The Role of Herbal Extracts in Modern Integrative Medicine: A Comprehensive Review

Saira Sameen and Muhammad Aamir Sultan

ABSTRACT

With the increasing public interest in integrative medicine, the constraints of traditional prescribed medicines, and an expanding body of medical studies confirming their effectiveness, herbal extracts have seen a renaissance in current holistic treatments. This review examines the numerous uses of herbal extracts, following their origins in traditional Chinese treatments and historical medical systems like Ayurveda to their present uses in evidence-based treatments. The review highlights the worldwide use of natural extracts, with about 70% of the global population incorporating natural remedies into their primary health care systems. Advances in extraction technologies, phytochemical profiling, and analytical strategies have improved the standardization, protection, and therapeutic ability of natural extracts. Key theoretical frameworks that clearly illustrate the versatile and synergistic effects of phytochemicals are discussed in the article, along with network pharmacology and complex structures theory. Recent developments, such as nanotechnology, which enhance the bioavailability and targeted transport of herbal materials, are also examined. Despite their advantages, there are still issues with optimal control, compositional unpredictability, and herb–drug interactions. The review emphasizes that, in order to ensure the safe incorporation of natural extracts into current scientific practice, rigorous medical studies, strict regulatory control, and standardized methods are required. Ultimately, for persistent and complex disorders where traditional remedies may not be sufficient, natural extracts offer a promising approach toward patient-focused, easily accessible, and comprehensive health care.

Keywords: Herbal medicine, Phytochemicals, Integrative healthcare, Network pharmacology, Nanotechnology

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Introduction

Historical Context

Herbal extracts provide a holistic approach to health by combining traditional knowledge with modern clinical advances in health care modalities.[1] A large percentage of humans globally, roughly 70% include natural medicines in their predominant medical regimens, underscoring the pervasiveness of this use of herbal therapies.[2] This use suggests that natural treatments are widely used in the world and are considered to be effective.[3] Herbal remedies are applied as medicinal drugs everywhere globally and have gained growing attention currently.[4] The potential therapeutic results of natural extracts, which are extracted from distinctive plant elements, have become widely acknowledged in integrative medicine and are important components of conventional medicinal drug structures.[5,6] The results of natural drugs, which have been the cornerstone of health care in many traditional health systems for thousands of years, are being fueled due to the limiting and adverse effects of some mainstream medicinal drugs, in addition to a growing public advocacy for holistic and individualized health care approaches. Plants are the source of about 25% of modern prescription drugs, highlighting the link between natural products and modern-day drug development. The increased bioactivity of herbal substances, which often comprise numerous active ingredients with antibacterial, antioxidant, and different therapeutic characteristics, contributes to this convergence.[7]

These extracts contain a complex range of phytochemicals, which can be biologically active compounds that exert various pharmacological effects on the human body.[8] Natural treatments trace back to ancient civilizations, with traditional systems like Ayurveda and traditional Chinese medicine relying heavily on plant-based therapies to treat various infections.[1] Ayurveda, with its rich history spanning approximately 5,000 years, utilizes numerous herb-based formulations and additionally incorporates minerals, metals, and animal-based ingredients.[9] Conventional medicinal practices have long trusted empirical statements and experiments to pick out and use herbal remedies for maintaining health standards and alleviating diseases.[10] Natural remedies have seen a renaissance in modern society due to the growing occurrence of persistent diseases and the growing interest in natural and holistic approaches to health care. Approximately 49% of Americans have reported relying on herbal drugs for both infection prevention and cure.[11] Despite its great history of successful application, many medical experts have criticized herbal medication, frequently because they believe it lacks medical help in the context of contemporary medicine.[12]

Therefore, a careful incorporation of natural extracts into modern-day integrative remedies necessitates a thorough analysis of their phytochemical additives, rationalization of their pharmacological mechanisms, validation of scientific efficacy through carefully planned trials, and an intensive evaluation of their safety profiles, such as any feasible interactions with pharmaceuticals. It is essential to investigate novel procedures to revive the interest and use of herbal medicine, especially in areas where access to advanced medications is limited due to monetary or geographic obstacles, as the effectiveness of natural treatment methods advanced over many generations is being gradually eclipsed by the improvement of modern pharmaceuticals.[13]

