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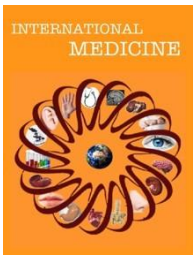

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Original Research

Clinical Profile of Newly Diagnosed Type 2 Diabetes Mellitus Patients

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Abstract

Background: Type 2 diabetes mellitus (T2DM) often remains undetected for several years before clinical diagnosis, during which time chronic hyperglycaemia may already produce microvascular and macrovascular damage. Characterising the clinical profile of patients at the time of first diagnosis is important for guiding early risk stratification and management. ***Objective:*** To study the demographic, clinical, anthropometric, and biochemical profile of newly diagnosed T2DM patients, and to determine the prevalence of associated comorbidities and complications already present at the time of diagnosis. ***Methods:*** This cross-sectional observational study included 200 patients newly diagnosed with T2DM, defined according to American Diabetes Association criteria, presenting to a tertiary care hospital. Demographic data, presenting symptoms, anthropometric measurements, blood pressure, fasting and postprandial plasma glucose, HbA1c, and lipid profile were recorded. All patients underwent screening for diabetic retinopathy, peripheral neuropathy, and nephropathy at the time of diagnosis. ***Results:*** The mean age at diagnosis was 48.6 ± 11.3 years, with a male predominance (58.0%). Polyuria (54.0%) and polydipsia (48.0%) were the most common presenting symptoms, while 38.0% of patients were detected incidentally on routine screening. The mean HbA1c at diagnosis was 8.9 ± 1.8%, and 69.0% of patients were overweight or obese. Hypertension (46.0%) and dyslipidaemia (52.0%) were the most common associated comorbidities. Notably, 31.0% of patients already had at least one microvascular or macrovascular complication at the time of diagnosis, most commonly peripheral neuropathy (17.0%), followed by retinopathy (12.0%) and nephropathy (9.0%). ***Conclusion:*** A substantial proportion of patients with newly diagnosed T2DM already have measurable target-organ damage at the time of diagnosis, underscoring a prolonged preceding period of undetected hyperglycaemia. These findings support the case for more proactive screening strategies in at-risk populations to enable earlier detection and intervention.

Keywords: *Type 2 diabetes mellitus; Newly diagnosed; Clinical profile; HbA1c; Microvascular complications; Screening.*

Introduction

Diabetes mellitus has emerged as one of the most pressing global public health challenges of the present century. According to the International Diabetes Federation (IDF) Diabetes Atlas, an estimated 589 million adults aged 20–79 years were living with diabetes in 2019, a figure projected to rise to 853 million by 2050, with type 2 diabetes mellitus (T2DM) accounting for more than 90% of all cases worldwide (1,2). Strikingly, the IDF estimates that approximately 43% of adults living with diabetes globally — around 252 million people — remain undiagnosed, with the overwhelming majority residing in low- and middle-income countries where access to routine screening is often limited (1).

T2DM is characterised by an insidious onset, with chronic hyperglycaemia frequently preceding clinical diagnosis by a considerable period. Earlier estimates suggested that the interval between the biological onset of T2DM and its clinical detection could extend up to seven to ten years, during which sustained hyperglycaemia may already initiate the structural and functional vascular damage that underlies both microvascular complications, such as retinopathy, nephropathy, and neuropathy, and macrovascular complications, such as coronary artery disease and peripheral vascular disease (3,4). Although earlier detection through increased disease awareness and more widespread opportunistic screening has likely reduced this lag in many settings in recent decades, contemporary studies continue to demonstrate that a substantial proportion of patients already harbour one or more chronic complications at the time their diabetes is first diagnosed (4).

