Volume 3, Issue 6, June 2025 ISSN (E): 2938-3765

IMPROVEMENT OF DRUG FORM PREPARATION TECHNOLOGY FROM DRY EXTRACT OF MEDICINAL PLANTS FOR DIGESTIVE SYSTEM WOUND DISEASES

Qayumov G‘anisher Olimovich
Assistant of the Department of Traditional Medicine and Pharmacology
Fergana Medical Institute of Public Health

Abstract
This study explores advanced pharmaceutical technologies for developing drug formulations using dry extracts from medicinal plants, aimed at healing digestive tract injuries. It examines innovative extraction methods, formulation optimization, and improved delivery systems to enhance bioavailability and therapeutic effects. Techniques like spray-drying, freeze-drying, and supercritical fluid extraction are employed to standardize active compounds while preserving biological activity. The findings show improved drug stability, dissolution, and targeted delivery, supported by advanced analytical methods. The research supports the creation of modern, evidence-based phytopharmaceuticals that align with regulatory standards while maintaining traditional efficacy.

Keywords: Medicinal, extracts, digestive system wounds, pharmaceutical technology, formulation, bioavailability enhancement, phytopharmaceuticals, gastrointestinal, therapy, wound healing, extraction optimization, pharmaceutical quality control.

Introduction

Today, contemporary pharmaceutical research increasingly recognizes the therapeutic potential of medicinal plants in treating complex gastrointestinal disorders, particularly those involving mucosal damage and wound healing processes within the digestive system. The global burden of digestive system diseases continues to escalate, with peptic ulcer disease affecting approximately 10-15% of the global population, while inflammatory bowel diseases demonstrate rising incidence rates across developed nations. Traditional pharmacological approaches, while effective in many cases, often present limitations including adverse effects, drug resistance, and incomplete healing responses, necessitating the exploration of alternative therapeutic modalities. The integration of traditional medicinal knowledge with modern pharmaceutical technology represents a promising avenue for developing effective treatments for digestive system wound diseases. Medicinal plants have been utilized for centuries in various traditional medicine systems for treating gastrointestinal ailments, with many species demonstrating scientifically validated gastroprotective, anti-inflammatory, and wound healing properties. However, the transition from traditional preparations to standardized pharmaceutical formulations requires sophisticated technological approaches to ensure consistent therapeutic efficacy, safety profiles, and regulatory compliance.

Web of Medicine: Journal of Medicine, Practice and Nursing
webofjournals.com/index.php/5

Recent advances in pharmaceutical technology have revolutionized the preparation of plant-based drug formulations, particularly through improvements in extraction methodologies, standardization processes, and delivery system design. The development of dry extract preparation techniques has emerged as a particularly significant advancement, offering enhanced stability, improved bioavailability, and standardized dosing compared to traditional liquid preparations. These technological improvements address fundamental challenges in phytopharmaceutical development, including variability in active compound concentrations, stability issues, and inconsistent therapeutic outcomes. The complexity of digestive system wound healing involves multiple physiological processes, including inflammation control, cellular regeneration, angiogenesis, and restoration of mucosal barrier function. Effective therapeutic interventions must address these multifaceted healing mechanisms while minimizing potential adverse effects on normal digestive function. Medicinal plant extracts offer unique advantages in this context, providing complex mixtures of bioactive compounds that can simultaneously target multiple healing pathways through synergistic mechanisms.

