Study of Microalbuminuria in Type 2 Diabetic Patients in the Reference Health Center of Commune VI of the Bamako District

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Abstract	Original Research Article

***Introduction*:** Diabetes is a group of metabolic diseases characterized by chronic hyperglycemia of variable degree resulting from a defect in insulin secretion and/or its action. Diabetic nephropathy is a common complication of diabetes, which in the early stage is characterized by a slight increase in urinary albumin excretion. ***Objective*:** To study micro albuminuria in type 2 diabetics in the diabetology-endocrinology unit of the Reference Health Center of Commune VI of Bamako. ***Methodology*:** We carried out a retrospective and prospective analytical study for one year from November 2021 to October 2022. This study described the sociodemographic and clinical variables. It focused on the prevalence of micro albuminuria in diabetics apart from urinary infection in the diabetology-endocrinology service unit of the Reference Health Center of Commune VI of Bamako. All type 2 diabetic patients with micro albuminuria less than 300 mg/24 hours apart from any urinary infection with or without hypertension were included in this study. ***Result*:** During the study period, 100 type 2 diabetic patients, whether hypertensive or not, were recruited, among whom 38 presented micro albuminuria with a hospital frequency of 38%. The sex ratio was 0.61, the average age was 56.79 years with extremes of 40 and 79 years. In our study, 40% of patients were overweight, more than half were at the stage of diabetic nephropathy. HyperLDLdemia was (17%). Hypertension was the most common associated risk factor and affected 55% of patients. Smoking was present in 20%. Retinopathy was present in 18%. Neurological complications represent 67%. Cardiomyopathy was the most represented cardiovascular complication with 17%. ***Conclusion*:** Micro albuminuria can appear at any age of development of diabetes. Whether or not it is associated with other risk factors remains decisive; it is the first paraclinical sign of diabetic nephropathy.
Keywords: Nephropathy, Microalbuminuria; Diabetes; complications; CS Ref CVI; Bamako.

INTRODUCTION

Diabetes mellitus is defined as a group of metabolic diseases characterized by chronic hyperglycemia of variable degree resulting from a defect in insulin secretion or insulin action or both abnormalities combined [1].

It is a pathology that is experiencing global progression; it is the most common endocrine pathology with 50% of all cases of endocrinopathy, it doubles in volume every 10 to 15 years in all countries in the world and becomes a public health problem that does not spare the Africa [2].

The estimated prevalence of diabetes (type 1 and type 2 combined, diagnosed and undiagnosed among people aged 20 to 79 years increased from 151 million (4.6% of the world population in 2000) to 463 million (9 .3% of the population) today [2].

In the absence of sufficient measures to address the pandemic, we predict that 578 million (10.2%) of the population will be living with diabetes by 2030; we will reach 7000 million (10.9%) by 2045 if nothing is done [2].

In Africa the prevalence of diabetes was 19 million in 2019 with a projection of 29 million in 2030 and 47 million in 2045 [2].

Diabetes is characterized mainly by non-degenerative complications (metabolic and infectious) and degenerative complications (micro angiopathies and macro angiopathies) [3].

Among the degenerative complications of diabetes, diabetic nephropathy holds a special place because of its inexorable progression towards renal failure in the absence of any early treatment.

This development is all the more rapid as diabetes is associated with high blood pressure. Diabetic nephropathy is responsible for 15% of deaths with a frequency of 25% of all diabetics whose disease has been progressing for more than 30 years [4].

In diabetics the prevalence of microalbuminuria is estimated at 15 to 20%. It is estimated that a third of diabetics worldwide develop kidney disease; the first sign of the appearance of kidney damage is microalbuminuria which appears in 2 to 5% of patients per year [4].

Conventionally, we are used to defining microalbuminuria as being present on the basis of the dosage included in the range of 30-300 mg/24 hours.

It now appears interesting to consider microalbuminuria as a continuous variable, making it possible to assess the level of risk at the time of screening and the effect of treatment during follow-up [5].

Our study therefore aimed to demonstrate the importance of measuring microalbuminuria in the management of diabetic nephropathy and to study this microalbuminuria in type II diabetics outside of urinary infection in the treatment unit. Diabetology-endocrinology of the reference health center of commune VI of Bamako.

METHODOLOGY

We carried out a retrospective and prospective analytical study for one year from November 2021 to October 2022. This study included sociodemographic and clinical variables.

This study focused on the prevalence of micro albuminuria in diabetics apart from urinary infection in the diabetology-endocrinology service unit of the reference health center of commune VI of Bamako.

All diabetic patients with microalbuminuria less than 300 mg/24 hours apart from any urinary infection with or without hypertension were included in this study.

Not included in this study were all diabetic patients who presented microalbuminuria associated with a urinary infection, macroproteinuria and/or other known renal pathologies.

Albuminuria was assessed using 24-hour urine, a method considered to be the <<GOLD STANDARD>> because it takes into account variations in urinary albumin excretion depending on the circadian rhythm.

