

THE EVALUATION OF ACUTE TOXICITY OF COLLOIDAL SILVER NANOPARTICLES

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Introduction: Nanoparticles (NP) are defined as materials produced at a nanoscale range of 1–100 nm in length or diameter that demonstrate unique new properties. Over the past few decades, nanomaterials have had a great impact and gained enormous attention in medicine due to their potential. Although the applications and benefits of silver nanoparticles are extensively and currently being widely used in medical sectors, there is still limited information concerning human health and their impacts on it.

Aim of the study: Registration of acute toxicity of the colloidal solution of silver nanoparticles, with the determination of its possibility of application in medical practice.

Material and methods: Within the scope of this study, experiments were performed on 20 male rats, without pedigree, aged 3-4 months with body weight between 180-260 g. The animals were maintained under conditions close to physiological optimum.

Results: The study was conducted on 20 male rats, divided by 5 at each dose, according to body mass. For the establishment of the toxic dose at enteral administration, the following doses were tested: 60, 80, 100, 200, 300 mg / kg of body weight with subsequent supervision of the animal for 7-14 days. Were subjected to observation the notified changes. It was recorded the time of the occurrence of the intoxication phenomena and death of animals.

Clinical and general signs: Exceeding 2 hours after administration of the colloidal solution intraperitoneally, in all doses in rats, inhibition symptoms appeared as softness, drowsiness, lack of appetite and lack of thirst. Rats were huddled, with ruffled fur. They had intensified breathing. These symptoms were more expressed in animals that received the colloidal solution in higher doses - 200-300 mg / kg body weight. In the next 6-8 hours, the condition of the animals, that received the doses of 60-100 mg substance / kg, gradually normalize and after 24 hours the intoxication symptoms disappeared and the general condition stabilize. These animals survived.

In all acute toxicity tests, were recorded 6 deaths in the 14 days of observation period in all animals. The lethality of rats at a dose of 300 mg / kg was 100 % and this occurred at the 2-5 th day after the administration of the substance.

The lethality of rats at a dose of 200 mg / kg was 50 % and occurred at the 7th and 8th day after the administration of the substance.

Toxic changes in animals remaining alive were short-term changes, reversible, more pronounced at doses greater than 200 mg/kg. During the surveillance period (14 days) were not identified deviations in the overall condition of animals. Based on experimental results we calculated the median lethal dose.

Conclusions: Despite the varied uses of AgNPs in many medical fields, there is a lack of information on the toxicity of silver nanoparticles regarding the health implications. Thus, the objective of this study was to investigate the acute toxicity of AgNPs by experiments on rats. Furthermore, lethal dose (LD50) in acute toxicity test was evaluated. Following the practical part, it was found that the threshold toxic dose (LD50) of colloidal solution of silver nanoparticles in single administration for rats is 100mg/kg. Therefore, it was found that colloidal solution of silver nanoparticles refers to a group of less toxic substances.