MAIN BODY

The technological advancement of drug form preparation from medicinal plant dry extracts requires comprehensive understanding of both traditional medicinal applications and modern pharmaceutical principles. Contemporary extraction methodologies have evolved significantly beyond traditional water and alcohol-based preparations, incorporating sophisticated techniques that optimize the recovery of bioactive compounds while maintaining their therapeutic integrity. Supercritical fluid extraction, utilizing carbon dioxide under specific temperature and pressure conditions, has emerged as a particularly effective method for obtaining high-quality extracts with minimal degradation of thermolabile compounds. Modern spray-drying technology represents another significant advancement in dry extract preparation, enabling the transformation of liquid plant extracts into stable powder forms with controlled particle size distribution and improved flow properties. This technology utilizes precisely controlled temperature and airflow parameters to remove moisture while preserving the biological activity of heat-sensitive compounds. The resulting dry extracts demonstrate enhanced shelf stability, reduced microbial contamination risks, and improved compatibility with various pharmaceutical excipients for formulation development. Freeze-drying technology offers additional advantages for preparing high-quality dry extracts, particularly for compounds that are sensitive to thermal degradation. This process involves sublimation of frozen water content under vacuum conditions, resulting in dry extracts with preserved molecular structure and biological activity. The porous structure created through freeze-drying enhances dissolution characteristics, potentially improving bioavailability when formulated into final drug products.

The standardization of medicinal plant extracts represents a critical aspect of pharmaceutical quality control, requiring sophisticated analytical methodologies to ensure consistent therapeutic efficacy. High-performance liquid chromatography coupled with mass spectrometry provides precise quantification of active compounds, enabling the establishment of standardized extract specifications. These analytical techniques facilitate the identification and quantification of marker compounds that serve as quality indicators for therapeutic efficacy and batch-to-batch consistency.

Web of Medicine: Journal of Medicine, Practice and Nursing
webofjournals.com/index.php/5

Formulation development for digestive system applications requires careful consideration of the unique physiological environment within the gastrointestinal tract. The varying pH conditions, enzymatic activity, and transit times throughout different segments of the digestive system influence drug release patterns and absorption characteristics. Advanced formulation strategies include the development of enteric-coated systems that protect active compounds from gastric acid degradation while ensuring targeted release in the small intestine where optimal absorption occurs. Mucoadhesive drug delivery systems represent an innovative approach for treating digestive system wounds, utilizing polymeric materials that adhere to mucosal surfaces to provide prolonged contact time between therapeutic agents and damaged tissues. These systems incorporate medicinal plant extracts within biodegradable polymer matrices that gradually release active compounds directly at the site of tissue damage, enhancing local therapeutic concentrations while minimizing systemic exposure. Nanotechnology applications in phytopharmaceutical formulation have opened new possibilities for improving the therapeutic efficacy of medicinal plant extracts. Nanoencapsulation techniques enable the protection of bioactive compounds from degradation while enhancing their permeation through biological barriers. Liposomal formulations, solid lipid nanoparticles, and polymeric nanoparticles provide controlled release characteristics and improved bioavailability for poorly soluble plant compounds.

The development of combination formulations incorporating multiple medicinal plant extracts requires careful consideration of potential interactions between different bioactive compounds. Synergistic effects can enhance therapeutic efficacy, while antagonistic interactions may reduce treatment effectiveness. Comprehensive compatibility studies, including chemical stability assessments and pharmacological interaction evaluations, are essential for optimizing multi-component formulations. Quality control methodologies for plant-derived pharmaceutical products must address the inherent variability in natural materials while ensuring consistent therapeutic outcomes. Standardized cultivation practices, controlled harvesting conditions, and validated processing procedures contribute to reducing variability in raw material quality. Advanced analytical techniques enable comprehensive characterization of extract compositions, facilitating the establishment of quality specifications that ensure therapeutic consistency. Bioavailability enhancement strategies for medicinal plant extracts include the incorporation of absorption enhancers, solubilization agents, and permeation promoters that improve the uptake of active compounds across intestinal barriers. Cyclodextrin complexation represents one effective approach for improving the solubility and stability of poorly water-soluble plant compounds, while maintaining their biological activity and therapeutic efficacy. The development of sustained-release formulations for digestive system applications addresses the need for prolonged therapeutic activity while reducing dosing frequency and improving patient compliance. Matrix tablets, coated pellets, and osmotic pump systems provide controlled release characteristics that maintain therapeutic concentrations over extended periods, particularly beneficial for chronic conditions requiring long-term treatment.

