

## Exploitation and Scope of Herbal Medicine in Modern Drug Delivery System

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### Short Communication

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### Abstract:

The chemical components found in herbal treatments are referred to as phytochemicals, and they may be classified into several groups such as alkaloids, terpenoids, glycosides, saponins, and flavonoids. Herbal remedies may be used to cure a wide range of conditions and disorders, such as gastrointestinal issues, skin infections, arthritis, migraines, and fatigue, since these phytochemicals are present in them. Compared to conventional medications, herbal medicines are less costly and have less significant side effects. The laws governing herbal medications differ per nation at the moment. This makes it impossible for manufacturers of herbal medicines to provide a standard product for the worldwide market. Therefore, international regulatory bodies and organizations such as the WHO should work together to develop a unified and consistent policy for herbal medicines. In light of the growing need for plant medicines, this study focuses on the significance, advantages, drawbacks, and clinical applications of contemporary herbal drugs.

**Key Words:** Herbal Medicine; Alkaloids; Drug Delivery; Application; Remedy.

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## INTRODUCTION

The foundation of complementary and alternative therapies, which are currently gaining international recognition and progressively being integrated into healthcare systems, is herbal medicine [1, 2]. In emerging nations across the world, the use of herbal medicine has grown by gender, socioeconomic class, and ethnicity [3 – 6]. Its affordability, broad acceptability as a natural product with minimal toxicity, efficacy for illnesses that are difficult to diagnose, and adaptability in terms of preparation, use, and convenience are significant factors driving this growth in investment and usage [7, 8]. Herbal medicine (HM) is used to prevent and treat a variety of illnesses. It is made from preparations of bioactive natural ingredients such as herbs or botanicals; some formulations may also contain ingredients like mushrooms and bee products, as well as minerals (kaolin, bentonite), ash, seashells, insects, and animal parts. HM has a lot of advantages, but it can also have some drawbacks. The majority of HM's harmful effects and its pharmacological effects are linked to secondary metabolite activity [9]. Certain HMs have been linked to a range of significant side effects, including nephrotoxicity, cardiac, neurological, and cancer-related effects [10–12]. HM poisoning can happen and can range from mild to severe and occasionally fatal, depending on the herb or herbal ingredient, preparation, and user. Strict regulation, clarity, and control are necessary in this sector due to the counterfeiting of herbal medications and their combination with conventional treatments, which calls for more knowledge. Novel approaches such as the identification of active chemicals, authentication, fingerprinting, genetic sequencing, and biosynthetic pathway alteration have resulted in the discovery of novel products with increased clinical effectiveness and fewer side effects [13, 14].

New formulations of herbal medicinal products are being introduced into the market, and their popularity is growing daily. Due to public demand and the therapy's safety, several pharmaceutical companies have introduced herbal medications. The sensible application of herbal medicine has relatively few side effects and has been used for centuries to treat illness, however, no proof has ever been proven. Recent years have shown that many natural medications have scientific backing [15]. There is ample evidence of the Indian medical system, including Siddha and the old Ayurvedic and Unani remedies. It is crucial to utilize herbal medicines with caution as they can be fatal if not used appropriately and can create major health problems. On the other hand, there has to be more documented research on the usage of herbal remedies, and they should be safe and have few to no adverse effects. Certain herbal medications have more toxic effects than advantageous ones. One of the major problems facing the world today is low quality as a result of heavy metal and toxic substance pollution [16]. There are hundreds of polyherbal remedies on the market that can be used to treat a

variety of medical ailments, including infections in the skin and metabolic disorders. The majority of formulations contain more than eight drug combinations; drug standardization and quality difficulties are the main causes of these problems. Thus, more research on quality control is required [17, 18].

