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EXPLORING THE ROLE OF HERBAL DRUGS IN NON-COMMUNICABLE DISEASE MANAGEMENT: FROM TRADITION TO CLINICAL TRIALS

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ABSTRACT

Introduction: Non-communicable diseases (NCDs), including respiratory disorders, cardiovascular diseases, diabetes, cancer, and neurodegenerative disorders, are the leading causes of morbidity and mortality worldwide. Conventional pharmacological treatments, though effective, often carry significant side effects and long-term risks, prompting increasing interest in alternative and complementary therapies. Hence, there is a need to the add on therapy for the better outcome of treatment plans. Herbal medicine, rooted in traditional systems Ayurveda, has emerged as a promising adjunct or alternative approach for managing NCDs. **Methodology-** A literature review was done through classical Ayurveda texts and other databases sources, and data was analyzed to fix the use of herbal drug research that can provide better treatment in NCDS. **Result-**This research explores the current status and potential of herbal drugs in the prevention and treatment of major NCDs. **Conclusion-** Key botanicals such as *Curcuma longa*, *Withania somnifera*, have demonstrated anti-inflammatory, antioxidant, antihyperglycemic, and neuroprotective effects in various studies. However, challenges persist in the form of standardization, quality control, herb-drug interactions, and regulatory oversight. This paper

also reviews recent clinical trials registered globally to assess the efficacy of herbal formulations in NCD populations.

KEYWORDS: Herbal medicine, Herbal drugs, non-communicable diseases, Clinical trials, Alternative medicine.

INTRODUCTION

NCDs- Non-Communicable Diseases such as respiratory diseases, cardiovascular diseases, diabetes mellitus, cancer, and other neurodegenerative conditions are increasing at global levels and is a main concern of health challenges now a days. According to the World Health Organization (2023), NCDs account for approximately **74% of all global deaths**, with a disproportionately high burden in low- and middle-income countries. The increasing prevalence of NCDs is considered due to practicing the risk factors such as sedentary lifestyles, poor dietary habits, tobacco and alcohol use, and environmental stressors.

Despite the availability of synthetic pharmaceuticals and allopathy medications for managing NCDs, many of these drugs are associated with significant side effects, high costs, and long-term compliance issues. This has led to growing interest towards complementary and integrative health approaches with our traditional medicine system particularly the use of **herbal drugs**, which are derived from plants and promise with the natural healing with least or no side effects.

Herbal drugs (also known as phytomedicines or botanical medicines) are plant-derived substances used in the prevention or treatment of diseases. Unlike synthetic drugs, herbal drugs often involve complex mixtures of bioactive compounds. The use of plants or plant-derived preparations or extract with therapeutic value has renewed interest in today's modern era as a complementary and alternative approach to the prevention and treatment of NCDs.

Herbal remedies have been an integral part of traditional medical systems (Ayurveda) for centuries. These systems rely on complex formulations containing multiple bioactive compounds that act synergistically to modulate physiological pathways. In recent years, the integration of traditional herbal knowledge with modern biomedical research has led to the emergence of herbal drug research, which seeks to validate, standardize, and optimize plant-based treatments using scientific methodologies.

Need of Research

Our Ayurvedic text literature promises many such herbal remedies or herbal drugs for the treatment of various disease. The widespread use of herbal medicines does not assure the safety and efficacy of these medicines. Herbal medicines consist of many chemical constituents with complex pharmacological effects on the human body. Although herbal practitioners and believers do not require clinical trials, it is necessary for large scale ethical acceptance and viability at the international market as it is the need of the time.[1] In today's upgrowing advancement era, it is difficult to compete with the allopath medicinal system or to making them aware about the actual strength of the herbal drug, there is a need to do research work on these drugs.

There is a need to prove the herbal drugs with the research through clinical trials that they actually work with the treatment said in the text for NCDs.

There is a lack of knowledge among the people regarding the purity of the said herbal drug selling in the market, hence its standardization and quality test research has to be done. Then only the herbal terminology can grow up above the allopath and its potential can be estimated.

A growing body of clinical trials supports the therapeutic potential of various medicinal plants in managing NCDs. For instance, **berberine** (from *Berberis* aristata) **improves insulin sensitivity** and glucose uptake by activating AMPK pathways resulting in lowering blood glucose levels in type 2 diabetes, while **curcumin** (from *Curcuma longa*) the active compound in turmeric, exhibits anti-inflammatory and anti-cancerous properties. Similarly, **guggul** has been used for lipid regulation, and **ashwagandha** is gaining attention for its adaptogenic and stress-reducing effects. These plant-based therapies often target multiple disease pathways simultaneously, making them potentially valuable in the management of NCDs.

