EFFECT OF ZINC SULFATE ON BASIC CLINICAL AND LABORATORY MARKERS OF DIABETES

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ABSTRACT — The work is devoted to evaluating the effect of zinc sulfate on the basic clinical and laboratory markers of diabetes mellitus against the background of hypoglycemic therapy with metformin hydrochloride. The study was conducted on volunteers — patients with type II diabetes mellitus. Changes in carbohydrate metabolism were studied by evaluation of blood glucose levels, C-peptide and insulin levels, glycated hemoglobin. It was found that the use of zinc drugs helps to reduce the indicators of the clinical and laboratory markers. The changes of these indicators in men were more pronounced compared to women. The supplementation of zinc sulfate into the treatment regimen of patients with type II diabetes mellitus contributes to a more effective reduction in the indicators of carbohydrate metabolism compared to the conventional therapy.

KEYWORDS — type II diabetes mellitus, hypoglycemic therapy, zinc sulfate, markers of diabetes mellitus.

INTRODUCTION

Today type II diabetes mellitus is an important problem in endocrinology and medicine, which is associated with the widespread prevalence of this disease. It is noted that this endocrine pathology is socially significant, as it leads to an increase in the percentage of disability and death of patients from developing complications. In this connection, the development of new methods for the correction of this disease is an urgent task [3, 7].

A major treatment of type II diabetes is the use of oral hypoglycemic agents, mostly the drugs of the class of biguanides and thiazolidinediones. However, their use does not always result in positive dynamics. Furthermore, clinical studies have noted a high percentage of complications, which are especially pronounced in elderly patients. In this connection, the use of additional agents that help reduce blood glucose levels is a promising direction [2, 4, 5].

Zinc plays a significant role in the development of diabetes II. It was found that insulin is synthesized and stored in β-cells of the pancreas in the form of Zn^- insulin crystals. It has been proven that in the cofactor Zn^{2+} is involved in the processing and storage of insulin and is also a signaling molecule for α-cells, being released into the extracellular space after secretion, insulin plays the role of an inhibitor of glucagon secretion by directly triggering ATP-sensitive potassium channels. It has also been shown that patients with diabetes mellitus have a deficit of zinc, especially with a chronic complicated course [1, 6, 8].

Hence, *the purpose of this work* was to study the effect of zinc sulfate on the main clinical and laboratory markers in patients with type II diabetes mellitus.

MATERIALS AND METHODS

The studies were conducted with the participation of 36 volunteers — patients with type II diabetes mellitus aged 55 to 65 years (20 women and 16 men). In all patients this diagnosis was made 5 years ago and at the time of the study all of them were taking metformin hydrochloride as a hypoglycemic agent (Siofor 850; Berlin-Chemie AG/Menarini Group, Germany).

All participants were divided into 3 groups. The participants of the first control group were given metformin hydrochloride 850 mg only once a day. The second group comprised of women who received metformin hydrochloride 850 mg per day and zinc sulfate 124 mg (Zincteral; Teva, Israel) twice a day. The third group consisted of men who received the same treatment as women. Evaluation of the main clinical and laboratory markers of diabetes mellitus (blood glucose, C-peptide and insulin levels, glycated hemoglobin) was carried out 2 months after the start of treatment.

The results of determining the main clinical and laboratory markers of diabetes mellitus are presented in the table.

The glucose level of blood in the group of men who received zinc sulfate along with metformin hydrochloride was lower by 20%, in the group of women — by 14% compared with the group of patients receiving the standard treatment. Glycated hemoglobin decreased in both groups by 15%. As a result of the use of zinc sulfate in patients with type II diabetes mellitus

Table 1. The level of the main clinical and laboratory markers of diabetes mellitus

Groups of patients	Indicators			
	Blood glucose; Mmol/l	Glycated hemoglobin; %	C-peptide; ng/ml	Insulin; μU/ml
Control (metformin hydrochloride)	7,3 ±1,2	7,6±0,9	5,3±0,7	21,9±1,8
Men (metformin hydrochloride + zinc sulfate)	5,9±0,9	6,4±0,9	3,3±0,5	7,6±1,4
Women (metformin hydrochloride + zinc sulfate)	6,3±1,1	6,6±0,8	3,5±0,9	8,3±1,5

there was a decrease in the level of C-peptide in the male group by 38% and in the female by 34%; insulin decreased by more than 60% compared to the group of patients treated with metformin hydrochloride alone.

Taking into account our outcomes it can be assumed that supplementary intake of zinc preparations facilitates a decrease in clinical and laboratory indicators of diabetes mellitus and its compensation. It is interesting that the positive changes in these indicators in men were more pronounced as compared to women, which may be attributed to the level of testosterone and a more developed muscular system [8].

CONCLUSION

Thus, supplementation of zinc sulfate in the management of patients with type II diabetes mellitus contributes to a more effective decrease in indices of carbohydrate metabolism in comparison with the standard therapy.

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