The classical presenting symptoms of T2DM — polyuria, polydipsia, polyphagia, and unexplained weight loss — result directly from the osmotic effects of sustained hyperglycaemia, but a considerable proportion of patients remain asymptomatic in the early years of the disease and are instead identified incidentally during routine health checks, pre-operative evaluation, or screening prompted by an unrelated illness (5). This heterogeneity in mode of presentation has direct implications for the clinical profile observed at diagnosis, since patients detected through symptomatic presentation often have more advanced hyperglycaemia and a higher prevalence of complications than those identified through opportunistic screening (3,5).

Several studies examining the clinical profile of newly diagnosed T2DM patients have consistently highlighted a high background prevalence of cardiometabolic risk factors and target-organ damage at the time of diagnosis. The landmark Verona Newly Diagnosed Type 2 Diabetes Study (VNDS) found that as many as half of newly diagnosed T2DM patients already exhibited clinical or preclinical evidence of microvascular and/or macrovascular complications at presentation, despite a trend toward earlier diagnosis attributed to increased disease awareness in recent decades (4). Similarly, a study evaluating microvascular complications in newly diagnosed T2DM patients in a South Asian population found that overall microvascular complication prevalence rose sharply with poor glycaemic control, with neuropathy, nephropathy, and retinopathy identified in 68.5%, 56.2%, and 31.4% of patients with poor glycaemic control respectively, compared with substantially lower rates among those with better control at diagnosis (6). A separate study evaluating risk factors for microvascular complications in newly diagnosed T2DM reported an overall microvascular complication prevalence of 18.04%, with neuropathy, retinopathy, and nephropathy each

independently associated with older age and higher HbA1c at diagnosis (7).

Beyond microvascular disease, newly diagnosed T2DM patients frequently present with an adverse cardiometabolic risk profile, including overweight or obesity, hypertension, and dyslipidaemia, which compound the risk of subsequent cardiovascular events if left unaddressed (4,8). Large registry-based studies have further demonstrated that the presence of complications at the time of diabetes diagnosis is independently associated with adverse long-term outcomes, including accelerated progression to end-stage renal disease, underscoring the prognostic importance of characterising the clinical profile at first presentation rather than waiting for complications to declare themselves later in the disease course (9). Given the considerable variation in clinical profile and complication burden reported across different populations and healthcare settings, continued local evaluation of newly diagnosed T2DM patients remains clinically valuable. The present study was therefore undertaken to characterise the demographic, clinical, anthropometric, and biochemical profile of newly diagnosed T2DM patients at a tertiary care centre, and to determine the prevalence of associated comorbidities and complications already present at the time of diagnosis.

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Materials and Methods

Study Design and Setting

This cross-sectional observational study was conducted in the Department of General Medicine at a tertiary care teaching hospital over a period of 12 months, following approval from the Institutional Ethics Committee. Written informed consent was obtained from all participants prior to enrolment.

Study Population

Adults aged 18 years and above with a new diagnosis of T2DM, made within the preceding three months according to American Diabetes Association criteria (fasting plasma glucose ≥126 mg/dL, or 2-hour plasma glucose ≥200 mg/dL during a 75 g oral glucose tolerance test, or HbA1c ≥6.5%, or random plasma glucose ≥200 mg/dL with classical symptoms of hyperglycaemia), were considered for inclusion. A total of 200 consecutive eligible patients were enrolled. Patients with type 1 diabetes mellitus, gestational diabetes, secondary diabetes due to pancreatic disease or drug-induced hyperglycaemia (such as with corticosteroid therapy), and those with a pre-existing diagnosis of diabetes of more than three months' duration or already established on antidiabetic therapy prior to the index diagnosis, were excluded.

Data Collection

A structured proforma was used to record demographic details (age, sex, residence, family history of diabetes), presenting complaints, and mode of detection (symptomatic presentation versus incidental detection on routine or opportunistic screening). Height and weight were measured using a standardised stadiometer and calibrated weighing scale to calculate body mass index (BMI), and waist circumference was measured at the level of the umbilicus. Blood pressure was recorded in the sitting position using a calibrated mercury sphygmomanometer, with the mean of two readings taken five minutes apart used for analysis.

