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Green synthesis nanoparticles as an anti-cancerous agent

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Abstract

The advancement in the field of nanoscience and nanotechnology to synthesize material at a nanoscale level has proved to have a great effect on the various sciences. In recent times the use green synthesize nanoparticles in field of engineering and biomedicine has gained a huge attention. Unlike the use of chemical method to manufacture the nanoparticle by the use of chemicals that are toxic, expensive and non-ecofriendly. The limitation of the chemically synthesized nanoparticles has generated a need of an alternative means of ecofriendly synthesis process. Green synthesized nanoparticles have emerged as an effective solution to this problem as they are convenient, inexpensive, rapid and eco-friendly. The use of green synthesized nanoparticle has been used as an anti-cancerous agent. This article's center point is on the application of the green synthesis of nanoparticle and their application as an anti-cancerous agent, their characteristics and the mechanism of the drug action and also the future aspects of the nanoparticle as an anticancer agent.

Keywords: *Nanoparticle, Toxic, Cancerous, Eco-friendly, Nanotechnology.*

1. Introduction

The science discipline of nanotechnology examines materials at the nanoscale, which is between 1 and 100 nm.[1,2] Nanotechnology has been emerged as an one of the major and revolutionary disciplines of science having a vast applications in various field of sciences such as agriculture, energy, electronics, mechanics, optics pharmaceutics, sensors and biomedicines[3-5]. The production of nanoparticles through chemical means is outdated approach and is toxic, expensive and non-ecofriendly whereas the green synthesis of nanoparticle is a modernized strategy for producing nanoparticles that are economical, non-toxic, biocompatible, and environmentally beneficial[6-9]. Because they differ in size, shape, and surface area these nanoparticles bear some different properties when compared to the bulk material[10-15]. Due to such properties the functionalization of nanoparticles allows then to exhibit directed delivery, transportation and spread of nanoparticles to specific cells which make them useful in Drug delivery, gene delivery, and further medicinal uses[16-18]. Nanoparticle also possess properties like anti-bacterial, antifungal, antibiotic, antioxidant, wound healing, and antiviral properties[19-22]. For the production of the green nanoparticles the metal ions are firstly reduced by biological means i.e by the use of different biological entities like bacteria, fungi and yeast, Cancer is fetal disease and a condition of uncontrolled cell division and unrestrained cell differentiation, till now the treatment of cancer was done mainly by the application of chemotherapy radiations and surgical methods which were effective in destroying the cancer cells but alongside they had a very negative impacts on human health and normal cells as they are non-directed and effects the normal cell in the same manner as that of cancer cells[23-26]. These therapies are now outdated due the development of modernized nanomedicines that are directed targeted drug delivery and multi-target inhibitor due which they not produce much adverse effect on the body[27]. These nanoparticles not only aid in the treatment of cancer but also helped in the early detection of the cancer[28-31]. This article mainly summarizes the application of green synthesized nanoparticle and their application as an anti-cancer agent, the properties of green nanoparticles, their mode of action, and the potential uses and future directions of green nanoparticle production as an anti-cancer agent in the field of nanoscience.

2. Green Synthesis Of Metallic Nanoparticles

The progress in nanotechnology for the production of nanoparticles has been immensely advanced from the physical and chemical methods[32,33] The traditional methods used to produce nanoparticles are lithography, sol-gel technique, pyrolysis, chemical vapour deposition, and electrodeposition.[6,34-36]. Since these traditional techniques are expensive, detrimental to the environment, and involve the use of poisonous chemicals, high pressure, and a lot of energy, they are bad for both the environment and living creatures.[37-39]. However, The creation of metallic nanoparticles has been approached differently via green or biological means, and these production approaches have been determined to pose no danger to the environment.[40,41]. When The green or biological approaches are superior to the traditional physical and chemical ones are proved to be of great benefit in terms of economy, safe, reproducible, modest and generally producing the stable materials[42,43]. The green or biological method uses different biological entities or biomaterials for the production of the nanoparticles[44]. These entities consist of bacteria, fungi, microalgae, fungi, yeast and plants. These biosynthesized nanoparticles have a diverse application in the field of medical treatment, diagnosis, creation of surgical nano instruments and production of a range of chemical goods[45].

