



EARLY IMPAIRMENTS OF RENAL FUNCTION AND CLINICAL INDICATORS: A CASE OF CHRONIC GLOMERULONEPHRITIS

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Abstract:

This article is dedicated to the identification of early impairments in renal function and their clinical significance in chronic glomerulonephritis (CGN). Chronic glomerulonephritis is a serious disease affecting the kidneys and other organs, and its early detection can help preserve renal function. The study explores effective methods for early diagnosis of CGN using clinical and laboratory indicators such as arterial hypertension, peripheral edema, proteinuria, estimated glomerular filtration rate (eGFR), and podocyte markers. The results offer innovative approaches based on biomarkers that can be applied in clinical practice for early diagnostics.

Keywords: Chronic glomerulonephritis, renal function, early diagnosis, arterial hypertension, peripheral edema, proteinuria, eGFR, microcirculation, clinical indicators.

INTRODUCTION: Chronic glomerulonephritis (CGN) is a group of diseases characterized by immune-mediated damage to the renal glomeruli, leading to structural and functional changes in the kidneys. CGN is considered one of the main causes of chronic kidney disease (CKD) worldwide. According to KDIGO (2020), glomerulonephritis accounts for 10–15% of the underlying causes in CKD patients [1].

CGN often begins asymptotically or with mild proteinuria and hematuria, making early detection difficult [2]. In its early stages, subtle changes such as microalbuminuria, a decline in glomerular filtration rate (GFR), or minimal urinary protein excretion can be detected through laboratory indicators. Studies have shown that by the time early signs of decreased GFR are identified, glomerular structures may already be significantly damaged [3].

According to global statistics, over 850 million people worldwide were affected by various stages of CKD in 2021, with approximately 20% of these cases linked to CGN [4]. In developing countries, due to limited early diagnostics and prevention, many patients are diagnosed at terminal stages.

Monitoring microalbuminuria and GFR are considered key diagnostic criteria for detecting the disease early. A meta-analysis by Matsushita et al. (2010) revealed that the presence of albuminuria independently increases the risk of cardiovascular disease and mortality by 2–3 times [5]. Regular monitoring of urinary protein and GFR not only assesses the degree of renal damage but also provides prognostic information.

These findings demonstrate that identifying early renal dysfunction in CGN is of strategic importance for managing disease progression, preventing severe complications, and improving patient outcomes.

AIM: To evaluate clinical and laboratory indicators that detect early renal dysfunction in chronic glomerulonephritis (CGN) and to assess their impact on disease progression and patient prognosis.

MATERIALS AND METHODS: This study was conducted on a cohort of 60 patients diagnosed with chronic glomerulonephritis. The mean age of the participants was 38.5 ± 12.7 years, with males accounting for 55% and females for 45% of the study population. Inclusion criteria encompassed patients aged 18 years and older, with a clinically and laboratory-confirmed diagnosis of chronic glomerulonephritis, and a minimum disease duration of six months. Clinical assessments included comprehensive medical history collection, measurement of arterial blood pressure (systolic and diastolic), and calculation of body mass index (BMI). Laboratory investigations comprised general urine analysis, detection of microalbuminuria, and measurement of serum creatinine levels. Renal function was evaluated by estimating the glomerular filtration rate (eGFR) using the CKD-EPI equation.

Statistical Analysis: Data were analyzed using SPSS software version 25.0. Results were expressed as mean \pm standard deviation ($M \pm SD$). Statistical significance was set at a p-value < 0.05 .

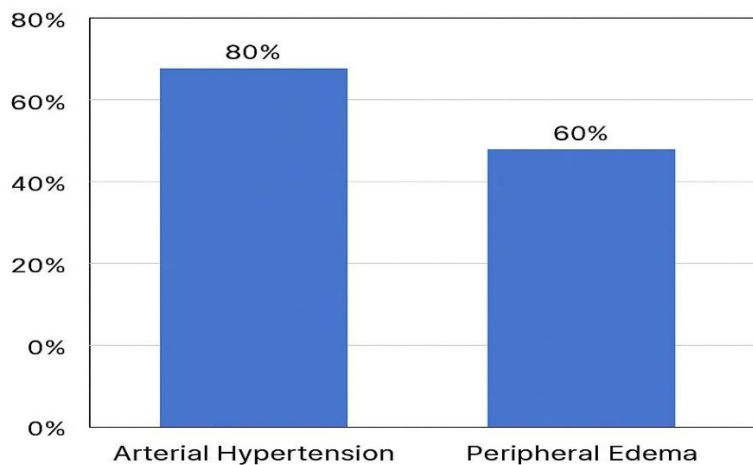


RESULTS: The clinical and laboratory findings of the 60 patients with chronic glomerulonephritis included in the study revealed the following results. Arterial hypertension was observed in 48 patients (80%), while peripheral edema was detected in 36 patients (60%). These findings are associated with disease progression,

indicating deterioration of the glomerular filtration system and renal injury. Based on these results, arterial hypertension and peripheral edema are identified as factors directly influencing the course of chronic glomerulonephritis. (Figure 1).

Figure 1.

