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Research Article

MINERAL STATUS IN BUFFALO CALVES AFFECTED WITH SARCOPTIC MANGE

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ABSTRACT

The present study was conducted to estimate the levels of minerals in buffalo calves affected with sarcoptic mange so as to find their role in its effective treatment. Multiple skin scrapings from buffalo calves suspected of being affected with sarcoptic mange were examined. Blood samples were collected from 20 mange-affected and six mange-free buffalo calves for estimation of macro- and micro-minerals. Significant low levels of calcium, phosphorus, magnesium, copper and manganese were observed in mange-affected calves as compared to the healthy ones. Zinc, selenium and iron levels were also lower in the affected animals as compared to the healthy ones, however, the decrease was not significant statistically. The study indicates that incorporation of trace minerals as supportive therapy along with specific therapy might help in quick recovery of sarcoptic mange in buffalo calves.

Key words : Buffaloes, minerals, sarcoptic mange, scrapings

Blood is an important component in assessing the health status of animals. Both the physiological and pathological conditions of animals can be assessed by hematological and biochemical analyses of the blood (Coles, 1986; Bush, 1991). Several trace elements are required as micronutrients for various body functions and well being of the immune system. The deficiencies of trace elements and infectious diseases often coexist and exhibit complex interactions. Several trace elements have immunomodulatory functions and influence the susceptibility to the course and the outcome of a variety of infections (Coles, 1986). Buffaloes are commonly infected with sarcoptic mange caused by mite *Sarcoptic scabiei* which is notorious and highly contagious.

Sarcoptic mange is also common in dog, camel, swine, goat, sheep and rabbits (Rathore and Lodha, 1973; Naidu and Rao, 1999). In the present study, the levels of certain minerals in buffalo calves affected with sarcoptic mange were estimated.

MATERIALS AND METHODS

Skin scrapings from buffalo calves at an organized farm in Hisar suspected of being affected with sarcoptic mange based on its typical signs and lesions were harvested for mite's examination. The freshly scratched lesions were cleaned with 70% ethanol to remove contaminant fungi and other agents. Multiple skin scrapings were collected and used for direct microscopic examination and identification as per method of Soulsby (1982). Examination of skin scrapings revealed the presence of *S. scabiei* mites. The animals with these mites were selected for examination of macro- and micro- minerals.

Blood was collected from jugular vein in heparinised vials from 20 mange-affected buffalo calves. Blood was also collected from six mange-free calves and these calves acted as negative control. Plasma was separated by centrifugation of heparinized blood and kept at -20°C until analyzed. Samples of plasma were digested by the method of Kolmer *et al.* (1951) and were analyzed for magnesium (Mg), copper (Cu), zinc (Zn), manganese (Mn), iron (Fe) and selenium (Se) by double beam Atomic Absorption Spectrophotometer using air-acetylene flame. Plasma calcium (Ca) and phosphorus (P) were estimated by commercial diagnostic kits (Bayer Diagnostics India Ltd., India). Results were analyzed using t-test as described by Snedecor and Cochran (1994).

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RESULTS AND DISCUSSION

Buffalo calves affected with sarcoptic mange showed intense pruritus, papules, erythema, alopecia and crusts which affected predominantly neck, legs and brisket region.

Mean levels of calcium in sarcoptic mange-affected calves were significantly lower ($P \leqslant 0.05$) as compared to healthy calves (Table 1). Similarly, mean levels of phosphorus and magnesium in calves affected with sarcoptic mange were significantly lower ($P \leqslant 0.01$) than healthy calves. Decreased levels of Ca, P and Mg observed in this study are in agreement with the findings reported earlier in mange-affected buffalo calves (Kumar and Suryanarayana, 1995), goats (Dalpati and Bhowmik, 1996) and cattle (Kozat *et al.*, 2005). In contrast, similar mineral studies in mange-affected camels by Mal *et al.* (2000) revealed no significant alterations in the levels of Ca and Mg. Serum concentration of minerals is affected by a number of factors such as food, age, disease, ecology of the region etc. Minerals participate in immunity of the host and play an important role in hair and feather formation (Underwood, 1977). Hence, decreased mineral levels may be due to pathological changes caused by mites in skin of animals. Also hypocalcaemia and hypophosphataemia in mange-infected animals might be attributed to non-diffusible albumin bound fractions (Dalpati and Bhowmik, 1996).

A significant decrease in the levels of Cu and Mn was observed in mange-affected calves as compared to healthy ones (Table 1). Low levels of Zn, Se and Fe were also recorded in mangy calves as compared to healthy calves, however, the differences were not statistically significant. Low levels of Cu, Mn and Zn have been observed earlier by Kozat *et al*. (2005) in cattle calves affected with psoroptic mange. Similarly, Dalpati and Bhowmik (1996) and Dede *et al.* (2003) have also reported decreased levels of Cu and Zn in goats affected with lice and mange mites, respectively. Low Zn levels have also been observed in camels affected with sarcoptic mange (Singh *et al.*, 2003).

Bibi Nitzan and Cohen (2006) examined the role of Zn as a mode of treatment for a wide range of dermatoses whereas Trost *et al*. (2006) studied potential relationship of Fe deficiency to hair loss. Alopecia in lambs has been related with deficiencies of Cu and Fe in sheep in Egypt (Saleh *et al.*, 1998). Kumar et al. (2007) also reported low level of copper in a buffalo heifer showing signs of localized area of skin depigmentation and alopecia. Wanger *et al.* (1991) also reported that the trace element concentrations changed during parasitic infection. Generally, the mites feed on lymph and cause dermatitis, haemorrhage, hypoproteinemia and oedema. The demand of the parasite for Fe seems to be high (Blood and Radostits, 1989), therefore, the mange infestation deprives the animal from substantial amount of iron. Hafez (1994) and Mal *et al*. (2000) have also reported decreased level of Fe in camels affected with sarcoptic mange.

Low concentrations of plasma iron, copper, magnesium and zinc observed in sarcoptic mange infested buffalo calves possibly resulted from lack of energy, malabsorption, stress conditions and interference of transportation of micro minerals produced by toxins of mites (Dalpati and Bhowmik, 1996). These findings suggest that micro minerals may play an important role in susceptibility and pathogenicity of mange in the animals. Hence, incorporation of trace minerals as supportive therapy along with specific therapy might help in quick recovery from sarcoptic mange.

Table 1
Plasma levels of minerals in sarcoptic mange-affected and healthy buffalo calves

Mineral	Sarcoptic mange-affected (n=20)	Healthy (n=6)
Calcium (mg/dl)	7.68 ± 0.22^{b}	9.36 ± 0.51^{a}
Phosphorus (mg/dl)	3.83 ± 0.16^{B}	4.57 ± 0.19^{A}
Magnesium (mg/dl)	2.23 ± 0.16^{B}	2.95 ± 0.12^{A}
Copper (µg/dl)	113.78 ± 5.09^{b}	165.33 ± 17.19^{a}
Zinc (µg/dl)	251.55 ± 9.54^{a}	295.46 ± 19.10^{a}
Selenium (µg/dl)	16.99 ± 1.49^{a}	18.66 ± 3.08^{a}
Manganese (µg/dl)	64.76 ± 2.68^{B}	78.10 ± 3.04^{A}
Iron (µg/dl)	139.85 ± 8.60^{a}	169.66 ± 20.15^{a}

All values are Mean±S.E.; Different superscripts (a,b) indicate significant difference within a row at 5% level of significance; Different superscripts (A,B) indicate significant difference within a row at 1% level of significance.

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