Microbial green synthesis of nanoparticles and exploiting them for biological applications has received considerable attention in the recent past. Gold (Au) nanoparticles were synthesised using *Streptomyces ghanensis* sp. VITHM1 (MTCC #12465) biomass and evaluated for its cytotoxic activity. Au NPs were synthesised after 56 h of incubation with 1 mM HAuCl₄ in cell free supernatant at room temperature. The synthesized NPs were characterized by UV-visible spectrum, X-ray diffraction (XRD), atomic force microscopy, scanning electron microscopy equipped with energy dispersive spectroscopy, transmission electron microscopy, fourier transform infrared spectroscopy, dynamic light scattering (DLS) and zeta potential. The synthesised gold nanoparticles were highly stable, spherical in shape and the average size was 30-50 nm. The secondary metabolites present in the biomass were identified by gas chromatography-mass spectrometry (GC-MS). The mechanism of formation of gold nanoparticles with the two major secondary metabolites present in the extracted biomass was proposed. The 3D structure of the unit cell in the synthesized nanoparticles was determined by XRD data base. The synthesized gold nanoparticles (200 µg/mL) exhibited admirable cytotoxic activity by inducing apoptosis in Hep-2 cells after 48 h of incubation. Gold nanoparticles (250 µg/mL) did not cause any haemolysis on human red blood cells. These results of this study suggest that *Streptomyces* biomass-mediated gold nanoparticles can be explored for cytotoxic activity.

**KEYWORDS:** *Streptomyces ghanensis* sp. VITHM1; secondary metabolites; Nanoparticles; 3D structure; Hep-2 cells; Cytotoxicity.


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**Introduction**

Bacterial biomass is often used for green synthesis of desired metal NPs worldwide in the recent past. *Streptomyces* is the most common actinobacteria genus, that have been proved as a pivotal source for the production of more than 70% of the naturally occurring antibiotics available in the market and continuing as rich source of new bioactive metabolites and new chemical entities (Kavitha et al., 2010). Use of microorganisms (green technology) is considered as an alternative to chemical technology for synthesis of inorganic NPs. The microbial synthesis of NPs finds extensive biomedical applications and considered as the most commercialised NPs. Different microorganisms like bacteria, yeast and fungi are known for biological synthesis of Au NPs (Rajeshkumar et al., 2013). Generally, the physical and chemical methods employed for synthesis of NPs can result in high levels of formation of hazardous by-products that are toxic to human health and thereby limits their applications in clinical fields as well. To overcome these problems there is a growing interest in the development of environment friendly approach for the synthesis of metal NPs that do not use toxic and expensive chemicals. Use of biomass or extracts of many organisms (both unicellular & multicellular) have been tried with success as reducing agents. Therefore, the biological approach for synthesis of NPs are given much importance because they are clean, non-toxic, safe, biocompatible, inexpensive and uniform production of NPs (Kumar et al., 2012). NPs are solid particles that are generated from a wide variety of physical, chemical and biological process with different properties, size and shape. NPs have been received a great attention in the field of biology and have several biomedical applications due to their stability, low toxicity and biocompatibility (Khan et al., 2014). The different combination of inorganic (nanoparticles) and organic materials (bioactive compounds) forms hybrids and possess unique properties due to their small size and large specific surface area (Tiwari et al., 2011).

Cancer is one of the major causes of clinical mortality worldwide. Most of the anticancer drugs available in the market are toxic in nature. Therefore, there is always a...