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The Plasma Folate and Vitamin B12 Contents in Camels (*Camelus dromedarius*)

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Abstract: The aim of this study was to establish reference range for folate and vitamin B12 plasma levels in camels (*Camelus dromedarius*). No effect of sex on folate and vitamin B_{12} were observed. Folate levels were 9.9±1.9 and 8.3±1.4 μmol L^{-1} and B12 levels were 169±11.8 and 173±12.4 pmol L^{-1} for male and females, respectively. As for age, adult camels have significantly higher folate (9.4±1.19 μmol L^{-1}) and B12 (182±13.8 pmol L^{-1}) than yearling (8.7±2.02 μmol L^{-1}), (174±9.11) and neonate (6.8±1.00 μmol L^{-1}), (166±10.9 pmol L^{-1}). Physiological status showed insignificant effect on folate and B12 plasma levels. Folate plasma levels in non-pregnant, pregnant and lactating were 7.9±1.4; 8.2±1.99 and 8.9±2.01 μmol L^{-1}, respectively. However, the corresponding levels for B12 were 177±16.7; 182±13.8 and 185±12.1 pmol L^{-1}, respectively.

Key words: Camel, folate, vitamin B12, plasma folate

INTRODUCTION

Vitamin nutritional requirements in the Camelidae have received little interest as compared with other livestock species. B-vitamins are normally synthesized in sufficient amounts by the ruminal microflora. However, if rumen function is impaired, as by starvation, nutrient deficiencies, or excessive levels of antimicrobials, synthesis of these vitamins may be impaired. Supplemental dietary folic acid and B12 were largely metabolised degraded and or absorbed anterior to the small intestine. The intestinal B-vitamin supply can be predicted based on dietary composition and intake, small intestinal absorption of B12 averaged 48% [1]. The data about water-soluble vitamins, particularly folate and B_{12} are scarce. Therefore, the present study was designed to assess plasma status of folate and B12 in the camels in relation to sex, age and physiological status.

MATERIALS AND METHODS

The study was conducted at Butana area, Central-Eastern part of Sudan, where large numbers of camels are kept. A hundred and twenty camels of both sexes, aged between 0.5-10 years of age and belonging to Lahawiyin tribe. The camels were browsing on Acacia nilotica, Acacia mellifera, Blepharis perisca and Aristida funiculate, as the sole and preferable desert vegetation.

Sample collections and analysis: Blood samples were collected from the jugular vein. Folate concentrations in plasma were determined by using an automated chemical analyser according to Garbis *et al.,*[2]. B12 plasma concentrations were measured by the method adopted by Waxman and Schreiber[3]

Table 1: Plasma folate and B12 concentrations according to sex in camels (*Camelus dromedarius*)

Sex	Folate (μmol L^{-1})	B12 (pmol L^{-1})
Male (65)	9.9±1.9	169±11.8
Female (55)	8.3±1.4	173±12.4

Values are expressed as means±SD ^{a,b,c}Means on the same column having different superscripts are significantly different at $p<0.05$

Table 2: Plasma folate and B12 concentrations according to age in camels (*Camelus dromedarius*)

Age group	Folate (μmol L^{-1})	B12 (pmol L^{-1})
Neonate (11)	7.8±1.00^{a}	166±10.9^{a}
Yearling (35)	8.7±2.02^{b}	174±9.11^{b}
Adult (74)	9.4±1.99^{c}	182±13.0^{c}

Values are expressed as means±SD ^{a,b,c}Means on the same column having different superscripts are significantly different at $p<0.05$

Data analysis: Statistical analyses were performed using SYSTAT[4]. Student's t-test was performed to compare the means of different age group, $p < 0.05$ indicated statistical significance. Data are presented as means±Sd.

RESULTS AND DISCUSSION

No influence of sex on folate and B12 plasma levels was observed (Table 1). However, age greatly affected their levels as shown in Table 2. Non-pregnant camels have higher folate and B12 plasma levels than pregnant and lactating ones (Table 3).

To the best of my knowledge, this is the first study to report vitamin B12 and folate plasma levels in camels under natural vegetation. Cobalt is a micro mineral, which is incorporated in vitamin B12 synthesis, which in turn is essential for proper formation of red blood cells. Ruminant bacteria for their synthesis of vitamin B12 require elemental cobalt. Cobalt deficiency may cause a type of anemia, a reduction in growth and appetite.

Table 3: Plasma folate and B12 concentrations according to physiological status in camels (*Camelus dromedarius*)

State	Folate (μmol L^{-1})	B12 (pmol L^{-1})
Non pregnant, non lactating (17)	7.9±1.42[a]	177±16.7[a]
Pregnant, non-lactating (21)	8.2±1.99[b]	182±13.8[b]
Lacating, non-pregnant (27)	8.9±2.01[b]	185±12.1[b]

Values are expressed as means±SD [a,b]Means on the same column having different superscripts are significantly different at $p<0.05$

Ruminants as well as the camelidae entirely rely on ruminal microorganism for the supply of vitamin B12. Although pseudoruminants, the camelidae calves requires dietary B-vitamins, microbial synthesis in the rumen is though to satisfy the functioning ruminants' needs. Folic plasma levels in racing dromedary were 7.6±3.3 μg L^{-1}[5], which is lower than the level reported in the Sudanese camels, in the present investigation. A compared with the data obtained for New-World Camelids (NWCs), the present data indicated higher B12 status. This vitamin in guanacos was 153 pmole L^{-1}[6]. As for monogastric animals, the mean folate and vitamin B12 plasma levels for Rhesus monkey (m. mulata) were 3.4-10.7 μmol L^{-1} and 600-1015 pmol L^{-1}, respectively[7]. No increase in the plasma folic acid in camels following oral administration of the vitamin in racing camels in the United Arab Emirates[5]. This could be attributed to ruminal destruction of the vitamin and /or microbial uptake[7].

As for the reproductive status, non-pregnant camels have lower folate and B_{12} than their counterparts. Sex indicated insignificant effect on folate and B12 status. In cattle, plasma levels less than 45 pmol L^{-1} may be indicative of cobalt deficiency. Quessant sheep showed plasma concentration above the deficient range, which is 150-300 pmol L^{-1}[8]. The difference in age group is clear, adult having higher folate and B12, which may be related to rumen development and /or feeding pattern.

CONCLUSION

Feeding pattern and /or environmental effect may cause higher values reported in B-vitamins in this study. It is essential, however, to assess cobalt status in camels to give better prediction of the present data.

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