Regulatory considerations for plant-derived pharmaceutical products require comprehensive documentation of safety, efficacy, and quality parameters according to international pharmaceutical standards. Good Manufacturing Practice guidelines ensure consistent production quality, while clinical trial data provides evidence of therapeutic efficacy and safety profiles. The

Web of Medicine: Journal of Medicine, Practice and Nursing
webofjournals.com/index.php/5

establishment of monographs for standardized plant extracts facilitates regulatory approval processes and supports quality assurance programs. Recent advances in personalized medicine approaches consider individual variations in metabolism and therapeutic response when developing plant-based treatments for digestive system disorders. Pharmacogenomic factors influencing drug metabolism, genetic variations in drug transporters, and individual differences in gut microbiome composition all contribute to therapeutic outcome variability, necessitating flexible formulation strategies that can accommodate individual patient needs. Environmental considerations in pharmaceutical manufacturing increasingly influence the selection of extraction and processing technologies. Green chemistry principles promote the use of environmentally sustainable solvents and processing methods, while waste reduction strategies minimize the environmental impact of pharmaceutical production. Supercritical fluid extraction and other solvent-free technologies align with these environmental objectives while maintaining product quality standards.

This conclusion highlights the significant progress in developing drug formulations from medicinal plant dry extracts by merging traditional knowledge with advanced pharmaceutical technologies. It emphasizes the role of modern extraction and delivery methods-such as spray-drying, freeze-drying, and nanoencapsulation-in enhancing the stability, bioavailability, and targeted action of treatments for digestive system wounds. The text underlines the need for ongoing research in extraction optimization, formulation strategies, and quality control, and points to future directions like personalized medicine. It concludes that scientifically validated phytopharmaceuticals are increasingly accepted and commercially viable, offering effective and safe options for managing gastrointestinal diseases.

References:

1. Zhang, Y., et al. (2023). Advanced extraction technologies for bioactive compounds from medicinal plants: A comprehensive review. Journal of Pharmaceutical Sciences, 112(8), 2145-2162.
2. Umarovich, B. M. (2025). DEVELOPING OF VIRAL INFECTIONS IN HEMATOPOIETIC STEM-CELL TRANSPLANT (HSCT) RECIPIENTS. Web of Medicine: Journal of Medicine, Practice and Nursing, 3(5), 468-473.
3. Muhammadiev, S. (2025). HEMIEPIPHYSIODESIS IN PEDIATRIC ORTHOPAEDICS AS A TREATMENT OF KNEE DEFORMITIES. International Journal of Artificial Intelligence, 1(4), 225-227.
4. Pulatjonovna, U. M. (2024). METABOLITE SYNDROME AND COGNITIVE IMPAIRMENT. IMRAS, 7(6), 419-423.
5. Умарова, М., & Кодиржонов, Н. (2022). ТРОМБОЛИТИЧЕСКАЯ ТЕРАПИЯ В ЛЕЧЕНИИ ИШЕМИЧЕСКОГО ИНСУЛЬТА. Theoretical aspects in the formation of pedagogical sciences, 1(5), 218-220.
6. Умарова, М. (2021). МИГРЕН КАСАЛЛИГИ ВА УНИНГ ШОШИЛИНЧ ТЕРАПИЯСИНИ ТАКОМИЛЛАШТИРИШ. ИНТЕРНАУКА, 47, 93.

Web of Medicine: Journal of Medicine, Practice and Nursing
webofjournals.com/index.php/5

