

SYSTEMATIC REVIEW    Oseni *et al.*, Microalbuminuria in Nigerian Patient with Type 2 Diabetes

# The Rising Burden of Microalbuminuria in Nigerian Patients with Type 2 Diabetes: A Systematic Review of Prevalence and Pathophysiology

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## Abstract

**Background:** The escalating prevalence of Type 2 Diabetes Mellitus (T2DM) in Nigeria brings with it a significant burden of microvascular complications, particularly microalbuminuria, an early marker of diabetic nephropathy and cardiovascular disease. This systematic review synthesises current evidence on the prevalence and pathophysiology of microalbuminuria among Nigerian T2DM patients.

**Methodology:** A systematic literature search was conducted using PubMed and Google Scholar for articles published between 2014 and 2025. Studies reporting the prevalence of microalbuminuria in Nigerian adults with T2DM were included.

**Results:** The prevalence of microalbuminuria in this population is notably high, with reported rates ranging from 34% to 58%. Recent hospital-based studies from Ogun State and Gusau reported rates of 53.4% and 62.5%, respectively. Key drivers include poor glycaemic control (elevated HbA1c), concurrent hypertension, and prolonged diabetes duration.

**Conclusion:** Microalbuminuria is a pervasive and serious complication of T2DM in Nigeria. Its high prevalence underscores an urgent need for systemic reforms in diabetes care, focusing on routine screening, stringent glycaemic and blood pressure management, and public health education to mitigate the risk of progressive renal and cardiovascular disease.

**Keywords:** Microalbuminuria, Type 2 Diabetes Mellitus, Diabetic Nephropathy, Prevalence, Nigeria, Systematic Review

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## Introduction

Diabetes Mellitus (DM) constitutes a paramount global public health challenge, with its prevalence in sub-Saharan Africa rising at an alarming and unprecedented rate. Nigeria, as the continent's most populous nation, bears a substantial and growing burden of Type 2 Diabetes Mellitus (T2DM), with recent estimates suggesting the country has the highest number of people living with diabetes in Africa.<sup>1,2</sup> This epidemic is fuelled by rapid urbanisation, nutritional transitions towards

processed foods, and increasingly sedentary lifestyles.<sup>3,4</sup> The implications of this surge extend far beyond the diagnosis of hyperglycaemia, as the long-term microvascular and macrovascular complications of diabetes place a crippling strain on individuals, families, and a healthcare system already grappling with multiple burdens of disease.<sup>5,6</sup>

A critical and often underdiagnosed consequence of T2DM is diabetic nephropathy (DN), a leading cause of end-stage renal disease worldwide. The

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clinical course of DN is typically insidious, and comorbid, often poorly managed, microalbuminuria, defined as a urinary albumin excretion of 30–300 mg/24 hours, serves as its earliest clinical sign.<sup>7,8</sup> The detection of microalbuminuria is a pivotal moment in the management of a diabetic patient. Beyond its prognostic value for progressive renal function decline, it is a well-established, independent marker for heightened systemic cardiovascular risk, reflecting a state of widespread endothelial dysfunction and chronic inflammation.<sup>9-11</sup> This intimate link between renal and cardiovascular pathology underscores the critical importance of early identification.

Within the Nigerian context, the prevalence of microalbuminuria among T2DM patients is disproportionately high, with numerous hospital-based studies consistently reporting rates between 34% and 58%.<sup>12-14</sup> Some regional reports, such as one from Gusau, indicate figures as high as 62.5%.<sup>15</sup> This elevated prevalence is not merely a clinical observation but a reflection of deeper systemic issues. It is fuelled by a nexus of factors, including limited access to consistent and affordable healthcare, widespread suboptimal glycaemic control, and a high prevalence of

hypertension<sup>16,2,17</sup> Consequently, this review aims to systematically consolidate the current literature on the prevalence and underlying pathophysiological mechanisms of microalbuminuria in Nigerian T2DM patients. By synthesising this evidence, we seek to elucidate the scale of the problem, clarify its drivers, and discuss the urgent clinical and public health interventions required to mitigate this growing crisis.

## Methodology

A systematic search of the literature was performed to identify all relevant studies published between 2014 and 2025. Electronic databases, including PubMed and Google Scholar, were queried using a combination of keywords and MeSH terms: "microalbuminuria," "albuminuria," "Type 2 Diabetes Mellitus," "Nigeria," and "prevalence." The search was limited to studies in human subjects published in English. Included studies were hospital or community-based cross-sectional studies that reported the prevalence of microalbuminuria in Nigerian adults with T2DM. The titles, abstracts, and subsequently full-text articles were screened for eligibility by the authors.