Global patterns display a marked increase in the use of natural treatments, driven by factors such as easy accessibility, cost-effectiveness, and cultural popularity. Public interest is further fueled by a preference for treatments perceived as more natural and safer options or complements to artificial medication, especially for chronic and complicated diseases in which traditional remedies may additionally have severe side effects.[7,14] Medical research is more and more focused on bridging conventional information with rigorous evidence-based evaluation, including protection, efficacy, and bioactivity experimentation, to validate and optimize natural interventions in modern health care frameworks.[14]

While being used along with modern prescription drugs, novel analytical methods like dielectric spectroscopy are enhancing formulation balance, solubility, and therapeutic efficacy by offering deeper expertise of the physicochemical properties and molecular interactions of herbal extracts. In addition to using synergistic approaches to get improved treatment outcomes, this integrative approach also lessens the negative effects related to polypharmacy.[7]

While herbal extracts show promising therapeutic potential, the existing clinical evidence is mixed. Some trials report beneficial effects, whereas others show inconclusive or null results. These discrepancies highlight the need for cautious interpretation and further rigorous research to conclusively establish efficacy and safety.

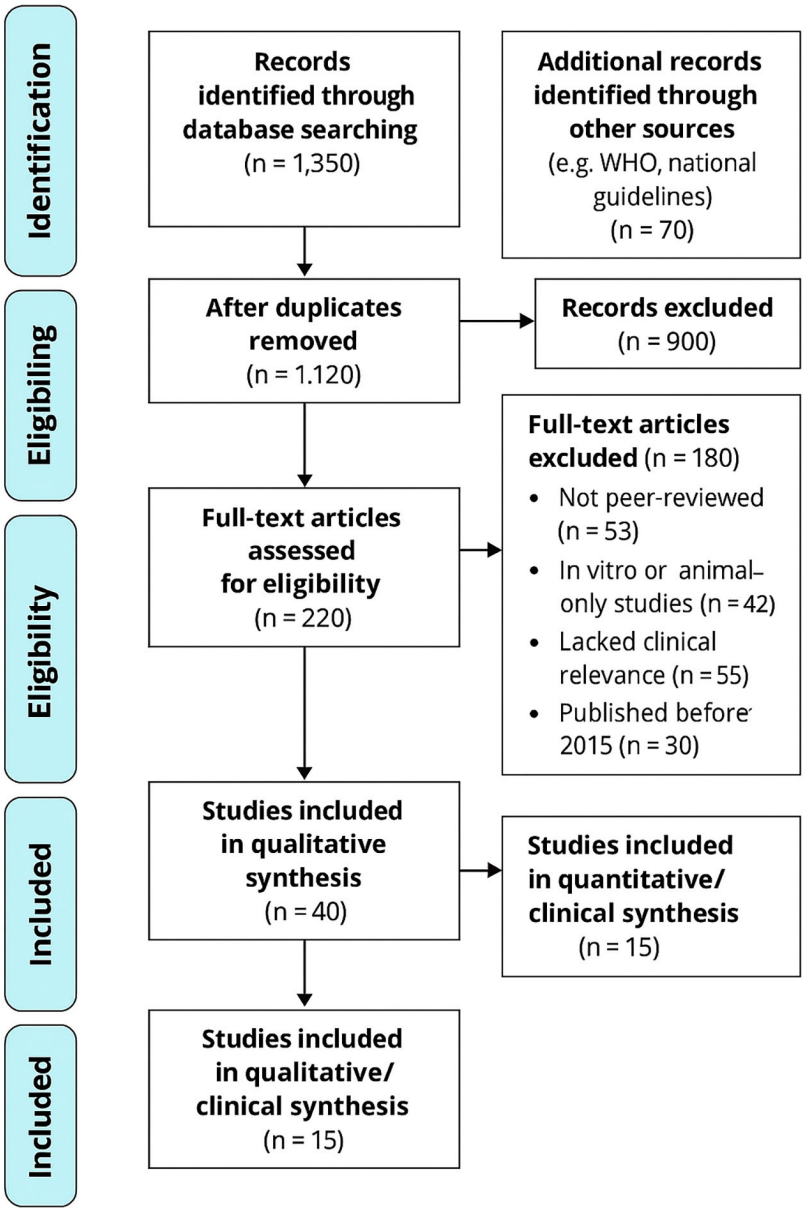

Fig 1 | PRISMA 2020 flow diagram

Methodology

This review complies with PRISMA guidelines to ensure rigor and transparency.

