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Diabetic Kidney Disease in Elderly Patients

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Abstract

Introduction: Diabetic kidney disease represents a substantial complication, particularly prevalent among elderly individuals with type 2 diabetes. This study aims to assess the prevalence of kidney disease and elucidate associated risk factors in this in this vulnerable population..

Materials and Methods: This is a retrospective descriptive and analytical study involving 430 elderly type 2 diabetic patients followed in the Endocrinology, Diabetology, Metabolic Diseases, and Nutrition Department at Hassan II University Hospital, Fez, over an eight-year period. Patients were categorized into two groups: Group 1 (65–74 years) and Group 2 (≥75 years).

Results: Our findings revealed a notable burden of diabetes-related kidney disease among elderly patients. Specifically, 46.59% exhibited isolated albuminuria, while 57.52% suffered from renal insufficiency across various stages. Key risk factors contributing to this included poor glycemic control, extended diabetes duration, hypertension, dyslipidemia, and smoking, all demonstrating significant correlations.

Conclusion: The escalating prevalence of diabetic kidney disease and its associated risk factors in the elderly underscore the imperative for tailored therapeutic interventions. These findings emphasize the urgent need for specific geriatric-focused approaches to optimize management in this vulnerable population.

Introduction

The prevalence of kidney disease escalates with advancing age, being diagnosed in approximately 25% of individuals aged 65 to 74 years, and in over 50% of those aged above 75 years [1]. This condition is influenced by a combination of ethnic, genetic, and environmental factors that limit renal functional reserve, rendering the kidneys more susceptible to various adverse conditions [2,3]. Among these, type 2 diabetes stands out as a significant contributor [2,3], along with persistent hypertension, dyslipidemia, and smoking smoking [4,5].

In the elderly population, the risk of cardiovascular morbidity and mortality is notably elevated, which underscores the necessity for meticulous therapeutic management, multidisciplinary follow-up, and tailored geriatric care. Given this backdrop, our study aims to investigate the prevalence and staging of kidney disease as well as identifying the risk factors associated with renal insufficiency in elderly diabetic patients. This research was conducted within the Endocrinology, Diabetology, Metabolic Diseases, and Nutrition Department at Hassan II University Hospital, Fez, encompassing a comprehensive eight-year period.

Through this study, we seek to provide a deeper understanding of the burden of diabetic kidney disease in elderly patients and to elucidate the specific risk factors that contribute to its development and

progression. Our findings are intended to inform and enhance clinical practices, ultimately aiming to improve patient outcomes through targeted intervention strategies and effective management protocols.

Subjects and methods

Type of study and patients

This is a retrospective descriptive and analytical study involving 430 elderly type 2 diabetic patients, followed in the Endocrinology, Diabetology, Metabolic Diseases, and Nutrition Department at Hassan II University Hospital, Fez, over a period of 8 years. The patients were divided into two subgroups: G1 (young elderly) aged 65–74 years and G2 (elderly) aged ≥75 years, according to the definition of elderly by the WHO (age ≥75 years or ≥65 years with a disabling condition) and the National Institute on Aging in the United States (young elderly: 65-74 years, elderly: 75-85 years, and oldest old: 85 years and older).

Inclusion and exclusion criteria

Our study included all elderly type 2 diabetic patients followed for confirmed diabetic kidney disease, defined by the persistent presence of albuminuria > 300 mg/24 h on at least 2 samples 3-6 months apart and/or a progressive decline in glomerular filtration rate [6]. Patients with a history of systemic disease, pyelonephritis, autoimmune diseases, long-term use of nephrotoxic drugs that could lead to non-diabetic kidney failure, and those lost to follow-up were excluded from the study.

Collected Data

Anamnestic data: demographic parameters (age, sex), various factors that could impair renal function (hypertension, duration of diabetes, dyslipidemia, toxic habits), and degenerative status.

