Screening for diabetes kidney disease in primary health care

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ABSTRACT

Diabetes Kidney Disease (DRD) is asymptomatic in the early stages of the disease, and for this reason, most patients are diagnosed only when they already have several complications. The aim of this study was to assess whether DRD screening is being carried out properly in patients with type 2 diabetes mellitus (DM2) treated in primary health care (PHC) of the Unified Health System. A cross-sectional study was carried out, lasting five months, in the PHC of the municipalities of Bernardino de Campos and Salto Grande, SP. Inclusion criteria were: diagnosis of DM2, age > 18 years, and being monitored in the units participating in the study. A total of 1093 met the inclusion criteria and agreed to participate in the study. It was found that 398 (36.4%) of the patients had never performed urine albumin and creatinine tests, and they did not calculate the albumin/creatinine ratio in a urine sample, together with the calculation of the glomerular filtration rate (GFR) estimated by CKD-EPI from serum creatinine; in contrast, 401 (36.7%) of the patients underwent these exams and had these indexes calculated in the last 12 months. These 401 patients had these DRD screening tests and calculations performed once every 12 months for the last 5 years. Os demais pacientes (294; 26,9%) realizaram somente exame de creatinina sérica nos últimos 12 meses. Os resultados demonstraram que o rastreamento da DRD não está sendo realizado de maneira adequada na maioria dos pacientes.

Keywords: Chronic kidney insufficiency, Type 2 *Diabetes Mellitus*, Primary health care, Diabetic nephropathy.

INTRODUCTION

Diabetic kidney disease (DKD) is one of the most frequent microvascular complications of type 2 diabetes mellitus (DM2). Approximately 40% of patients with DM2 develop DKD, which is the leading cause of chronic kidney disease (CKD) and end-stage kidney disease[1]. The prevalence of DKD has increased significantly, especially in developing countries such as Brazil[2]. DKD increases the mortality rate, mainly due to cardiovascular disease[3-5].

Chronic hyperglycemia is considered one of the main risk factors for the onset and progression of DKD. Hyperglycemia worsens renal function by altering the antioxidant system, which generates an increase in the formation of advanced glycation end products[6]. Long-term controlled clinical trials have shown that strict control of blood glucose concentration reduces the onset and progression of DKD[7-8].

DKD is asymptomatic in its early stages, and in most cases, it is only identified when severe complications of the disease appear[9]. The current guideline of the Brazilian Society of Diabetes (*Sociedade Brasileira de Diabetes* - SBD) recommends that the first DKD screening in patients with DM2 be performed soon after diagnosis; and recommends annual screening by measuring urinary albumin or the albumin/creatinine ratio in a urine sample, together with the calculation of the glomerular filtration rate (GFR) estimated by CKD-EPI from serum creatinine[10].

So far, there are few studies that have evaluated how DKD screening is carried out in patients with DM2 treated in primary health care (PHC) of the Public Health System (*Sistema Único de Saúde* - SUS), which is the place where most of these patients are monitored[11]. DKD screening has been evaluated in the SUS PHC in the city of Divinópolis, which has 240 thousand inhabitants. However, according to the Brazilian Institute of Geography and Statistics, 61.7% of Brazilian municipalities have a population <20 thousand inhabitants, and the size of the municipalities directly interferes in the organization of health services[11].

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Thus, this study aimed to assess whether screening for DKD in patients with DM2 treated at the SUS PHC in municipalities with <20 thousand inhabitants is being carried out following SBD recommendations.

METHODS

A cross-sectional study was carried out from June to October 2022 in PHC units in the municipalities of Bernardino de Campos and Salto Grande, in the state of São Paulo. Bernardino de Campos has 11,158 inhabitants and three PHC health units, while Salto Grande has 9,364 inhabitants and three PHC health units. This project was approved by the ethics committee for research involving human beings of the Marília Medicine Faculty (*Faculdade de Medicina de Marília*) under CAAE No. 57857822.1.0000.5413.

Inclusion criteria were: medical diagnosis of DM2, age >18 years, and being monitored in the PHC of the municipalities participating in the study. These criteria were identified using the citizen's electronic medical record. The researchers carried out home visits to patients who met the inclusion criteria, explained the objectives of the study, and how each patient would participate in the study. Patients who agreed to participate in the study signed an informed consent form.

Data from eligible patients who agreed to participate in the study were collected using the citizen's electronic medical records and interviews during home visits carried out by the researchers. The data collected were the patient's age, sex, education, illnesses, medications used, form of follow-up (doctor-centered or multidisciplinary follow-up with consultations with a nurse and clinical pharmacist), last date of testing, frequency of testing, and the result of the last examination of urinary albumin, creatinine, serum creatinine, calculation of the albumin/creatinine ratio in a urine sample, together with the calculation of the glomerular filtration rate (GFR) estimated by CKD-EPI from serum creatinine. As the citizen's electronic medical record was implemented in 2017 in these two municipalities, five years was the cut-off point for obtaining the last date of testing and frequency of application of the tests and calculations mentioned above.

Descriptive statistics were used to analyze the results, which are presented in absolute frequency, relative frequency, and mean ± standard deviation, as appropriate.

