Letter to Editor

Nanomedicine: The Novel Weapon against Parasitic Infections

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Dear Editor-in-chief

Due to the side effects of drugs and resistance to the used chemicals in the treatment of tropical diseases such as malaria, leishmaniosis, trypanosomiasis and Schistosomiasis, which millions of people around the world are infected, nowadays nanomedicine usage with the production of nanofibers and nanoparticles (nanopowders, nanocrystal or nanocluster). The particles with a diameter of less than 100 nanometers is considered as a special treatment in parasitic diseases[1,2].

Due to the intracellular nature of some parasites, their treatment is a major challenge for researchers to develop new drugs. Findings show that Chitosan nanoparticles and metals such as silver, gold, and metal oxides have a lethal or inhibitory effect on various parasites, including giardiasis, leishmaniosis, malaria, or toxoplasma and insect larvae[1].

The effects of drug release from chitosan nanofibers have also been performed in various external and internal evaluations on lesions caused by Leishmania major and the therapeutic effect of gold and silver nanoparticles on malaria and their concomitant use with bioresonance waves on leishmaniasis[2,4].

The main purpose of using nanoparticles is to use it as a drug delivery system and to release the drug agent in order to affect the specific site. Recently, the use of particle systems such as nanomedicine as a physical tool to improve the pharmacokinetic properties of various types of drug molecules in vivo is being developed[1,4].

The endocytic pathway transfers nanoparticles to the site of pathogens. The breakdown of these substances by lysosomal enzymes releases drugs into the phagocytic or lysosomal vesicle, or this process is released into the cytoplasm by a diffusion phenomenon. Specific transmission depends on the physical and chemical nature of the molecules[1].

In recent years, the use of nanoparticles for the treatment of parasitic diseases has considered, although limited research has conducted in this regard (Table 1). Finally, it can be concluded that according to recent findings on the inhibitory and long-term effects of nanofibers and nanoparticles on different parasites with less side effects than conventional drugs, more effective and less side effects drugs can be developed. Useful vaccines have also been developed to control parasitic diseases.

Keywords: Nanomedicine, Parasitic Infections

Table 1: Research conducted in the use of nanoparticles for the treatment of parasitic diseases

Researcher	Type of parasite	Year	Type of nanostructures	Results
Rahimi M, *et al.*[2]	*Leishmania*	2020	Chitosan nanofibers	Killing effect on parasite
Seyyed tabaei SJ, *et al.*[3]	*Leishmania*	2020	Chitosan nanofibers	Killing effect on parasite + Wound treatment
Azimijou N, *et al.*[4]	*Leishmania*	2020	Silver nanoparticles + Bioresonance wave	Killing effect on parasite
Soflaei S, *et al.*[1]	*Leishmania*	2012	Selenium nanoparticles	Killing effect on parasite
Said DE, *et al.*[1]	*Giardia*	2012	Silver nanoparticles	Killing effect on cyst
Allahverdiyev AM, *et al.*[1]	*Leishmania*	2011	Silver nanoparticles	Reduction on wound size + Inhibition of parasite growth
Torabi N, *et al.*[1]	*Leishmania*	2011	Gold nanoparticles	Reduction effect on death in infected mice + Reduction on amastigote number
Danesh-Bahreini MA, *et al.*[1]	*Leishmania*	2011	Chitosan nanoparticles	Increased immune response to the parasite as an adjuvant
Inbaneson SJ, *et al.*[1]	*Plasmodium*	2011	Metal oxide nanoparticles	Killing effect on parasite
Mohebali M, *et al.*[1]	*Leishmania*	2009	Silver nanoparticles	Reduction on wound size + Inhibition of parasite growth

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