2.1 Green synthesis of nanoparticles via fungi

The application of fungi as a biomaterial in order to create nanoparticles has been very wide and extensive due to its properties like high efficiency of fungal metabolite to fabricate different nanoparticles, sufficient amount of secretion of proteins and enzymes and the easy to handle in laboratory[46-48]. The economic viability, simplicity of scaling up, and presence of mycelia, which provide the synthesis additional surface area, have all contributed to the great interest in the fungal application of nanoparticle production.[49,50]. These fungal synthesized nanoparticles also have metal accumulation properties that make them more diverse in their use. Fungi being capable of synthesizing proteins and enzymes both Therefore, it is possible to synthesise nanoparticles both intracellularly and extracellularly.[51,52]. Fungi being growing rapidly and forming huge masses allows to produce large and rapid number of nanoparticles[53]. By the use of different species of fungi different sizes of nanoparticles can be synthesized[54]. Fungal nanoparticles have strong anti-oxidant and anti-microbial qualities that make them useful for treating a variety of illnesses, particularly cancer.[55].

2.2 Green synthesis of nanoparticles via bacteria

Bacteria are the microorganisms that are exposed to most diverse and extremes conditions of the environment due to their ability to resist themselves towards different environmental stresses[23,56]. Bacteria have been given the title of "factory of nanoparticles" due to the properties like ease in purification and high yield they have been extensively used in the production of nanoparticles[57-59]. Different type of bacteria has been used to synthesize different nanoparticles of different shape and sizes[53,60,61]. Additionally, throughout the incubation phase, bacteria may produce nanoparticles in broth media, making them an acceptable, adaptable, and appropriate method for producing nanoparticles on a wide scale.[46,48,62,63]. The nanoparticles synthesized from bacteria exhibit a great anti-viral and anti-cancerous properties that are very useful in the medical and treatment of various diseases[64-66]. These nanoparticles are also synthesized from bacteria so are eco-friendly, non-toxic and cost efficient[67].

2.3 Green synthesis of nanoparticles via plants

The application of plants has drawn a lot of attention in recent times not because of its property to hyperaccumulate and biologically reduce the heavy metals but also because of its rapid, non-toxic, ecofriendly, economical protocol and a single step process for the biological synthesis of nanoparticles[68-70]. The diversity in the nanoparticles size and shapes is mainly due variation in the concentration and composition of the various active biomolecules which includes bioactive alkaloids, polyphenols, proteins, sugar and terpenoids[71,72]. This process includes the mixing of plant extract with the metal ion solution which immediately starts the reduction of the metal ion[46,49,73]. The shift in the solution's colour indicates the creation of nanoparticles.[74]. The fungal nanoparticles have outstanding anti-oxidant and anti-microbial qualities. As the process progresses, the nanoparticles combine to create a variety of forms, including triangles, cubes, squares, rods, and wires that, which are highly effective in treating a number of illnesses, particularly cancer.[75]. The quality, size, and shape of the produced nanoparticles are influenced by the quantity of plant metal salts, reaction time, reaction solution pH, and temperature.[57,76].

3. Use of metallic nanoparticles on drug delivery

3.1 Silver nanoparticles

Cancer is one of the leading causes of mortality in the modern world, with over 10 million new cases each year. Nanoparticles have certain advantages over conventional drug delivery techniques. Biodistribution and specific targeting Biocompatibility and safety. The ability of silver nanoparticles to stimulate the production of reactive oxygen species (ROS) and so disrupt the mitochondrial respiration chain of cancer cells has been the subject of several investigations.[77]. The silver nanoparticle have proven to have anti-cancer properties. Researchers has reported data on silver nanoparticle indices, cytotoxic effect against leukemia cell. PVP coated silver nanoparticle are effective to reduce the activity of acute melanoid Decima cell and additionally cause apoptosis and DNA damage by the release of silver ions and the production of reactive oxygen species. Researchers found that AgNPs significantly cytotoxically affected human liver (HepG2) cells at concentrations ranging from 1 to 20 µg/mL.[78]. Bees might be used to create silver nanoparticles in a straightforward, low-cost, and environmentally beneficial manner. The Colombia caco-2 cells were treated using the produced nano carrier.[79]. The silver nanoparticle loaded with PCA resulted in 80% inhibition as compared to silver nanoparticle at same concentration[80]. Because of DOX's intracellular acidic pH responsive release, which makes the medication visible to reach the cancer cell's nucleus, the Ag-NGO-DOX has the ability to transport and release the medicine at a specific place.[81,82]. Nanoparticles have been extensively used in drug delivery applications due to their low loading and silver toxicity. However, because of its effective cell membrane penetration, a number of eco-friendly techniques have been developed to improve stability and reduce toxicity.[83,84].