DKD staging was performed based on the *Kidney Disease: Improving Global Outcomes* (KDIGO) recommendation, which combines stages of loss of renal function based on GFR and urinary albumin excretion[12].

RESULTS

A total of 1093 patients met the inclusion criteria and agreed to participate in the study. Table 1 describes the demographic, clinical, and therapeutic characteristics of the patients.

Table 2 describes the prevalence of tests and calculations recommended by the SBD for DKD screening. More than half of the patients did not undergo adequate DKD screening. In the 401 patients who underwent all the DKD screening tests and calculations recommended by the SBD, it was verified that this screening occurred once a year for the last five years.

Table 1
Demographic, clinical, and therapeutic characteristics of the patients. N = 1093.

Variable	Outcome
Age, mean (DP) years	56.9 (1.4)
Female, n (%)	685 (62.7)
Schooling, n (%)	
• Incomplete primary education	385 (35.2)
• Complete primary education	708 (64.8)
Diseases, n (%)	
• Arterial hypertension	838 (76.7)
• Isolated hypercholesterolemia	740 (67.7)
• Obesity	667 (61.0)
Diseases, mean (DP)	3.7 (0.9)
Drugs, n (%)	
• Metformin	940 (86,0)
• Glibenclamide	857 (78.4)
• Losartan	741 (67.8)
• Hydrochlorothiazide	693 (63.4)
• Amlodipine	677 (61.9)
• Simvastatin	643 (58.8)
Drugs, mean (DP)	4.3 (0.5)

Among the 398 patients who underwent adequate DKD screening, it was found that 276 patients (69.3%) had normal albuminuria (< 30 mg/g), 119 patients (29.9%) had moderately increased albuminuria (30 – 299 mg/g) and three patients (0.8%) had significantly increased albuminuria (> 300 mg/g). While 276 patients (69.3%) had the GFR estimated by CKD-EPI based on slightly decreased serum creatinine (60 – 90 mL/minute/1.73m^2), 115 patients (28.9%) had estimated GFR moderately decreased (30 – 44 mL/minute/1.73m^2), 6 patients (1.5%) had a very low estimated GFR (15 – 29 mL/minute/1.73m^2), and 1 patient (0.3%) had GFR renal failure (< 15 mL/minute/1.73m^2).

Table 3 describes the DKD risk stratification of the sample.

Table 2
Frequency of laboratory tests and screening calculations for kidney disease in diabetes. N = 481.

Variable	n (%)
Urinary albumin and creatinine tests were performed once every 12 months, and the albumin/creatinine ratio was calculated in a urine sample, together with the calculation of the glomerular filtration rate estimated by CKD-EPI from serum creatinine.	401 (36.7)
Never performed urinary albumin and creatinine tests, and the albumin/creatinine ratio was not calculated in a urine sample, as well as not calculating the glomerular filtration rate estimated by CKD-EPI from serum creatinine.	398 (36.4)
Only had serum creatinine tests in the last 12 months, never had urine albumin and creatinine tests, and did not have their albumin/creatinine ratio in a urine sample calculated, as well as not calculating the glomerular filtration rate estimated by CKD-EPI from serum creatinine.	294 (26.9)

CKD: *Chronic Kidney Diasease.*

Table 3
Diabetes Kidney Disease risk stratification. N = 113.

Variable	N (%)
Low risk	276 (69.3)
Very high risk	122 (30.7)

RESULTS

This was the first study carried out in the PHC of the SUS in municipalities with a population of <20,000 inhabitants that assessed whether screening for DKD in DM2 patients is being carried out following SBD recommendations. The results showed that more than 60% of the sample had never had laboratory tests or DKD screening calculations. As DKD is asymptomatic, and its prevalence has increased significantly in recent years, these results demonstrate the need to adopt health strategies that change this scenario.

Among the patients who underwent laboratory tests and DKD screening calculations annually in the last five years, all were followed up by a multidisciplinary team with an established clinical and therapeutic protocol for the follow-up of patients with DM2. This protocol described the frequency of DKD screening and how it should be performed, and it authorized nurses and clinical pharmacists to request laboratory tests for this screening during consultations carried out by these professionals. The results of laboratory tests, medications used, and subjective information collected and organized during consultations with nurses and clinical pharmacists were discussed with the unit's physician, and a care plan was subsequently elaborated with the interventions that would be adopted for each patient[13,14]. However, all patients who did not adequately undergo DKD screening were followed up using the physician-centered model, without the involvement of other professionals.

A study carried out in Divinópolis found that 21.9% of the patients underwent the urinary albumin test, 12.1% of the patients underwent the albumin/creatinine ratio test, and 89.0% of the patients underwent the serum creatinine test (which enabled researchers to calculate the estimated GFR)[11].

CONCLUSION

It was verified that DKD screening in patients with DM2 assisted in the PHC of the SUS is not being carried out properly, with a direct influence of the care model on this result. The adoption of multidisciplinary strategies with the insertion of clinical nurses and pharmacists and the elaboration and follow-up of clinical and therapeutic protocols are essential to improve DKD screening in PHC.

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