Clinical and paraclinical data: body mass index (expressed in kg/m²), waist circumference, glycated hemoglobin, complete lipid profile, uric acid, hemoglobin, renal function, and 24-hour urinary albumin excretion.

Diabetic kidney disease is assessed by measuring 24-hour urinary albumin excretion and estimating renal function using creatinine clearance according to the Modification of Diet in Renal Disease (MDRD) formula, classified based on Kidney Disease: Improving Global Outcomes (KDIGO) guidelines [7].

Statistical analysis

Firstly, we conducted a descriptive analysis of the clinical and paraclinical characteristics of the patients. We then calculated the means and standard deviations for quantitative variables and the percentages for qualitative variables.

Secondly, a univariate analysis was performed to investigate potential correlations between the various risk factors studied and the development of chronic kidney disease in elderly patients with type 2 diabetes using the chi-square test. A significance level of $p < 0.05$ was considered statistically significant for all analyses. Statistical analysis was performed using SPSS software (IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp).

Ethical considerations

Data was collected with the patients' consent while respecting their anonymity and information confide-

ntiality.

Results

The clinical and para-clinical characteristics of our patients

The study analyzed 430 elderly type 2 diabetic patients, split into 225 patients aged 65-74 years and 205 patients aged ≥75 years.

Older elderly patients had a longer diabetes duration, poorer glycemic control, higher hypertension, and dyslipidemia rates but lower Body Mass Index and waist circumference. Smoking and triglyceride levels were higher in the younger group, while HDL-c and lower LDL-c levels were slightly better in the older group. Uric acid levels were lower in the older group.

Diabetic complications, including retinopathy and cardiovascular insufficiency, were more prevalent in the older patients. These findings highlight the need for age-specific management strategies to address the distinct health challenges of these groups. Table 1 summarizes patient characteristics by age group.

Table 1: Clinical and Paraclinical Characteristics of Patients by Age Group

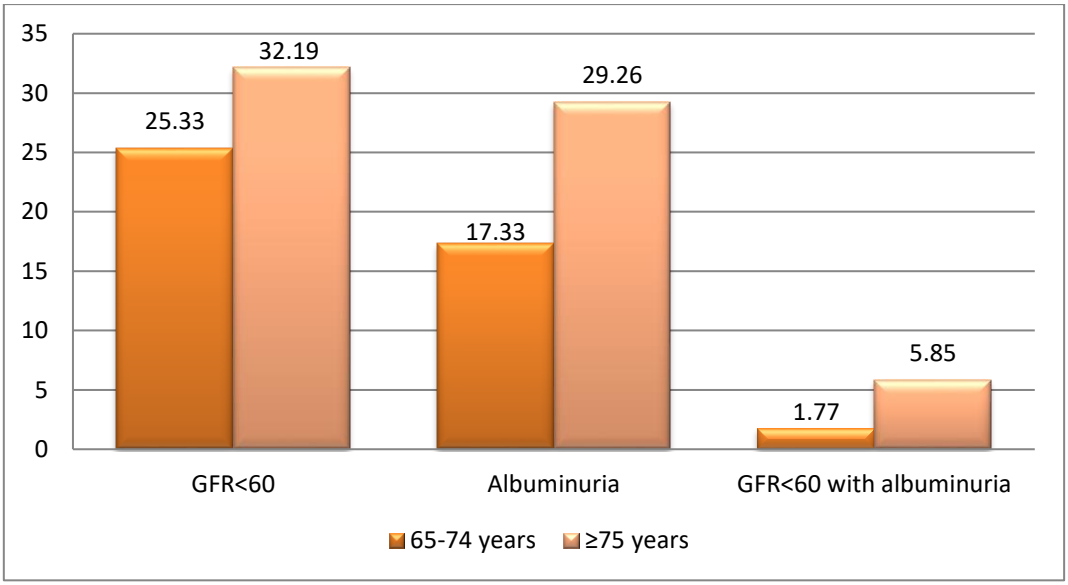
Parameters	65–74 years n=225	≥ 75 years n=205
Age (years)	67.47 ±2.8	78.59 ±2.5
Diabetes Duration (years)	11.34±3.6	12.27±2.7
Hypertension	111 (49.33)	121 (59.02)
Dyslipididemia	80 (35.55)	95 (46.34)
Smoking	37 (16.44)	14 (6.82)
BMI (Kg/m^2)	30.82±5.9	26.50±4.33
WC (cm)	107.4±13.88	99.70±11.67
HbA1c (%)	08.76±1.8	10.09±2.6
TG (g/l)	1.55±0.50	1.22±0.36
HDL-c (g/l)	0.44±0.13	0.46±0.12
LDL-c (g/l)	0.88±0.28	0.77±0.25
Uric Acide (mg/l)	62.36±12.82	49.33±13.33
DR	70 (31.11)	81 (39.51)
IC	52 (23.11)	89 (43.41)