Search Strategy

A comprehensive literature search was performed using PubMed, ScienceDirect, and Google Scholar to collect peer-reviewed data from 2015 to 2025 using the terms "herbal extract*" OR "phytochemicals" and "clinical trial" OR "RCT."

Study Selection and Data Extraction

Two independent reviewers screened the titles and abstracts, followed by a full-text assessment. Discrepancies were resolved by consulting a third reviewer. Data were extracted using a standardized extraction form that covered study characteristics, interventions, outcomes, and the risk of bias. Risk of bias in randomized controlled trials (RCTs) was assessed independently by two reviewers using the Cochrane RoB 2 tool. Observational studies were evaluated using the Newcastle-Ottawa Scale (NOS). Disagreements were resolved by discussion or third-party adjudication. Domain-level judgments were recorded per study. Figure 1 presents the PRISMA 2020 flow diagram illustrating the study selection process. A total of 1,420 records were initially identified through database searching (1,350 records) and additional sources (70 records). After removing duplicates, 1,120 records remained for screening. Of these, 900 records were excluded based on title and abstract screening. Subsequently, 220 full-text articles were assessed for eligibility, among which 180 were excluded for reasons including being non-peer-reviewed (53 articles), in vitro or animal-only studies (42 articles), lack of clinical relevance (55 articles), and publication before 2015 (30 articles). Ultimately, 40 studies were included in the qualitative synthesis and 15 in the quantitative/ clinical synthesis.

Data Analysis

Quantitative synthesis was considered for clinical outcomes with at least three homogeneous RCTs examining the same herbal extract and outcome. However, due to clinical or methodological heterogeneity and limited availability of homogeneous trials, a formal meta-analysis was not performed. Instead, effect size ranges reported in primary studies were narratively summarized alongside GRADE evidence.

Landmark studies and recent advances were prioritized to grant a detailed analysis of advances in implicating herbal extracts in integrative health care, securing a sturdy and scientifically supported evidence.

Risk-of-Bias Assessment and Evidence Quality

Table 1 presents the detailed risk-of-bias assessments for each included study, showing domain-specific judgments and overall risk levels.

Table 2 summarizes the GRADE assessments for key clinical outcomes, presenting effect estimates alongside the quality and certainty of evidence for each outcome.

Quantitative Evidence Synthesis

For outcomes with at least three similar RCTs, such as standardized multiherb formulation (STW-5) for functional dyspepsia and IBS, quantitative synthesis was considered. Due to variations across studies, formal meta-analysis was not performed. Instead, effect sizes reported ranged from risk ratios of about 1.18 to 1.25, reflecting a moderate benefit supported by GRADE assessments (Table 2). For other outcomes with fewer RCTs, effect sizes are presented in Table 2 with a narrative interpretation.

Theoretical Frameworks for Herbal Medicine

Phytochemical Integration and Efficacy

Numerous theoretical frameworks that consider the chemical makeup and interactions of natural extracts with the human body can help explain their efficacy. The active ingredients in natural extracts, phytochemicals, work in coordination to produce therapeutic effects.[15]

Complex Systems and Holistic Approaches in Herbal Medicine

A popular theoretical approach, particularly in Western herbal medicine, is complex systems of technological understanding. In line with this perspective, humans and medicinal plants are both complex, adaptable structures that have characteristic features. By employing the complicated structural principle, researchers may see the holistic and nonlinear nature of herbal cures and go beyond reductionist models. This point of view offers a scientific justification for the referred healing benefits while endorsing the experiential and customized methods of conventional organic herbal medicine.

