BROAD VIEW OF NANO HERBAL MEDICINE

Rajeshwar Verma [1*], Shubham Bhardwaj [1], Jyoti Gupta[2]

IEC School of Pharmacy, IEC University, Baddi, Himachal Pradesh, India
E-Mail: rajaerv8@gmail.com

ABSTRACT

As we know traditional herbal medicines have been widely used around the world since the ancient times but most of the traditional herbal drugs and their extracts despite of their impressive in-vitro findings demonstrate less or negligible in-vivo activity due to their poor lipid solubility or improper molecular size, resulting in poor absorption and hence poor bioavailability. Poor bioavailability increases system clearance requiring repeated administration or higher dose, which makes the drug as a poor candidate for therapeutic use. Nanotechnology is bringing a new aspect in the field of scientific and technology and its application in healthcare that lead to development of novel drug delivery systems. Drug delivery system for herbal formulations based on applicative, nanotechnology has a potential future for enhancing the product efficacy and overcoming problem of slow or less absorption; associated with the herbal drugs. The marketed nano herbal products are Aegis. Lifepak Nano, Nano phyto proflex, Nano garcinia raspberry, Nano green coffee, Nano D3. Curcuma longa, Gymnema sylvestre, salvia miltiorrhiza, proteins and many more. Hence nano herbal drugs has become the broad view of new nanotech era for better and safer health care.

Keywords: Nanotechnology, Herbal drugs, In-vitro and In-vivo, Bioavailability, broad view.

Introduction

From ancient times, herbal drugs and natural products are being used to cure the diseases[1].More than two thirds of the world's plant species – at least 35000 of which are estimated to have medicinal value come from the developing countries. At least 7000 medicinal compounds in the modern pharmacopoeia are derived from plants.[2] Phytotherapeutics need a logical approach to deliver the components in a constant manner to enhance the patient compliance and avoid repeated administration. This can be done by designing novel drug delivery system (NDDS) for herbal components. NDDSs not only trim the repeated administration to overcome the non-compliance, but also aid to enhance the therapeutic value by trimming toxicity and enhancing the bioavailability, and so on.[3-4]Novel drug delivery system (NDDSs) for herbal drugs includes drug delivery, which trims dosage frequency, enhances the solubility and absorption whereas decreases elimination.[1]

Nanotechnology is bringing a new aspect in the field of scientific and technology and its application in healthcare that lead to development of novel drug delivery systems. Nanotechnology commonly refers to structures that are up to several 100 nm in size which can be increased up to 1000 nm. Nanotechnology and nano science studies have develops briskly during the past years in a large range of product results. It gives opportunities for the development of materials, including those for medical applications, where conventional techniques may reach their limits.[5]

POTENTIAL OF NOVEL DRUG DELIVERY SYSTEM FOR HERBAL DRUGS

In the previous few decades, huge attention has been target on the development of novel drug delivery systems for herbal drugs. NDDS is beneficial in delivering the herbal drug at fixed rate and delivery of drug at the site of action which reduces the toxic affects with enhance in bioavailability of the drugs. In the NDDS technology, control of the distribution of the drug is done by incorporating the drug in changing the structure of the drug at molecular size.[6] Various novel drug delivery systems such as liposomes, niosomes, microspheres and phytosomes have been reported

for the delivery of herbal drugs. For example, liposomes act as potential carrier to carry anticancer agents by increasing amount of drug in cancer area and decrease the accumulation of drug in normal cells/tissues thereby preventing tissue toxicity effects.[7]Many drug delivery and drug targeting systems are currently under development to reduce drug elimination and loss, to prevent harmful toxic-effects and to enhance drug bioavailability and the fraction of the drug accumulated in the target zone.[8]

Advantages of novel drug delivery systems

1. Increased solubility.
2. Increased bioavailability.
3. Protection from toxicity.
4. Increased pharmacological activity.
5. Increased stability.
6. Improved tissue macrophages distribution.
7. Sustained delivery.
8. Protection from physical and chemical degradation.[9]

NANOPARTICLES FORMULATION AND THEIR PHARMACOLOGICAL ACTION

Different nanoparticles formulation and their pharmacological action have been discussed in given below table:

Sr. No	Nanoparticle Name	Functionalization	Uses	Method of synthesis	References
1	**Curcumin**	**Anticancer**	**Potent anticancer and antitumor**	**Wet- milling technique**	10,11,12
2	**Paclitaxel**	**Anticancer**	**Several tumors, ovarian and breast tumor**	**Nano precipitation**	13,14,15
3	**Berberin**	**Antineoplastc**	**Inflammation and several cancer**	**Emulsion and ionic gelatin**	16,17,18
4	**Camptothecin**	**Anticancer**	**Potent anticancer**	**Encapsulated with hydrophobically modified glycol**	19
5	**Ginkgo beloba**	**Alzhemier's dementia**	**Loss of memory, thinking, language, behaviour**	**Combination of dry and wet process**	20
6	**Triptolide**	**Anti arthritis**	**Rheumatoid arthritis, inflammatory and autoimmune diseases**	**Nano encapsulation**	21,22
7	**Saliva militiorrhiza**	**Anti hyperlipidemia**	**Cerebrovascular diseases**	**Phospholipid comlpex loaded**	23,24,25
8	**Qurecetin**	**Antioxidant**	**Potent anticancer**	**Gelatin and chitosan loaded**	26,27,
9	**Breviscapine**	**Anticardiovascular**	**Cerebrovascular and cardiovascular diseases**	**Lipid encapsulation**	28,29,30
10	**Naringenin**	**Antioxidant, anti-inflammatory**	**Several tumors and hepatoprotective**	**Nano precipitation**	31, 32
11	**Dodder**	**Antioxidant**	**Carcinogenesis and hepatoprotecticve**	**Nano precipitation**	33,34,35
12	**Silymarins**	**Hepatoprotectives**	**Hepatoprotectives,**	**Cold**	36,37,38

			several liver diseases and breast cancer	**homogenization**	
13	**Genistein**	**Antioxidant**	**Cardiovascular, breast and uterine cancer also in osteoporosis**	**Nano emulsion and chitosan microspheres**	39,40
14	**Annual magwort**	**Antimalarial**	**Antimalarial, also used for asthma**	**Hydrophilic encapsulation**	41

How nanotechnology based drug most effective as cancer cure?

Cancer is a complex and evolving disease and also has been a constant battle globally with a lot of development in cures and preventative therapies. As of today, there is no definitive and selective drug for cancer. Blood vessels in tumors are "leaky" because they have gaps from 200-2000 nm, which allow nanoparticles to escape into the tumor. Nanometer sized particles below 500 nm can promote tumor selectivity and help in delivering low-solubility drugs. In the current cancer care, chemotherapy, radiation therapy, hypothermia has been used in-combination more often than standalone. Researchers have been studying on new phytochemical and their synthetic analogues which can fight against cancer and counter the side effects caused by the current chemo and radiation methods. The use of nanotechnology in cancer treatment offers some exciting possibilities, including the possibility of destroying cancer tumors with minimal damage to healthy tissue and organs, as well as the detection and elimination of cancer cells before they form tumors.Like Curcumin, camptothecin, paclitaxel, another phytochemical defines under intense investigation for its anti-cancer property is Andrographolide. Andrographolide, a diterpenoid lactone, which is one of the considerable bioactive components of the Acanthaceae family plant called Andrographis paniculata. It has been studied for its advantageous properties such as anti-inflammatory, analgesics, antihuman immunodeficiency virus effects, immune regulation, neuroprotective, choleretic cardiovascular, anti-hyperglycemic and antitumor and has been widely used in clinic for the treatment of fever, inflammation, and other infectious diseases. It is important to design and develop composite derivatives of Andrographolide in a manner to act as first line anti-cancer chemotherapeutic agents because of its poor oral bioavailability making it difficult to prepare formulation for clinical use. It is the high time to apply modern techniques to revise and standardize the ancient knowledge to tackle emerging world healthcare challenges such as multi-drug resistance antibiotics and cancers.[42-44]

FUTURE ASPECT OF NANO-HERBAL DRUGS

Herbal remedies products research is more familiar worldwide. This would not only give relieve from unwanted effects such as toxicity and hypersensitive reactions but also will increase the patient's strength internally is very much confidence boosting which is desirable. Herbal remedies are also wealthy resource of beneficial product holding antioxidants and constituents that can be made use in purposeful foods.[45]In the future, the concept of herbal nanoparticles for the treatment of critical diseases such as cancer, diabetes mellitus, and anemia drug delivery may also fascinate some potential research groups and potentially create attention grabbing results. It is expected that the adequate and valuable applicability of the natural products and herbal remedies being applied with the nanocarrier will increase the implication of existing drug delivery systems.[1]

CONCLUSION

Hence, using "herbal therapy" in the form of nanocarriers will definitely increase its potential for the treatment of many chronic diseases and health benefits. This type of research among the traditional "herbal remedies" and newer approaches of modern drug delivery system, i.e., "nanotechnology" has the attractive therapies to the pharmaceutical in the near future that will enhance health of people. It is anticipated that the effective and valuable relevance of the natural products and herbal remedies being applied with the nano carrier will enhance the significance of existing drug delivery systems.

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