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Influence of nanosilver on secondary follicles of ovary via intraperitoneal injection in rats

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ABSTRACT

Silver nanoparticles, which have well known antibacterial properties, have been used extensively in a range of medical settings. Despite the wide spread use of nanosilver products, relatively few undertaken to determine the biological effects of nanosilver exposure. The present study investigated the effect of nanosilver on ovary secondary follicles. Nanosilver at concentrations of high-dose (10 ppm) and low-dose (1 ppm) were intraperitoneal injected into rats. The rats were sacrificed after the 30 days of inject period, and the ovaries were obtained for histopathology observation. Results show that in groups, which received nanosilver for 30 days, we observed a decrease in secondary follicles numbers. No destructive effects were seen in control group. According to this study, we can propose that administration of nanosilver to the ovary appeared to have an inhibitory effect on ovulation induction.

Keywords: Nanosilver, Ovary, Rat, Peritoneal injection

INTRODUCTION

Silver nanoparticles have gained much popularity on account of their antimicrobial properties [13,15, 16]. They are extensively used in detergents and wound disposal [1]. It has been reported that ultrafine particles could cause more damage than larger particles when delivered at the same concentration [16,17,18]. One of the material scientist's particular interests is the fact that nanostructured materials have higher surface area than conventional materials [2]. By this resean, silver nanoparticles have the properties of a high surface area, very small size (<10nm), and high depression. It is well known that silver ion and silver-based compound are highly toxic effects on the mammalian cells. It could move into the circulatory system by traversing the blood-lung barrier and, thus, distribute the whole body [12]. Therefore, this nanoparticle can affect organs such as heart, lung, Brain and others. In this organ, nanoparticles cause diseases such as cardiovascular disease, pulmonary inflammation, and neural degeneration [6, 9, 13]. To date, little is understood concerning the distribution, accumulation, and target organ of silver nanoparticles in organisms. In the previous research, we have investigated the effect of nanosilver on primary follicles in rats and in this study, we therefore investigated the influence of this nanoparticle on secondary follicles to assess the toxicity of nanosilver to determine whether this nanoparticle can affect on secondary follicles in ovary [5].

MATERIALS AND METHODS

Laboratory animals:
Adult Wistar female rat with the average weight of 200 g were obtained from the Shahrekord University. The animals were kept at 25 ˚C with enough humidity. The rats were fed standard diets.

Animal's treatment:
Rats were randomly divided into four groups of seven animals. Each group was kept in a separate cage. Group 1 or control group and group 2 served as normal control and in each injection received only normal saline. Group 3, rats which received high dose (10 ppm) of nanosilver through intraperitoneal injection, group4, rats which received low dose (1 ppm) through the same procedure. The treatment went on for four weeks.

Histological examination:
The rats sacrificed and the ovary tissue was separated. The ovaries were fixed with buffer formalin solution in order to conduct histopathology experiments. Histological section were prepared from the ovaries, stained, and examined under light microscope.

Statistical analysis:
The data were analyzed and compared by using the statistical test including analysis of variances and tukey test. P value less than 0.05 were considered as significant.

RESULTS AND DISCUSSION

Result of this study showed that in groups, which received nanosilver at concentrations of high-dose (10 ppm), and low-dose (1 ppm) via intraperitoneal injection, number of secondary follicles decreased (Fig. 1).There is significant difference between treatment groups and control group.

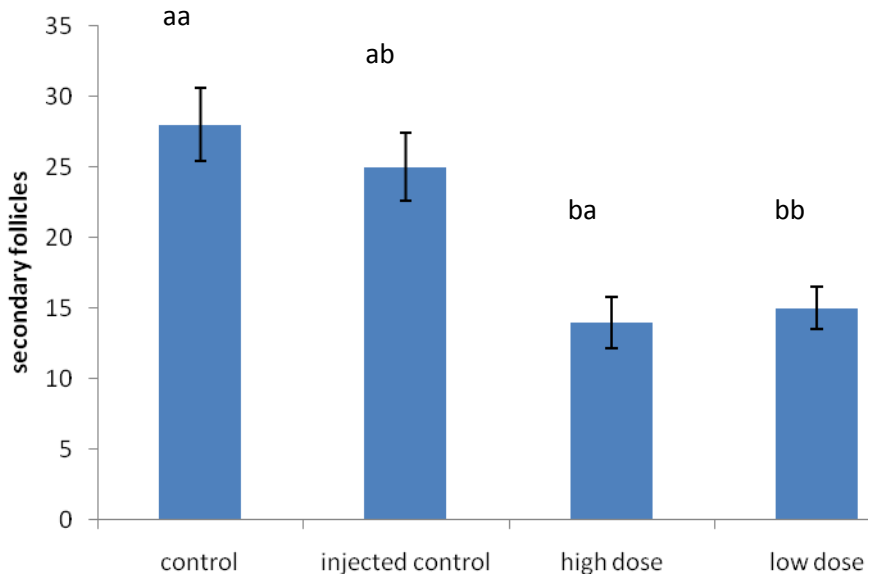

Figure 1. Effect of nanosilver on secondary follicle number.