Laboratory Investigations

Venous blood samples were collected after an overnight fast of at least eight hours for estimation of fasting plasma glucose, lipid profile (total cholesterol, triglycerides, high-density lipoprotein [HDL], and low-density lipoprotein [LDL] cholesterol), and glycated haemoglobin (HbA1c) by high-performance liquid chromatography. A 2-hour postprandial plasma glucose sample was also obtained. Renal function tests, urine microalbumin-to-creatinine ratio, and electrocardiography were performed in all patients. All patients underwent fundus examination by an ophthalmologist for evidence of diabetic retinopathy, and clinical screening for peripheral neuropathy was performed using the 10 g monofilament test and vibration perception threshold testing with a biothesiometer. Nephropathy was defined as the presence of micro- or macroalbuminuria on a spot urine sample, and peripheral vascular disease was assessed clinically and, where indicated, using ankle-brachial pressure index measurement.

Statistical Analysis

Data were entered into a structured spreadsheet and analysed using SPSS software. Continuous variables were expressed as mean ± standard deviation, and categorical variables as frequencies and percentages. Comparisons between subgroups were performed using the chi-square test for categorical variables and the independent samples t-test for continuous variables, with a p-value of less than 0.05 considered statistically significant.

Results

A total of 200 patients with newly diagnosed T2DM were enrolled in the study. The demographic and clinical characteristics of the study population are summarised in Table 1.

Table 1. Demographic and clinical characteristics of the study population (N = 200)

Characteristic	Value	Percentage / Range
Total patients (n)	200	100%
Male	116	58.0%
Female	84	42.0%
Mean age, years (± SD)	48.6 ± 11.3	Range 22-78
Age group <40 years	38	19.0%
Age group 40-59 years	104	52.0%
Age group ≥60 years	58	29.0%
Urban residence	138	69.0%
Rural residence	62	31.0%
Family history of diabetes mellitus	92	46.0%
Detected incidentally (asymptomatic screening)	76	38.0%
Detected on symptomatic presentation	124	62.0%

The mean age at diagnosis was 48.6 ± 11.3 years, with the largest proportion of patients in the 40-59 year age group (52.0%). There was a male predominance (58.0%), and a family history of diabetes was present in 46.0% of patients. Notably, 38.0% of patients were detected incidentally during routine health screening rather than through symptomatic presentation, while the remaining 62.0% presented with overt

symptoms of hyperglycaemia.

Table 2. Presenting symptoms at the time of diagnosis

Presenting Symptom	No. of Patients*	Percentage (%)
Polyuria	108	54.0%
Polydipsia	96	48.0%
Fatigue / generalised weakness	84	42.0%
Unexplained weight loss	52	26.0%
Blurring of vision	44	22.0%
Polyphagia	38	19.0%
Recurrent skin / genital infections	32	16.0%
Paraesthesia / tingling of extremities	28	14.0%
Non-healing wound or ulcer	10	5.0%
Asymptomatic (incidental detection)	76	38.0%

Polyuria (54.0%) and polydipsia (48.0%) were the most frequently reported presenting symptoms, consistent with the classical osmotic manifestations of hyperglycaemia. Fatigue and generalised weakness were reported by 42.0% of patients, while unexplained weight loss and visual blurring were present in 26.0% and 22.0% of patients respectively. Notably, 5.0% of patients presented with a non-healing wound or ulcer, and 38.0% were entirely asymptomatic, with diabetes detected only on incidental laboratory screening. (*Percentages do not sum to 100% as patients commonly reported more than one symptom.)