3.2 Gold nanoparticles

Important and frequently employed in the biomedical area, gold nanoparticles have demonstrated exceptional efficacy in their capacity as medication carriers. Drug delivery uses gold nanoparticles. because of their functionalisation to target drug delivery, inertness, biocompatibility, and ease of manufacturing. Furthermore, the usage of gold nanoparticles has reduced the likelihood of negative consequences and damage to healthy cells. The use of gold nanoparticles is crucial for the treatment of cancer because of its delayed aggregation and size-dependent cytotoxic impact on different types of cancer cells. Gold nanoparticles' anti-cancer mechanism is a complicated and poorly understood process. The gold nanoparticles are positively charged while the normal cell contains a negative charged compounds such as the counter-charged lipids that take over the internalisation of gold nanoparticles. Because endocytosis results in the accumulation of tiny gold nanoparticles within hepatic cells, it provides an additional pathway for the entrance of gold nanoparticles into the cell.. Numerous biomolecules, including DNA, peptides, and antibodies, can be functionalised on the surface of gold nanoparticles. Gold has been mixed with a substance called methotrexate, which is an equivalent of folic acid and can stop cancer cells from growing and reproducing. used as an anti-cancer medication. Pancreatic tumour cells were inhibited by cedoximab and gemactiabine. It can be used to treat breast cancer in conjunction with other combinations..

3.3 Zinc oxide nanoparticles

The use of zinc oxide or zinc nanoparticles in drug delivery systems for the treatment of inflammation, diabetes, and cancer shows promise. Unlike other nanoparticles. These have a lower toxicity and are biodegradable in nature Due to these, they have been an excellent choice as an inner career in the delivery of different drugs. The combination of zinc nanoparticles with certain drugs have significantly decreased anti-cancer medication cytotoxicity and take into account an increase in cancer targeting in human hepatocarcinoma cells caused by ROS. The ZnO NPs proved useful as excellent anticancer medication delivery vehicle [17]. Aegle marmelos leaf extract is used in the environmentally friendly manufacture of zinc ferrite magnetic nanoparticles for medication administration. According to a research, biosynthesised zinc ferrite nanoparticles loaded with the anticancer medication carfilzomib showed a 95% release in 360 minutes.

3.4 Other nanoparticles

Other metallic nanoparticles include Titanium dioxide nanoparticles, Copper nanoparticles, Palladium nanoparticles.

Pd is a very valuable metal having strong mechanical, electroanalytic, and catalytic qualities. [19]. As self-therapeutics, Pd nano-based structures have been created containing pharmacologic nanoparticles that have been shown to be cytotoxic and antibacterial. [20]. The brilliant feature of PdNPs for loading anti-cancer medications was their great porosity. A connecting molecule can be used to indirectly conjugate the medicinal medicine to the PdNPs.

Due to its chemical stability, low toxicity, and affordability, titanium dioxide (TiO2), also known as titania, is a semiconductor metal oxide that may find application in drug delivery systems, particularly in the treatment of cancer. [21, 22]. Anatase, which has a higher chemical activity, and rutile are the two crystalline forms of titanium dioxide.

CuNPs' main benefit over gold and silver nanoparticles is their availability and inexpensive cost, which leads to sample synthesis and a variety of CuNP applications. [23, 24]. One of the vital trace elements found in the majority of living things is copper, a metal that is easily accessible. Experimental studies on the development of targeted drug delivery and bioimaging molecules produced transferrin (Tf) templated copper nanoclusters (Tf-CuNCs) with enhanced luminescence..

4. Mechanism of drug release

Common peptides, antibodies, chemotherapeutic drugs, and common nucleic acids are only a few of the medicinal agents that are frequently delivered via metallic nanoparticles[85,86]. Numerous metallic nanoparticles, including those made of copper, zinc, titanium, silver, platinum, gold, and others, have improved optical qualities[87,88]. Through bonding, covalent bonding, and electrostatic interactions, the surface may be readily functionalised to conjugate the active biomolecules and the targeted agents[89,90]. It is simple to load more than one medicament on the disc. Getting the therapeutic material to the site of action, minimising the negative effects of the medicine on healthy tissue or organs, and controlling the drug's release to avoid conventional overdose are the three main goals of effective medication administration [91]. The transfer of pharmaceuticals from the starting point of the nano carrier system to the nano carrier's exterior and, eventually, to the external environment is known as drug release Water is absorbed by the narrow carrier in an aqueous environment, increasing the nanocarrier's pore size[92]. As time goes on, the water-filled pores may cause new pores with a bigger diameter to grow, which would aid in the drug's release[93]. The concentration gradient, number of pores, and rate of nanocarrier breakdown all affect how the medication moves through water-filled pores[94].Osmotic pumping is the term for another way that medications flow through pores that are loaded with water[95]. A strong osmotic pressure brought on by water flow in the non-swollen area propels the medication outside the nanocarrier system.

