HEMATO BIOCHEMICAL AND MICRO MINERALS ALTERATIONS IN LEUKODERMIC BUFFALOES OF EASTERN PLAIN ZONE OF MIDDLE GANGETIC PLAIN REGIONS

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ABSTRACT

In the present study 3,800 buffaloes were screened for skin depigmentation irrespective of age, sex and breed in which 18 were found leukodermic. The cases were diagnosed on the basis of history and clinical signs. Hematology and serum micro minerals status were evaluated. In the present study a non significant change in value of Hb, PCV, TEC, TLC, MCV, MCH, and MCHC in leukodermic buffaloes were obtained. The mean activities of ALT, AST, and ALP were significantly higher in Leucodermic buffaloes as compared to healthy buffaloes. A significant decline in serum copper and zinc levels from 77.69+1.39 and 88.38+1.13 to 52.37+0.59 and 73.65+0.88 respectively in Leucodermic buffaloes were noticed.

Keywords: Leukoderma, buffaloes, hemato biochemical and micro minerals

INTRODUCTION

Leukoderma, loss of normal skin pigmentation (Radostits *et al.*, 2007), is the most common chronic depigmentation disorder affecting 1 to 2% of world population (Szczurko and Boon, 2008). Leukoderma is recorded in dairy animals, mainly buffaloes (Gill and Gill, 1975). It includes loss of functioning melanocytes which causes the appearance of white patches on skin (Hong *et al.*, 2005). Im *et al.* (1994) defined Leukoderma as a pigmentry disorder of unknown cause characterized by depigmented patches due to destruction of melanocytes. The mechanism by which melanocytes are lost may be multiple but is not yet identified. Till now the exact etiology of leukoderma is unknown and occurs in dark brown skinned buffaloes (Hussain, 1999). Causative factors of leukoderma may include environmental insult (Cumming and Nordlund, 1995), autoimmune response in which melanocytes are destroyed by immune system (Fishman *et al*., 1997), and inherited predisposition and/or copper deficiency (Panduranga Rao *et al*., 2002). The long period housing also causes loss of skin pigmentation (Cockrill, 1974). Thus it is concluded that etiology of leukoderma is multiple (Norris *et al*., 1994). Earlier preliminary reports indicated that leukoderma in dairy animals is copper responsive. A break down in the conversion of tyrosine to melanin in hair follicle probably explain the early failure in pigmentation, since this

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conversion is catalyzed by a copper containing polyphenyl oxidase, tyrosinosae (Holstein *et al.*, 1979). It is usually not harmful and causes no physiological pain to the animal. The present study was conducted for comparison between Haemato biochemical serum micro minerals profiles alterations in healthy and leukodermic buffaloes.

MATERIALS AND METHODS

The study area is under subtropical zone of Indo Gangetic and lies between latitude 26.47° north and longitude 82.12° east with elevation of about 113 meter from mean sea level (Sastry, 1995). Screening of leukoderma in buffaloes was conducted between January 2013 to March 2014. A total 3,800 buffaloes were screened for the disease irrespective of age, sex and breed in which 18 were found leukodermic. The study was conducted in two groups. Group 1 include 18 apparently healthy buffaloes on the basis of clinical examination, blood and micro mineral analysis. Group 2 was comprised of 18 buffaloes suffering from leukoderma. All buffaloes were clinically examined. Respiration, pulse rate, heart rate, rectal temperature, feed intake, rumen motility was in normal range, urination and defecation was normal. Fecal examination and skin scrapping were performed for the detection of any parasitic eggs/larvae in the feces and detection of demodex, mange and fungal infection respectively.

Blood samples were collected aseptically from jugular vein of each animal using sterilized disposable syringe and placed in two sets of sterile glass tubes, first set with anticoagulant, EDTA (1 mg/ml of blood) for hematological purposes and second set without anticoagulant for serum separation. Then serum samples were stored in labeled vials at -20ºC for further analysis of biochemical profile. The blood samples were analyzed for Hb, PCV, TLC, TEC, and erythrocytic indices like MCV, MCH, and MCHC by using standard methods (Benjamin, 1985). The serum micro minerals such as copper, iron, zinc and manganese were estimated on atomic absorption spectrophotometer using standard diagnostic kits at Department of Soil Science, College of Agriculture, College of Agriculture, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar Udham Singh Nagar Uttarakhand. Diagnoses of leucoderma in buffaloes were based on the basis of history, clinical signs, fecal examinations, and skin scrapping, blood and serum micro minerals analysis. The data generated was subjected to statically analysis as per method described by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

The blood samples were subjected to complete blood count to compare the hematological status of leukodermic and healthy buffaloes. The value of Hb, PCV, TEC, and MCV decreased from 12.25±0.25, 40.2±0.47, 7.19±0.05 and 52.57±0.46 in leukodermic buffaloes to 10.71±0.16, 35.11±0.50, 6.8±0.11 and 51.78±1.83 respectively (Table 1). The decrease was however statistically non significant. There was a non significant increase in TLC, MCH and MCHC (Table 1). A non significantly lower Hb, PCV and TEC and non significantly higher TLC in leukodermic buffaloes was reported by Randhawa *et al.* (2009). They also recorded non significant variation in values of MCV, MCH and MCHC in leukodermic buffaloes. However in contrast to earlier reports, Gapat *et al.* (2013) reported a highly significant decrease in Hb, PCV and TEC along with non significant change

Table 1. Hematology of healthy and leukodermic buffaloes.