Table 3. Anthropometric and biochemical parameters at diagnosis

Parameter	Mean ± SD	Range / Remarks
Mean BMI (kg/m²)	26.4 ± 4.1	–
Mean waist circumference (cm)	94.6 ± 9.8	–
Mean systolic blood pressure (mmHg)	132.8 ± 16.4	–
Mean diastolic blood pressure (mmHg)	84.2 ± 9.7	–
Mean fasting plasma glucose (mg/dL)	186.4 ± 52.6	–
Mean postprandial plasma glucose (mg/dL)	278.9 ± 68.3	–
Mean HbA1c (%)	8.9 ± 1.8	Range 6.6–14.2
Mean total cholesterol (mg/dL)	198.6 ± 38.4	–
Mean triglycerides (mg/dL)	184.3 ± 64.7	–
Mean HDL cholesterol (mg/dL)	41.2 ± 7.6	–
Mean LDL cholesterol (mg/dL)	118.7 ± 30.5	–

The mean BMI of the study population was 26.4 ± 4.1 kg/m², placing the average patient in the overweight category, with a mean waist circumference of 94.6 ± 9.8 cm indicating substantial central adiposity. The mean HbA1c at diagnosis was 8.9 ± 1.8%, considerably above the diagnostic threshold of 6.5%, indicating that most patients had been hyperglycaemic for a meaningful period prior to detection. Mean fasting and postprandial plasma glucose values were 186.4 ± 52.6 mg/dL and 278.9 ± 68.3 mg/dL respectively. The lipid profile showed mean triglycerides of 184.3 ± 64.7 mg/dL and mean HDL cholesterol of 41.2 ± 7.6 mg/dL, reflecting the atherogenic dyslipidaemia pattern characteristically associated with T2DM.

Table 4. Associated comorbidities and risk factors at diagnosis

Associated Factor / Comorbidity	No. of Patients	Percentage (%)
Overweight/obese (BMI ≥23 kg/m²)	138	69.0%
Hypertension (known or newly detected)	92	46.0%
Dyslipidaemia	104	52.0%
Coronary artery disease	18	9.0%
Current smoker	44	22.0%
Current alcohol consumer	36	18.0%
Sedentary lifestyle	126	63.0%

Overweight or obesity (BMI ≥23 kg/m²) was present in 69.0% of patients, reflecting the strong association between excess adiposity and T2DM. Dyslipidaemia (52.0%) and hypertension (46.0%) were highly prevalent at the time of diagnosis, and a sedentary lifestyle was reported by 63.0% of patients. Coronary artery disease was already documented in 9.0% of patients at the time their diabetes was first diagnosed.

Table 5. Microvascular and macrovascular complications present at the time of diagnosis

Complication	No. of Patients	Percentage (%)
Any microvascular or macrovascular complication	62	31.0%
Diabetic peripheral neuropathy	34	17.0%
Diabetic retinopathy	24	12.0%
Diabetic nephropathy (micro/macroalbuminuria)	18	9.0%
Peripheral vascular disease	8	4.0%
Coronary artery disease (documented)	10	5.0%
No complications detected at diagnosis	138	69.0%

Nearly one-third of patients (31.0%) already had at least one microvascular or macrovascular complication at the time their T2DM was first diagnosed. Diabetic peripheral neuropathy was the most common complication (17.0%), followed by diabetic retinopathy (12.0%) and nephropathy (9.0%), while peripheral vascular disease and documented coronary artery disease were present in 4.0% and 5.0% of patients respectively. The remaining 69.0% of patients had no detectable complication at the time of diagnosis.

Discussion

The present study characterises the clinical, anthropometric, and biochemical profile of 200 newly diagnosed T2DM patients and demonstrates that a considerable proportion already harbour cardiometabolic risk factors and chronic complications at the time of diagnosis. The mean age at diagnosis of 48.6 ± 11.3 years and male predominance observed in our cohort are broadly consistent with previously reported demographic patterns of T2DM, while the finding that 38.0% of patients were detected incidentally rather than through symptomatic presentation underscores the often insidious and clinically silent course of early T2DM (3,5).

