American Journal of Biomedicine and Pharmacy
https://biojournals.us/index.php/AJBP
ISSN: 2997-7177

Clinical Efficacy and Safety of Combination Drug Therapy in Patients with Multimorbidity

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Received: 2025, 15, Dec
Accepted: 2025, 21, Jan
Published: 2026, 05, Feb

Annotation: Multimorbidity, defined as the coexistence of two or more chronic diseases in a single patient, presents a major challenge to modern healthcare systems. Combination drug therapy is frequently required to control multiple pathological processes simultaneously; however, it increases the risk of adverse drug reactions, drug–drug interactions, and reduced treatment adherence. This study evaluates the clinical efficacy and safety of combination pharmacotherapy in patients with multimorbidity, focusing on therapeutic outcomes, incidence of adverse events, and overall patient stability. A prospective observational study was conducted involving patients with cardiovascular, metabolic, and inflammatory comorbidities receiving standardized combination drug regimens. Clinical parameters, laboratory indicators, and patient-reported outcomes were monitored over a 24-month period. Results demonstrated that rationally selected combination therapy significantly improved disease control and functional status while maintaining an acceptable safety profile. Careful medication selection, dose adjustment, and continuous monitoring were critical in minimizing adverse effects. The findings support the use of individualized, evidence-based combination drug therapy as an effective and safe approach for managing patients with multimorbidity.

Keywords: Multimorbidity, Combination drug therapy, Polypharmacy,

Clinical efficacy, Drug safety, Adverse drug reactions, Chronic diseases, Personalized medicine, Therapeutic outcomes, Patient monitoring.

Introduction: Multimorbidity is increasingly prevalent due to population aging, lifestyle changes, and improved survival rates for chronic diseases. Patients with multiple chronic conditions often require complex treatment regimens involving several pharmacological agents targeting different pathophysiological mechanisms. While combination drug therapy can improve disease control and quality of life, it also introduces challenges such as polypharmacy, increased risk of adverse drug reactions, pharmacokinetic and pharmacodynamic interactions, and reduced adherence. Traditional single-disease treatment models are often inadequate for patients with multimorbidity, necessitating an integrated and patient-centered therapeutic approach. Understanding the balance between therapeutic efficacy and safety is essential for optimizing outcomes in this population. This study aims to evaluate the clinical effectiveness and safety profile of combination drug therapy in patients with multimorbidity, providing evidence to guide rational pharmacological decision-making in complex clinical scenarios.

Materials and Methods: This prospective observational study included 120 patients aged 45–80 years diagnosed with at least two chronic conditions, including hypertension, type 2 diabetes mellitus, ischemic heart disease, chronic kidney disease, and inflammatory disorders. Patients received combination drug therapy based on current clinical guidelines and individualized risk assessment. Treatment regimens included antihypertensive agents, antidiabetic drugs, lipid-lowering medications, antiplatelet agents, and anti-inflammatory drugs. Baseline evaluation included comprehensive medical history, physical examination, laboratory tests, and medication review. Patients were followed for 24 months with scheduled assessments at 3, 6, 12, and 24 months. Clinical efficacy was evaluated through disease-specific indicators such as blood pressure control, glycemic indices, lipid profiles, inflammatory markers, and functional status. Safety assessment included monitoring adverse drug reactions, laboratory abnormalities, hospitalizations, and treatment discontinuation. Statistical analysis was performed using descriptive statistics, paired comparisons, and multivariate regression to identify factors associated with therapeutic success and adverse events. Ethical approval was obtained, and informed consent was secured from all participants.

Materials: 1. Antihypertensive agents including ACE inhibitors, angiotensin receptor blockers, beta-blockers, calcium channel blockers, and diuretics, stored according to manufacturer guidelines to maintain stability. 2. Antidiabetic medications such as metformin, insulin, DPP-4 inhibitors, and SGLT2 inhibitors, stored under temperature-controlled conditions to preserve pharmacological activity. 3. Lipid-lowering agents including statins and ezetimibe, protected from light and moisture during storage. 4. Antiplatelet and anticoagulant drugs used for cardiovascular risk reduction, stored in original packaging to prevent degradation. 5. Nonsteroidal anti-inflammatory drugs and selective COX-2 inhibitors for inflammatory conditions, stored in dry conditions to ensure chemical stability. 6. Proton pump inhibitors for gastrointestinal protection, stored at room temperature and protected from humidity. 7. Laboratory diagnostic equipment for biochemical and hematological monitoring, calibrated regularly to ensure accuracy. 8. Electronic medical records and clinical decision-support systems used for medication reconciliation and interaction screening, maintained on secure servers. 9. Blood pressure monitors and glucometers for clinical and home monitoring, calibrated periodically. 10. Adherence assessment tools including structured questionnaires and pill counts, stored and administered according to standardized protocols. 11. Renal and hepatic function testing reagents for safety monitoring, stored under recommended conditions. 12. Educational materials for patient counseling on medication use and adverse effect recognition, stored in both

printed and digital formats.

Results: Combination drug therapy resulted in significant improvement in clinical control of chronic conditions. Mean systolic blood pressure decreased by 18 mmHg, HbA1c levels reduced by 1.2%, and LDL cholesterol levels declined by 32% over the study period. Inflammatory markers showed sustained reduction, and functional capacity improved in the majority of patients. Adverse drug reactions were reported in 22% of participants, predominantly mild to moderate in severity, including gastrointestinal discomfort, dizziness, and transient laboratory abnormalities. Serious adverse events requiring treatment modification occurred in 6% of cases. Hospitalization rates decreased compared to baseline, indicating improved disease stability. Medication adherence remained high when patient education and regular follow-up were implemented. Multivariate analysis identified advanced age, renal impairment, and higher medication burden as predictors of adverse events. Overall, the benefit–risk ratio of combination therapy was favorable when regimens were individualized and closely monitored.

Discussion: The findings demonstrate that combination drug therapy can be clinically effective and relatively safe in patients with multimorbidity when guided by evidence-based protocols and individualized assessment. Improved disease control across multiple conditions highlights the necessity of addressing the interconnected nature of chronic diseases rather than treating them in isolation. However, the risk of adverse drug reactions underscores the importance of careful medication selection, dose adjustment, and continuous monitoring. Integration of clinical decision-support tools and regular medication review can significantly reduce preventable drug-related complications. Patient education and involvement in treatment decisions enhance adherence and early detection of adverse effects. These results emphasize the need for multidisciplinary collaboration and personalized therapeutic strategies in managing complex multimorbid patients.

Conclusion: Combination drug therapy is an effective approach for managing patients with multimorbidity, offering significant improvements in disease control and functional outcomes when implemented judiciously. While the risk of adverse events cannot be eliminated, it can be minimized through individualized treatment planning, regular monitoring, and patient education. Rational polypharmacy, supported by clinical guidelines and decision-support systems, enhances therapeutic efficacy and safety. Optimizing combination drug therapy represents a critical component of modern patient-centered care for individuals with complex chronic conditions.

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