Current status of diagnosis and management of prediabetes at Hai Phong Medical University Hospital in 2023

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ABSTRACT

Objectives: To evaluate the current status of diagnosis and management of prediabetes at Hai Phong Medical University Hospital in 2023. ***Method***: A cross-sectional study was conducted on 214 patients with prediabetes (126 men, 88 women; mean age 67.1 ± 8.5 years) who attended Hai Phong Medical University Hospital between January and October 2023. Data on diagnostic tests, clinical characteristics, and treatment modalities were collected and analyzed according to the American Diabetes Association (ADA) and Vietnamese Ministry of Health guidelines [1,7]. ***Results:*** All patients were diagnosed with prediabetes based on fasting plasma glucose, while only 15.9% underwent HbA1c testing and 1.4% received an oral glucose tolerance test (OGTT). Screening for pharmacological treatment criteria was incomplete: BMI was assessed in 29.4% of patients, HbA1c in 17.3%, and family history in 27.6%. Among those evaluated, 91.1% met at least one ADA-recommended criterion for pharmacological therapy. However, only 1.4% received metformin, while 98.6% were managed with lifestyle modification alone. ***Conclusions:*** The diagnosis and management of prediabetes at Hai Phong Medical University Hospital did not fully adhere to international and national guidelines [1,2,7]. Underutilization of HbA1c and OGTT, incomplete risk factor assessment, and limited pharmacological intervention highlight the need for improved adherence to evidence-based recommendations to prevent progression to type 2 diabetes [8,10].

Keywords: *prediabetes, fasting glycaemia, HbA1c, ADA, OGTT.*

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INTRODUCTION

Type 2 Diabetes mellitus is a chronic non-communicable and incurable disease. Prediabetes is defined as an intermediate state of hyperglycemia with glucose levels above the normal state but below the diagnostic levels of diabetes. Prediabetes can be reversed with early detection and lifestyle intervention and/or medication therapy [1].

According to the International Diabetes Federation (IDF), the global prevalence of prediabetes was 7.5% in adults aged 20–70 (equivalent to 352.1 million individuals) in 2019, and by 2045 its prevalence is projected to reach 8.3% [2]. In the USA, more than one out of three adults over 20 years has prediabetes [5]; in Vietnam, the prevalence of prediabetes among adults aged 30–69 was 17.8% according to the STEPS survey 2020 [3].

Recent clinical trials and follow-up studies have demonstrated that diabetes can be prevented with intensive lifestyle modification and/or metformin among

individuals with prediabetes. For example, the Diabetes Prevention Program Outcomes Study (DPPOS) confirmed that lifestyle interventions reduced the incidence of diabetes by 58%, while metformin reduced it by 31%, with benefits persisting at 15 years [10]. Similar findings have been reported in European and Asian populations [6,8].

In 2020, the Ministry of Health of Vietnam issued guidelines for the diagnosis and treatment of prediabetes [7]. However, in Hai Phong city, there have been limited reports on prediabetes at the grassroots level. Therefore, we conducted this research with the goal of describing the current status of diagnosis and management of prediabetes at Hai Phong Medical University Hospital in 2023.

MATERIALS AND METHODS

Study Design and Setting

We conducted a hospital-based cross-sectional study at Hai Phong Medical University Hospital, Vietnam, between January and October 2023. The study protocol was reviewed and approved by the Institutional Scientific Council of Hai Phong University of Medicine and Pharmacy. Written informed consent was obtained from all participants prior to enrollment.

Study Population

A total of 214 out patients with prediabetes who were examined and diagnosed at the outpatient department of Haiphong Medical University hospital (126 men and 88 women), aged 32–86 years (mean age 67.1 ± 8.5 years), were included. Eligible participants met the following *inclusion criteria*:

- Fulfilling diagnostic criteria for prediabetes according to the American Diabetes Association (ADA) and the Vietnamese Ministry of Health (MoH) guidelines [1,7].
- Ability and willingness to provide informed consent and complete study procedures.

Exclusion criteria were:

- Previous diagnosis of type 2 diabetes or current use of antidiabetic medication.
- Use of drugs known to affect glucose metabolism.
- Severe comorbidities or conditions limiting participation.

Data Collection

Sociodemographic and clinical data were collected through structured interviews and medical record review. Variables included age, sex, weight, height, body mass index (BMI), blood pressure, history of hypertension, history of gestational diabetes mellitus (GDM, in women), and family history of type 2 diabetes mellitus (T2DM) in first-degree relatives.

