Mini Review

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Current issue on nanoparticle toxicity to aquatic organism

Abstract

In the fast growing world, Nanotechnology is one of the highly used technologies. The nanoparticles have variable in size and dimension between 1 to 100nm. Due to its unique physical and chemical properties they are broadly used in medical field as in drug delivery system, in the food, in various types of cosmetics, also in the agriculture fields as chemicals, in the water purification etc. However, as the more benefits by nanoparticles also have Newly-Identified Health Risks by them as the scientific committee always raised issues time by time. The current work focus on the release of nanoparticles in the aquatic environment and their effects on aquatic organisms posing a risk to human being also that remains poorly explained by us.

Keywords: nanoparticles, aquatic system, drug delivery, cosmetics, agriculture fields

Volume 5 Issue 2 - 2019

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Received: February 22, 2019 | **Published:** March 15, 2019

Introduction

Nowadays use of Nanoparticles are increasing in personal care products, in the medical and pharmaceutical industry as well as in the food industries etc. Maximization uses of Nanoparticle in the environment and its residue can exert harmful effects on the animals as well as plants. A survey revealed that in the European consumers using more than 2300 products which are containing nanoparticles.[1] Most types of nanoparticles are TiO, SiO , AlO, ZnO , carbon nanotubes (CNTs), FeO, as well as CeO and Ag etc and the use in the huge quantities.[2]

Nanoparticles and its effects on aquatic ecosystem

Nanoparticles in the aquatic ecosystem easily dissolved due to tiny in size and shape however, it represents with a confined solid phase similar to others poorly soluble compounds in the aquatic system. Some of the nanoparticles such as Ag, ZnO, and CuO release ions in the system which is responsible for the major causes of toxicity. Certain eco-toxicity tests with the fish, crustaceans, and algae base set of organisms for risk assessment of toxic matter present in the water bodies have performed but it's possible when the nanoparticle effect in many cases beyond the use of high concentrations (>10 mg L).[3] The studies revealed that change in the concentrations of nanoparticles causes the change in the behavior of aquatic organism. For example shading in algal tests of platinum nanoparticles[4] and the effects of carbon nanotube on green algae caused by shading and agglomeration,[5] also altered in the feeding behavior or impaired mobility of crustaceans.[6,7] It has also reported to increased mucus production in fish where fish ingested water containing single walled carbon nanotubes (SWCNT) which was precipitated in the gut lumen and in their intestinal part also. Due to this fish showed aggressive behaviour and fin nipping which may be associated with the gill irritation and their brain injury as the SWCNT aggression. SWCNTs act as a respiratory toxicant and fish faced oxidative stress and disturbances of osmoregulatory system of fish as reported.[8]

Various organism of aquatic ecosystem are a part of food chain. If they affected then also affected food chain and disturbing it that indirectly become the extinction of organism or disturb ecosystem. Scientist has revealed that by the exposure of ZnO nanoparticles enhancing reactive oxygen species in zebra fish embryos.[9] Later,[10] reported that ZnO nanoparticles in fish model can cross the chorion layer and finally reached to the embryo which was caused more toxic because that stages are more crucial in the developmental period as compared to adults than that of the others metal salt effects.[10] In mice model ZnO nanoparticles also showed change in chromosomal aberration, abnormally in morphology of sperm, and it has confirmed by analysis of RAPD profile.[11] The studies has been confirmed that the absorption of fine nanoparticles of ZnO and TiO_2 across porcine skin in *in-vitro* model and in adult and their embryo of fish model dose depend manner.[12,13] In 2016, Spence and co-worker revealed the nanoparticles are harmful for the amphibians also.[14]

Conclusion

Thus, disturbing ecosystem food chain could be ultimately leads to change human life or races. If that will be having deleterious effects definitely take action and more work needed for exploring on such behavior of the nanoparticles. In conclusion, the impact of nanoparticles on organisms in the aquatic system needs to be more carefully evaluated with enhancement of technologies developed now days. However, a limited study has been available regarding the risk assessment of nanoparticles on the aquatic ecosystems.

Acknowledgments

Mrs. Vimala Bind contributing in the preparation of manuscript.

Conflicts of interest

The authors declare that there is no Conflict of interests.

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