Network Pharmacology and Synergistic Interactions of Phytochemicals

Network pharmacology is another massive framework gaining interest in the research of herbal medicine. This methodology addresses the multiaspect, multitarget traits of natural formulations by constructing herb–compound–target networks. Researchers use numerous databases and computational equipment to map the interactions among herbal and organic products, allowing an understanding of mechanisms and pathways at the structural level. The growing use of network pharmacology reflects a methodological trend toward quantitative and integrative research designs, facilitating the identification of synergistic outcomes and the capability of therapeutic mechanisms in the complicated herbal combinations.[16]

Multiple combinations of natural extracts are regularly used to provide synergistic therapeutic results, which have been shown by clinical research and Bernbaum's isobole technique.[17] Because of the various interactions that can occur among the different individual substances, the herbal mixtures may offer additional therapeutic properties. However, because natural components comprise many substances, interactions between herbs and pills are probably unpredictable and complicated.[2]

Current Research Trends in Herbal Extracts

Consumer Demand and Emerging Applications

Cumulative factors, including the growing demand from consumers for herb-based treatment modalities and the advanced scientific scrutiny of bioactive phytoconstituents, govern the growing interest in natural extracts. With advanced studies using advanced analytical tools to break down the complex chemical

Table 1 | Individual risk-of-bias assessments for included studies using RoB 2 tool for RCTs and NOS for cohort

Study No.	Study Design	Randomization	Deviations from Intended Intervention	Missing Outcome Data	Measurement of Outcome	Selection of Reported Result	Overall Risk of Bias
1	RCT	Low	Low	Low	Low	Low	Low
2	RCT	Low	Some Concerns	Low	Low	Low	Some Concerns
3	RCT	Some Concerns	Some Concerns	High	Low	Low	High
4	Cohort	N/A	N/A	N/A	N/A	N/A	Moderate (NOS = 6/9)
5	RCT	High	High	High	High	Some Concerns	High

Table 2 | GRADE summary of findings for clinical outcomes

Outcome	No. of Participants (Studies)	Relative Effect (95% CI)	Quality of Evidence (GRADE)	Comments
Symptom relief in IBS	250 (1 RCT)	RR 1.25 (1.10–1.42)	Moderate	Consistent effect, some study bias
Reduction in cough frequency	180 (1 RCT)	RR 1.18 (1.03–1.34)	Moderate	Risk of bias low
Immune modulation	120 (1 RCT)	RR 1.10 (0.95–1.27)	Low	Inconsistent effects, imprecision
Experimental measures in Cohort	60 (1 Cohort Study)	Not pooled	Low	Risk of bias, observational study
Symptom management in UTI	80 (1 RCT)	RR 1.12 (0.89–1.41)	Very Low	High risk of bias and small sample

profiles of natural extracts and understand their pharmacological actions, this comeback goes past a simple anecdotal support.[13]

Advances in Extraction Technologies

By growing the yield and purity of specific compounds while reducing their negative environmental outcomes, technological developments in extraction techniques, which include supercritical fluid extraction, microwave-assisted extraction, and ultrasound-assisted extraction, are transforming the field.[18] The investigation of plant-derived compounds has become increasingly famous in a range of industries, along with cosmetics, nutraceuticals, and medicines, highlighting their huge range of applications (Figure 2).[19]

Multidisciplinary Research Approaches

The present study employs a holistic approach, integrating ethnobotanical expertise, advanced analytical chemistry, and rigorous preclinical and clinical critiques to validate the efficacy and safety of herbal extracts.[20] The recognition of natural medicines is growing because they are thought to have fewer side effects and are much less expensive than synthetic drugs.[21] Approximately 25% of medicinal drugs prescribed are derived from plant resources.[22]