Laboratory Measurements [1,2,7]

- Fasting plasma glucose (FPG): Measured after an overnight fast of at least 8 hours.
- Oral glucose tolerance test (OGTT): Conducted using a 75 g oral glucose load with plasma glucose measured at 2 hours.
- HbA1c: Determined by high-performance liquid chromatography (HPLC) using the Bio-Rad D-10 Hemoglobin A1c Testing System (Bio-Rad Laboratories, Hercules, CA, USA), certified by the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC).
- Lipid profile: Total cholesterol, HDL-C, and triglycerides were measured using standard enzymatic methods.

Diagnostic Criteria

Prediabetes was defined according to ADA and MoH guidelines [1,7] as the presence of one or more of the following:

- Impaired fasting glucose (FPG 5.6–6.9 mmol/L).

- Impaired glucose tolerance (2h-OGTT 7.8–11.0 mmol/L).
- HbA1c 5.7–6.9%.

Criteria for Pharmacological Therapy

Based on ADA and MoH recommendations [1,7], pharmacological therapy (metformin) was indicated for prediabetic patients with at least one of the following:

- BMI ≥25 kg/m².
- Age <60 years.
- History of GDM.
- Both IFG and IGT.
- HbA1c >6.0%.
- Hypertension.
- HDL-C <0.9 mmol/L or triglycerides >2.52 mmol/L.
- First-degree relative with T2DM.

Statistical Analysis

- Data were entered and analyzed using SPSS version XX (IBM Corp., Armonk, NY, USA).
- Continuous variables were first tested for normality using the Kolmogorov–Smirnov test.
- Variables with normal distribution (e.g., age, fasting plasma glucose) were presented as mean ± standard deviation (SD).
- Variables with skewed distribution (e.g., triglycerides, HbA1c) were presented as median (interquartile range, IQR).
- Categorical variables (e.g., sex, presence of hypertension, family history of diabetes) were expressed as frequencies and percentages.
- Key biochemical parameters including fasting plasma glucose (FPG), 2h-OGTT, and HbA1c values were summarized in descriptive statistics to provide a comprehensive overview of glycemic status in the study population.
- A p-value <0.05 was considered statistically significant.

RESULTS

General characteristics and current status of prediabetes diagnosis at Haiphong Medical University hospital

Table 3.1. *Age of study subjects*

Age	n	%	Mean±SD (min; max)
≤50	7	3,3	**67.07 ±8.53 (32; 86)**
51-60	39	18,2	
61-70	92	43,0	
≥71	76	35,5	
Total	214	100,0	

Table 1 shows that the mean age of study population was 67.07 (SD 8.53) years; the rate of 61-70 year age group was highest 43.0% and ≤50 year age group was lowest 3.3%.

Table 3.2. *Tests for diagnosing prediabetes in subject population*

Method	n (214)	%
FPG	214	100,0

HbA1c	34	15,9
OGTT	3	1,4

All of our 214 patients were diagnosed with prediabetes by fasting blood sugar testing with 100% results ≥5.6mmol/l, but only 15.9% patients were assigned to test for HbA1c and only 3 patients (1.4%) received a 75-g OGTT.

Status of management of prediabetic patients at Hai Phong Medical University Hospital

Table 3.3. *Status of screening for criteria for initiating drug treatment in study subjects (n=214)*

Criteria	**Number of patients assessed**		**Number of qualified patients**	
	n	(%)	**n**	**(%)**
BMI≥25	63	29,4	7	11,1
Age <60	214	100	45	21,0
History of GDM	126	100	0	0
IFG and 2h-OGTT	3	1,4	3	100,0
HbA1c>6%	37	17,3	23	62,2
HTA	214	100	202	94,4
HDL-c <0,9	153	71,5	8	5,2
Triglycerid>2,2	212	99,1	60	28,3
1st degree relative T2DM	59	27,6	4	6,8

According to the guidelines of ADA for prediabetes management, as long as a prediabetic patient has 1 of the following 9 criteria, they need to be treated by both pharmacological and non pharmacological therapy, including: BMI ≥25mg /m2; age <60; women with history of GDM; both IFG and ITG; HbA1c>6.0%; hypertension; HDL<0.9 mmol/l; Triglycerides>2.52 mmol/l and 1st degree relatives with diabetes. The table 3.3 shows that patients have not been fully screened for the above important criteria. BMI, OGTT, A1c, HDL-c, 1st degree relative with T2DM were respectively available in 29.4%, 1.4%, 17.3%, 71.5%, and 27.6%. The sad truth is that the OGTT, a very important and decisive test, which should have been performed in 100% of patients according to current recommendations, was performed in this study in only 1.4% due to its main disavantages including low reproducibility, inconvenience and high cost.

Table 3.4. *Result of screening for criteria requiring drug therapy in study subject*

No of criteria	n	%
Zero	2	0,9
01	108	50,5
02	75	35,0
03	25	11,7
04	4	1,9
Total	214	100,0

Table 3.4 shows that there werre only 2 patients (0.9%) did not meet drug treatment criteria and 91.1% met criteria for initiating drug thepapy.

