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RESEARCHES REGARDING THE DYNAMIC OF GLUCOSE, CHOLESTEROL AND TRIGLYCERIDES IN EXPERIMENTAL DIABETES ON WISTAR RATS

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Abstract: In the present paper we present the dynamic of three important biochemical constants in diabetes (glycaemia; cholesterol and triglycerides) followed for seven months. The dynamic of glycaemia reaches 203.85 ±13;471mg‰ after seven months at the diseased lot; whereas at the lot treated with Eridiarom these values oscillate between 139;286 – 150;57mg‰ and the lot treated with Diavit oscillates between 125;739 and 147;543mg‰. The dynamic of cholesterol oscillates between 133.714 – 160.429 mg‰ at the diseased lot; steps down to 122.429 – 129.786 mg‰ at the lot treated with Eridiarom and between 105.714 – 121.929 mg‰ at the lot treated with Diavit. Induction of diabetes with Streptozotocin determines the increase of: glycaemia; cholesterol and triglycerides. Long time treatment with Eridiarom and Diavit determines a constant decrease to normal of these parameters.

MATERIAL AND METHODS

The researches were performed on 4 lots of rats; Wistar race; males; 6 months old; medium mass of 150 grams over a period of 7 months. Animals from infected lots were injected with 4 g/ 100g / body Streptozotocin for the induction of diabetes.

Lot I – 8 animals experimentally sicken with Streptozotocin; daily treated with 2.5 g/day **Eridiarom.**

Lot II – 8 animals experimentally sicken with Streptozotocin; daily treated with **Diavit** (3 g/day).

Lot III – 8 animals experimentally sicken with Streptozotocin and **untreated (sicken whitness).**

Lot IV – 8 animals clinically healthy not sicken and untreated **(healthy witness).**

The maintenance conditions; microclimate as well as the food were standard for the rats.

Every two months blood samples were collected from all animals; the determinations being automatically processed in the Konelab laboratory. The samples were collected in special recipients; transported on ice and processed imediatelly.

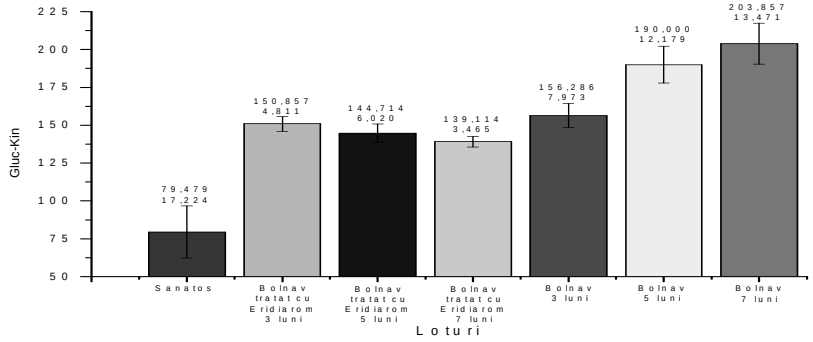
RESULTS AND DISCUSIONS

Glycaemia dynamic

Moderate hypoglycaemia mirrors a deficit in glucide contribution or an excess of protidic contribution in the nourishment. The one in cetosis can be encountered in bovines; ovines; in insulin coma (especially in diabetes dogs; overdosed with insulin or in the ones with insulinosecretant tumours); in neonatal hypoglycaemia at piglets and lambs. (1; 3; 4)

Moderate hyperglycaemia mirrors an excess of glucide contribution or a deficit of protidic contribution in the food. Extreme hyperglycaemia can be encountered in: sugar diabetes; cerebral cortex necrosis in ruminants (hypotiaminosis); myoglobinurical myopatia; stress states and administration of corticosteroids.