Values are expressed as mean ± standard deviation or number (%).

BMI: Body Mass Index, WC: Waist Circumference, HbA1c: Glycated Hemoglobin, TG: Triglycerides, DR: Diabetic Retinopathy, IC: Ischemic Cardiopathy.

Prevalence of diabetic kidney disease according to age group:

The Figure 1 depicts the prevalence of diabetes-related kidney disease in two elderly patient groups. Urinary albumin excretion alone was found in 46.59% of cases, with 17.33% in the younger elderly group (G1) and a higher rate of 29.26% in the older elderly group (G2). Additionally, renal insufficiency affected 57.52% of patients, with 63% classified as moderate, 28% as severe, and 9% as end-stage renal insufficiency. These findings highlight the significant burden of diabetes-related kidney disease in elderly patients, emphasizing the prevalence of albuminuria and various stages of renal insufficiency.



GFR :Glomerular Filtration Rate

Figure 1: Prevalence of Diabetes-Related Kidney Disease in our Patients

Risk factors associated with renal insufficiency

In our investigation of variables linked to renal insufficiency (RI) in elderly diabetic patients, distinct patterns emerged across two age groups: 65–74 years and ≥75 years (Table 3).

Age: While not statistically significant, a trend towards older age is notable among patients with RI, particularly in the ≥75 years group.

Diabetes Duration: Patients with RI had slightly longer diabetes durations, a finding significant in both age groups.

Hypertension: There's a notably higher prevalence of hypertension among patients with RI in both age groups, highlighting a strong link between high blood pressure and kidney dysfunction.

Smoking: Interestingly, while smoking rates were lower among RI patients aged 65–74 years, smoking didn't appear to influence RI risk in those aged ≥75 years.

Glycemic Control (HbA1c %): RI patients exhibited higher HbA1c levels, indicating poorer blood sugar control, a significant trend across both age groups.

Lipid Profiles: Associations between lipid parameters and RI varied, with hypertriglyceridemia and hyperuricemia showing differing relationships across age groups.

Anemia: Notably, a significant association between anemia and RI was observed in the ≥75 years group, suggesting a potential role of anemia in kidney dysfunction among older patients.

In summary, hypertension, longer diabetes duration, suboptimal glycemic control, and select lipid abnormalities emerge as significant risk factors for RI in elderly diabetic patients. Anemia may also play a role, particularly in the older age group. These findings provide valuable insights for understanding and managing kidney disease in this population.

Table 2 : Risk Factors Associated with Renal Insufficiency in our Patients

		65–74 years			>= 75 years	
Variables	RI- N=168	RI+ n=57	p-value	RI- n=118	RI+ n=87	P-value

