MEDICAL SCIENCES

GLYCAEMIC CONTROL UNDER THE INFLUENCE OF ALPHA-LIPOIC ACID IN PEOPLE WITH TYPE 2 DIABETES MELLITUS WHO HAVE HAD MYOCARDIAL INFARCTION

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Type 2 diabetes mellitus (DM) is a widespread metabolic pathology associated with high cardiovascular morbidity and mortality. Oxidative stress plays a leading role among the pathophysiological mechanisms underlying diabetes and its macrovascular consequences [1, p. 15–24; 2, p. 575–584; 4, p. 1808–1829]. Therefore, inhibition of the peroxidation process can help to control diabetes and its complications. This determines the feasibility of using in clinical practice not only hypoglycemic drugs, but also complex therapy aimed at inhibiting prooxidant activity. It has been proven that alpha-lipoic acid (ALA) is a powerful antioxidant: it can weaken the action of reactive oxygen species, reduce oxidative stress, and it is an inducer of other antioxidants [3, p. 1021–1027; 5, p. 947–959].

Purpose: to investigate indices of carbohydrate metabolism in patients with type 2 DM who have had non-Q-myocardial infarction (non-Q-MI) under the influence of ALA.

Materials and methods: Study included 43 type 2 DM patients who have had non-Q-MI. Mean (±SD) age was 62.49 (±7.1) years. Patients were divided into 2 groups according to their baseline HbA1c level: good (1 group, n=22; HbA1c < 7%) and poor (2 group, n=21; HbA1c ≥ 7%) glycaemic control. For the basic treatment of patients during 4 months, it was added ALA 600 mg/day. Indices of carbohydrate metabolism were evaluated at the baseline and 4 months after treatment. The control group (CG) consisted of 20 healthy individuals. The significance of the differences in comparing values before and after treatment was determined using the Student's *t*-test (p). Value of $p<0.05$ was considered to be significant.

Results and their discussion: According to the results of our study, it is expected that the indices of carbohydrate metabolism, namely, the levels of FG ($p<0.001$), PPG ($p<0.001$), HbA1c ($p<0.001$), insulin ($p<0.001$) and the

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HOMA-IR index (p<0.001) were significantly higher in the examined patients compared with CG (Table 1).

Table 1

Dynamics of the indices of carbohydrate metabolism in patients during the treatment (mean ± SD).

Variables	Time	Group 1 (n=22)	Group 2 (n=21)	Control group (n-20)
FG, mg/dl	Before	140.86±22.90#	181.91±39.64#	84.33±10.08
	After	128.27±18.32*	158.92±34.56*	
PPG, mg/dl	Before	171.27±30.65#	215.04±36.88#	96.83±9.62
	After	164.39±28.04	205.86±34.45	
HbA1c, %	Before	6.71±0.30#	8.28±0.72#	5.01±0.42
	After	6.45±0.41*	8.04±0.71	
Fasting insulin, µIU/mL	Before	15.42±6.06#	18.45±7.17#	10.63±3.01
	After	14.63±6.07	17.83±7.53	
HOMA-IR	Before	5.53±2.88#	8.31±3.99#	2.20±0,66
	After	4.72±2.31	6.82±2.93	

Note: # – p<0.001 compared with CG individuals; * – p<0.05 compared with data before treatment.

The use of ALA for 4 months in the group 1 patients causes a decrease in FG (p<0.05) and HbA1c (p<0.05) as well as a positive tendency to decrease the HOMA-IR index (p<0.2).

Analysis of the investigated parameters in the group 2 after receiving ALA showed a significant decrease in the concentration of FG (p<0.05). There was also a tendency for HbA1c and HOMA-IR to decrease (p<0.2).

There were no significant dynamics of the level of PPG and insulin. However, a more detailed intragroup analysis was performed.

Thus, elevated insulin levels were recorded in 4 patients (18.2%) of group 1, normal insulin content – in 18 patients (81.8%) of this group Under the influence of ALA there was a decrease of 9.1% (p>0.05) in patients with hyperinsulinemia with an increase in the corresponding percentage of patients with normal insulin content (Figure 1).

Analysis of the HOMA insulin resistance index showed that the vast majority of patients in the main group – 20 patients (90.9%) had an increased level of the index, 2 people (9.1%) were characterized by normal indicators of the index HOMA-IR. The treatment resulted in a decrease in the prevalence of insulin resistance by 22.7% (p<0.1) – Figure 1.