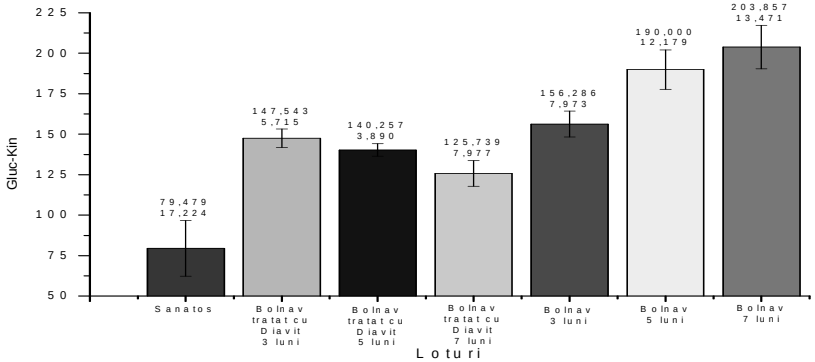
Typical cases of sugar diabetes are illustrated clinically by polyuro-polydipsia; polyfagia; obesity followed by a rapid weakening in contrary with polyfagia (bulimia) and paraclinically by hyperglycaemia (in dog > 150 – 170 mg/dl; in cat > 250 mg/dl; in horses > 150 mg/dl; in bovines > 100 mg/dl; in birds > 720 mg/dl); glycozuria and eventually cetoacidosis with cetonuria. (3; 4; 8)



Graph 1 - Glycaemia dynamic in the lot treated with Eridiarom (mg‰)

Induction of diabetes with Streptozotocin determines a significant increase of glycaemia compared to the whiteness lot; respectively 156.2 mg‰ at 3 months; 190 mg‰ at 5 months and up to 203.85 mg‰ at 7 months after administration. In the lot treated with Eridiarom (graph 1) after 3 months there is a slightly decrease of glycaemia mean to the value of 150.85 mg‰ and than 144.7 mg‰ at 5 months; with a continuosly decreasing tendency to the value of 139 mg‰ at 7 months after administration.

If in the healthy lot the glycaemia is maintains around 80 – 85 mg‰; in the sickened and untreated lot it maintains between 156.286 ± 7.973 mg‰ (at 3 months) and to over 200 mg‰ at 7 months of disease. In the treated lot these values go down to 150.857 mg‰ at 3 months and gradually lowers to 139 mg‰ after 7 months of treatment.



Graph 2 - Glycaemia dynamic in the lot treated with Diavit (mg‰)

In the lot treated with Diavit (graph 2); the decreasing tendency of the glycaemia mean is more pronounced starting at 147.54 mg‰ at 3 months; 140.25 mg‰ at 5 months and 125.73 mg‰ at 7 months following the administration of Streptozotocin; being situated between the normal values admitted for glycaemia.

Cholesterol dynamic

Cholesterol is a lipid substance present in all the cells of the body playing an important role in the health of the organism because:

- helps at the forming of cellular membranes
- constitutes a starting point for the synthesis of suprarenal and ovary hormones
- is irreplaceable for some of its functions
- is indispensable to lipid digestion following the transformation by the liver in bile acids

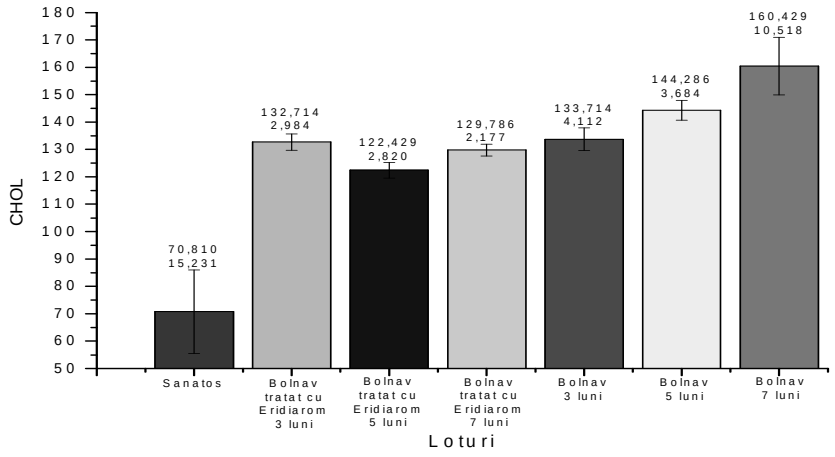
Hypercholesterolemia (increased level of cholesterol in the circulating blood) represents a major risk factor for cardiovascular disease. This modification at blood level does not present typical clinical signs. (8)

LDL represents the "bad" cholesterol because its deposits on artery walls cause the formation of blood clot. High levels of LDL increase the risk of coronaries disease and of cerebral vascular accidents.

