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REGIONAL PREVALENCE OF CHRONIC KIDNEY DISEASE IN UZBEKISTAN, THE IMPORTANCE OF LABORATORY INDICATORS IN EARLY DETECTION, AND HEALTHY NUTRITION STRATEGIES

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Abstract Chronic kidney disease (CKD) is a growing public health concern with significant regional variation in prevalence and clinical outcomes. In Uzbekistan, CKD incidence has increased over recent years, with notable differences among regions. Early detection using reliable laboratory biomarkers such as estimated glomerular filtration rate (eGFR), albuminuria, cystatin C, and emerging indicators is critical for preventing progression to end-stage renal disease. In addition, patient-centered nutrition plays a key role in CKD prevention and slowing disease progression. This review examines available regional CKD epidemiology in Uzbekistan, highlights the role of laboratory diagnostics in early detection, and discusses evidence-based dietary recommendations for CKD risk reduction and management.

Introduction Chronic kidney disease (CKD) leads to gradual loss of renal function over time and is associated with high morbidity, mortality, and healthcare cost worldwide. Recent data indicate an increasing CKD burden in Uzbekistan, mirroring global trends. [1,2,3,4,5] Early diagnosis and preventive measures are essential to curb progression and reduce complications. Globally, CKD affects approximately 10–15% of adults, and its prevalence continues to rise due to aging, diabetes, and hypertension. Early stages are often asymptomatic, underscoring the need for laboratory screening and nutrition-focused interventions.[6,7,8,9,10]

Regional Prevalence of CKD in Uzbekistan

The **Republic of Uzbekistan's national registry data for 2020** showed a total of **118,026 registered CKD cases** across all regions, with large inter-regional differences in case numbers and outcomes. For example: Karakalpakstan had 9,013 registered CKD patients; Andijan had 416; and Bukhara had 4,500 in 2020. These variations likely reflect differences in disease recognition, screening coverage, and healthcare infrastructure. Regions such as Tashkent, Samarkand, Kashkadarya, and Surkhandarya reported higher numbers of CKD patients than others in recent years.

Longitudinal data from 2019–2024 indicate a rising CKD burden in Uzbekistan, with total cases increasing from approximately 125,274 in 2019 to over 213,000 in 2024. Regions such as Jizzakh, Tashkent region, and Khorezm experienced notable increases, while Andijan and Bukhara showed lower relative numbers. This trend likely reflects both genuine increases in CKD incidence and improved diagnostic practices, including heightened use of laboratory screening like GFR estimation and albuminuria measurement. [10,11,12,13,14]

Laboratory Indicators in Early Detection of CKD

1. Estimated Glomerular Filtration Rate (eGFR)

Serum creatinine and eGFR are the foundation of clinical CKD diagnosis. eGFR accounts for patient demographic variables and is critical in identifying patients with reduced kidney function before overt symptoms appear. According to KDIGO guidelines, persistent eGFR < 60 mL/min/1.73 m² for at least three months indicates CKD. Early stage CKD (stages 1–3) may only be detectable through eGFR changes rather than symptoms. [15,16,17,18,19]

2. Albuminuria and Urine Biomarkers

Albuminuria, measured as the urine albumin-to-creatinine ratio (UACR), is a sensitive early marker of glomerular damage, especially in patients with hypertension or diabetes. Regular assessment of albuminuria can identify kidney damage even before eGFR declines significantly.[20,21,22,23,24]

3. Cystatin C and Emerging Biomarkers

Cystatin C is an alternative to creatinine that is minimally affected by muscle mass or diet and may improve early CKD detection. Studies in Uzbekistan suggest elevated cystatin C correlates with preclinical renal dysfunction, including in patients with metabolic risk factors such as prediabetes. [25,26,27,28]

Emerging markers such as β_2-microglobulin and NGAL have also been investigated for their diagnostic and prognostic roles, potentially identifying kidney injury before traditional biomarkers rise, though their clinical implementation requires further validation. [29,30,31,32,33]

Healthy Nutrition in CKD Prevention and Management

Diet and lifestyle play critical roles in CKD prevention and progression:

1. Limit Excessive Protein Intake

While protein is essential for health, high dietary protein can increase glomerular workload and accelerate CKD progression. Moderate protein intake tailored to individual CKD stage may help slow decline in kidney function.[34,35,36]

2. Sodium Restriction

Reducing sodium consumption (< 2 g/day) helps control blood pressure and decreases proteinuria, slowing CKD progression.[37,38]

3. Balanced Electrolytes and Phosphorus

CKD patients often experience imbalances in potassium and phosphorus. Diet plans should consider food sources of these minerals to prevent hyperkalemia and hyperphosphatemia.

4. Fruits, Vegetables, and Anti-Inflammatory Diets

A diet rich in fruits, vegetables, whole grains, and anti-inflammatory nutrients supports overall cardiovascular health and may reduce CKD risk. Personalized dietary counseling by a dietitian is recommended.

Healthy eating patterns such as the **DASH (Dietary Approaches to Stop Hypertension)** and **Mediterranean diet**, which emphasize fruits, vegetables, lean

proteins, nuts, and healthy fats, have shown benefits in reducing CKD risk and related cardiovascular disease.

Discussion

Uzbekistan's regional CKD data emphasize the growing need for systematic screening programs that incorporate laboratory indicators including eGFR, UACR, cystatin C, and emerging biomarkers. Inter-regional differences suggest uneven access to diagnostics and nephrology care, highlighting a need for health policy reform to standardize screening across all regions. Incorporating healthy nutrition and lifestyle interventions into CKD prevention strategies can further reduce disease progression and improve patient outcomes.

Conclusion

CKD in Uzbekistan shows significant regional variability in prevalence, influenced by disparities in healthcare access and diagnostic practices. Early detection using laboratory indicators is critical for identifying disease in asymptomatic stages and implementing timely interventions. Nutrition plays a pivotal role in CKD prevention and patient management. Strengthening laboratory screening programs and promoting healthy diets tailored to CKD risk can reduce the national burden of chronic kidney disease.

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