This study, carried out as part of academic work, was conducted in strict compliance with the rules of good clinical practice. Free and informed consent from patients was obtained in writing. Confidentiality was strictly respected during data collection. The information obtained as part of this study was treated anonymously.

RESULTS

During the study period, 100 type 2 diabetic patients, whether hypertensive or not, were recruited, among whom 38 presented microalbuminuria with a hospital frequency of 38%, which allowed us to have the following results: the female predominance was clear in our study 62% compared to 38% for men. The average age was 56.79 years with extremes ranging from 40 to 79 years. Patients over 50 years old constituted 44% of our sample.

In our study, the frequency of albuminuria was higher in patients with more than 15 years of experience with a statistically significant link in univariate analysis (p = 0.0042) (See Figure below).
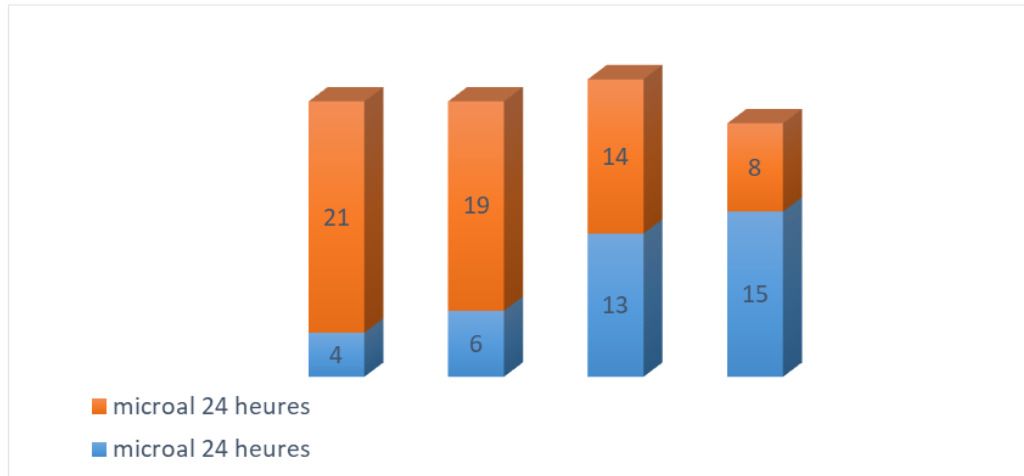
Figure 1: Distribution according to duration of progression of diabetes and microalbuminuria

Table 1: Distribution according to BMI and microalbuminuria

Body mass index	Microalbuminuria 24 hours		Total
	Positive	Négative	
Lower than 18,5	1(01%)	5(05%)	6(06%)
Between 18,5 à 24,9	10(10%)	13(13%)	23(23%)
Between 25 à 29,9	17(17%)	23(23%)	40(40%)
Between 30 à 34,9	11(11%)	13(13%)	24(24%)
Between 35 à 39,9	1(01%)	6(06%)	7(07%)
Total	**38**	**62**	**100**

Almost the majority of patients were overweight, i.e. 40%. P=0.0022

The determining factors of albuminuria can be divided into two: non-modifiable factors (heredity, age, duration of progression of diabetes) and (modifiable factors (glycemic balance, hypertension, and dyslipidemia).

Table 2: Distribution of patients according to risk factors associated with micro albuminuria

Risk factors	Microalbuminuria 24 hours	
	Positive	Négative
Tobacco	65,78(n=25)	34,21%(n=13)
Obesity (BMI)	31,57(n=12)	30,64(n=19)
HT	84,21(n=32)	37,09(n=23)
Dyslipidemia	44,73(N=17)	55,26(n=21)
HBA1c (>7%)	76,31(n=29)	27,41(n=17)

Table 3: Distribution of patients according to associated complications and microalbulinuria

Associated complications	Microalbuminuria 24 hours	
	Positive	Négative
Eyepieces	86,84% (n=33)	23,25%(N=10)
Cardiovascular	44,73% (n=17)	0,00%(n=0)
Neurological	100% (n=38)	38 ,8(n=26)

DISCUSSION

This was a prospective descriptive and analytical study which took place over a period of 12 months.

During the study period we collected 100 type 2 diabetic patients, whether hypertensive or not, of whom 38 patients had micro albuminuria identified on the basis of the inclusion criteria, i.e. an overall frequency of 38%. This prevalence (38%) of microalbuminuria is close to those found by Monabeka *et al.*, [6] in Congo (37.9%) and by Yameogo *et al.*, [7] in Senegal (36.8%). On the other hand, it is lower than that found by Elyoussfi [8] in Morocco (47.5%). All these results are totally different from those of Charfi *et al.,* [9] in Tunisia who found a prevalence of 15%. This difference is due to the fact that in Charfi *et al.*, [9] the sample size was small, in addition

the study was retrospective and took into account patients at the macroalbuminuria stage.