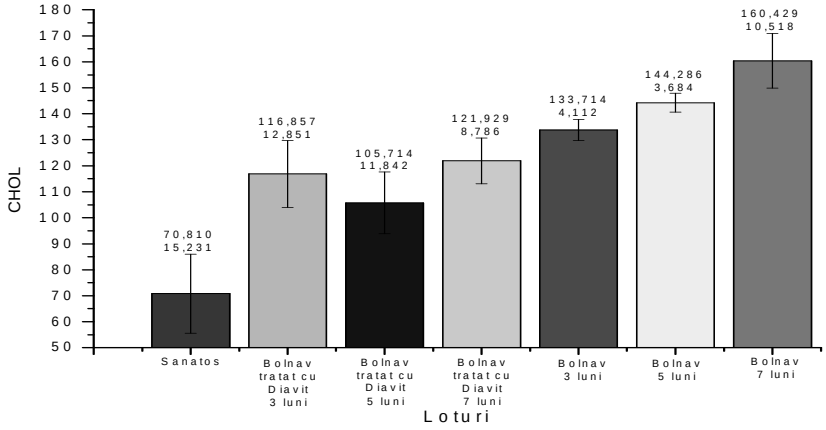
HDL represents the "good" cholesterol; it transports the cholesterol from different locations of the body back to the liver; which causes its elimination from the organism; so also the protection of blood vessels. (7; 8)

Following the induction of subclinical diabetes in rats we can observe that after 3 months; the value of cholesterol reaches 133.71 mg‰; at 5 months reaches 144.28 mg‰ and at 7 months 160.42 mg‰. In the treatment with Eridiarom (graph 3) it has a value of 132.71 mg‰ at 3 months; lowers at 5 months to 122.42 mg‰ and at 7 months increases again to the value of 129.78 mg‰ during treatment. We can observe maintenance within the superior limits of cholesterol; without exceeding the maximum admitted limit.

In al treated lots the cholesterol is maintained between 122.4 and 144.286 mg‰ compared to the sickened and untreated lot at which is maintained at over 133.714 or even 160.429 mg‰.



Graph 3. Cholesterol dynamic in the lot treated with Eridiarom (mg‰)



Graph 4. Cholesterol dynamic in the lot treated with Diavit (mg‰)

Following the induction of subclinical diabetes in rats we can observe that after 3 months; the value of cholesterol reaches 133.71 mg‰; at 5 months reaches 144.28 mg‰ and at 7 months 160.42 mg‰. In the treatment with Diavit (graph 4) cholesterol has a value of 116.85 mg‰ at 3 months; at 5 months lowers to 105.7 mg‰ and at 7 months climes again to the value of 121.92 mg‰. We can observe maintenance between the superior limitsof cholesterol without exceeding the superior admitted limit; but lower values than in case in Eridiarom treatment.

Triglyceride dynamic

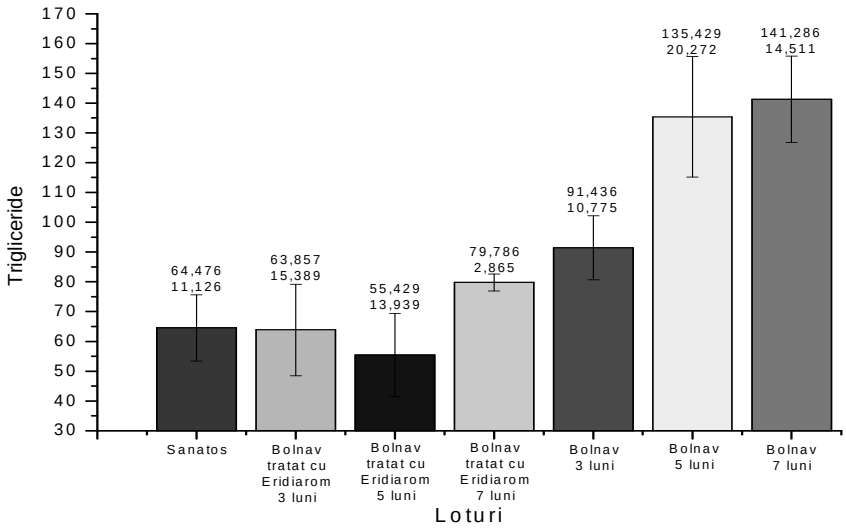
Triglycerides are fats with alimentation origin or are produced within the body. They constitute a major source of energy. In diabetes they have increased values.

