



The Revolutionary Technology: *Nano Herbal Medicine*

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Introduction

Herbal medicines and natural products are being used to cure the diseases since ancient time, later allopathic system came to india in 20th century. Herbal medicines have been used all over the world from since many years. Unlike widely used allopathic system, the herbal remedies have thousands of constituents that all work simultaneously against the diseases. In India, there is huge market for herbals. Standardization of herbal medicine is challenge in india and has to be systematized. The new approach in herbals as nanotechnology have a sound future which has a scientific approach to deliver the ingredients in sustained manner which increases the patient compliance and avoid repeated administration. The prefix "nano" in the nanotechnology means a billionth (1×10^{-9}). "Nanotechnology" is based on the recognition of the particles less than the size of 100 nanometers (nm) impart to nanostructures built from them new properties and behaviour. This happens because particles, which are smaller than the characteristic lengths associated with particular phenomenon often display new chemistry and physics, leading to new behavior which depends on the size. In recent years, nanotechnology has become one of the most important and exciting forefront fields in science. Nanotechnology is a field of applied science and technology which aims to develop devices and dosage forms in the range of 1 to 100 nm. The applications of nanotechnology for treatment, diagnosis, monitoring, and control of biological systems have recently been referred to as nanomedicine. By developing new formulation as nano herbal medicines like nanofiber, nanoparticles, dendrimers etc, we can increase the effectiveness of herbal treatment. Nano dosage increases solubility, stability and bioavailability, decreases the toxicity, increases pharmacological activity, improves the distribution and lowers the rate of physical and chemical degradation, etc.

Need of Nanotechnology for Herbal medicines:

Oral route of herbal drugs undergoes through degradation process in stomach in acidic pH then it goes to systemic circulation. During this process large amount of drug gets disintegrated and low amount of drug goes into systemic circulation after liver. Nanocarriers applying to herbal remedies will carry optimum amount of the drug to their site of action bypassing all the barriers such as acidic pH of stomach, liver metabolism and increase the prolonged circulation of the drug into the blood due to their small size.[2,3]

Benefits of Nanotechnology:

Nano-sized delivery system is having following benefits:

- They are able to deliver high concentrations of drugs to disease sites because of their unique size.[2]
- Lower side effects.[2]
- Deliver the drug in the small particle size that enhances the entire surface area of the drugs allocating quicker dissolution in the blood.
- Shows EPR (enhanced permeation and retention) effect, i.e., enhanced permeation through the barriers because

of the small size and retention .[2]

- The concentration seems to persist at the sites for the longer periods.[2]
- Exhibits passive targeting to the disease site of action without the addition of any particular ligand moiety.[2]
- Minimal in the dose of the drug formulation.[2]

Techniques for Nano particles Preparation:

There are many technique for preparing the nano particles like complex coacervation method, co-precipitation method, salt-out method, nano precipitation method, solvent emulsification-diffusion method, Supercritical fluid methods and high-pressure homogenization method. These techniques have given the robust strength to herbal products against degradation thus increased the safety & pharmacological activity of drugs. Nano carriers applying to herbal remedies will carry optimum amount of the drug to their site of action by passing all the barriers such as acidic pH of stomach, liver metabolism due to its small size.

There are many techniques for determination of herbal drugs but AFM i.e. Atomic Force Microscopy technique is widely used for determination of nano drugs which determines the nano structure. The AFM is a very high-resolution type of scanning probe microscopy and it is one of the foremost tools for imaging, measuring, and manipulating matter at the nano scale.

Types of Nano particles

- Solid lipid nano particles
- Polymeric nano particles
- Magnetic nano particles
- Metal and inorganic nano particles
- Polymeric micelles
- Phospholipids micelles
- Quantum dots
- Colloidal nano-liposomes
- Dendrimers

Development

The use of nanotechnology in medicine and more specifically drug delivery is set to spread rapidly. Presently, many substances are under investigation for drug delivery. pharmaceutical sciences are using nano particles to reduce toxicity and side effects of drugs. From a positive view point, especially the potential to cross the blood brain

barrier may open new ways for drug delivery into the brain. In addition the nano size also allows for access into the cell and various cellular compartments, including the nucleus. In Ayurveda, seven metals, viz., gold, silver, copper, iron, lead, tin and zinc are used therapeutically. These metals are passed through many process and finally

transformed into therapeutic form for various diseases. "Bhas-

ma" are the metal based medicine prepared from metals after many systematic processes to raw metal into therapeutic form. The particle size of "Swarna Bhasma" (gold ash, a therapeutic form of gold metal of nano size particles when evaluated through various tools and techniques) is about 56 nm. The "Bhasma" are metalomedicine in powder form of nano to submicron size particles.

The chemists are using nanotechnology for plant research to be applied as "phytotherapy". The new breakthrough solution uses what are called "mesoporous" nanoparticles. These nanoparticles both

introduce the gene and activate it at the same time, in a precise and controlled manner and without toxic after effects.

pharmaceutical scientists have shifted their focus to designing a drug delivery system for herbal medicines using a scientific approach. *Cuscuta chinensis* is a commonly used traditional Chinese medicine to nourish the liver and kidney. Due to the poor water solubility of its major constituents such as flavonoids and lignans, its absorption upon oral administration could be limited. So, the nanoparticles for the same were developed.(4)

Although the anti tumour activity of camptothecin has been intensively studied for nearly fifty years, recent advances in drug delivery systems of camptothecin have considerably improved this drug's efficiency due to development in nano-sized dosage forms of camptothecin derived drugs.

Future scope:

The research has been going on herbal remedies and natural products. The only requirement is to develop the better systems for the proper delivery of such drugs at the sites and in the whole body in the doses which will not compromise with the existing treatment. Something that would not only give relief from side effects like toxicity and hypersensitive reactions but also quality of life of patient. Using "herbal remedy" in the nanocarriers will increase its potential for the treatment of various chronic diseases and health benefits. Many successful examples with experienced evidences are present among us in the direction of nano research. Herbal remedies are also prosperous resources of advantageous compounds holding antioxidants and constituents that can be made use in purposeful foods.[5] This type of collaborative research among the traditional "Herbal remedies" and newer approaches of modern drug delivery system, i.e., "Nanotechnology" has established the attractive therapies to the pharmaceutical in near future that will enhance health of people. It is anticipated that the effectual and valuable relevance of the natural products and herbal remedies being applied with the nanocarrier will enhance the significance of existing drug delivery systems.

Market size:

The market value of the worldwide Nano medicine industry was \$63.8 billion & \$72.8 billion in 2010-2011 respectively. The market is estimated to grow up to \$130.9 billion by fiscal year 2016.

Conclusion: Nano technology is revolutionary technique in all fields and provides many benefits. Its uses in herbal medicines increases the effectiveness of drug thus reduces the doses by increasing the potency and reach in body.

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