Blood parameters	Healthy buffaloes (N=18)	Leukodermic buffaloes (N=18)
Hb (gm/dl)	12.2±0.25	10.71±0.16
PCV (%)	40.2±0.47	35.11±0.50
TEC ($\times10^6$/µl)	7.19±0.05	6.8±0.11
TLC ($\times10^3$/µl)	10.52±0.42	10.64±0.20
MCV (fl)	52.57±0.46	51.78±1.83
MCH (pg)	15.59±0.32	17.17±0.20
MCHC (%)	30.35±0.36	30.93±0.40

in TLC, MCV, MCH and MCHC in leukodermic buffaloes in comparison to healthy control. Sharma *et al.* (2008) had reported a significant decrease Hb and TEC no variation in TLC in mineral deficient buffaloes. Hypo chromic macrocytic anaemia with Hb concentration as low as 6.5 gm/dl and TEC 3.65×10^6/µl was reported by Pankaj *et al.* (2007) in a buffalo heifer with hypocuprosis, moderate zinc deficiency and discolouration of skin. Hypochromic macrocytic anaemia due to copper deficiency is well documented by Underwood (1977). A non significant decrease in Hb, PCV and TEC was also reported by Soodan *et al.* (2007).

The mean activities of ALT, AST, and ALP were significantly higher in leukodermic buffaloes as compared to healthy buffaloes (Table 2) which can be attributed to skeletal muscle damage. There was an increase in GGT values also although it was statistically non significant. A significant increase in blood glucose level from 54.26±1.84 mg/dl to 68.22±2.46 in leukodermic buffaloes was observed. This may be due to increased adrenal activity induced glycogenolysis. Lerner and Fitzpatrick (1950) have reported decreased melanin synthesis with increased adrenal activity. No significant changes in serum total protein, albumin, globulin and albumin: globulin was observed in the present study.

Serum micro mineral status of healthy and leukodermic buffaloes was evaluated to compare the serum micro mineral status in healthy and leukodermic buffaloes. A significant decline in serum copper and zinc levels from 77.69+1.39 and 88.38+1.13 to 52.37+0.59 and 73.65+0.88 respectively in leukodermic buffaloes were noticed (Table 3).

Gapat *et al.* (2013) also reported 56.53±1.12, 74.63±1.17 and 103.59±1.05 µg/dl serum Cu, Zn and Fe respectively in leukodermic buffaloes. Where as in healthy buffaloes it was 75.61±1.11, 86.68±1.55and 105.80±0.80 µg/dl serum Cu, Zinc, Fe respectively. The level of Mn also showed a decline but it was non significant. Sinha *et al.* (1976) showed a serum Cu level of 125 µg/dl in buffaloes with Leukoderma in comparison to 150 µg/dl in normal control buffaloes.

It can be concluded that there is a non significant variation in the hematological parameters between the leukodermic and the apparently healthy buffaloes. The mean activities of ALT, AST, and ALP were significantly higher in leukodermic buffaloes as compared to healthy buffaloes. A significant decline in serum copper and zinc levels in Leucodermic buffaloes suggest a decline in copper and zinc level as a probable cause of leukoderma in this region, thereby opening

Table 2. Serum biochemical profile of healthy and leukodermic buffaloes.

Blood parameter	Healthy buffaloes (N=18)	Leucodermic buffaloes (N=18)
ALT (IU/L)	36.27±1.34	78.26*±3.48
AST (IU/L)	123.42±5.86	152.64*±6.42
GGT (IU/L)	13.21±0.64	18.64±1.98
ALP (IU/L)	110.26±3.82	164.42*±2.68
Glucose (mg/dl)	54.26±1.84	68.22*±2.46
Total protein (g/dl)	8.24±0.24	8.48±0.16
Albumin (g/dl)	3.84±0.42	3.92±0.68
Globulin (g/dl)	4.41±0.28	4.58±0.32
Albumin : globulin	0.86±0.04	0.87±0.06

Values with superscript *differ significantly (P<0.05).

Table 3. Serum Mineral status of healthy and leukodermic buffaloes.

Mineral	Healthy buffaloes (N=18)	Leukodermic buffaloes (N=18)
Copper (µg/dl)	77.69±1.39	51.01*±0.32
Iron (µg/dl)	105.92±1.11	100.14±0.13
Zinc (µg/dl	88.38±1.13	73.65*±0.88
Manganese (µg/dl)	60.10±0.64	51.91±0.275

Values with superscript *differ significantly (P<0.05).

new vistas for the treatment of leukoderma using multimineral injection or mineral depots.

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