Calories assimilated extra through feeding are transformed in triglycerides; and later deposited in adipose cells (the cells that compose the fat layer) so they can be used later; when a deficit is created. If more calories are consumed constantly (exceeding the body needs); than the level of triglycerides from the blood increases. (4; 8)

Hypertriglyceridemia is part of a group of disorders called metabolic syndrome (increased arterial tension; obesity; lowered ADL cholesterol) which increases the risk of cardiac disease; sugar diabetes and cerebral vascular stroke.

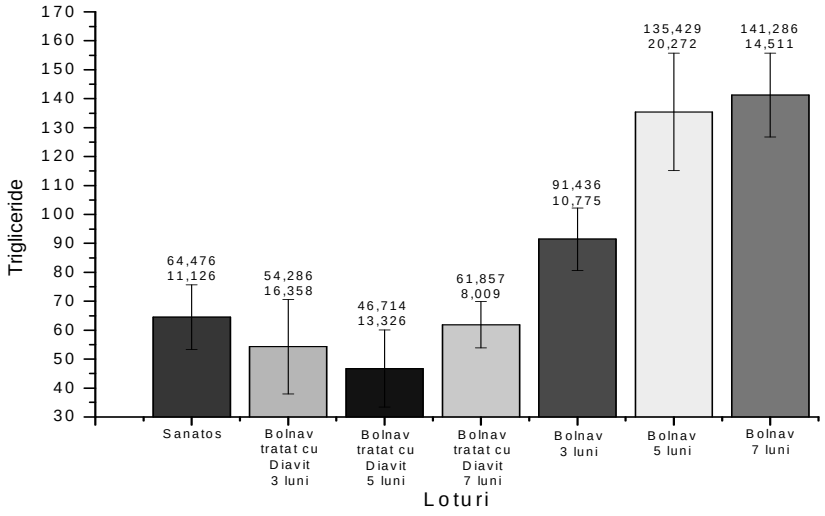
Measurement of triglycerides level from blood is accomplished as a part of the analysis through which blood cholesterol is measured. (8)

The most frequent cause of hypertriglyceridemia is obesity and therapeutical neglected sugar diabetes; hypothyroidism; renal diseases; lipid metabolism disorders; estrogens therapy; diuretics; betablocants and steroids. (4)



Graph 5. Triglyceride dynamic in the lot treated with Eridiarom (mg‰)

Our results show that at 3 months after induction of diabetes with Streptozotocin; seric value of triglyceride in the treated lots decreases to 63.85 mg‰; at 52.42 mg‰ after 5 months and are easily increasing after 7 months at a value of 79.78 mg‰ following the administration of Eridiarom (graph 5). This is contrasting with the impressive increase in the sickened lot of 91.43 mg‰ after 3 months; 135.42 mg‰ after 5 months and reaches a maximum limit at 7 months with a value of 141.28 mg‰.



Graph 6. Triglyceride dynamic in the lot treated with Diavit (mg‰)

Our results show that at 3 months after induction of diabetes with Streptozotocin; seric value of triglyceride in the treated lots decreases to 54.28 mg‰; at 46.71 mg‰ after 5 months and are easily increasing after 7 months at a value of 61.85 mg‰ following the administration

of Diavit (graph 6). This is contrasting with the impressive increase in the sickened lot of 91.43 mg‰ after 3 months; 135.42 mg‰ after 5 months and reaches a maximum limit at 7 months with a value of 141.28 mg‰.

CONCLUSIONS

- Induction of diabetes with Streptozotocin determines a significant increase of the mean of glycaemia in the sickened lot towards the witness lot. In the treatment with Eridiarom at 3 months; we notice a slightly decrease of glycaemia mean maintained at 5 months after administration. In the treatment with Diavit the decreasing tendency of glycaemia mean s accentuated especially after 5 months.
- The changes produced in the metabolism of streptozotocinic diabetes are reflected also in the high value of cholesterol mean in the sickened lot compared to the witness lot; a hypercholesterolemiant tendency is noted at the lots treated with Eridiaorom and Diavit.
- Our result illustrate that in 5 months following Streptozotocin inducted diabetes; serical value of triglycerides is decreasing at the lots treated with Eridiarom and Diavit; contrasting the impressive increase in the sickened lot.

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