The lipid solubility of plant drugs is low due to their big size, which makes passive diffusion difficult to absorb. The goal of the more recent plant medication formulations is to attain rich bio-membrane penetration [19]. However creating novel medication formulations for scientific study is able to address a number of scientific issues, such as metabolism, absorption, distribution, binding of receptor sites, mechanism of action, and suitable dosage form [20]. Combining herbal medications with an advanced drug delivery method to enhance their overall effectiveness. The innovative system included components including liposomes, micro-emulsions, matrix systems, and nanoparticles, among others. Furthermore, like in many other nations, the advancement of herbal medicine formulations primarily focuses on quality control and regulatory procedures. Applying a cutting-edge drug delivery method could improve therapeutic efficacy and lessen undesirable side effects.

### Important application of herbal drugs

Herbal medicine (HB) comprises plant materials, herbs, prepared herbal remedies, and herbal finished products with plant parts or substances as active agents. Additional plant substances, alone or in combination, are specifically useful for illness prevention and treatment [21]. The fact that HMs are produced and used in a variety of ways nowadays influences how well they work as well. The type of illness being treated, the administration method, the patient, the culture, and even the philosophical background all have a significant impact on the dosage form of herbal medicine. HM is frequently made from fresh or dried herbs in traditional medicine and clinics. It is frequently made as poultices, decoctions, infusions, powders to apply to open wounds, and puddings.

The consequence of medication transport that is specifically directed toward cell surface receptors. Additionally, can enhance the unique system of a herbal formulation to accomplish highly selective interactions between ligands and receptors, which can lead to increased accuracy in the site of action. An anastomosing healing effect of the muscles and tissue was demonstrated by the plant extract of Danshen (*Radix Salvia miltiorrhiza*) combined with chitosan-gelatin as a sustained release implant [22]. The mixture of a natural substance includes various phytoconstituents, including curcumin C3 complex (a phytoconstituent of *Curcuma longa*), glucose sulfate, and baseline (a constituent of the *Boswellia serrata* extract). These ingredients work in concert to provide support against inflammatory diseases like arthritis. In the conventional Chinese medical system, the use of nanoparticles to treat thrombus condition attenuates the effect against thrombi and arterial embolism. Peach seeds, safflower, Angelica root, Szechwan lovage rhizome, Rehmannia root, red peony root, gadflies, earthworms, and ground beetles are among the therapeutic herbs. Compared to its non-nanoparticle counterpart, the traditional Chinese medical system has greater capacity for action [23]. It was discovered that topical application of capsaicin and glycyrrhetic acid, a significant component of licorice and chilies, had an influence on local adiposity. It demonstrated a notable decrease in the thickness of fat when applied topically [24].

### Herbal Ingredient Transdermal Drug Delivery Techniques

The benefits of this approach include easier use, lower side effects, improved medication levels, and regulated drug release. The transdermal film delivery technique, which targets the skin for stable drug release into the bloodstream, is better suited for the delivery of herbal medications containing botanical constituents like curcumin (*Curcuma longa*) and *Boswellia serrata*. Because of this, the new system processes herbal chemicals through first-pass metabolism without causing the rashes that come with injections. Additionally, this approach uses zero-order kinetics to prolong drug release at exceptionally high doses, and it is an easily accessible technique. One may also characterize the application of turmeric in this novel technique as the most recent manifestation of the Ayurvedic turmeric pack or jump, which is used to enhance the local action of components in specific drug release locations [25].

### Herbal drugs as Nano-molecules

Herbal preparations that are well-organized to release both hydrophilic and hydrophobic components are known as nano-molecules. Nanoparticles are parts that are between 10 and 1000 nm in size [26]. In recent years, recyclable polymeric Nano-molecules have been used in significant concentrations as a viable drug delivery strategy [27]. It is a dispersed structure with an active ingredient core inside a nanocapsule that is coated in polymer. Comparing separate herbal formulations to nano-ization offers several advantages, such as better absorption of active substances, soaking of therapeutic dosages, and enhanced solubility of components [28].

### Herbal medicine in diabetes

*Adina cordifolia* (Roxb) leaves have a variety of substances found in them, including as gums, tannins, saponins, and flavonoids. These components work to improve insulin secretion by restoring the function of pancreatic tissues. They also

help to prevent the intestines from absorbing glucose. The fiber, oil, juice, and flour of young coconuts (*Cocos nucifera* Linn) have all been shown to have hypoglycemic properties [29]. The antidiabetic action of *Axonopus compressus* is attributed to its flavonoids, glycosides, tannins, and other active components. Methanolic leaf extract of this plant lowers blood sugar levels [30].