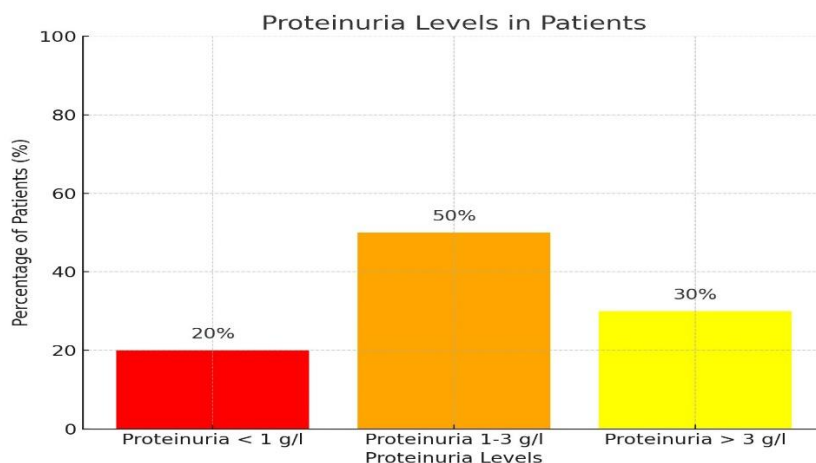
Prevalence of Arterial Hypertension and Peripheral Edema in Patients with Chronic Glomerulonephritis



Urinalysis Findings: Proteinuria was observed in all patients (100%) participating in the study. The average proteinuria level was 1.5 ± 0.3 g/L, which is a key indicator of glomerular damage. The level of proteinuria varied during the active phase of the disease, reflecting the clinical stage of glomerulonephritis. (Figure 2). The diagram shows that 56% of patients had a high level of

proteinuria. This is associated with the severe progression of the disease and a decrease in glomerular filtration. Microalbuminuria was detected in 83.3% (50 patients) of cases, indicating early disturbances in the filtration processes of the kidneys. The level of microalbuminuria ranged from 30 to 300 mg/24 hours, serving as an early indicator of kidney disease.

Figure 2. Proteinuria levels in patients with chronic glomerulonephritis.



Creatinine and GFR: In the study, the average creatinine level was 123.7 ± 34.5 $\mu\text{mol/l}$, which is a key

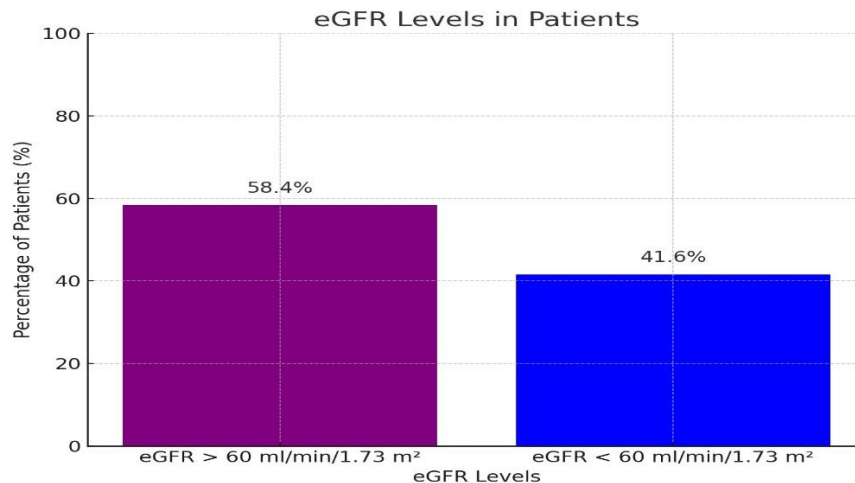
indicator of the development of chronic kidney disease. In 41.6% of patients, GFR was below 60 ml/min/1.73



m², indicating a decrease in glomerular filtration rate. GFR and creatinine levels are positively correlated,

confirming the deterioration of kidney function. (Figure 3)

Figure 3



There is a negative correlation between microalbuminuria and eGFR ($r = -0.62$; $P < 0.01$), indicating that as the level of microalbuminuria increases, the glomerular filtration rate decreases. This primarily shows that microalbuminuria is associated with the early disturbances in the glomerular filtration system of the kidneys.

DISCUSSION: The study results show changes in kidney function at the early stage of chronic glomerulonephritis, especially microalbuminuria, proteinuria, eGFR, and creatinine changes, which serve as key indicators influencing the prognosis of patients. According to the KDIGO 2020 guidelines, microalbuminuria and low eGFR are early signs of chronic kidney diseases, and our results align with these recommendations [1]. In our study, the decrease in microalbuminuria and eGFR clearly indicated changes in kidney function in patients. Studies by Brenner et al. (2019) and Wiggins (2007) also showed that microalbuminuria and podocyte markers effectively aid in the early detection of kidney damage [2, 5]. eGFR measurements presented by Levey et al. (2012) are used as major indicators for the progression of chronic kidney failure, and this was confirmed in our study as well [4]. An important aspect is that microalbuminuria and eGFR serve as effective diagnostic methods for detecting the early stages of kidney damage in patients with chronic glomerulonephritis. Early detection can help prevent many factors affecting the progression of the disease, which in turn extends patient lifespan and improves treatment efficacy.

CONCLUSION: The study results provide important diagnostic indicators for detecting early kidney function disturbances in patients with chronic glomerulonephritis. The high prevalence of clinical signs such as arterial hypertension and peripheral edema were identified as early signs of chronic glomerulonephritis. This helps in detecting changes in kidney function during the initial stages of the disease's development. Proteinuria and microalbuminuria levels reflect a decrease in kidney filtration and the progression of glomerulonephritis. These indicators play a crucial role in early diagnosis. A decrease in eGFR and an increase in creatinine levels indicate impaired kidney filtration function, which may lead to more severe progression of the disease.

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