Many of the medicinally active compound currently available to physicians have a long history of use as herbal remedies. According to the World Health Organization (WHO), more than 120 active compounds isolated from plants are widely used in modern allopathic medicine.[2] However, integrating herbal medicines from traditional use to evidence-based clinical application presents numerous challenges. The complexity of herbal formulations, variability in plant sources, lack of standardization, and limited pharmacokinetic and toxicity

data hinder their acceptance in mainstream medicine. Additionally, designing and conducting **clinical trials** for herbal products requires overcoming methodological hurdles such as appropriate dosing, placebo control, blinding, and identifying suitable biomarkers of efficacy. Regulatory frameworks for herbal drugs also vary widely across regions, with some countries offering expedited approval for traditional medicines, while others require full compliance with conventional drug development protocols.

Despite these challenges, there is growing global momentum to integrate validated herbal medicines into national healthcare systems as part of a **holistic strategy** to combat NCDs. International organizations such as the WHO and national regulatory bodies like the **Ministry of AYUSH (India)** are actively promoting scientific research, clinical validation, and pharmacovigilance of traditional remedies. Advances in phytochemistry, systems biology, and clinical trial design are further facilitating the development of herbal interventions that are both effective and safe.

Herbal Medicine Clinical Trial

WHO encourages clinical trials on traditional herbal drugs mentioned in classical Ayurveda texts by providing guidelines and protocols to support the research projects for assessment of safety, affordability and effectiveness which in turn then can be used in the management of several NCDs.

Once the drug is attained its standardization and with its full potential of its property can further is being used in the treatment plans.

AIMS AND OBJECTIVES

This review (or study) aims to explore the current landscape of herbal drug research in the context of NCDs, examining both the opportunities and limitations associated with their development, standardization, and clinical evaluation.

By bridging the gap between traditional knowledge and modern medicinal system, herbal medicine holds the potential to offer accessible, affordable (cost effective), and sustainable solutions for the long-term management of non-communicable diseases.

MATERIAL AND METHODS

All the information regarding texts and concepts that can be or need to be integrated was collected from ancient ayurvedic literature, related journals, research and review articles, and other authentic sources.

Key Herbal Agents and Outcomes.

Drug	Chemical Composition	Outcome
Berberis aristata	Berberine	Significant ↓ in HbA1c Can be used in the treatment of Diabetes Mellitus.[3]
Citrullus colocynthis (L.) schrad fruit	Fruit capsule	The results showed a significant decrease in HbA1c and fasting blood glucose levels.[4]
Curcuma longa	Curcumin	Have anti-inflammatory and antioxidative properties. Can be used in the treatment of osteoarthritis or rheumatoid arthritis.[5]
Phyllanthus niruri	Spray-dried extract	The SDEPN induced significantly different cytotoxic effects for HepG2 and Huh-7 cells. In contrast, the SDEPN had a protective effect on HaCaT cells compared with control cells.[6]

RESULT

The above said studies suggest that there are many such herbal drugs which can be used in the treatment of NCDs, once they are being proven authenticated, standardize on the basis of clinical trials.

The above said data is reviewed from the various research articles through databases that provides the knowledge of herbal drugs with their efficacy and potential that can be further used for treatment plans.

Standardization of extracts and blinding are major challenges that need to be fixed for the better outcome.

Herbal drugs are often used as adjunct therapy in NCDs.

DISCUSSION

Significance:

Herbal drugs present an attractive, cost-effective option for NCD management due to their multi-targeted actions and historical usage. Phytochemicals such as curcumin, berberine, and withanolides show promise in improving metabolic and inflammatory parameters.

Limitations in Research

- Lack of standardized and quality control of the herbal drugs used in clinical trials and use of different dosages of herbal medicines.[7]
- Inadequate long-term safety data
- Regulatory challenges in approving herbal interventions.
- Inconsistencies in clinical trial design.
- Recommendations:
- More rigorous, multicenter randomized controlled trials (RCTs) are needed.
- Pharmacokinetics and herb-drug interaction studies must be prioritized.
- Collaboration between modern pharmacology and traditional medicine systems is essential for better integration.

CONCLUSION

Herbal drug research in NCDs is a rapidly evolving field due to widespread of the disease globally that need to be proven with significant potential. Although traditional knowledge and early clinical results are promising, but there is a lack of high-quality, large-scale evidence limits and their acceptance in mainstream medicine. With standardized formulations, ethical trial designs, and regulatory support, herbal drugs can become an important part of NCD management in the future.

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