

EFFECT OF PROTEIN HYDROLYSATE, ALVESIN AND PHYSIOLOGICAL SALINE ON GLYCEMIA IN EXPERIMENTAL DIABETES CAUSED BY STREPTOSOTOCIN

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There exists an opinion in the literature available that streptosotocin (S) possesses a stronger selective diabetogenic action on pancreatic β -cells as compared with that of alloxan when modelling an experimental diabetes. This selectivity is evident only when rats are concerned but not any other laboratory animals.

Proceeding from these data, we decided to study blood glucose level in rats with diabetes induced by S and treated with protein hydrolylate (PH), alvesin (A) and saline.

Material and Methods

Experiments were carried out on 24 white non-thoroughbred male rats. Blood samples to determine blood glucose used as normal values were taken from all the animals. Experimental diabetes was induced by S injection into the tail vein at dose of 40 mg/kg b.w. after a method described by other authors (4, 5, 9). Animals were divided into 4 groups with 6 rats each and treated by the following way: 1st was a control group; 2nd – with PH "Hydroprot"; 3rd – with A, and 4th – with saline only. The substances mentioned were given orally by means of stomach-tube at dose of 6 ml/kg b.w. after every blood sample taking. Glucose was determined after the orthotoluidine method on the 1st, 2nd, 3rd, 4th, 5th, 7th, 10th, 21st, 65th and 180th day after S injection. Data obtained were processed after the method of variation analysis.

Results and Discussion

Fig. 1 shows our data about blood glucose level.

There is blood glucose level increase till the 7th day of the trial in control animals. It is to be noted that this value rises from 4 mMol/l (initial one) up to 8 mMol/l on the first day after S injection reaching its maximum of 9 mMol/l on the 2nd day. Then there is a tendency towards blood glucose reduction being on the 10th day within normal limits and remaining with insignificant aberrations until the end of the experiment. The mechanism of hyperglycemia is difficult to be explained. It is most probably due to S cytotoxic action on pancreatic β -cells determined by NAD reduction (8, 11, 12) and to proinsulin synthesis inhibition (3, 13). Hyperglycemia normalization later on is related to spontaneous healing of animals (3) or to the possible fact that S dose has proved to be rather low (14).

PH-treated animals show hyperglycemia, remaining till the 10th day with maximal levels on the 1st one (8.2 mMol/l) and on the 2nd one (8.4 mMol/l) after S injection. Data about examinations on the next days are in normal ranges.

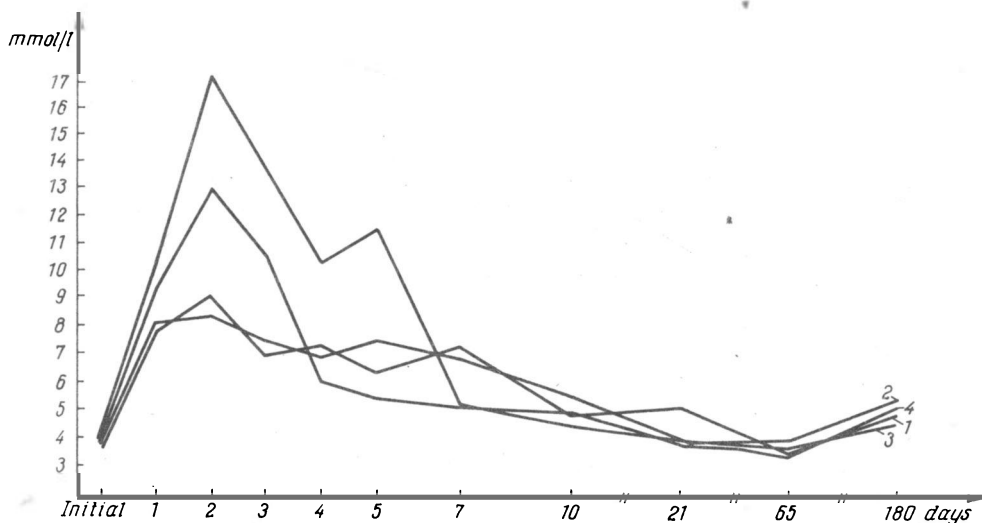


Fig. 1. Blood glucose level.