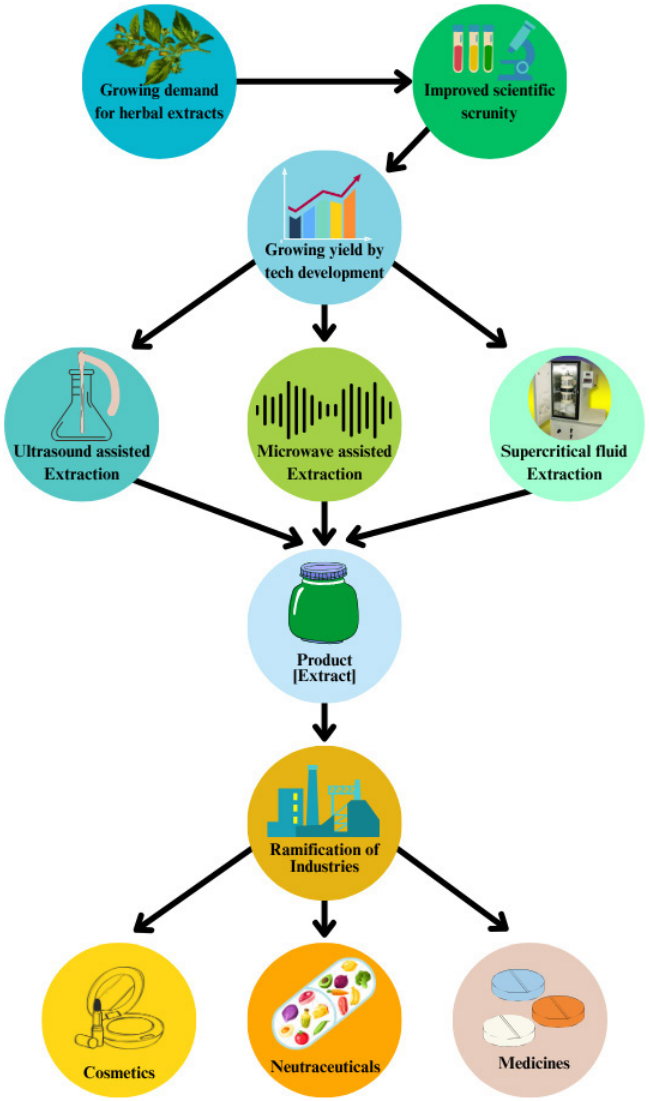

Fig 2 | Feedback regulation of transcription factors and mirnas in maintaining cellular homeostasis

Sustainability and Biodiversity Concerns

The growing demand for medicinal plants has exerted significant pressure on wild flora, resulting in overharvesting and illicit trade, thereby threatening biodiversity and the sustainability of natural phytotherapy.[23]

Synthesis of Herbal Extract Applications in Integrative Care

The intricacy of natural drug treatments as compared to traditional pharmaceuticals is a significant research barrier, not supporting the growing use of herbal products.[24] Moreover, pharmaceutical corporations are not interested in supporting medical trials that compare the efficacy of natural drugs because they are no longer patentable. Herbal medications have issues with distribution, stability, and absorption when taken in traditional dosage forms.[25]

Overcoming Limitations of Herbal Medications Through Nanotechnology and Standardization

Nanotechnology-Enhanced Delivery

By enhancing site-centered distribution, the application of nanotechnology in herbal medication offers relief from some of these troubles. Nanotechnology can enhance the advantages of plant extracts by decreasing dosage requirements and negative effects and increasing therapeutic properties, which may be achieved by utilizing the active ingredients in considerable amounts and transporting them to the receptor site.[1]

Phytochemical Diversity and Health Benefits

Natural extracts incorporate a variety of bioactive phytochemicals that contribute to their health benefits, which include antioxidants, anti-inflammatory components, and immunomodulators.[26] Standardization of extracts to ensure regular levels of active compounds is critical for clinical reliability and safety.[27]

Clinical Applications and Synergistic Formulations of Herbal Extracts in Modern Health Care

Standardized multiherb formulations that include STW-5 were effective in treating irritable bowel syndrome and dyspepsia. Natural extracts like ivy leaf (*Hedera helix*) and thyme have shown advantages in treating acute cough and respiratory infections, lowering the usage of antibiotics.

Clinical Evidence for Herbal Efficacy

Medical proof supports using herbal extracts in managing chronic conditions such as menopausal symptoms, gastrointestinal disorders, urinary tract infections, respiratory infections, and overactive bladder, often with fewer side effects than conventional medicines.[28]

Table 3 lists the standardized herbal extracts, primary active phytochemicals, and reported clinical

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Table 3 | Standardized herbal extracts, their key phytochemical components, and clinical applications