5. Characteristics Of nanoparticle used in drug delivery system

Human health is vulnerable to several infections and illnesses. Research is required to identify novel medication classes to address the problems posed by these aggressive illnesses and infections.[96]. The outbreak of the COVID-19 was an eye-opener for need of accelerating the drug research globally[97]. The green or biosynthesized nanoparticles are not only modern method but also one of the most preferred methods for the delivery of drug not only because they are not only economical, non-toxic, and environmentally safe, but they also have superior medication delivery qualities.[98-100]. In order to use nanoparticles as a drug delivery agent, they must fulfill some requirement or must contain some specific characteristics which are discussed below Human health is vulnerable to several infections and illnesses. Research is required to identify novel medication classes to address the problems posed by these aggressive illnesses and infections.[96]. The outbreak of the COVID-19 was an eye-opener for need of accelerating the drug research globally[97]. The green or biosynthesized nanoparticles are not only modern method but also one of the most preferred methods for the delivery of drug not only because they are not only economical, non-toxic, and environmentally safe, but they also have superior medication delivery qualities.[98-100]. In order to use nanoparticles as a drug delivery agent, they must full fill some requirement or must contain some specific characteristics which are discussed below

5.1 Shape of nanoparticles

Another important feature that is taken into account for drug delivery applications is the form of the nanoparticle. [101]. The shape of nanoparticle affects various aspects of nanoparticle such as drug loading capacity, bio distribution of nanoparticle and cellular uptake of drug[102,103]. Different forms of nanoparticles, comprise irregular, worm-like, bead-like, rectangular, spherical, and rod-like shapes. [104]. Compared to spherical nanoparticles, non-spherical and rod-shaped nanoparticles are reported to be the most stable over blood circulation time. due to their low phagocytic activity[105]. Around 100 nanometres is the ideal size for spherical nanoparticles because it allows for overcoating, facile surface modification, and the ability to load more drugs with greater release, all of which contribute to optimal drug delivery.[106,107].Another important feature that is taken into account for drug delivery applications is the form of the nanoparticle. [101]. The shape of nanoparticle affects various aspects of nanoparticle such as drug loading capacity, bio distribution of nanoparticle and cellular uptake of drug[102,103]. Different forms of nanoparticles, comprise irregular, worm-like, bead-like, rectangular, spherical, and rod-like shapes. [104]. Compared to spherical nanoparticles, non-spherical and rod-shaped nanoparticles are reported to be the most stable over blood circulation time. due to their low phagocytic activity[105]. Around 100 nanometres is the ideal size for spherical nanoparticles because it allows for overcoating, facile surface modification, and the ability to load more drugs with greater release, all of which contribute to optimal drug delivery.[106,107].

5.2 Size of nanoparticles

One of the most crucial aspects of a nanoparticle system is the size of the particles. For the medicine to enter the cell and be absorbed by the receptor cell[108,109]. The size of the nanoparticle plays a crucial role in the efficient delivery of drugs since it affects the stability, loading, and release of the drug as well as its biological destiny, toxicity, and targeting ability.[110]. The ideal nanoparticle size range for medication delivery is believed to be between 10 and 100 nm.[111,112]. It is optimum size for the drug delivery because they penetrates the small blood capillaries easily and has a longer circulation in the body as well as they have a higher affinity to many receptors hey smaller size of nanoparticle also helps in deep permeability and retention effect dead causes the maximum accumulation of the drug at the target site[113-115]. The nano particles smaller than the optimum size are not considered for the medical use due to the fact that they penetrate into the cell organelle diet results in the organelle damage also various nanoparticles are not considered for medical use as they can agitate and cause the hey formation of the clot in the blood circulatory system hence a uniform and optimum size nanoparticles are ideal for the drug delivery[116-119].One of the most crucial aspects of a nanoparticle system is the size of the particles. For the medicine to enter the cell and be absorbed by the receptor cell[108,109]. The size of the nanoparticle plays a crucial role in the efficient delivery of drugs since it affects the stability, loading, and release of the drug as well as its biological destiny, toxicity, and targeting ability.[110]. The ideal nanoparticle size range for medication delivery is believed to be between 10 and 100 nm.[111,112]. It is optimum size for the drug delivery because hey penetrates the small blood capillaries easily and has a longer circulation in the body as well as they have a higher affinity to many receptors hey smaller size of nanoparticle also helps in deep permeability and retention effect dead causes the maximum accumulation of the drug at the target site[113-115]. The nano particles smaller than the optimum size are not considered for the medical use due to the fact that they penetrate into the cell organelle diet results in the organelle damage also various nanoparticles are not considered for medical use as they can agitate and cause the hey formation of the clog in the blood circulatory system hence a uniform and optimum size nanoparticles are ideal for the drug delivery[116-119].