The high mean HbA1c of 8.9 ± 1.8% observed at diagnosis in our cohort indicates that, on average, patients had been hyperglycaemic for a substantial period before detection, a finding that resonates with the broader literature on the natural history of T2DM. The Verona Newly Diagnosed Type 2 Diabetes Study similarly found that despite a trend toward earlier detection in recent decades attributable to increased disease awareness, approximately half of newly diagnosed patients already showed clinical or preclinical evidence of microvascular and/or macrovascular complications, reflecting a prolonged antecedent period of undetected hyperglycaemia (4). Our observed complication prevalence of 31.0% at diagnosis, while somewhat lower than the VNDS figure, remains substantial and is consistent with the broader pattern described across multiple populations of measurable target-organ damage being present well before diabetes is formally diagnosed.

The prevalence and pattern of microvascular complications observed in our study — with peripheral neuropathy (17.0%) being the most common, followed by retinopathy (12.0%) and nephropathy (9.0%) — is broadly comparable to figures reported in similar populations. A study evaluating microvascular complications and their associated risk factors in newly diagnosed T2DM patients reported an overall microvascular complication prevalence of 18.04%, with neuropathy, retinopathy, and nephropathy present in 8.2%, 9.5%, and 2.8% of patients respectively, and found that subjects with microvascular complications were significantly older and had significantly higher HbA1c values than those without complications (7). Similarly, a study from a tertiary diabetic clinic found that microvascular complications were markedly more prevalent among newly diagnosed patients with poor glycaemic control (HbA1c >6.5%) compared with those with good control, with neuropathy, nephropathy, and retinopathy present in 68.5%, 56.2%, and 31.4% of the poorly controlled group respectively (6). Taken together, these findings reinforce the strong, consistent association between the degree of hyperglycaemia at diagnosis and the burden of microvascular complications already present, a relationship also evident in our own cohort given the comparatively high mean HbA1c observed.

The high prevalence of overweight/obesity (69.0%), dyslipidaemia (52.0%), and hypertension (46.0%) observed at diagnosis in our study highlights the cluster of cardiometabolic risk factors that frequently coexist with incident T2DM, consistent with the well-established pathophysiological links between insulin resistance, central adiposity, and atherogenic dyslipidaemia (8). Large-scale registry data from Taiwan examining over one million newly diagnosed T2DM patients similarly demonstrated that complications present at the time of diagnosis were independently associated with adverse long-term renal outcomes, including more rapid progression to dialysis, reinforcing that the clinical and metabolic profile observed at first diagnosis carries important prognostic implications well beyond the index presentation (9). These collective findings argue strongly for more proactive, population-based screening strategies, particularly in middle-aged adults with risk factors such as obesity, sedentary lifestyle, and family history, since a substantial fraction of the burden described in our and other studies could plausibly be detected — and complications potentially averted — through earlier identification of hyperglycaemia.

This study has certain limitations. As a single-centre, cross-sectional study, our findings may be influenced by referral bias inherent to a tertiary care setting, which could result in a higher complication burden than would be observed in a community-based or primary care population. The reliance on a single HbA1c measurement and screening assessment at the time of diagnosis, rather than longitudinal follow-up, also precludes assessment of how the clinical profile evolves with subsequent treatment. Larger, multicentre, community-based studies would help to validate and extend these findings.

Conclusion

This study demonstrates that newly diagnosed T2DM patients present with a substantial burden of cardiometabolic risk factors, including overweight/obesity, hypertension, and dyslipidaemia, and that nearly one-third already have at least one microvascular or macrovascular complication at the time of diagnosis, most commonly peripheral neuropathy. A considerable proportion of patients remain asymptomatic and are detected only through incidental screening, underscoring the prolonged silent phase that frequently precedes clinical diagnosis of T2DM. These findings support the implementation of more proactive screening programmes in at-risk populations to enable earlier detection of T2DM and timely intervention before the development of irreversible target-organ damage.

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