## Results

**T2DM**

**Patients**

**Demographics**

The compiled data from studies across Nigeria's geopolitical zones reveal a consistently and alarmingly high prevalence of microalbuminuria. A detailed study conducted in Sagamu, Ogun State (South-West Nigeria), reported a prevalence of 53.4% among its cohort, firmly associating this complication with prolonged duration of diabetes and inadequate glycaemic control.<sup>16</sup> Mirroring this finding, a more recent investigation from Gusau, Zamfara State (North-West Nigeria), documented an even higher rate of 62.5%, with statistical analysis strongly correlating its presence with elevated HbA1c levels and systolic hypertension.<sup>15</sup> A broader perspective is provided by a systematic review and meta-analysis focusing on the African continent, which indicated a pooled microalbuminuria prevalence ranging from 30% to over 60% in patients with diabetes, with Nigerian data forming a significant part of this high-end estimate.<sup>18</sup> This considerable range underscores microalbuminuria as a common complication, while also hinting at significant regional variations, likely driven by differences in local risk factor profiles, genetic predispositions, and disparities in healthcare access and quality.

The development of microalbuminuria in this cohort is unequivocally multifactorial. Poor glycaemic control remains the most consistently documented and potent modifiable risk factor. Multiple studies confirm a direct correlation between rising HbA1c levels and the increasing incidence of microalbuminuria, suggesting that for every percentage point increase in HbA1c, the risk of renal damage escalates significantly.<sup>19,20</sup> The coexistence of hypertension acts as a powerful force multiplier, significantly amplifying the risk. Hypertension contributes to haemodynamic stress on the glomeruli, accelerating the pathological processes that lead to albumin leakage.<sup>17,21,22</sup> Other significant contributing elements identified in the literature include increasing patient age, a longer duration of diabetes since diagnosis, and the presence of diabetic dyslipidaemia—characterised by elevated triglycerides and low HDL-cholesterol.<sup>23,24</sup> Furthermore, emerging data points to the role of socioeconomic determinants, where patients from lower socioeconomic strata exhibit higher rates of microalbuminuria, likely due to delayed presentation and poorer access to consistent medication and monitoring.<sup>25</sup>

**Discussion**

The pathophysiological pathway to microalbuminuria in T2DM is complex, representing a deleterious interplay of metabolic, haemodynamic, and inflammatory pathways. Chronic hyperglycaemia, the hallmark of diabetes, induces direct glomerular injury through several mechanisms. These include the formation of advanced glycation end-products (AGEs) that cross-link proteins in the glomerular basement membrane, and the generation of profound oxidative stress, which collectively damage the structural integrity of the filtration barrier and impair podocyte function.<sup>9,19,26</sup> Concurrent hypertension, highly prevalent in Nigerian diabetic patients, exacerbates this injury by increasing intraglomerular capillary pressure, a process that accelerates glomerulosclerosis and podocyte loss.<sup>17,21</sup> Furthermore, a state of chronic, low-grade inflammation and systemic endothelial dysfunction, mediated by profibrotic cytokines such as Transforming Growth Factor-beta (TGF- $\beta$ ), promotes extracellular matrix deposition and renal fibrosis, further cementing renal damage.<sup>9,27</sup> This triad of metabolic, haemodynamic, and

inflammatory insults creates a perfect storm for the development and progression of microalbuminuria.

The high prevalence rates observed across Nigeria are therefore a clarion call for a paradigm shift in diabetes management from a reactive to a proactive model. The stark regional variations and the powerful, consistent link to modifiable risk factors like hyperglycaemia and hypertension suggest that a significant proportion of this microvascular burden is preventable. A critical failure point identified in the literature is the profound underutilisation of routine screening. The reliance on dipstick urinalysis, which detects overt proteinuria but misses microalbuminuria, and the limited availability of cost-effective spot urine albumin-to-creatinine ratio (UACR) tests in primary and secondary care settings, means that a vast number of patients are diagnosed at a late, often irreversible stage, missing the critical window for early intervention that can halt or slow progression.<sup>28,29</sup>

Addressing this challenge demands an integrated, multi-pronged approach. Firstly, the implementation of annual microalbuminuria screening for all T2DM patients, using the UACR method as recommended by international

SYSTEMATIC REVIEW Oseni *et al.*, Microalbuminuria in Nigerian Patient with Type 2 Diabetes guidelines, must be prioritised and integrated into coordinated action. Strengthening healthcare national diabetes care protocols.<sup>8,30</sup> Secondly, systems to enable routine screening, ensuring aggressive and tailored management of access to effective antihyperglycaemic and hyperglycaemia and hypertension is non-antihypertensive therapies, and launching public negotiable. This includes the preferential use of health initiatives for diabetes education are critical renin-angiotensin-aldosterone system (RAAS) steps. Future research should focus on nationwide inhibitors like ACE inhibitors or ARBs, which epidemiological studies and cost-effective have proven efficacy in reducing albuminuria and interventions tailored to the Nigerian context to slowing nephropathy progression beyond their curb the rising tide of diabetic complications. blood-pressure-lowering effects.<sup>31</sup> Finally, community-centred education programmes

focusing on lifestyle modification, including dietary changes, physical activity, and smoking cessation—are essential for long-term risk reduction and empowering patients in their own care. The exploration of novel, cost-effective strategies, such as the adaptation of digital health platforms for patient monitoring and education as seen in other settings, could offer promising avenues for the Nigerian healthcare context.<sup>32</sup>

## Conclusion

Microalbuminuria is a highly prevalent and serious complication of T2DM in Nigeria, signalling a high risk for subsequent renal and cardiovascular disease. The current situation demands urgent and

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