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Research Article

MINERAL STATUS IN DOGS AFFECTED WITH SARCOPTIC MANGE

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ABSTRACT

The present study was conducted to quantify the levels of important minerals in dogs affected with sarcoptic mange so as to find their role in its effective treatment. Multiple skin scrapings from dogs suspected of being affected with sarcoptic mange were examined. Blood samples were collected from 20 mange-affected and six mange free dogs for estimation of macro- and micro-minerals. Significant low levels of plasma phosphorus, copper, zinc, selenium and manganese were observed in mange-affected dogs as compared to mange-free dogs. Calcium, magnesium and iron levels were lower in affected dogs as compared to mange-free dogs, however, the decrease was not significant statistically.

Key words: Dogs, minerals, sarcoptic mange, scrapings

Minerals are essentials for a number of physiological functions. Mineral imbalance due to excess or deficiency has been found to be associated with certain pathological conditions (Coles, 1986). Trace elements and minerals are important in terms of increasing the resistance against the diseases in biological organisms, causing several clinical conditions in case of their shortage or excess (Underwood and Suttle, 2001). The present study was therefore, conducted to estimate the levels of important minerals in dogs affected with sarcoptic mange so as to find their role in its effective treatment.

MATERIALS AND METHODS

The skin scrapings from dogs suspected of being affected with sarcoptic mange and showing 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 the method of Soulsby (1982).

Blood was collected from saphneous vein in heparinised vials from 20 mange-affected dogs brought to the Teaching Veterinary Clinical Complex, LLRUVAS, Hisar from July 2007 to June 2008. Blood was also collected from six mange free dogs and they were kept as negative controls. Plasma was separated by centrifugation of heparinized blood at 3000 rpm for 20 minutes and kept at -20^{0}C until analysed for macro- and micro minerals.

Samples of plasma were digested by the method of Kolmer *et al.* (1951) and were analyzed for magnesium (Mg) and trace elements viz. copper (Cu), zinc (Zn), manganese (Mn), iron (Fe) and selenium (Se) by double beam Atomic Absorption Spectrophotometer using air-acetylene flame. The plasma calcium (Ca) and phosphorus (P) were estimated by commercial diagnostic kits. Results were analyzed using t-test as described by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

Dogs affected with mange showed intense pruritus, papules, erythema, alopecia and crusts predominantly on pinnae, elbows, ventrum and hocks. Blood was taken from such dogs for estimation of macro and micro minerals.

Significantly lower levels of P were observed in dogs affected with sarcoptic mange than mange-free dogs. The Ca and Mg levels were also lower in mange-affected dogs as compared to the negative controls,

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Table 1
Plasma levels of minerals in sarcoptic mange affected and healthy dogs (Mean±S.E.)

Mineral	Mange-affected (n=20)	Mange-free (n=6)
Calcium (mg/dl)	9.37^{a}±0.26	10.10^{a}±0.32
Phosphorus (mg/dl)	4.77^{b}±0.15	5.36^{a}±0.20
Magnesium (mg/dl)	1.70^{a}±0.09	1.93^{a}±0.09
Copper (µg/dl)	102.98^{b}±3.13	117.42^{a}±4.62
Zinc (µg/dl)	166.09^{b}±4.82	207.68^{a}±15.31
Selenium (µg/dl)	11.26^{B}±0.48	15.97^{A}±0.99
Manganese (µg/dl)	64.08^{B}±3.06	81.05^{A}±2.15
Iron (µg/dl)	109.35^{a}±2.53	121.00^{a}±5.30

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.

though the differences were not statistically significant (Table 1). Decreased levels of Ca, P and Mg observed in sarcoptic mange-affected dogs in this study are in agreement with the findings of Dede *et al.* (2003) who reported similar changes in lice infested goats. Decreased levels have also been 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 study 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 diet, age, disease, ecology of the region etc. Also minerals participate in immunity 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 dogs. Also hypocalcaemia and hypophosphataemia in mange infested animals might be attributed to non- diffusible albumin bound fractions.

Significant low levels of Cu, Zn, Se and Mn were observed in mange-affected dogs as compared to negative controls (Table 1). Low levels of Cu, Mn and Zn have been observed earlier by Kozat *et al.* (2005) in cattle calves affected with mange. Similarly, Dede *et al.* (2003) and Dalpati and Bhowmik (1996) 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). However, no significant changes in the levels of Fe, Zn and Cu were observed by Chandy *et al.* (2000) in dogs affected with sarcoptic mange. Bibi Nitzan and Cohen (2006) examined the role of Zn as a mode of treatment for a wide range of dermatoses and 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). Wanger *et al.* (1991) also reported that the trace element concentrations changed during parasitic infection.

Low levels of Fe were seen in mange-affected dogs but it was not significantly different from the negative controls (Table 1). 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 Fe. Hafez (1994) and Mal *et al.* (2000) have also found decreased level Fe in camels affected with sarcoptic mange.

Low concentrations of plasma iron, copper, magnesium and zinc observed in sarcoptic mange infested dogs possibly resulted from lack of energy, malabsorption, stress conditions and interference of transportation of micro minerals produced by toxins of mites.

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