1 – controls; 2 – protein hydrolysate; 3 – alvesin; 4 – physiological saline

The comparison of the results of the first group (S-injections only) and of the second one (S-injections combined with PH-administration) demonstrates lower blood glucose levels on the 2nd, 4th, 5th, 7th, and 21st day of the experiment in the ranges of 6–8 mMol/l when the second group is concerned. However, these differences are statistically insignificant. Proceeding from the mechanisms mentioned we can suppose that PH treatment induces NAD stabilization at a higher level as well as proinsulin synthesis stimulation. In our and other authors' opinion (1, 2), blood glucose reduction is due to complexing of glucose with PH, but according to other investigators (6, 7) it is related to insulinogenic effect.

Blood glucose levels with A-treated animals are considerable higher not only in comparison with initial ones but also with these of the groups treated with PH and S only. Maximal levels are found out on the 2nd day (13.2 mMol/l) and on the 3rd one (10.8 mMol/l) and then there is a tendency towards reduction. Blood glucose level is within normal limits on the 5th day. Then it remains with insignificant aberrations until the end of the experiments without reaching the initial normal value. However, data are statistically insignificant. We accept that higher blood glucose levels are related to the greater amount of glycemic amino acids in A composition.

The animals of the 4th group treated with saline demonstrate the highest blood glucose levels as compared with these of the other groups. Starting from 4.10 mMol/l, it reaches up to 10.50 mMol/l on the 1st day after S injection, up to 17.2 mMol/l on the 2nd one and then tendency towards reduction is seen. Blood glucose level is 13.46 mMol/l on the 3rd day, 10.50 mMol/l on the 4th and 11.8 mMol/l on the 5th. Data are also statistically insignificant. This high glycemia combined with the fact that amino acids and lower peptides are absent in saline, i.e. these factors inducing sharply expressed hyperglycemia are not present in these animals, can be difficult interpreted. Probably, complex neuro-reflectory and humoral-hormonal mechanisms are involved. Glucose normalizes on the 7th day and remains with insignificant aberrations until the end of the trial.

On the basis of our investigations the following conclusions can be drawn:

1. S injection induces 7-day lasting hyperglycemia in rats.

2. Hyperglycemia does not change essentially after PH "Hydroprot" treatment. Blood glucose level increase after treatment with A and saline is statistically insignificant.

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ВЛИЯНИЕ БЕЛКОВОГО ГИДРОЛИЗАТА, АЛЬВЕЗИНА И ФИЗИОЛОГИЧЕСКОГО РАСТВОРА НА ГЛИКЕМИЮ ПРИ ЭКСПЕРИМЕНТАЛЬНОМ ДИАБЕТЕ, ВЫЗВАННОМ СТРЕПТОЗОТОЦИНОМ

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РЕЗЮМЕ

Опыты проведены на 24 белых крысах, распределенных на четыре группы. Была взята кровь для исследования уровня сахара крови, который послужил нормой. У всех животных был вызван диабет стрептозотоцином, который вводился в дозе 40 мг/кг в хвостовую вену.

Первая группа животных была использована в качестве контрольной. Второй группе был введен белковый гидролизат. Третьей группе ввели альвезин, а четвертой - физиологический раствор. Указанные вещества вводились через рот с использованием зонда, по 6 мл/кг телесного веса. Кровь бралась для исследования на 1, 2, 3, 4, 5, 7, 10, 21, 65 и 180-тый дни.

Результаты исследования показали повышение уровня сахара крови у животных всех групп при первых 7 исследованиях, что было лучше всего выражено при группах животных, получивших физиологический раствор и альвезин. Стоимости, показанные при последующих исследованиях животных всех групп до конца опыта, были в границах нормы.