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NANOTECHNOLOGY-BASED HERBAL MEDICINES: A COMPREHENSIVE REVIEW

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ABSTRACT: Since ancient times, herbal medicines have been commonly used around the world. The advancement of phytochemical and phytopharmacological sciences has made it possible for some medicinal plant products to elucidate the composition and biological activities. The efficacy of many medicinal plant species depends on the availability of active compounds. Most of the extracts' biologically active constituents, such as flavonoids, tannins, and terpenoids, are highly soluble in water but have low absorption since they are unable to traverse the cells' lipid membranes, have excessively large molecular size, or are poorly absorbed, resulting in loss of bioavailability and efficacy. Owing to these barriers, some extracts are not used clinically. Combining herbal medicine with nanotechnology has been widely suggested because nanostructured systems could be capable of potentiating the action of plant extracts, reducing the dosage and side effects needed, and improving operation. During the whole treatment cycle, nano systems will deliver the active constituent at an appropriate concentration, directing it to the desired site of action. These criteria are not fulfilled by traditional therapies. The goal of this study is to explore drug delivery systems and herbal medicines based on nanotechnology.

KEYWORDS: Allopathic, Drug, Herbal Medicines, Plants, Systems.

INTRODUCTION

Throughout human evolution, understanding and use of plants as herbal medicines has occurred in different populations, starting when man learned to pick plants for food and to alleviate ailments and diseases[1]. Herbal medicines were, however, gradually replaced by allopathic medicines during the second half of the twentieth century, especially in the Western world. Currently, allopathic therapies, especially in developing countries, are more commonly practiced than conventional medicines[2].

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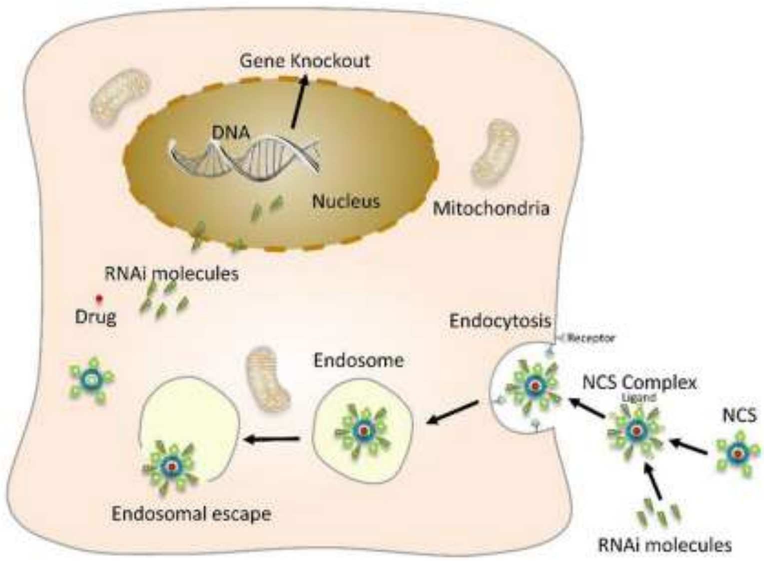

Figure 1: Illustrates the schematic diagram of nanoparticles-mediated gene[2]**.**

