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Assessment of the hypoglycemic activity of the vanadium macromolecular metal complex

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Abstract

In a previous work, a method for the synthesis of a new metal-polymer complex of oxovanadium(IV) based on poly-*N*-vinylpyrrolidone was described, its structure was studied by spectral methods, and its composition was determined. Based on the data of electronic and vibrational spectroscopy, it was shown that the complex is formed due to the interaction of the metal with nitrogen and oxygen atoms of the polymer lactam ring, it should be noted that this type of interaction can occur both by intramolecular or intermolecular coordination. Using the Prozorovsky's express method for estimation of acute oral toxicity the median value of LD_{50} of the synthesized complex was determined and it amounted to 1350 ± 160 mg/kg. The obtained LD_{50} value allow to attribute this metal-polymer complex to the class of low-toxic substances, which opens up some prospects for its further research on insulinomimetic activity.

The aim of this work is to investigate the hypoglycemic activity of new polymer derivatives of vanadyl (VO^{2+}) based on poly-*N*-vinylpyrrolidone (PVP) and to explore the possibility of using these compounds or compositions based on them for the prevention and treatment of type 2 diabetes. The work describes a method for creating an experimental model of type 2 diabetes mellitus in animals, combining the use of a high-fat diet and streptozotocin as a diabetogenic agent. The results of evaluating the effect of the studied metal-polymer complexes on such indicators of carbohydrate metabolism of laboratory animals as changes in blood glucose and urine, change daily diuresis of animals during treatment. The results of evaluating the effect of the metal-polymer complexes on such indicators of carbohydrate metabolism in laboratory animals as a change in blood and urine glucose, a change in the daily diuresis of animals during and after treatment are presented. The investigation of the effect of the obtained vanadium compounds on carbohydrate indices was carried out using metformin as a comparison drug. It was found that the new metal-polymer complexes of vanadium have hypoglycemic activity, normalizing the blood glucose level of laboratory animals with high-fat diet/ streptozotocin induced diabetes.

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