The female predominance was clear in our study 62% compared to 38% for the male sex. This result is comparable to that of Mariko [10] and Coulibaly [11] in Mali who found respectively (61.9% and 63.2%). This female predominance was also found by Djrolo *et al.*, [12] in Cotonou in Benin (62.1%) but also by Touré [13] in Mali and Yameogo *et al.*, [7] in Senegal which had found 59.5% and 74.5% respectively. On the other hand, Charfi *et al.*, [9] in Tunisia found a male predominance with 63.4% men. Women have more consultations than men. But in Mali SIDIBE [14] and TOURE [13] find that diabetes is of comparable frequency in both sexes.

The average age was 56.79 years with extremes ranging from 40 to 79 years. This average is close to that of Taleb *et al.*, [15] in Lebanon (56.4 ± 11 years) MARIKO [10] who found 52.34 years but higher than that of SIDIBE who found 42 years.

Patients over 50 years old constituted 44% of our sample. This predominance of subjects over 50 years old could be justified by the silent nature of the progression of type 2 diabetes but also by the frequency of diabetes which increases very markedly with age.

The determining factors of albuminuria can be divided into two: non-modifiable factors (heredity, age, duration of progression of diabetes) and (modifiable factors (glycemic balance, hypertension, and dyslipidemia) [16].

The univariate analysis of our results allowed us to highlight a correlation between the occurrence of albuminuria and the duration of progression of diabetes (p = 0.004), arterial hypertension (p < 0.0022), the imbalance of diabetes (p < 0.01), dyslipidemia (p = 0.0049) and diabetic retinopathy (p < 0.0041). These different factors have been identified in many other studies by various authors.

In the study by Varghese *et al.*, [17], the risk factors were arterial hypertension, increased glycated hemoglobin, dyslipidemia and duration of progression of diabetes. For Yameogo *et al.*, [7], these were: arterial hypertension, obliterating arteriopathy of the lower limbs, diabetic foot, glycated hemoglobin value, dyslipidemia and duration of progression of diabetes. And as for Monabeka *et al.*, [6], the risk factors for the occurrence of microalbuminuria were the duration of progression of diabetes, arterial hypertension and diabetic retinopathy.

Approximately 20 to 30% of diabetics will have an increase in albuminuria after an average duration of diabetes of 15 years [18]. In our study, the frequency of albuminuria was higher in patients with more than 15 years of experience with a statistically significant link in univariate analysis (p = 0.0042). This result is consistent with that of Ching-Heng *et al.*, [19]. In multivariate analysis, there was no statistically significant link between duration of diabetes and albuminuria.

Diabetes imbalance was found in 29% of our patients. This result is lower than that of Taleb *et al.*, [14] in Lebanon, Yameogo *et al.*, [7] in Senegal and Elyoussfi [8] in Morocco who found respectively: 66.6%, 75.2% and 79.1% of patients with diabetes imbalance. The patients in our series were therefore better balanced. This state of affairs could be explained by the fact that our patients were all followed by Endocrinologists.

In univariate analysis, there was a statistically significant link between diabetes imbalance and the occurrence of albuminuria (p < 0.0049). Albuminuria occurs more quickly in patients with poor glycemic control (higher HbA1c level). This has been established by several other studies [7, 6, 8].

Fifty-five (55%) of the hypertensive patients had positive albuminuria. This result is lower than that of Yameogo et al. [7] in Senegal 70.1%. In both univariate and multivariate analysis, hypertension remains strongly associated with the occurrence of albuminuria. Its presence increases the risk of albuminuria occurring by 2 (p=0.0022).

Most often it is HDL cholesterol and triglycerides which are implicated in the occurrence of albuminuria. Our study did not allow us to demonstrate this state of affairs. Indeed, during the analyzes of our results, we noticed that only total hypercholesterolemia, in univariate analysis, was a risk factor for the occurrence of albuminuria (p = 0.04). In multivariate analysis, hypercholesterolemia increases the risk of albuminuria by 1.5 (OR = 1.5, p = 0.5).

Other microvascular complications had a statistically significant link with the occurrence of albuminuria, in univariate analysis; these are diabetic retinopathy (p < 0.0041) and peripheral neuropathy (p = 0.0015). In our study, 69.7% of patients with diabetic retinopathy had albuminuria. This result is similar to that of Monabeka *et al.*, [6] in Congo which found 68.1%. In multivariate analysis, retinopathy remains strongly associated with albuminuria. Its presence increases the risk of albuminuria by 3 (OR = 3, p = 0.03). This correlation was demonstrated by Schwartz *et al.*, [20] in a study where diabetic retinopathy was more closely associated with Kimmelstiel-Wilson nodules than with mesangial sclerosis. The reason for this association is not known; but what is certain is that blocking the renin angiotensin system slows the rate of progression of diabetic nephropathy and may have a similar benefit in diabetic retinopathy.

CONCLUSION

Microalbuminuria remains the first preclinical sign of diabetic nephropathy and its measurement makes it possible to realize the existence of incipient renal damage. It must be measured systematically in all diabetic patients without urinary infection in order to identify early renal damage and consequently adopt adequate treatment with the aim of reducing or slowing down its progression towards patent diabetic nephropathy, a prelude to the onset of renal failure.

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