EXPERIMENTAL EFFECT OF SERUM FROM ATHEROSCLEROTIC PATIENTS ON LIPOLYTIC ACTIVITY OF THE AORTIC WALL

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UDC 616.13-004.6-07:[616.132-008.939.15-02:616.15

Serum from patients with atherosclerosis, with an increased content of β-lipoproteins, inhibits the lipolytic activity of the aortic wall in rats in vitro.

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Lowering of the lipolytic activity of the aortic wall in rats resulting from a state of stress [2] leads to the accumulation of β-lipoproteins in the aortic wall and to the development of lipoidosis [3, 4]. It may be supposed that lowering of lipolytic activity of the vessel wall plays an important role in the development of lipoidosis and atherosclerosis in man also. To study this problem, it is essential to determine whether conditions favoring a lowering of the lipolytic activity of the blood vessel wall are created in patients with atherosclerosis. The object of the present investigation was to study the effect of serum from athersclerotic patients on lipolytic activity of the aortic wall of rats in vitro.

EXPERIMENTAL METHOD

The lipolytic activity of the aortic wall of rats was determined by a modified method [7]. Aortas from several normal rats weighing 300-350 g and kept on an ordinary laboratory diet were freed from adventitia, finely minced, thoroughly mixed, and samples weighing 50 mg were added to 1.5 ml of a 2% emulsion of Tween-85 (sorbital trioleate), mixed in the ratio of 2:1 with blood serum from atherosclerotic patients. The Tween-85 emulsion was made up in 4% serum albumin solution in Krebs–Ringer phosphate buffer (pH 7.4). Immediately after addition of the sample of aorta, 0.5 ml of incubation mixture was withdrawn in order to determine the concentration of free fatty acids (FFA). The remaining 1 ml of incubation mixture with weighed sample of aorta was incubated with constant agitation for 2 h at 37°. The lipolytic activity of the aorta was determined from the difference in FFA concentration in the incubation mixture before and after incubation, and expressed as μeq/ml/g aortic tissue. FFA were determined by the method described in [6]. The concentration of β-lipoproteins in the patients' serum was determined by precipitation with heparin by Ledvina's method [5]. Statistical analysis of the numerical data was carried out by a non-parametric method using the Wilcoxon–Mann–Whitney test [1].

TABLE 1. Effect of Serum from Patients with Atherosclerosis on Lipolytic Activity of Rat Aortic Wall (mean data)

Group of patients	Blood level of β-lipoproteins (in mg%)	Lipolytic activity of aorta (in μeq/ml/g)
1st	650(460—770)	13,0(4—21)
2nd	980(800—1 450)	8,8(4—15)
	$u=0$	$u=86$
	$P<0,01$	$P<0,05$

EXPERIMENTAL RESULTS

The action of blood serum from 40 women aged 50-70 years, with atherosclerosis affecting mainly the coronary vessels, was studied on the lipolytic activity of the

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aortic wall. The mean level of β-lipoproteins in their blood serum was 780 mg% (limits of variations 460-1450 mg%). Depending on the level of their serum β-lipoproteins, the patients were divided into two groups: the β-lipoprotein concentration in group 1 (25 patients) was below 780 mg%, and in group 2 (15 patients) it was above 780 mg%. Data showing the effect of serum from both groups of patients on the lipolytic activity of the aortic wall are given in Table 1.

The results show that serum from patients with atherosclerosis, with a raised β-lipoprotein level, had a clear inhibitory action on the lipolytic activity of the aortic wall. This inhibitory action may be a pathogenetic factor in the deposition of lipids in the arterial wall.

Further investigations should help explain the mechanism of inhibition of the action of blood serum from artherosclerotic patients on the lipolytic activity of the aortic wall and indicate possible ways of removing this inhibition.

LITERATURE CITED

1. E. V. Gubler and A. A. Genkin, The Use of Criteria of Non-parametric Statistics in Medico-Biological Research [in Russian], Leningrad (1966), p. 17.
2. S. M. Leites and Chou-Su, Klin. Med., No. 7, 15 (1962).
3. B. L. Lempert and F. L. Leites, Byull Éksperim. Biol. i Med., No. 10, 25 (1963).
4. B. L. Lempert, Probl. Endokrinol., No. 4, 74 (1965).
5. M. Ledvina, Lab. Delo, No. 3, 13 (1960).
6. W. G. Duncombe, Clin. Chim. Acta, 9, 122 (1964).
7. T. Zemplenyi, Z. Lodja, and D. Grafnetter, Circulat. Res., 7, 286 (1959).