



# Effect of vanadium and chromium citrates on lipid composition in blood plasma of rats with experimental diabetes

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## Introduction

Deviations of lipid metabolism caused by **diabetes** evolve in different ways. This is the effect of hyperglycemia, peroxide oxidation of lipids and fatty acids in vasoconstrictor reactions, the participation of lipoproteins in the formation of immune vascular damaging complexes and the interaction of lipids with platelets and vascular walls.

The available oral hypoglycemic drugs do not have the desired properties, so studies are aimed at identifying more effective and safe prophylactic diabetic drugs. **Vanadium** and **Chromium**, which act as insulin mimetic and can increase the sensitivity of cells to the hormone. Therefore, the **purpose of the study** was to investigate the effects of vanadium and chromium citrates on lipid metabolism indices in the blood plasma of rats with experimental diabetes.

## Results

It was found that the content of **total lipids** increased in the rats' blood plasma of the III group relative to the animals of the I group, it is can be explained by the mobilization of fats from the depot (the lipomobilization syndrome). The study of lipid classes in the blood plasma of rats with experimental diabetes in group III has revealed an increase in the content of **phospholipids**, **non-esterified fatty acids**, **triacylglycerol** and **non-esterified cholesterol** by 45.2% ( $p < 0.05$ ), but esterified **cholesterol** decreased by 12.1% ( $p < 0.05$ ) compared with control animals.

The effects of vanadium and chromium have changed the ratio of lipid classes in the blood of animals from experimental groups. In particular, a decrease by 5.6% ( $p < 0.05$ ) in the content of **phospholipids** indicates an increased activation of their hydrolysis. The decreased by 24.1% ( $p < 0.05$ ) content of **non-esterified cholesterol** indicates an increase in the functional activity of tissues. Also, non-esterified cholesterol can be reduced when used for the synthesis of sex hormones and hormones of the adrenal cortical layer. The content of **triacylglycerol** decreased by 31.5% ( $p < 0.05$ ) indicates an increase in the  $\beta$ -oxidation of fatty acids and is associated with their formation in the process of glucose metabolism through L- $\alpha$ -glycerophosphate. It is also known that the rate of synthesis of triacylglycerol changes under the influence of hormones. Thus, insulin stimulates the transformation of carbohydrates into triacylglycerol and vice versa.