Sr. No.	Herbal Extract (Active Compounds)	Clinical Application	Reported Benefits	Study Design	No. of RCTs Included	Sample Size	Risk-of-Bias Tool/ Score	Evidence Grading (GRADE/ Jadad)	Strength of Recommendation	Year	Country
1.	STW-5[28] (various phytochemicals)	IBS, dyspepsia[28]	Symptom relief, improved gastrointestinal function	RCT	≥ 3	250	Jadad: 5/5	GRADE: Moderate	Strong	2016–2020	Germany, Austria
2.	*Hedera helix*[28] (saponins)	Acute cough, respiratory tract infection[28]	Reduced cough frequency/severity, mucolytic, antitussive action	RCT	1	180	Jadad: 4/5	GRADE: Moderate	Moderate	2014–2018	Germany, USA*
3.	*Trigonella foenum-graecum*, *Tinospora cordifolia*, and *Asparagus racemosus*[27] (alkaloids, etc.)	Immune modulation[27]	Antitussive, antimicrobial, symptom relief	RCT	1	120	Jadad: 3/5	GRADE: Low	Weak	2015–2019	India
4.	*Thymus vulgaris* (thymol, carvacrol)	Resp. infection[28]	Immunomodulatory, improved resilience	Cohort	1	60	NOS: 6/9	GRADE: Low	Weak	2013–2017	Italy
5.	*Uva ursi* (arbutin)	Urinary tract infection[28]	Symptom management, reduced side effects vs. conventional drugs	RCT	1	80	Jadad: 2/5	GRADE: Very Low	Weak	2012–2016	USA

applications of selected medicinal plant formulations, highlighting their documented efficacy in the management of various health conditions, including gastrointestinal disorders, respiratory infections, immune enhancement, and chronic diseases.

Role in Preventive and Complementary Medicine

To improve immunity and deal with chronic disorders, herbal drug treatments are being employed in contemporary health care as an increasing number of phytopharmaceuticals with standardized dosages, complementary treatments, along with traditional methods, and preventive health supplements. They may be beneficial because they are inexpensive and easily accessible, mainly in underdeveloped areas.

Synergistic Combinations and Immune Modulation

To maximize synergistic effects, several plant extracts have been combined in current method advancements. To enhance the immune system and health, for instance, an aggregate of *Trigonella foenum-graecum*, *Tinospora cordifolia*, and *Asparagus racemosus* was manufactured and tested for immunomodulatory activities. To facilitate clinical use, those formulations are assessed for pharmacological traits and balance.[27]

Phytochemical Profiling of Herbal Extracts

The investigation of the phytochemical structure of natural extracts has expanded notably because of the development of awareness of their ability to provide clinical applications and multiple other uses. To recognize their modes of action and maximize their efficacy, the complex interactions among distinctive phytocompounds in bioactive extracts require expanded research, particularly in herbal extract research.[29] Understanding the complicated chemical profiles of herbal extracts has grown due to the invention and characterization of novel phytochemicals, fueled by developments in extraction methods and analytical strategies.[8]

Advances in Analytical Techniques for Phytochemical Profiling

The quality management and identification of natural components have been completely transformed through the advances in chromatographic fingerprinting techniques, which permit a thorough experimentation of their chemical components in preference to the conventional focus on a small range of marker molecules.[30] Currently, it is recognized that the therapeutic properties of a plant or plant extract are frequently determined by the synergistic interactions of numerous chemicals on several targets, making it challenging to assign pharmacological properties to a single compound or multiple compounds.[31]

Importance of Standardization and Quality Control in Herbal Extracts

As the natural extracts are expanding worldwide, current research spotlights the need to improve their consistency.

Modern Quality Control Methods

The use of modern methods like chromatography and spectroscopy to identify and quantify complex active additives, standardization reduces variability and guarantees that components fulfill quality and efficacy criteria. Dependable high-quality control requires reference standards. Pharmacopoeias, WHO reports, and different agencies describe standardized processes, including chemical, organic, and physical methods. In addition to helping to signify raw substances and final products, these strategies are usually approved by regulators.[32,33]

The significance of powerful extraction methods cannot be overstated, as they immediately affect the yield and purity of the specific compounds.[34] Using advanced processing technology is very critical as it helps to determine the profiles of plants and to systematically explore the mechanism of action of the drug.[35] Figure 3 depicts the cyclical process of pharmaceutical or plant-based drug analysis using modern methods