### Benefits associated with herbal medication for health

In several communities, Herbal medicine is the most important component of healthcare. In fact, the majority of healthcare for at least 80% of Africa's agrarian population is provided by strictly conventional, nature-based pharmaceutical treatments. Herbal medicine is the most effective treatment for 60% of children in Ghana, Mali, Nigeria, and Zambia who have superinfection from malaria and other illnesses. Patients can receive Herbal medicine on a regular basis. Strong traditional medicine practices exist in rural South Africa as well; these practices rely on the Herbal drugs. Herbal medicine is in borrowing in China and India for over half of the whole amount of fitness product usage [31]. In general, herbal medications are gentler to the body. Natural therapies cause less side effects when given as prescribed. Instead of using pharmaceutical drugs, consider choosing natural ones to lessen the dependence on them and maybe prevent any negative consequences. Before using herbal medicines, be careful to check for drug interactions if someone takes prescription medications.

### Unwanted effects of herbal drugs

Taking herbal supplements may increase or decrease the effectiveness of other drugs you are taking or may increase the risk of negative side effects. For example, St John's Wort mostly decreases the effectiveness of other medicines but increases the effects of antidepressants [32]. There have also been reports of potential interactions between herbs and drugs that may raise the risk of adverse drug reactions (ADRs). These interactions are most likely caused by the activation or inhibition of cytochrome P450 isoenzymes. For instance, ginkgo (*Ginkgo biloba*) taken with warfarin can result in spontaneous bleeding, and trazodone combined with ginkgo can put a person in a coma. When taken with phenelzine, ginseng (*Panax ginseng*) reduces warfarin (and alcohol) concentrations and causes mania and insomnia [33]. Other herbal remedies, such as *Lavandula angustifolia miller*, *Trigonella foenum-graecum*, *Gymnema sylvestre*, *Panax ginseng*, *Silybum marianum* and *Cinnamomum spp*, which have mild side effects are also commonly used by Indian practitioners.

### European regulations for herbal medicine

The European Directive 2001/83/EC stipulates that the approval of herbal medicinal products for marketing is dependent upon their efficacy, safety, quality, and completion of specific tests and experiments. Definitions for traditional herbal medicine, a list of community herbal substances, herbal monographs, and measures for a streamlined registration process are all outlined in Directive 2001/83/EC. The European Medicines Agency (EMA) established the Committee on Herbal Medicinal Products (HMPC) in accordance with Regulation (EC) No 726/2004 and European Directive 2004/24/EC (2004, Sep). The majority of enterprises that produce herbal products had significant challenges when trying to comply with Directive 2001/83/EC, namely regarding efficacy, and European Directive 2004/24/EC, which streamlined the registration process [34]. HMPC Monographs of European Pharmacopoeia provide quality requirements for herbal products and medicinal substances. HMPC guidance documents address various efficacy, safety quality, non-clinical, clinical issues. HMPC has the responsibility to identify priority herbal constituents/combinations/products, and they should be entered in a monograph.

The majority of herbal medicinal product marketing approvals are granted by individual EU member states; nevertheless, the EU harmonizes information about herbal products and their approvals through Directive 2004/24/EC [34].

### CONCLUSION

The analysis found that there is a global increase in the usage of herbal medicine. Additional research is required to determine the drug's mechanism of action, safety, and dosage form formulation. Additionally, the healthcare professional must demonstrate a sufficient level of dedication to comprehending the use of herbal remedies, and pharmacovigilance systems must be developed. Herbal medicine has been a significant part in keeping people healthy since ancient times. Recent studies have shown that Indian traditional medical systems, such as Ayurveda and Unani, as well as Siddha, have a strong scientific foundation for efficacy.

**Competing interest:** None

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