Opinion

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Silver Nanoparticles Stabilized in Solution by Sodium Alginate Have Antimicrobial Effects

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Opinion

One of the current research focuses is to investigate the biological properties of metal nanoparticles in relation to important recent advances in Nanomedicine and Nano pharmacology. Nanomedicine is the study of the use of nanotechnologies in medicine to diagnose, cure, and prevent a variety of diseases. The mechanisms of action of medications based on silver nanoparticles are of special interest to researchers. It's worth noting that silver-based medications have long been utilised as antiseptics and anti-inflammatory treatments. The creation of medications with higher bactericidal, antiviral, antifungal, and antiseptic actions, as well as the ability to operate as high-efficiency disinfectants for a wide spectrum of harmful microbes, was aided by the introduction of nanosized silver.

However, there are several obstacles to putting silver nanoparticles to practical use, the most significant of which is the manufacture of nano-sized particles within a specified size range, as well as the development of stable colloidal systems that prevent nanoparticle agglomeration. The most challenging issue is finding the best nanoparticle stabiliser, however there are several approaches to take. Natural polymers, such as plant structural polysaccharides, are one of the most promising stabilisers for use with silver nanoparticles since they have a broad variety of biological activity. Seaweed-derived polysaccharide alginate has been shown to be a highly effective stabiliser, allowing silver nanoparticles to assemble with exceptional stability.

Because the toxicity of silver nanoparticles has yet to be determined, further research into their application is required. The development of Nano toxicology for these nanoparticles necessitates the quick development of new quantitative control methods that allow for the evaluation of distinct nanoforms' biological effects.

The luminous bacteria toxicity assay, which involves examining bioluminescence suppression in photo bacteria, has been proposed as a tool to assess nanoparticle toxicity. The reduction in bacterial luminescence is now linked to toxicity, ecotoxicity, biocidal and antibiotic characteristics, among other things. This method is promising for quick application (especially in field situations) since a time of ten to fifteen minutes is long enough to quantitatively analyse the acute effect on the samples.

The goal of this research was to see how a nanosilver solution in a sodium alginate matrix affected the growth and development of pathogenic bacteria (*S. aureus, E. faecalis, E. coli, P. vulgaris, E. cloacae, P. aeruginosa*), the yeast-like fungus *C. albicans,* and the reduction of bioluminescence in the luminescent bacteria *P. leiognathi Sh1*), Experimental isolates of the bacteria *S. aureus, E. faecalis, E. coli, P. vulgaris, and E. cloacae*, as well as an antibiotic-resistant strain of *P. aeruginosa* (*Pseudomonas aeruginosa*), were responsive to a solution of silver nanoparticles suspended in sodium alginate, as revealed in these research.

Thus, no haze was noticed in test tubes containing a solution of silver nanoparticles + alginate stabiliser at concentrations of 0.05% or 0.02% 24 hours after the investigation began, showing 100% prevention of bacteria growth and reproduction during the first day. A minor opacification was noticed when the test tubes were filled with a solution of silver nanoparticles + alginate stabiliser at concentrations of 0.01%, 0.005%, 0.0025%, or 0.00125%.