## Material & Methods

### Experimental diabetes mellitus (EDM)

5% solution of alloxan monohydrate



0 day 1 day 15 day 30 day 31 day 32 day 36 day 40 day

40 days of feeding with citrates

### Experiment Scheme

I group

Control, n=8

II group

Research + chromium (0.1 mg/ml) and vanadium (0.5 mg/ml) citrates, n=8

III group

Control with EDM, n=8

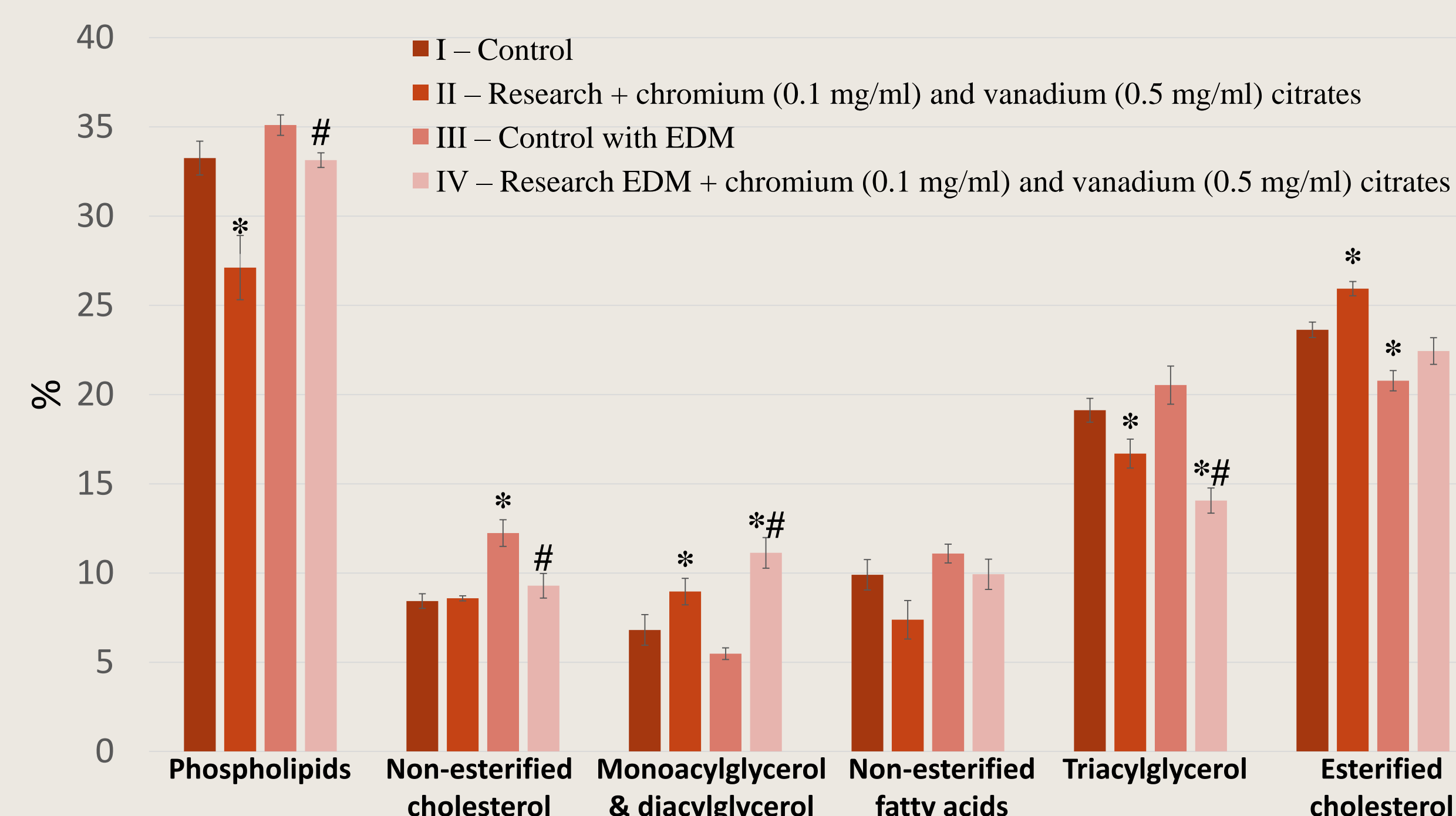
IV group

Research EDM + chromium (0.1 mg/ml) and vanadium (0.5 mg/ml) citrates, n=8

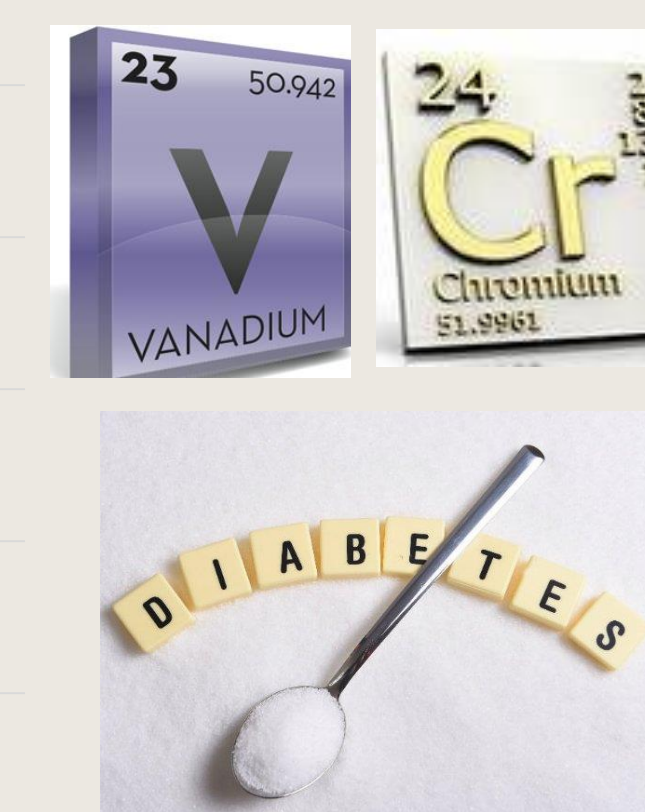
**Materials:** Blood plasma of rats

**Methods:**

- Obtaining of common lipids (Folch and Kates methods);
- Separation of lipids into classes (Kates method)
- Statistical analysis (using ANOVA)



**Note:** Probability of indexes of II, III and IV groups relative to I group \* –  $p < 0.05$ , probability of indexes of IV group relative to III group # –  $p < 0.05$



## Conclusions

The introduction of vanadium and chromium citrates into the diet of animals is effective in the prevention of disorders of the lipid metabolism indices in diabetes.