Chemistry of Natural Compounds, Vol. 37, No. 6, 2001

CAMEL'S MILK AND SHUBAT FROM THE ARAL REGION

O. Kh. Saitmuratova,[1] G. I. Sulaimanova,[2] and A. A. Sadykov[1]

UDC 613.287.6.636.295

Proteins of camel's milk and shubat were studied by electrophoresis. Their microelement compositions were determined. Electrophoresis showed two bands in camel's milk and several in shubat. It was found that Fe and Zn occur in greater quantities in both camel's milk and shubat than in cow's milk.

Key words: camel's milk, shubat, diabetes, iron-deficit anemia, hepatitis.

Camel's milk and shubat prepared from it have been used in folk medicine and in several clinics in Kazakhstan to treat various diseases (for example, GI-tract ulcers, chronic hepatitis, etc.). However, the chemical properties of these products and their biological characteristics were insufficiently studied. Data on the microelement content in camel's, cow's, horse's, and other milk have been reported [1-5].

Therefore, the protein fractions of camel's milk and shubat were studied by electrophoresis in order to standardize them and to determine the most important microelements found in them.

We previously studied the content of free amino acids and the total amino-acid and carbohydrate compositions of camel's milk and shubat [6, 7] and found differences in these compositions.

The present article reports data from separation by electrophoresis of proteins of native camel's milk and shubat. The electrophoresis was performed in PAAG (13%) with SDS (0.1%). The protein content of camel's milk significantly exceeds that in cow's and horse's (3.6, 3.3, and 1.8%, respectively) [8, 9].

The electrophoregrams show that proteins of camel's milk separate into two clearly resolved bands; 3-day shubat, into four bands; 10-day shubat, into yet another band in trace quantities (Fig. 1).

We assume by analyzing the electrophoregrams that the new protein bands in samples 2 and 3 are due to degradation of native proteins during fermentation of camel's milk. Camel's milk and shubat are known to be rich in albumin-type proteins. Our results indicate that protein fragments of lower molecular weight are formed during fermentation into shubat. These are readily assimilated in the GI tract.

We also investigated the microelement composition of camel's milk and shubat. Microelements play an important role in the formation of milk structural proteins and affect the quality and food value of milk products. Thus, microelements found in milk (especially Cu, Fe, Zn, and Ni) can act as catalysts of certain chemical reactions. Deficiencies of them lead to various pathological changes in the organism.

Scientists have recently explained the role of zinc in sugar diabetes. It is known to play an important role in the etiology of this disease [10]. Zinc deficiencies represent an important problem for practical medicine. Furthermore, β-cells of the pancreas contain Zn ions, which are necessary for normal functioning.

Camel's milk and shubat have the same content of Co, Se, Br, Hg, Sb, and Cd whereas the Fe content is 2.3 times greater in shubat than in native camel's milk (Table 1). Therefore, shubat is recommended for feeding anemic patients. The Zn content in camel's milk, on the other hand, is greater than in shubat, making it preferable for feeding sugar-diabetes patients. A comparison of the content of these two microelements in camel's and cow's milk found that camel's milk has 53 times more Fe and 20 times more Zn; shubat, 128 and 11 times more, respectively.

1) A. S. Sadykov Institute of Bioorganic Chemistry, Academy of Sciences of the Republic of Uzbekistan, Tashkent, fax (99871) 162 70 71, pr. Kh. Abdullaeva, 83; 2) KKO Institute of Bioecology, Academy of Sciences of the Republic of Uzbekistan, Nukus. Translated from Khimiya Prirodnykh Soedinenii, No. 6, pp. 486-487, November-December, 2001. Original article submitted July 27, 2001.

 0009-3130/01/3706-0566$25.00

TABLE 1. Microelement Composition of Camel's Milk and Shubat, μg/g

Microelement	Camel's	
	milk	shubat
Cl	0.0095	0.0087
Na	0.0055	0.0048
Br	30	26
Fe	32	77
Zn	59	33
Co	0.01	0.01
Se	0.1	0.1
Cr	0.1	0.1
Hg	0.01	0.01
Sb	0.01	0.01
Cd	0.1	0.1

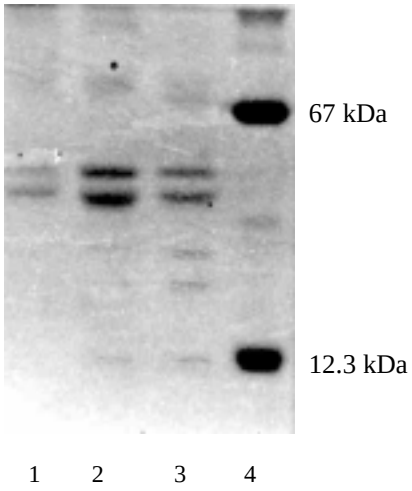

Fig. 1. Electrophoretic distribution of protein fractions of native camel's milk (1) and shubat (2, 3) in PAAG-SDS (13%) (dyed with coomassie blue); native camel's milk (1), 3-day camel's shubat (2), 10-day camel's shubat (3), marker proteins: bovine serum albumin, 67 kDa; cytochrome C, 12.3 kDa (4).

The Fe content in cow's milk [2] is 0.60 μg/g; Zn, 3.00. In camel's milk, the values are 32 and 59; in shubat, 77 and 33, respectively.

Thus, such important microelements as Fe and Zn occur in native camel's milk and shubat much more than in cow's milk. These products are recommended for treating patients with diabetes and iron-deficient anemia.

EXPERIMENTAL

We used fresh native camel's milk and 3-day and 10-day shubat prepared from camel's milk. The microelement composition was determined by neutron activation at the Institute of Nuclear Physics of the Academy of Sciences of the Republic of Uzbekistan. Electrophoresis of protein fractions was carried out by the Laemmli method [11] in PAAG (13%) with SDS (0.1%). The marker proteins were BSA (67 kDa) and cytochrome C (12.3 kDa).

REFERENCES

1. F. M. Elamin and C. G. Wilcox, *J. Diary Sci.*, **75**, No. 2, 3155 (1992).
2. E. A. Fetisov and E. A. Zhdanova, *Milk Microelements* [in Russian], TsHIITEN, Moscow (1970).
3. O. Kh. Saitmuratova, A. A. Sadikov, and Y. J. Sulaimanova, in: 4th International Symposium of the Chemistry of Natural Products, Egirder (Isparta), Turkey, June 6-8, 2001, p. 145.
4. F. C. Swope and J. R. Brunner, *Milchwissenschaft*, **23**, No. 28, 470-473 and 744 (1968).
5. I. M. Skurikhin and M. N. Volgarev, eds., *Chemical Composition of Food Products* [in Russian], VO "Agropromizdat," Moscow (1987), pp. 116-117.
6. G. I. Sulaimanova, O. Kh. Saitmuratova, and L. G. Konstantinova, *Khim. Prir. Soedin.*, 247 (1998).
7. O. Kh. Saitmuratova and G. I. Sulaimanova, *Khim. Prir. Soedin.*, 212 (2000).
8. P. V. Kuchenov, *Milk Treatment and Maintenance of Milk Equipment* [in Russian], Rossel′khozizdat, Moscow (1986).
9. T. Sharmanov, R. Kh. Kadyrova, and V. A. Salkhanov, *Vopr. Pitan.*, No. 3, 10 (1981).
10. A. P. Avtsyn, A. A. Zhavorokov, M. A. Rish, and L. S. Strochkova, *Human Microelementosis* [in Russian], Meditsina, Moscow (1991).
11. V. K. Laemmli, *Nature (London)*, **227**, 680 (1970).