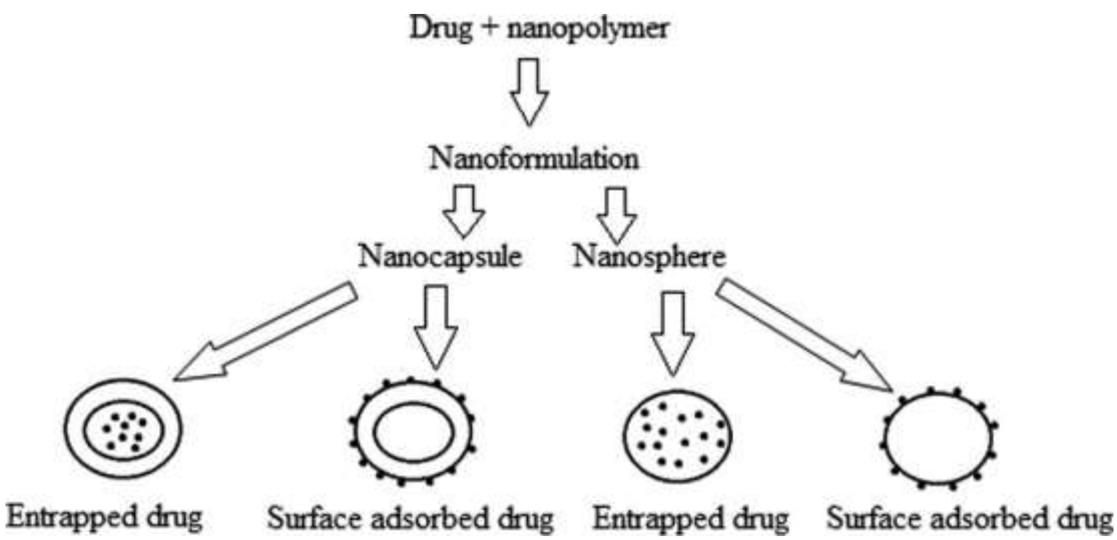

Figure 2: Depicts the drug and nano polymer flow chart.

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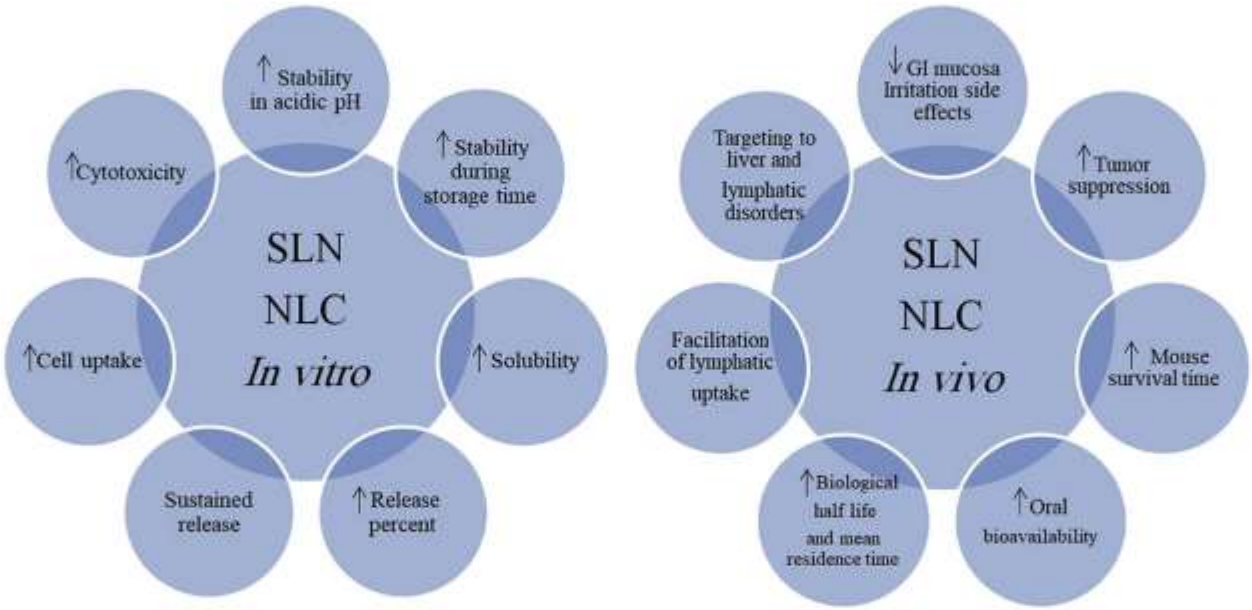

Figure 3: Depicts the nano structured lipid carriers[3]**.**

According to the World Health Organization, in order to meet and/or supplement their basic health needs, 80 percent of people in developing countries rely on conventional medical practises. Currently, despite advertisements and support from the pharmaceutical industry during the production of allopathic drugs, alternative practises for their health care continue to be used by a significant segment of the population in many countries[4]. Several of these approaches are derived from medicinal plants. However, the medicinal usage of these natural resources, which are primarily used by people who cannot afford different therapies, has significantly decreased due to economic, political, and social changes that have occurred worldwide[5].

