Madridge
Journal of Nanotechnology & Nanoscience

Letter to Editor Article

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Toxicity of Silver Nanoparticles

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Article Info

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Received: June 23, 2016
Accepted: July 18, 2016
Published: July 23, 2016

Citation: Khan NUS, Rahim M. Toxicity of Silver Nanoparticles. *Madridge J Nanotechnol Nanosci.* 2016; 1(1): 7-8.
doi: 10.18689/mjnn-1000103

Published by Madridge Publishers

To the Editor

Keywords: Toxicity; Silver nanparticles; Enivornmental and health hazards; Antibacterial.

Silver nanoparticles (AgNP) have been extensively used for packaging and storage of food products to enhance their shelf life [1]. Likewise, AgNP are increasingly used in various fields of pharmaceutical and biomedical sciences [2]. In addition, AgNP are good antibacterial and antiviral agents [3], and also used in the treatment of infection in burns, open wounds, chronic ulcer [4], trophic sores, eczema, and acne [5]. The use of silver based resin composites have been reported for the filling and coating of dental and medical devices. Similarly, the use of AgNP as an antimicrobial agent in toothpastes, shampoos, air sanitizer sprays, detergents and soaps has been reported previously [6]. AgNP are also investigated for its unique properties in catalysis, chemical sensing [7], biosensing, photonics and electronics [8], biomedical imaging, clinical diagnostics and therapeutics [9]. Pugazhendhi et al. (2016) reported that *Dioscoreaalata* mediated AgNP possess excellent antimicrobial activity by using agar well diffusion assay method [10]. Recently, Borrego et al. (2016) have been tested the potential antiviral activity of AgNP against Rift Valley fever virus (RVFV) by using both *in vitro* and *in vivo* (mice) studies. They claimed that AgNP has the ability to control the infectivity of RVFV [11]. Number of research papers have been published in 2016 reveal the *in vivo* evaluation of AgNP against Rhizoctoniasolani [12], Pseudomonas aeruginosa [13], lungs cancer cells [14], Bacillus subtilis [15], Endodontic Treatments [15] etc.

However, the toxicity of AgNP are reported by many researchers. The investigations of Mahmoudi and Serpooshan (2012) stated that the AgNP are highly toxic to healthy/normal cells [16]. Similarly, Bharadwaj Punita (2012) has been reported that AgNP are highly toxic to mammalian cells, brain cells, liver cells and stem cells. Furthermore, they also described that the nano-antimicrobial agentsare a big threaten to the whole biodiversity [17]. The previous studies also revealed that thezero-valent AgNP can generate highly reactive oxygen species (ROS) such as super oxide and hydroxyl radical, which can lead to oxidative stress [18,19]. Whereas, the ROS can cause the oxidative damage of biomolecules and DNA [20].

Due to bactericidal activities, AgNP have been extensively used in personal care products, home appliances, laundry additives, paints, food storage containers and food supplements. The unique properties of nanoparticles such as relatively high surface area, greater mobility and high chemical reactivity can result in unpresented environmental and public health hazards [21].

The aforementioned results clearly illustrated that before the use of AgNP against cancer cells and/or microbes, their cytotoxicity (against healthy cells) should be evaluated. As such, further studies are needed to fully evaluate its potential environmental and health hazards.

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