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Short Communication

THE RELATIONSHIP BETWEEN THE CONCENTRATION OF SELENIUM IN THE BLOOD AND THE ACTIVITY OF GLUTATHIONE PEROXIDASE IN THE ERYTHROCYTES OF THE DROMEDARY CAMEL (*CAMELUS DROMEDARIUS*)

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INTRODUCTION

Selenium (Se) is an essential micronutrient for the prevention of a number of deficiency syndromes in a variety of species (Underwood, 1981). The occurrence of Se deficiency in the dromedary camel was reported by Zhang *et al.* (1986). In Morocco, Se deficiency is a widespread problem in the major grazing areas (Hamliri, 1989) and one of the authors (A.H.) has diagnosed cases of Se deficiency in a group of young dromedary camels consuming a diet containing 0.02 p.p.m. Se on a dry matter basis.

The seleno-enzyme glutathione peroxidase (GSH-Px) is widely used as an indicator of Se status because it is regularly correlated with blood Se concentration (Ganther *et al.*, 1976). However, to the authors' knowledge this correlation has not been previously studied in the dromedary camel.

MATERIALS AND METHODS

Animals

Fifty-three clinically healthy dromedary camels (17 males and 36 females) between 3 and 16 years of age were sampled. The animals originated from two semi-arid areas of Morocco (Settat and Ouarzazate). They were grazing all the time on pasture and none of them had received mineral supplementation during the three months prior to sampling.

Sample collection

Blood was collected by jugular venipuncture into 10 ml heparinized vacutainers and kept refrigerated for transportation to the laboratory. All blood samples were analysed within three days of sampling.

Three feed samples were collected in each area where blood was collected and 5 g was taken from the mixed samples for Se analysis.

Analytical determinations

The concentrations of Se in whole blood and feed were determined by the fluorometric method of Koh and Bensen (1983). The activity of GSH-Px (EC 1.11.1.9) was measured in erythrocytes washed three times with 0.9% sodium chloride, using freshly prepared hydrogen peroxide as a substrate, according to the modification by Allen *et al.* (1975) of the method of Paglia and Valentine (1967). Enzymic activity was expressed in International Units (iu), where 1 iu was equivalent to 1 μmol of NADPH oxidized per min per g of haemoglobin (Hb) at 25°C.

Statistical analysis

The data were analysed using Student's t test to determine if sex or age had an influence on values. The age groups were 3–5 years, 6–10 years and 10–15 years. Differences were considered significant at $p<0.05$. Linear regression of GSH-Px on Se was carried out according to Snedecor and Cochran (1978).

RESULTS

The results are summarized in Table I; the ranges of Se concentration in the blood and the activity of GSH-Px in the erythrocytes were 82–175 ng/ml and 15–36 iu/gHb respectively. Feed Se levels were 0.107 ± 0.009 p.p.m. Se on a dry matter basis, which is above the minimum dietary requirement of 0.1 p.p.m. Se cited by Ammerman and

TABLE I
Erythrocyte glutathione peroxidase activity and blood Se concentration of male and female dromedary camels given as mean ± SD

Age group (y)	Sex	No. of animals	GSH-Px (iu/gHb)	Se (ng/ml)
	Male	4	24.2 ± 2.8	116.7 ± 11.4
3–5	Female	8	24.4 ± 3.4	109.1 ± 9.0
	Both sexes	12	24.3 ± 2.4	111.7 ± 10.0
6–10	Male	8	26.1 ± 3.9	113.6 ± 16.2
	Female	20	25.7 ± 5.3	117.8 ± 21.0
	Both sexes	28	25.8 ± 4.9	116.5 ± 19.7
10–15	Male	5	23.9 ± 5.2	110.2 ± 14.2
	Female	8	25.0 ± 4.7	114.6 ± 16.4
	Both sexes	13	24.6 ± 4.7	112.9 ± 15.2

Miller (1975). No effect of age or sex on the concentration of Se in the blood or on the activity of GSH-Px was found.

The relationship between the two parameters is shown in Figure 1. There was a significant correlation ($r=0.934, p<0.001, n=53$).

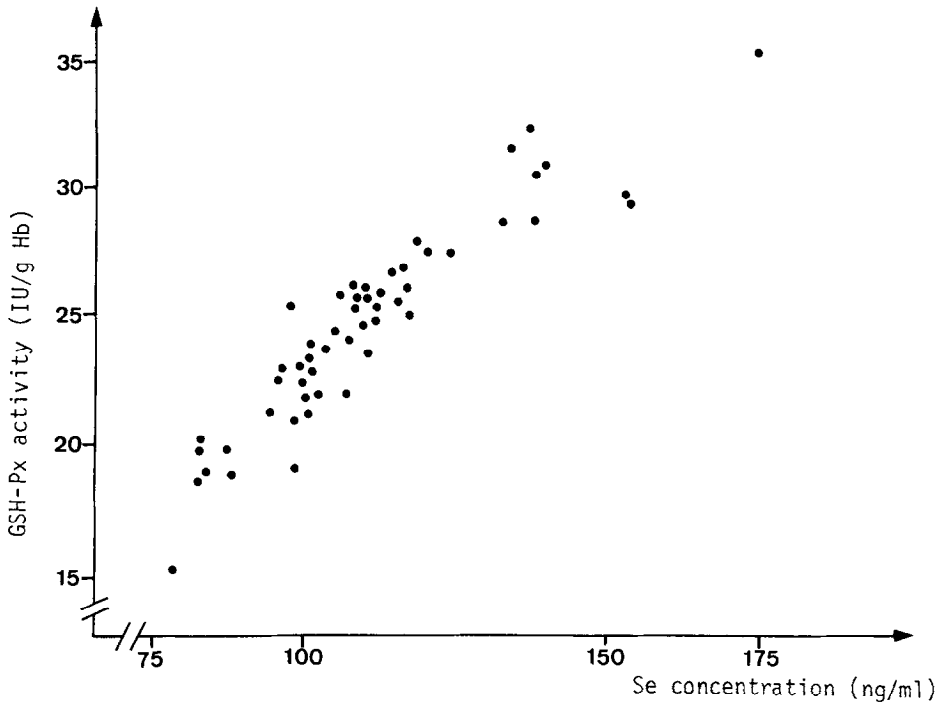

Figure 1. The relationship between the concentration of Se in whole blood and the activity of GSH-Px in the erythrocytes of the dromedary camels

DISCUSSION

The significant correlation between the activity of GSH-Px in the erythrocytes and the concentration of Se in whole blood suggests that the former can be used to assess the Se nutrition of the dromedary camel independently of age or sex. Similar correlations were reported by Wilson and Judson (1976) for sheep, Carlström *et al.* (1979) for cattle and Maylin *et al.* (1980) for horses.

The main advantages of using GSH-Px rather than Se for routine diagnosis of Se status are that the enzyme assay is easy to perform, less time consuming and less hazardous. Also, as shown by Kallfelz *et al.* (1983), the enzyme is stable at room temperature for at least a week. Thus, the enzyme activity can be determined if appropriate blood samples are sent by practitioners to arrive at the laboratory within a week.

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