5.3 Surface charge of nanoparticles and stability

The surface properties of nanoparticles play a major role in the stability and performance of the drug delivery[120,121]. The majority of cells typically have a negative charge on their surface because endocytosis neutralises the charge on the cell membrane.[122-124]. So for the successful uptake the surface charge of the nanoparticle must be positive as positive charge has more affinity towards the cell membrane as compared to the other charged particles i.e negative and neutral charge particles[125,126]. Generally, for avoiding non-specific binding of protein and other macromolecules, the nanoparticle has antifouling property[127]. Also to improve the prolonged circulation, the nanoparticle can be made functionalized by using some bioactive components[128,129]. The surface properties of nanoparticles play a major role in the stability and performance of the drug delivery[120,121]. The majority of cells typically have a negative charge on their surface because endocytosis neutralises the charge on the cell membrane.[122-124]. So for the successful uptake the surface charge of the nanoparticle must be positive as positive charge has more affinity towards the cell membrane as compared to the other charged particles i.e negative and neutral charge particles[125,126]. Generally, for avoiding non-specific binding of protein and other macromolecules, the nanoparticle has antifouling property[127]. Also to improve the prolonged circulation, the nanoparticle can be made functionalized by using some bioactive components[128,129].

5.4 Drug loading

Drug loading is the process of loading a medication so that its effectiveness is unaffected or that it is loaded efficiently.[129]. For an ideal nanoparticulate system the drug loading capacity should be high for its effective administration[130]. AlsoThe medicine should only be released by the nanocarrier at the intended location, not on the healthy cell.[131]. For the loading of the drug there are two ways first one is the conjugation of the drug on the nanoparticle surface[132]. This conjugation of the drug can be done by the covalent linkage and physical interactions[133]. The mechanism is depended upon the polarity of the medication and how it interacts with the nanocarrier, specifically whether it is by a physical interaction (electrostatic, van der Waals) or a chemical relationship (ionic, covalent, hydrogen).[134,135]. The surface conjugation has been a very useful in drug loading but still it has many limitations such as it gets easily dissociate, minimum amount of drug reaching the target site, release of drug at nonspecific site and early dissociation of drug interaction[136,137]. The other one is the encapsulation of the drug with the material. It helps to improve the active drug delivery, efficiency, bioactivity and the controlled release of the drug[131,138]. Drug loading is the process of loading a medication so that its effectiveness is unaffected or that it is loaded efficiently.[129]. For an ideal nanoparticulate system the drug loading capacity should be high for its effective administration[130]. AlsoThe medicine should only be released by the nanocarrier at the intended location, not on the healthy cell.[131]. For the loading of the drug there are two ways first one is the conjugation of the drug on the nanoparticle surface[132]. This conjugation of the drug can be done by the covalent linkage and physical interactions[133]. The mechanism is depended upon the polarity of the medication and how it interacts with the nanocarrier, specifically whether it is by a physical interaction (electrostatic, van der Waals) or a chemical relationship (ionic, covalent, hydrogen).[134,135]. The surface conjugation has been a very useful in drug loading but still it has many limitations such as it gets easily dissociate, minimum amount of drug reaching the target site, release of drug at nonspecific site and early dissociation of drug interaction[136,137]. The other one is the encapsulation of the drug with the material. It helps to improve the active drug delivery, efficiency, bioactivity and the controlled release of the drug[131,138].