7. Хошимова, А. Ё. (2018). ВЛИЯНИЕ ЗАГРЯЗНЕНИЯ ОКРУЖАЮЩЕЙ СРЕДЫ НА ЗАБОЛЕВАЕМОСТЬ БРОНХИАЛЬНОЙ АСТМОЙ. Актуальные вопросы современной пульмонологии. Ма, 200.
8. АБДУГАНИЕВА, А. Ё., & ЮЛДАШЕВА, Х. Б. К. ЛАБОРАТОРНАЯ ДИАГНОСТИКА ПРИ COVID-19. ИНТЕРНАУКА Учредители: Общество с ограниченной ответственностью" Интернаука", 37-38.
9. Умарова, М. (2021). ИНСОМНИА ВА МЕТАБОЛИК СИНДРОМНИНГ ЎЗАРО КОМОРБИДЛИГИ МУАММОНИНГ ДОЛЗАРБЛИГИ. Интернаука, (20-7), 29-30.
10. Исмаилов, С. И., & Маматханова, Г. М. (2022). ЭЛЕКТРОННЫЙ ДОКУМЕНТООБОРОТ КАК ВАЖНЕЙШИЙ ФАКТОР ПОВЫШЕНИЯ ЭФФЕКТИВНОСТИ УПРАВЛЕНИЯ ЗДРАВООХРАНЕНИЕМ. Евразийский журнал медицинских и естественных наук, 2(8), 38-45.
11. Erkinovich, M. B. (2023). Prevention and Modern Treatment of Fatty Embolism in Traumatological Patients. Eurasian Medical Research Periodical, 21, 158-164.
12. Abdujabborova, C. (2024). O'tkir zaharliligini aniqlash" LUPINUS AS". Universal xalqaro ilmiy jurnal, 1(9), 151-157.
13. Abdujabborova, C. (2024). PSORALEA DRUPACEAE BUNGE (PSORALEA KOSTYANKOVA OR AKKURAI) CHEMICAL COMPOSITION AND APPLICATION IN MEDICINE. B INTERNATIONAL BULLETIN OF MEDICAL SCIENCES AND CLINICAL RESEARCH (Т. 4, Выпуск 1, сс. 9–14). Zenodo.
14. Erkinovich, M. B. (2025, February). ACCUMULATION OF FLUID IN THE KNEE JOINT. In The Conference Hub (pp. 31-35).
15. Erkinovich, M. B. (2025). EFFECT OF JOINT FLUID ON JOINT ACTIVITY IN THE BODY. Web of Medicine: Journal of Medicine, Practice and Nursing, 3(2), 256-260.
16. Maxmudovna, M. G., Qizi, S. M. I., & Xasanboyevich, X. S. (2024). VIRAL HEPATITIS DISEASE AND ITS SPREAD AMONG THE POPULATION. THE EXAMPLE OF RISHTAN DISTRICT. Eurasian Journal of Medical and Natural Sciences, 4(1-2), 118-121.
17. Mamatkhanova, G. M., & Ismailov, S. I. (2021). Optimization Of Medical Records And Implementation Of Electronic Systems In Healthcare. The American Journal of Medical Sciences and Pharmaceutical Research, 3(01), 193-198.
18. Маматханова, Г. (2021). Оптимизация медицинской учетной документации и внедрение электронных систем в здравоохранение. Общество и инновации, 2(8/S), 61-67.
19. Мурадимова, А. Р. (2019). Нейрофизиологический аспект метаболической терапии хронической церебральной ишемии. In Инновации в медицине. Материалы I международной научно-практической конференции-Махачкала, 2019.-Том. II.-232 с. (p. 192).
20. Lutfidin o'g'li, Y. B. (2025). ENDEMIK BUQOQ KASALLIGINI TA'SIRIDAN YO'LDOSH TERMINAL SO'RGICHLARDAGI QON TOMIRLARNING PATOMORFOLOGIK O'ZGARISHLARI. THEORY AND ANALYTICAL ASPECTS OF RECENT RESEARCH, 3(33), 322-325.
21. Lutfidin o'g'li, Y. B. (2025). Major Hystologic Types of Lung Cancer. Miasto Przyszłości, 57, 81-86.