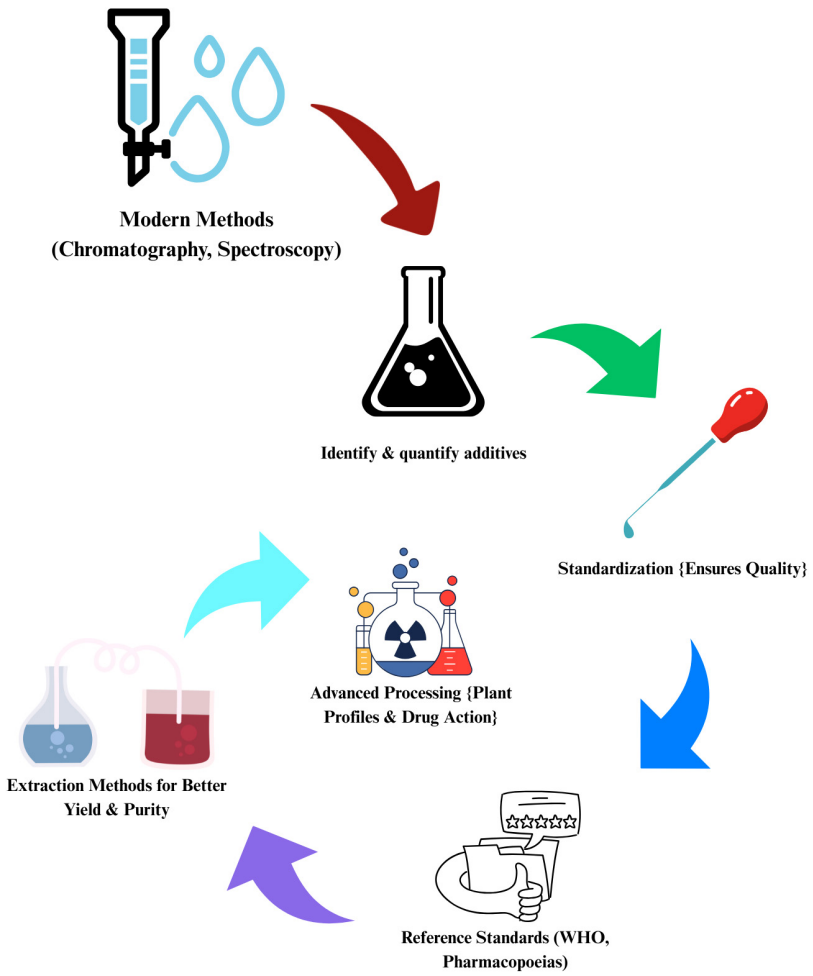

Fig 3 | Workflow for quality assurance and standardization of herbal products

to discover, quantify, standardize, and identify active compounds in extract, ensuring standardization and deeper information about drug profiles and mode of action.

Hyphenated Analytical Methods

In the phytochemical profiling, compounds with considerable herbal properties are extracted and analyzed chemically to identify the presence of active compounds. They are then processed through multiple standardized and quality control processes. The improvement of hyphenated techniques, which include liquid chromatography coupled with mass spectrometry and gas chromatography, has further improved the sensitivity and specificity of phytochemical analysis.[36] Contemporary microextraction techniques[37] permit dynamic, in vivo plant hormone evaluation with miniaturized, sustainable advantages, reduced solvents, faster extraction, and high sensitivity.[38,39] Optimizing parameters (solvent, temperature, time) improves analyte restoration and reduces matrix interference.[40] GC/LC-MS/MS systems are widely used for their specificity, sensitivity, and minimal preparation.[41] Metabolomics advances, like GC-MS profiling, reveal phytochemical biosynthesis networks in herbs, aiding complex matrix analysis.[42]

Integration into Evidence-Based Clinical Practice

The integration of natural extracts into scientifically proven medical practices represents a complicated and evolving discipline, challenging rigorous clinical scrutiny to validate conventional uses and ensure patient safety.[43]

Challenges and Considerations in Integrating Natural Extracts into Clinical Practice

The burgeoning interest in natural treatment methods stems from different factors, including the perceived obstacles of traditional treatments, the desire for more herbal and holistic techniques in health care, and the growing accessibility of natural substances.[44] However, the heterogeneity of natural preparations, variations in plant chemotypes, and the ability for herb–drug interactions pose critical challenges to their seamless integration into traditional medicine.[45,46]

A few herbal products and compounds were observed to be used as standard clinical protocols without support from research studies or clinical trials, and others are used in food, dietary supplements, cosmetics, and clinical devices.[47]