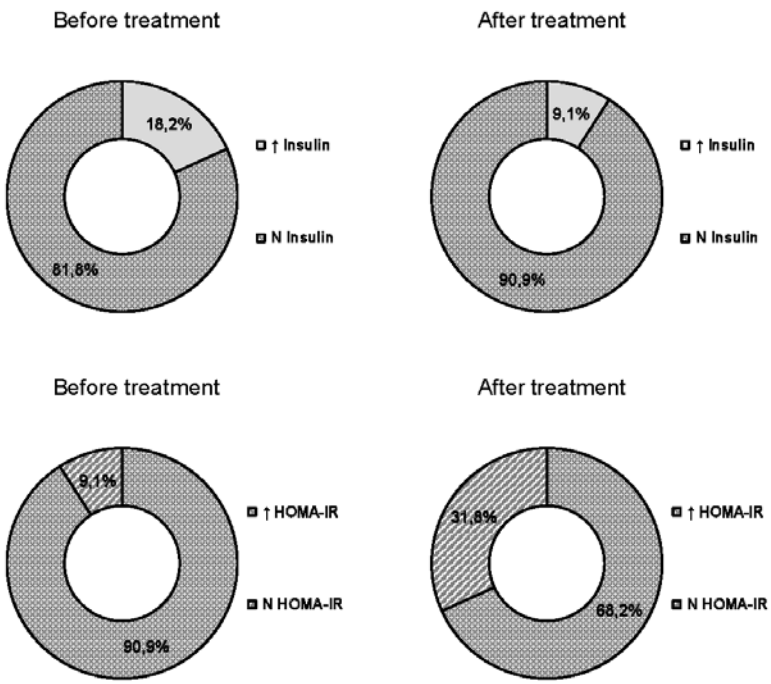

Figure 1. Dynamics of insulin levels and HOMA-IR index in patients of group 1 on the background of treatment.

Note: the difference is statistically insignificant (p>0.05)

Among patients of group 2 hyperinsulinemia occurred in 7 people (33.3%), and normal insulin levels were characteristic of 14 patients (66.7%) – Figure 2.

Against the background of the use of ALA, there was a decrease in the number of patients with elevated insulin levels by 9.5% (p>0.05) with an increase in the number of patients with normal insulin content by a corresponding percentage.

According to the initial data, 20 patients (95.2%) of group 2 had an increased index of insulin resistance HOMA, only 1 (4.8%) patient had normal values of this indicator. After treatment, the number of patients with insulin resistance decreased by 4.7% (p>0.05).

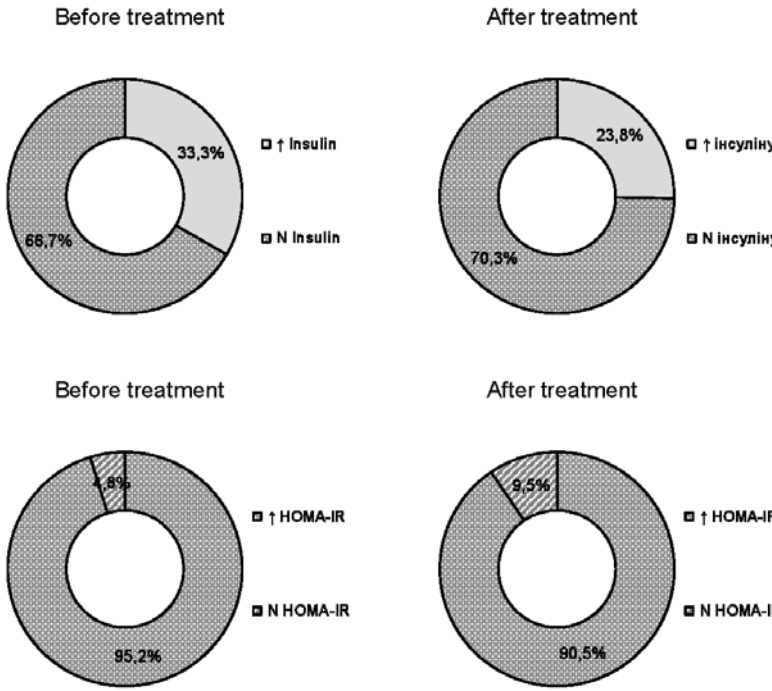

Figure 2. Dynamics of insulin levels and HOMA-IR index in patients of group 2 on the background of treatment.

Note: the difference is statistically insignificant ($p>0.05$)

Thus, according to the results of our research, it was determined that 4-month use of ALA as an adjunct to basic treatment of patients with type 2 DM who had non-Q-MI, determines the significant decrease in FG regardless of the degree of glycemic control. However, only in case of good glycemic control there was a significant decrease in HbA1c. The level of HOMA-IR in our study had only a tendency to decrease. Also in the group with good glycemic control the prevalence of insulin resistance among patients had a positive tendency to decrease.

Conclusion. The use of ALA for 4 months in postinfarction patients with type 2 diabetes improves carbohydrate metabolism with better influence on indices in case of initial good glycemic control.

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