Values represent the mean± the standard deviation o btained from at least seven independent experiments. Data were statistically calculated by one way ANOVA and Tukeys test. Different letters above bars indicate the presence of significant differences (p <0.05).

According to the last year's investigation, silver nanoparticle has toxic effects on organs. Silver can be accumulated in the liver, skin, kidneys, cornea, gingival, mucous membranes, nail, and spleen. Silver ion shows an affinity for thiol in the liver [3, 11]. Argyria can be considered a mechanism to detoxify silver by sequestering it in the tissues as harmless silver-protein complexes or silver sulphid [4]. Nanosilver can bind to different tissues and cause potential toxic effects like cell activation, producing reactive oxygen species, which are more toxic to tissue, inflammation and finally all these processes gradually lead to cell death [12, 13, 14]. Result of our study showed that in groups, which received nanosilver, number of secondary follicles decreased. We can propose that nanosilver have been affected ovary follicles and caused number of secondary follicles decreased. Probably, for the reason that after entrance of nanosilver to inside ovary cells, to cause oxidative stress in these cells, that activating of oxidative stress

factors leading to caspase cascade in cells [7,8]. On the other hand, simultaneous with activated oxidative stress, cells confront with decreased antioxidants [9, 10], subsequent this instances, reduction of secondary follicles take place. Therefore, according to this study, we can to suggest that nanosilver have cytotoxic effects on tissue ovary and affected ovulation.

REFERENCES

[1] Asz J, Asz D, Moushey R, Seigel J, Mallory SB, Foglia RP, *J Pediatr Surg*, **2006**, 41, 9.
[2] Cox DM, *Nanostructure Science and Technology: High Surface Area Materials*, International Technology Research Institute, VA **1999**, pp 49.
[3] Derake PL, Hazelwood KJ, *Ann Occup Hyg*, **2005**, 49, 575.
[4] Fung MC, Bowen D, *Clin Toxicol*, **1996**, 34, 119.
[5] Ghorbanzadeh V, Moshtaghian SJ, Habibian S, Ebadi AG, *World J Zool*, **2011**, 6, 215.
[6] Granum B, Lovik M, *Toxicol Sci*, **2001**, 65, 7.
[7] Johnson AL, Anim Reprod Sci, **2003**, 78, 185.
[8] Johnson AL, Langer JS, Bridgham JT, *Endocrinol*, **2001**, 143, 3405.
[9] Nemmar A, Hoet P, Dinsdale D, Vermylen J, Hoylaerts MF, Nemery B, *J Am Heart Assoc*, **2003**, 107, 1202.
[10] Overvik J, Lag M, Schwarze P, Refsnes M, *Toxicol Sci*, **2004**, 81, 480.
[11] Sue YM, Lee JY, Wang MC, Lin TK, Sung JM, Huang JJ, *Am J Kidney Dis*, **2001**, 37, 1048.
[12] Takenaka S, Karg E, Roth C, Schulz H, Ziesenis A, Heinzmann U, Schramel P, Heyder J, *Environ Health Perspect*, **2001**,109, 547.
[13] Tian J, Wong KK, Ho CM, Lok CN, Yu WY, Che CM, Chiu JF, Tam PK, *Med Chem*, **2007**, 2, 129.
[14] Xia T, Kovochich M, Brant J, Hotze M, Sempf J, Oberley T, Sioutas C, Yeh JI, Wienser MR, Nel AE, *Nano Lett*, **2006**, 8: 1794.
[15] Yoon KY, Hoon-Byeon J, Park JH, Hwang J, *J. Sci. Total Environ*, **2007**, 373, 572.
[16] Zhang Q, Kusaka Y, Zhu X, Sato K, Mo Y, Kluz T, Donaldson K, *J Occup Health*, **2003**, 45, 23.
[17] Oza G, Pandey S, Shah R, Sharon M, *Adv Appl Sci Res*, **2012**, 3, 1776.
[18] Teli MD, Kale RD, *Adv Appl Sci Res*, **2011**, 2 491.