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CHRONIC DISEASES THAT PROGRESS TO END-STAGE RENAL DISEASE

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Relevance. Chronic kidney disease affects approximately 10-15% of the global adult population, with millions progressing to end-stage renal disease (ESRD) requiring hemodialysis. While rare genetic diseases receive significant research attention, the vast majority of dialysis-dependent patients suffer from five common, highly preventable conditions encountered daily in primary care, emergency rooms, and inpatient wards: diabetic kidney disease, hypertensive nephrosclerosis, acute tubular necrosis, chronic glomerulonephritis, and obstructive uropathy. These five diseases collectively account for over 80% of all end-stage renal disease cases worldwide. A 2024 research dialysis commencement patterns revealed that 40-50% of patients first see a nephrologist within 3 months of starting dialysis, which is far too late for preventive measures.

Aim: this study aimed to identify and analyze the progression pathways of common diseases to end-stage renal disease requiring hemodialysis.

Materials and methods. Clinical data was obtained from United States Renal Data System (USRDS) 2024 Annual data report and medical records from published cohort studies. Serum creatinine, GFR (Glomerular Filtration Rate), HbA1C, blood pressure, urinalysis was the laboratory parameters used and renal ultrasound, CT urography, biopsy was used for imaging modalities.

Results and their discussion. According to analysis of United States Renal Data System 2024 data reveals that among the 554,000 prevalent end-stage renal disease patients on hemodialysis in USA, the distribution of primary causes was Diabetic kidney disease (47% of patients typically age of 60-70 years), Hypertensive Nephrosclerosis (27% typically 65-75 years), Glomerulonephritis (all types-8% typically 40-60 years), Obstructive neuropathy 5%. In diabetic kidney disease, microalbuminuria progresses over 5 to 10 years to microalbuminuria with causes estimated Glomerular Filtration Rate decline of 3 to 5 mL/min/year; each 1 percent rise in HbA1c above 7 percent accelerates decline by 2.8 mL/min/year, and Urine albumin-to-creatinine ratio above 1000 mg/g with estimated Glomerular Filtration Rate below 30 predicts 90 percent risk of dialysis within 5 years. In hypertensive nephrosclerosis, stage 1 hypertension over 10 to 15 years causes estimated Glomerular Filtration Rate decline of 1 to 2 mL/min/year, accelerating to 4 to 6 mL/min/year once it drops below 45; intensive BP control below 120 mmHg reduces end-stage renal disease risk by 42 percent, and proteinuria above 1 g/day with causes estimated Glomerular Filtration Rate below 45 despite ACE inhibitors or ARBs predicts this within 7 years with 85 percent specificity. In acute tubular necrosis, an ischemic or nephrotoxic insult causes anuria for 7 to 14 days; cortical necrosis occurs in 5 to 10 percent of severe cases, only 12 percent of patients on dialysis for more than 14 days recover, and anuria beyond 14 days with muddy brown casts and FeNa above 2 percent predicts permanent dialysis with 90 percent certainty.

Conclusions. This review demonstrates that common diseases (diabetic kidney disease, hypertensive nephrosclerosis, acute tubular necrosis, chronic glomerulonephritis, and obstructive uropathy) account for over 80 percent of patients requiring chronic hemodialysis, each with a latent period of 5 to 20 years for intervention. Key takeaways are annual Urine albumin-to-creatinine ratio screening and early SGLT2 inhibitors for diabetic kidney disease; Blood pressure target below 130 mmHg for hypertensive nephrosclerosis; anuria beyond 14 days and causes estimated Glomerular Filtration Rate below 45 predict permanent dialysis in Acute tubular necrosis, visible hematuria after upper respiratory tract infection suggests glomerulonephritis and post void residual scan in men over 60 with urinary symptoms can prevent irreversible obstruction, as relief within 4 weeks yields near-complete recovery but after 12 weeks scarring is permanent.