Web of Medicine: Journal of Medicine, Practice and Nursing
webofjournals.com/index.php/5

22. Yusupov, B., & Xatamova, M. (2025). GIPERTIREOZ TA'SIRIDAN YO'LDOSH TERMINAL SO'RG'ICHLARDAGI QON TOMIRLARNING PATOMORFOLOGIK O'ZGARISHLARI. Modern Science and Research, 4(2), 432-437.
23. Habibullayevna, A. G., & Shavkatjon o'g'li, Q. S. (2025, February). STRUCTURE AND INTRACELLULAR ACTIVITY OF THE DNA-CONTAINING HERPES SIMPLEX VIRUS. In International Educators Conference (pp. 126-132).
24. Мурадимова, А. Р. (2019). КЛИНИКО-НЕВРОЛОГИЧЕСКИЕ ОСОБЕННОСТИ ТЕЧЕНИЯ СО-СУДИСТОЙ ЭПИЛЕПСИИ, ПРОГНОЗИРОВАНИЯ И ЛЕЧЕНИЯ. In Инновации в медицине. Материалы I международной научно-практической конференции-Махачкала, 2019.-Том. II.-232 с. (p. 178).
25. Мурадимова, А. Р. (2019). КЛИНИКО-ДИАГНОСТИЧЕСКИЕ АСПЕКТЫ И СОВРЕМЕННЫЕ ПОДХОДЫ К ЛЕЧЕНИЮ СОСУДИСТОЙ ДЕМЕНЦИИ. In Инновации в медицине. Материалы I международной научно-практической конференции-Махачкала, 2019.-Том. II.-232 с. (p. 185).
26. Xojiakbarovna, K. M. (2025). SKLETAL MUSCLE RELAXANTS. PERIPHERALLY ACTING SKLETAL MUSCLE RELAXAXANTS: NEUROMUSCULAR BLOCKERS AND SYNTHETIC COMPETITIVE BLOCKERS. Web of Medicine: Journal of Medicine, Practice and Nursing, 3(5), 509-514.
27. Yevgenevna, S. O. (2025). PREDICTION OF PREECLAMPSIA DEVELOPMENT IN PREGNANT WOMEN WITH OVERWEIGHT AND OBESITY. Web of Medicine: Journal of Medicine, Practice and Nursing, 3(5), 561-568.
28. Isroilova, G. (2023). DEVELOPING THE PRINCIPLES OF STUDYING AND TREATMENT OF VAGINAL DYSBIOSIS DURING PREGNANCY. Modern Science and Research, 2(4), 52-53.
29. Юсупова, Р. Т., & Шаланкова, О. Е. (2020). РЕПРОДУКТИВНОЕ ЗДОРОВЬЕ ДЕВОЧЕК-ПОДРОСТКОВ, ПРОЖИВАЮЩИХ В УСЛОВИЯХ ФЕРГАНСКОЙ ДОЛИНЫ. In Университетская наука: взгляд в будущее (pp. 612-614).
30. Пулатова, Н. С., Йигиталиев, А. Б., & Абдурашидов, А. А. ЭПИДЕМИОЛОГИЯ РАКА ТЕЛА МАТКИ В ФЕРГАНСКОЙ ОБЛАСТИ. 1-SON, 1-JILD IYUL 2022 1-QISM, 29.
31. Эгамбердиев, Д. Э., Абдурашидов, А. А., & Эргашов, У. Ш. ПРОФИЛАКТИКА И МЕТОФИЛАКТИКА МОЧЕКАМЕННОЙ БОЛЕЗНИ.
32. Husanboy, U. (2024). ACUTE HEMORRHAGIC CYSTITIS DISEASE IN CHILDREN AND ITS DEVELOPMENT IN THE CHILD'S DODY. In International Conference on Multidisciplinary Sciences and Educational Practices (pp. 88-94).
33. Умарова, М. (2021). ИНСУЛТДАН КЕЙИНГИ ТАЛВАСА СИНДРОМИ. Интернаука, (18-5), 46-48.
34. Pattoyevich, G. A. (2025). IRON DEFICIENCY ANEMIA IN CHILDREN: EARLY DIAGNOSIS AND MODERN TREATMENT APPROACHES. Web of Medicine: Journal of Medicine, Practice and Nursing, 3(5), 494-501.
35. Ravshanovna, R. Y., & Abduxoliq o'g'li, R. A. (2024). Clinical and Morphological Characteristics and Treatment of Gaucher Disease. Miasto Przyszłości, 49, 1407-1412.

Web of Medicine: Journal of Medicine, Practice and Nursing
webofjournals.com/index.php/5