas.

The present state of trace mineral deficiency in sheep and goat in Kashmir valley may be attributed to the lack of knowledge regarding scientific feeding in general and unawareness about the implications of trace mineral deficiency in particular. Lengarite et al. (2012) have also reported mineral deficiency in grazing sheep and goat in arid range lands.

Based on the present findings it can be concluded that the sheep and goat in Kashmir valley are predisposed to trace mineral deficiency under the present feeding systems. Hence mineral supplementation in the form of mineral mixture or mineral drenching of these animals is imperative.

Author's Contribution

MIY implemented the study design. MCS, UD and PK provided the necessary guidance and drafted manuscript. AS, RJ, SUN and DPM helped in sample processing. All authors read and approved the final manuscript.

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Competing interests

Authors declare that they have no competing interests.

REFERENCES

Ben Salem H and Smith T (2008). Feeding strategies to increase small ruminant production in dry environments. *Small Ruminant Res*. 77: 174–194.

Bhooshan N Kumar P and Yadav MC (2010). Micro–minerals status in goats of different age in semi–arid region of India. *Ind. J. Ani. Sci.* 80 (3): 258–261.

Clark RGM Mantleman L and Verkerk GA (1987). Failure to obtain weight gain response to vitamin B12 treatment in young goats grazing pasture that was cobalt deficient for sheep. *N.Z. Vet. J.* 35: 38–39.

Gupta UC Wu K and Liang S (2008). Micronutrients in Soils, Crops, and Livestock. *Earth Science Frontiers*. 15 (5): 110–125.

Humann–Ziehank E Ganter M Hennig–Pauka I and Binder A (2008). Trace mineral status and liver and blood parameters in sheep without mineral supply compared to local roe deer (*Capreolus capreolus*) populations. *Small Rumin. Res.* 75: 185–191.

Kawas JR Andrade–Montemayor H and Lu CD (2010). Strategic nutrient supplementation of free–ranging goats. *Small Rumin. Res*. 89: 234–243.

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Khan ZI Hussain A Ashraf M Ashraf MY McDowell LR and Huchzermeyer B (2007). Copper nutrition of goats grazing native and improved pasture with the seasonal variation in a semiarid region of Pakistan. Small Rumin. Res. 67(2–3): 138–148.

Kolmer JA Spanbling EH and Robinson HW (1951). *Approved Laboratory Technique.*Appleton Century Crofts New York.

Lengarite MI Mbugua PN Gachuiri CK and Kabuage LW (2012) Mineral Status of Sheep and Goats Grazing in the Arid Rangelands of Northern Kenya. *Pakistan J. Nutr*. 11(4): 383–390.

Marchevsky N (1974) Errors in prevalence estimates in population studies: a practical method for calculating real prevalence. *Zoonosis*. 16: 98–109.

Pavlata L Chomat M Pechova A Misurova L and Dvorak R (2011). Impact of long–term supplementation of zinc and selenium on their content in blood and hair in goats. *Veterinarni Medicina*. (2): 63–74.

Radostits OM Gay CC Constable PD and Hinchcliff KW (2007). A textbook of the diseases of cattle, sheep, pigs, goats and horses. 10th edn, W B Saunders Co, Philadelphia.

Sharma MC Kumar P Joshi C and Kaur H (2006). Status of serum minerals and biochemical parameters in cattle of organized farms and unorganized farms of western Uttar Pradesh. *Asian J. Anim. Vet. Adv*. 1(1): 33–41.

Sharma MC Raju S Joshi C Kaur H and Varshney VP (2003). Studies on serum micro mineral, hormone and vitamin profile and buffaloes, its effect on production and therapeutic management in Haryana state of India. *Asian Australasian J. Anim. Sci.* 6: 519–528.

Singh MV (2009) Micronutrient nutritional problems in India and improvement for human and animal health. *Indian J. Fert*. 5(4): 11–26.

Smith MC and Sherman DM (2009). Goat medicine. Second edition, Wiley–Blackwell publication, USA. pp 747–749.

Snedecor GW and Cochran WG (1994). Statistical methods, Iowa State University press, Ames, Oxford and IBH, New Delhi.

Sowande OS Odufowra EB Adelakun AO and Egbeyale LT (2008). Blood minerals in wad sheep and goats grazing natural pastures during wet and dry seasons. *Arch. Zootec*. 9218: 275–278.

Suttle NF (2010). Mineral Nutrition of Livestock. (4th ed.) CABI Publishing, Wallingford, UK.

Vázquez–Armijo JF Rojo R Salem AZM López D Tinoco JL González A Pescador N and Domínguez–Vara IA (2011). Trace elements in sheep and goats reproduction: a review. *Tropical and Subtropical Agroecosystems*. 14(1): 1–31.

Xin GS Longa RJ Guo XS Irvine J Ding LM Ding LL and Shanga ZH (2011). Blood mineral status of grazing Tibetan sheep in the Northeast of the Qinghai–Tibetan Plateau. *Livestock Science*. 136: 102–107.

Yatoo MI Archana Saxena Pankaj Kumar Gugjoo MB Umesh Dimri Sharma MC and Jhambh R (2013). Evaluation of serum mineral status and hormone profile in goats and some of their inter–relations. *Vet. World*. 6(6):318–320.

Yatoo MI Devi S Kumar P Tiwari R and Sharma MC (2011). Soil plant animal micro mineral status and their inter relation in Kashmir valley. *Ind. J. Ani. Sci*. 81(6): 628–630.

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