5.5 Mechanism of drug release

Drug release is the process by which medications or antibiotics move from the nanocarrier system's starting point to its outside and enter the surrounding environment.[139,140]. Most of the drug release is carried out by diffusion through the help of pores or by creating a chemical potential gradient. For the development of the successful nanoparticle system, the drug release and polymer are the important factor for it[141]. The release of drug depends upon various factors such as the solubility of the drug, drug diffusion through nanoparticle matrix, desorption of the surface absorbed drug, nanoparticle matrix degradation, combination of the diffusion process[127,142,143]. In aquatic conditions there is a increase in the diameter of the pores of the nanocarrier due to the absorption of the water which causes the better release of the drug[144]. The concentration gradient, the number of pores, and the rate of degradation of the nanocarriers all influence how these drugs travel. Another drug mechanism is erosion.[145]. Surface erosion and bulk erosion are the two categories of erosion. "Surface erosion" is the gradual deterioration of the nanocarrier system that causes the outer surface to bend towards the inner surface.[137,146,147]. Another type of erosion is known as "bulk erosion," which happens when the entire nanocarrier matrix is weakened by the high rate of water penetration..[148]. In these two methods, "surface erosion" is the most desirable since it allows for controlled drug release, whereas "bulk erosion" allows for less controlled drug release because the drug comes into touch with the outside environment.[149,150]. Drug dose, longer period of exposure therapeutic effects, overexposure and reduced side effects are the factors that are considered during the drug delivery formulations[151]. Also drug delivery depends upon the physiochemical and external factor[152].
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6. Application of metallic nanoparticle as an anti cancerous agent

In recent times there has been a huge increase in cancer cases and majority of them are fatal[153]. The current method of treating cancer affect the functioning of normal cell by excess exposure of drug and radiation hence, there is a need of after developing new anticancer strategies as their drugs and radiation have a hazardous effect on the body while administrating excess drug and radiation[154-156]. Various plant extract and bioactive compounds have been know to have the potential views as an anti-cancer agent[157,158]. Hence, the modern medicine has focused upon the application of green metallic nanoparticle for the delivery of drugs these green metallic nanoparticle are cost effective, nontoxic and environmental friendly[159-161]. The plant derived green nanoparticle are found to have a great anti cancer property[108,162]. Because of their property to arrest the unregulated cell growth and regulate systemic cell growth[41,163]. Because of larger surface area and area to volume ratio, and other physicochemical property nanoparticle has always been in priority for drug delivery[116]. The silver nanoparticle have excellent capacity to treat cervical cancer cell[164]. Due to resistance towards moisture, air, acids and biocompatible nature the gold nanoparticle has gained huge attention in biomedical field specially in the area of cell targeting, tumor detection, drug delivery and cancer therapy[165-167]. The ability of gold and silver metallic nanoparticles to scatter light in the visible spectrum aids in the early identification of cancer.[168,169]. nanoparticle of metal. has characteristics that make them ideal for treating cancer, including as their smaller size, biocompatibility, and selective nature.[170]. This small size helps to enhance their surface area which makes them more effective[171].In recent times there has been a huge increase in cancer cases and majority of them are fatal[153]. The current method of treating cancer affect the functioning of normal cell my access exposure of drug and radiation hence, there is a need of after developing new anticancer strategies as their drugs and radiation have a hazardous effect on the body while administrating excess drug and radiation[154-156]. Various plant extract and bioactive compounds have been know to have the potential views as an anti-cancer agent[157,158]. Hence, the modern medicine has focused upon the application of green metallic nanoparticle for the delivery of drug s these green metallic nanoparticle are cost effective, nontoxic and environmental friendly[159-161]. The plant derived green nanoparticle are found to have a great anti cancer property[108,162]. Because of their property to arrest the unregulated cell growth and regulate systemic cell growth[41,163]. Because of larger surface area and area to volume ratio, and other physicochemical property nanoparticle has always been in priority for drug delivery[116]. The silver nanoparticle heaven excellent capacity to treat cervical cancer cell[164]. Due to resistance towards moisture, air, acids and biocompatible nature the gold nanoparticle has gained huge attention in biomedical field specially in the area of cell targeting, tumor detection, drug deliver and cancer therapy[165-167]. The ability of gold and silver metallic nanoparticles to scatter light in the visible spectrum aids in the early identification of cancer.[168,169]. nanoparticle of metal. has characteristics that make them ideal for treating cancer, including as their smaller size, biocompatibility, and selective nature.[170]. This molar size helps to enhance their surface area which makes them more effective[171].

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