For all scientific communities, elucidating the chemical composition of medicinal plants and their common uses has become a research subject. This research can lead to products that are increasingly innovative and have fewer side effects than current drugs. In addition, researchers have been fascinated by the immense diversity of the structures of natural products, as well as their physicochemical and biological properties. However, a low percentage of plants have been evaluated for their therapeutic value, even when they are used for local health care needs. Therefore, to explain any true potential, there is a lack of details.

DISCUSSION

Several groups of researchers have studied the biological function of medicinal plants from all over the world. These studies are focused on common uses of various organisms, as well as on popular knowledge and empirical studies explaining the use of medicinal plants, with an emphasis

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on how the pharmaceutical industry could benefit from these plants. During 1981-2006, approximately 50 percent of the medications approved were directly or indirectly derived from natural products.

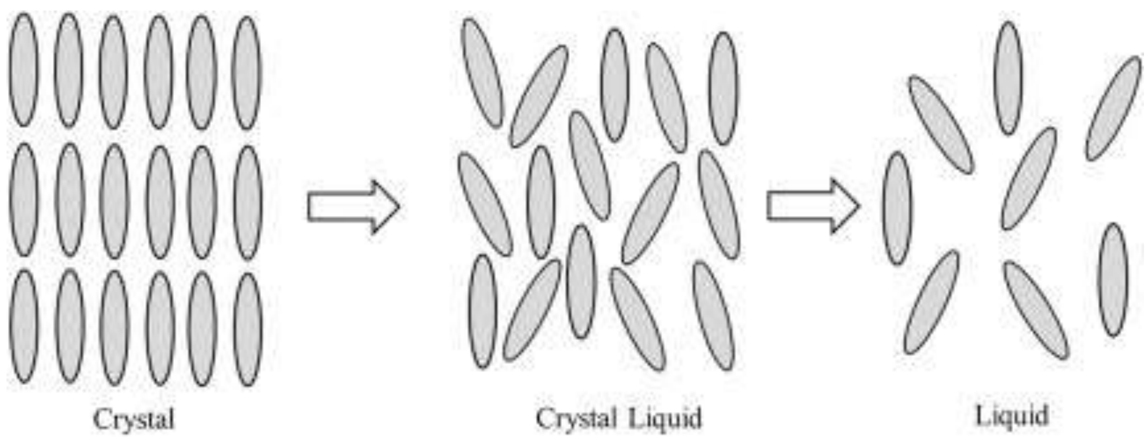

Figure 4: Illustrates the liquid crystalline.

For the effectiveness of a formulation, the chemical complexity of extracts is an extremely important factor, since the active ingredient must also be released from the formulation. As a result, vehicles must simultaneously increase the drug's solubility, minimise the process of degradation, decrease any toxicity and mask any bad taste, thereby monitoring the active absorption and biological reaction. Figure 1illustrates the schematic diagram of nanoparticles-mediated gene. Figure 2 depicts the drug and nano polymer flow chart. Figure 3 depicts the nano structured lipid carriers. Figure 4 illustrates the liquid crystalline.

The composition and biological activities of many medicinal plant products have already been identified by phytochemical and phytopharmacological research. Most of the extracts' biologically active constituents, such as flavonoids, tannins, and terpenoids, are highly soluble in water, but show low absorption because they are unable to cross lipid membranes, have high molecular sizes, and are poorly absorbed, resulting in a loss of bioavailability and efficacy[6]. Some studies have shown that herbal medicines have strong activity in in vitro assays that cannot be replicated in in vivo experiments. Furthermore, certain basic compounds are rarely used because they are incompatible or have undesirable properties with other components in the formulation[7].

CONCLUSION

Nanosized herbal drug delivery systems can theoretically increase biological activity and solve plant drug-related problems. Significant obstacles to the introduction of clinically effective

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therapies in this area, however, remain. Trials of innovative methods for monitoring nano-material interactions with biological systems are some of the current challenges of transforming these innovations into therapies. New challenges in the development of drug delivery systems based on nanotechnology include: the viability of scale-up processes that rapidly carry to the market novel therapeutic techniques and the possibility of acquiring multifunctional systems to satisfy many biological and therapeutic requirements. Checking the targeting efficacy of nanoparticles and meeting international requirements for their toxicology and biocompatibility are some additional new challenges.

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