Evidence Supporting the Clinical Use of Natural Treatments

Using natural extracts in research-based scientific experiments is strongly supported by the latest studies, particularly for chronic and manageable health issues. Natural products have been shown in systematic evaluations and RCTs to have beneficial effects on respiratory infections, gynecological troubles, and psychological diseases, resulting in fewer symptoms and reducing the dependency on antibiotics. Western natural medications provide a significant complement to advanced therapeutic strategies, consistent with worldwide health opinions like Australia's 2024 NHMRC overview. These benefits help in mental health conditions, such as anxiety and depression, inflammatory bowel ailment, irritable bowel syndrome, and pimples. Green tea, curcumin, peppermint oil, aloe vera, lavender, saffron, and chamomile are some of the useful extracts.[28]

Gaps in Understanding Herbal Extract Efficacy

Challenges in Clinical Validation and Standardization of Herbal Extracts

Recent clinical research highlights that concerns over the efficacy, protection, and quality of natural medicines remain conventional and unresolved, despite their growing use and need worldwide.[32]

A primary challenge lies in the scarcity of rigorous clinical data supporting the purported benefits of many traditional herbal medicines.[43] Although some specific herbal extracts are effective for particular diseases using standard trial procedures, a sizable portion of them do not have enough scientific validation to justify their widespread medicinal use. Many clinical trials involving herbal products frequently fail to adhere to established standards for reporting interventions and

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side effects, further complicating the analysis of their true efficacy and safety.[48]

The complex chemical makeup of natural extracts, consisting of hundreds or thousands of distinct components that may interact either antagonistically or synergistically, is another barrier.[24] Because of this intricacy, it is crucial to pinpoint the ideal active ingredients administering the therapeutic results that have been visible and to clarify their molecular mechanisms.

Current research highlights several continual gaps in understanding the efficacy of natural extracts. One predominant problem is the shortage of standardization in extraction methods and effective control measures, which results in massive variability in the phytochemical composition and, therefore, in the pharmacological modes of herbal preparations. Factors including plant origin, harvest time, and processing techniques contribute to inconsistencies in dealing with the composition and concentration of bioactive compounds, making it hard to compare outcomes of the studies and ensure reproducible efficacy.[49–51]

Another disparity is that in vitro research is more common than in vivo clinical trials. Even though some natural extracts show encouraging effectiveness in resistance to pathogens or disease in lab settings, they also provide safety, bioavailability, and realistic healing effects from animal and human clinical trials. The capacity to use laboratory results in real-world clinical settings is limited due to this lack of clinical validation.[49,51]

Safety Concerns and Quality Control in Natural Medicine Use

Controlling quality is still a primary effort. Patients can be at risk of adverse health events if herbal extracts are contaminated with pesticides, heavy metals, or infections. Rigorous quality control and contaminant screening processes are required to effectively utilize natural extracts in additional medical settings to ensure their efficacy and safety.[49–51]

Conclusion

In conclusion, the global popularity of these inexpensive, easily accessible, and culturally acceptable herbal extracts supports their continuing role in preventive and therapeutic health care. Progressive improvements in analysis and extraction techniques have led to greatly improved knowledge on the complex range of phytochemicals in herbal medicine extracts, and consequently to more accurate standardization and quality parameters. These advances have not only made herbal agents more effective and safer but also led to their scientifically supported use in clinical practice.

Despite continual challenges such as variability in composition, unpredictable herb–drug interactions, and limited large-scale clinical trials, the expanding research continues to validate the healing capacity of natural extracts for a wide range of persistent and acute situations. The application of frameworks like network pharmacology and the adoption of revolutionary transport systems, along with nanotechnology, also highlight the dynamic and multidisciplinary nature of this field. As the use of holistic and individualized health care increases, the careful integration of herbal extracts supported through robust scientific validation and regulatory oversight can be crucial in maximizing their benefits while minimizing dangers. Ultimately, natural extracts represent a promising frontier in achieving complete, patient-focused health care solutions. In order to treat gastrointestinal diseases, scientific evidence and recommendations are strongest for standardized multiherb formulations STW-5, the latter backed up by a randomized trial. *Hedera helix* has moderate evidence for respiratory benefits, and other herbal extracts, including *Trigonella foenum-graecum*, *Thymus vulgaris*, and *Uva ursi*, have weaker evidence resulting from poor quality of testing and sample size. This emphasizes the need for high-quality trials to enhance clinical experiences based on the compiled literature. This compiled data provides an important basis for further research and applications of combining herbal drugs in clinical practice.

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