ABSTRACT

The present study involving surveillance, clinico-biochemical and therapeutic studies on mineral imbalances in dairy animals was conducted in the semi-arid Mansa and Ferozepur districts of South-West Punjab, India. Based on mineral estimation in plasma, hair and other biochemical parameters, a widespread deficiency of Cu, Zn, Ca, P, Mg, Mn, and excess of Mo was detected in dairy animals of this area. Hair As levels in most of the animals were higher than 0.5 ppm, which suggested exposure of toxic form of As to them. Large population of animals in Mansa (95.3% buffaloes, 100.0% cattle) and Ferozepur (92.0% buffaloes, 95.7% cattle) was also affected by subclinical fluorosis, which adversely affected their plasma Pi, Zn, Mn, and haemogram. Moreover, hydrofluorotic buffaloes (drinking water F>1 ppm) had significantly lower plasma Ca and Cu, and higher plasma Pi and F levels, whereas, hydrofluorotic cattle had significantly lower plasma Zn and Mo levels. Despite the normal mineral status of the soils of this area, the observed mineral imbalances in dairy animals were due to inadequate green and mineral feeding, mineral imbalances in forages, and high F and As in drinking water of the area. The other factors like season, age and lactation affected mineral status of dairy animals. The plasma Ca, Mg, Mo and F of buffaloes, and Mo, Fe and F of cattle were significantly higher in summer season, whereas, plasma Zn and I of buffaloes, and Pi, Cu, Zn and Mn of cattle were significantly higher in winter season. Plasma Pi decreased and plasma F increased with age. Moreover, lactating buffaloes had significantly lower plasma Pi, Cu, Mn and Mo, and higher plasma Zn and F levels than the dry buffaloes.

Because of the mineral imbalances, dairy animals of this area exhibited various clinical signs like anestrous, repeat breeding, weakness, lameness, leucoderma and anaemia, and low milk yield. In comparison to healthy animals, anestrous buffaloes had significantly lower plasma Cu, Ca, Mg, Zn, Mn and serum proteins, and anestrous cattle had lower plasma Pi and Zn status. Repeat breeding in buffaloes was associated with significantly lower plasma Mg, Zn and Cu levels. Moreover, buffaloes who were weak and manifesting lameness maintained significantly lower haemogram that may be due to their lower plasma Pi status. Buffalo calves manifesting ill-thrift had significantly lower plasma Pi and Zn levels. Leucoderma in buffaloes was due to deficiency of Cu. The Cu status of buffalo calves showing hair coat depigmentation did not vary from the calves having normal hair coat. Defluoridation of drinking water with alum (1.5g/liter) and lime (200 mg/liter) was effective in reducing F toxicity, and improving plasma Ca, Cu and Zn status and health of fluorotic buffaloes.

Key words: Mineral imbalances, fluorosis, buffaloes, cattle, water defluoridation