



Nanotechnology and Nanomedicine-mini review

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SUMMARY

Nanotechnology is explained in terms of manipulation and exploitation of substances at the nano scale (nm) in the sequence from 0.1 to 100 nm. Nanoparticles are small sized particles with size upto 100 nm and are fundamental elements in the field of nanotechnology and are characterized by advanced features associated with their size, size dependent properties and morphology. Gold, magnesium, zinc, copper and silver are the different types of nano-material which have been used recently. From all of these nano-materials silver have been used in large scale due to increasing resistivity against many eukaryotic micro-organisms, viruses and bacteria. From early time to recent, human beings used the different parts of animal for folklore pharmaceutical purpose. Different parts and products of animals like meat, fats, egg, milk, fater, venom, horn, skin, excrement and corporal secretion are use for the synthesis of well known medications. Plants parts i.e. leave, root, bark, fruit, flower and etc. are also used in folklore medicine and are very effective in treatments; many of these are proved in nanomedicine.

Keyword: Nanotechnology, Nanoparticles, Ethnomedicinal

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INTRODUCTION

NANOTECHNOLOGY

Nanotechnology is explained in terms of manipulation and exploitation of substances at the nano scale (nm) in the sequence from 0.1 to 100 nm (Poole Jr and Owens, 2003). Nanotechnology is a common technology rather than a specific area of science or engineering. Across many sectors of the economy over the next two or three decade's nanotechnology may have broad effects. It refers to a set of methods and procedures linked with new ways of manufacturing materials by designing and engineering them at the atomic level (Bhushan and Baumann, 2007). Many new products and processes have been developed by this technique such as; surface coatings, lab-on-a-chip, nanostructure materials, nano tools, and nano-sensors (Stevens *et al.*, 2000; Bhushan, 2017). Major advantages associated with the nanotechnology lie in the synthesis of smaller, cheaper and efficient devices with fast speed and efficient working and high durability. Moreover, it requires less energy consumption (Stevens *et al.*, 2000; Chakraborty *et al.*, 2011).

NANOPARTICLES

Nanoparticles are small sized particles with size up to 100 nanometer and are fundamental elements in the field of nanotechnology and are characterized by advanced features associated with their size, size dependent properties and morphology (Holister *et al.*, 2003; Herr *et al.*, 2006; Mohanraj and Chen, 2006; Simi and Abraham, 2007). High surface area to volume ratio of nano particles renders them to be small size. Specific surface area of nanoparticles is associated with the catalytic reactivity. It is also associated with other properties such as antimicrobial activities of nanoparticles (Willems, 2005; Mody *et al.*, 2010). Due to these instinctive characteristics, nanoparticles play a vital role in optics, energy science, biomedicine and other health care applications (Fayaz *et al.*, 2010). Organic and inorganic are two main categories of nanoparticles. Metallic nanoparticles such as Ag, Au, Al and Cu; Semi-conductor nanoparticles such as ZnS, CdS and ZnO; magnetic nanoparticles such as Ni, Fe and Co are the examples of Inorganic nanoparticles (Khairutdinov, 1998). While carbon nanoparticles such as quantum dots, fullerenes and carbon nano tubes are the examples of organic nanoparticles. Among all of these silver and gold nanoparticles possess significant characteristics with valuable flexibility (Bangal *et al.*, 2005; Rafique *et al.*, 2016; Rónavári *et al.*, 2018).

IMPORTANCE OF NANOPARTICLES

Gold, magnesium, zinc, copper and silver are the different types of nano-material which have been used recently. From all of these nano-materials silver have been used in large scale due to increasing resistivity against many eukaryotic micro-organisms, viruses and bacteria (Gong *et al.*, 2007; Farokhzad and Langer, 2009). There are numbers of fields in which nanoparticles of silver are used like in bio-labeling, nonlinear optics, intercalation materials for electrical batteries as optical receptors, antibacterial capacities and as catalyst in chemical reactions (Zargar *et al.*, 2014). Anti-angiogenesis (Baharara *et al.*, 2014; Subramaniam *et al.*, 2021), anti-fungal (Gaurav *et al.*, 2015; Wang *et al.*, 2015) and anti-viral (Teirumnieks *et al.*, 2020) actions have been reported to be done by silver nanoparticles. Many Gram-positive and Gram-negative bacteria including some antibiotic resistant strains have been killed by silver nanoparticles (Guzman *et al.*, 2012).

ETHNO-MEDICINAL IMPORTANCE OF ANIMALS AND PLANTS

From early time to recent, human beings used the different parts of animal for folklore pharmaceutical purpose (Umair *et al.*, 2017b; Aslam and Faiz, 2020; Ijaz *et al.*, 2020; Mughal *et al.*, 2020; Ijaz and Iftikhar, 2021; Saleem *et al.*, 2021). Different parts and products of animals like meat (Haidar and Bashir, 2021), fats (Ijaz and Faiz, 2021), egg (Tariq, 2020), milk (Aslam and Faiz, 2020), fater (Adil and Tariq, 2020), venom (Altaf and Faiz, 2021), horn, skin, excrement and corporal secretion are use for the synthesis of well known medications (Hancock and Patrzykat, 2002). Plants parts i.e. leave (Malede *et al.*, 2020), root (Tabassum and Hamdani, 2014), bark (Iyiola *et al.*, 2011), fruit (Tabassum and Hamdani, 2014), flower (Umair *et al.*, 2017b; Umair *et al.*, 2019) and etc. are also used in folklore medicine and are very

effective in treatments (Khan *et al.*, 2017; Umair *et al.*, 2017a; Khan *et al.*, 2018); many of these are proved in nanomedicine (Alfieri *et al.*, 2021).

CONCLUSION

Nanoparticles are quickly fetching the focus of the majority hard work aiming at site-specific and targets and drug delivery. The targeting skill of nanoparticles depends on particular factors such i.e. to targeted delivery, toxicity and selective binding require to be trounced. Little information concerning the nanoparticles toxicity is a main certainly and concern needs more notice. If nanoparticles are carefully intended to attempt troubles linked to route and target of administration, nanoparticles may lead to a novel more winning model in the research and therapeutics in the world.

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