Age (years)	66.33 ±2.2	68.5 ±2.75	0.063	77.5±2.90	79.4 ±2.94	0.055
Diabetes duration (years)	10.96±3.11	11.28±2.67	0.026	11.03±2.58	11.93±2.94	0.016
Hypertension	88 (52.38)	37 (64.91)	0.001	61 (51.69)	61 (70.11)	0.001
Smoking	48 (28.57)	6 (10.52)	0.01	12 (10.16)	7 (8.04)	0.015
Obesity	53 (31.54)	19 (33.3)	0.2	16 (13.55)	20 (22.98)	0.81
HbA1c (%)	09.44±1.31	09.71±2.13	0.001	08.92±2.47	10.19±1.75	0.001
Hypertriglyceridemia	29 (17.26)	12 (21.05)	0.19	16 (13.55)	16 (18.39)	0.061
HypoHDLemia	44 (26.19)	16 (28.07)	0.42	23 (19.49)	26 (29.88)	0.005
HyperLDLemia	57 (33.92)	25 (43.85)	<0.001	46 (38.98)	31 (35.63)	<0.001
Anemia	21 (12.5)	9 (15.78)	0.012	12 (10.16)	25 (28.73)	0.13
Hyperuricemia	27 (16.07)	10 (18.51)	0.029	15 (12.71)	6 (6.89)	0.8

Values are expressed as mean±standard deviation or number (%).
RI- : Absence of renal insufficiency, RI+ : presence of renal insufficiency

Discussion

Our work has highlighted a progressive increase in the prevalence of diabetes-related kidney disease in elderly patients, which is likely the result of the high frequency of type 2 diabetes in this age group and the decrease in mortality rates due to better disease control, which may contribute to increased patient survival, allowing sufficient time for the development of chronic diabetes complications [8].

In a study conducted by Giuseppina et al. on a large sample of patients with type 2 diabetes spanning a wide age range, it was shown that renal complications affect 41.3% of this population, with over 60% of individuals over 75 years old being affected [9]. Indeed, the prevalence of diabetic kidney disease, particularly decreased glomerular filtration rate, was very high among subjects over 65 years old, with rates of 15.1% in Ireland [10] and 42% in type 2 diabetes patients over 75 years old according to the ZODIAC study [8], while the prevalence of albuminuria was 52% [8]. In comparison to our study, urinary albumin excretion alone was found in 46% of cases, while 57% of patients had chronic renal insufficiency.

Hyperglycemia and persistent hypertension are major risk factors for diabetic kidney disease [5]. However, it is extremely difficult to differentiate the specific roles of diabetes and hypertension in elderly diabetic kidney disease, due to their high prevalence with age and the kidney's sensitivity to hypertension in these patients [11]. In our study, glycemic imbalance, hypertension (P=0.001), and duration of diabetes (P=0.026 (G1), P=0.016 (G2)) were identified as risk factors associated with renal insufficiency, which was also demonstrated by Nielsen and colleagues [12], as well as Takamatsu, who showed that the decline in glomerular filtration rate with or without urinary albumin excretion was associated with the duration of diabetes and hypertension (72.2%) with P <0.0001 [4].

It is also well recognized that there are qualitative and quantitative changes in lipids and lipoproteins in diabetic patients responsible for significant atherogenesis [13]. Therefore, dyslipidemia represents a modifying risk factor for the progression of nephropathies, especially in elderly subjects [14]. In our study, 40.18% of our patients had hyperLDLemia with a highly significant P-value of 0.001, which aligned with the results of the study conducted by Takamatsu on a population of elderly diabetic patients (47.2%, P <0.0001) [4].

Given the aging population and the increasing prevalence of type 2 diabetes, these findings have substantial implications for healthcare providers. There is an urgent need to prioritize early detection and intervention strategies tailored to the elderly diabetic population to reduce the burden of diabetic kidney disease. Future research should focus on developing and evaluating targeted interventions to address the identified risk factors and improve outcomes for this vulnerable group.

Conclusion

Diabetic kidney disease remains a major health concern among elderly patients with type 2 diabetes. This study emphasizes the critical role of early and effective management of diabetes and its associated risk factors to prevent or delay the onset of kidney disease, ultimately enhancing the quality of life and reducing morbidity and mortality in this growing patient population.

Conflicts of interest

The authors declare do not have any conflicts of interest.

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