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Functional Versus Structural Renal Outcomes of SGLT2 Inhibitors in Autosomal Dominant Polycystic Kidney Disease: A Systematic Review of Preclinical and Clinical Evidence

Sodium-glucose cotransporter 2 inhibitors (SGLT2i) provide significant renoprotection in chronic kidney disease, but their efficacy in autosomal dominant polycystic kidney disease (ADPKD) remains unclear. This systematic review evaluated preclinical and clinical data regarding the effectiveness, safety, and mechanisms of SGLT2i in ADPKD. A comprehensive search of PubMed, Embase, and Scopus from inception to May 2026 yielded eleven eligible studies: four preclinical rodent models, one ongoing randomized controlled trial, and six observational or case-based clinical investigations. Data were extracted following PRISMA 2020 standards, with bias assessed via SYRCLE and clinical appraisal tools. Preclinical models consistently demonstrated reduced cyst load, decreased inflammation, suppressed fibrosis, and enhanced renal hemodynamics. Clinical evidence revealed tangible benefits in blood pressure control, proteinuria reduction, and metabolic parameters, though effects on total kidney volume were minimal or variable. Diverse study designs precluded quantitative meta-analysis. These findings highlight that while SGLT2i offers multi-pathway functional nephroprotection through natriuretic, anti-inflammatory, and antifibrotic mechanisms, structural attenuation of cyst expansion requires further validation. Clinically, SGLT2i demonstrates short-term safety and serves as a promising adjunct therapy for managing cardiovascular and metabolic markers in ADPKD, regardless of structural kidney alterations. Ultimately, robust randomized controlled trials are essential to establish long-term clinical efficacy and safety.

Keywords: SGLT2 inhibitors; ADPKD; renoprotection; polycystic kidney.

Biography

Faiza Naeem is a researcher and PhD scholar at Universiti Sains Malaysia. Her research focuses on novel therapeutic interventions and metabolic pathways in polycystic kidney disease and chronic renal conditions. She has conducted systematic review on SGLT2 inhibitors and renal outcomes, aiming to bridge preclinical evidence with clinical practice. Faiza Naeem is dedicated to improving patient care and long-term renal health outcomes through evidence-based research.

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