Table 3.5. *Current status of treatment methods of study subjects*

Therapy	n (214)	%
Non pharmacology	211	98.6
Metformin	3	1,4
Total	214	100,0

National and international studies and recommendations [1],[6] all emphasize the importance of early drug treatment for prediabetic patients at high risk of developing diabetes in the future (has 1 out of 9 standards). The results of tables 3.4 and 3.5 show that 02 patients, accounting for 0.9%, did not meet the criteria for drug treatment; and up to 91.1% have indications for drug treatment in addition to changing lifestyle behaviors and diet. However, in our study, the number of patients requiring medical treatment was very low (0.9%); and 91.1% was treated only by lifestyle behavior changes and dietary adjustments. This may be due to the doctor's reluctance to advise and non-compliance with current guidelines on the management of prediabetes and or the patient's refusal to treat with medication.

DISCUSSION

In this study, we found that the diagnosis and management of prediabetes at Hai Phong Medical University Hospital were suboptimal compared with ADA and Vietnamese Ministry of Health recommendations [1,7]. Although all patients were identified through fasting plasma glucose, the use of confirmatory tests such as HbA1c and OGTT was markedly limited (15.9% and 1.4%, respectively). This underutilization may reflect both clinical inertia and systemic barriers, including lack of insurance coverage and higher costs associated with these tests. Similar challenges have been reported in other low- and middle-income countries [9].

Risk stratification for pharmacological therapy was also incomplete. While nearly all patients met at least one ADA criterion for metformin initiation, only 1.4% received pharmacological treatment. Instead, the vast majority were managed with lifestyle modification alone. This discrepancy suggests a gap between guideline recommendations and clinical practice. Possible explanations include physicians' reluctance to prescribe medication for prediabetes, limited awareness of updated

guidelines, and patient hesitancy to initiate long-term pharmacotherapy [5].

Our findings are consistent with previous studies demonstrating underdiagnosis and undertreatment of prediabetes in Asia. For example, the Diabetes Prevention Program Outcomes Study (DPPOS) showed that intensive lifestyle intervention reduced the incidence of diabetes by 58%, while metformin reduced it by 31% compared with placebo, with benefits persisting at 15 years [10]. Similarly, the Finnish Diabetes Prevention Study (DPS) and subsequent European trials confirmed the long-term effectiveness of lifestyle modification [8]. Despite this robust evidence, pharmacological therapy was rarely implemented in our cohort, even among patients with multiple risk factors.

Importantly, several studies have demonstrated that initiating metformin therapy may help achieve faster improvement in glycemic control compared with lifestyle education alone. In the Diabetes Prevention Program (DPP), participants randomized to metformin showed a significant reduction in fasting plasma glucose within the first year, whereas lifestyle modification required more time to achieve comparable effects [10]. This suggests that metformin can provide an early metabolic benefit, particularly in individuals with multiple risk factors or those who may have difficulty adhering to intensive lifestyle changes.

Another relevant clinical question is whether pharmacological therapy must be continued indefinitely. Evidence from long-term follow-up studies indicates that if lifestyle modification is well maintained and weight loss is sustained, some individuals may discontinue metformin while preserving normoglycemia [10]. However, relapse of hyperglycemia is common when lifestyle adherence declines, and therefore ongoing monitoring is essential. Current ADA guidelines recommend that discontinuation of metformin in prediabetes should be individualized, based on sustained lifestyle success, absence of risk factors, and regular reassessment of glycemic status [1].

From a public health perspective, strengthening adherence to evidence-based guidelines is critical. Hospitals should prioritize routine use of HbA1c and OGTT for accurate diagnosis, ensure systematic screening for risk factors, and provide physician training on the benefits of early pharmacological intervention [1,4]. To improve care delivery in practice, several strategies can be implemented: (i) integrating prediabetes screening into routine outpatient check-ups; (ii) establishing standardized clinical pathways and electronic reminders to prompt physicians to order HbA1c or OGTT when indicated; (iii) enhancing patient education programs to increase awareness and acceptance of both lifestyle and pharmacological interventions. At the policy level, expanding insurance coverage for diagnostic tests and metformin therapy, coupled with continuous medical education for healthcare providers, may further improve the quality and consistency of prediabetes management [2]

Limitations of this study include its single-center design, relatively small sample size, and reliance on medical records, which may underestimate the true prevalence of risk factors. Nonetheless, the findings highlight important gaps in current practice and provide a foundation for targeted interventions.

CONCLUSION

Surveying some paraclinical characteristics in 214 patients with prediabetes, we draw the following observations:

- Diagnostic methods for detecting prediabetes were not performed according to recommendations: only 1.4% underwent OGTT and 15.9% underwent HbA1c testing, compared with international and national guidelines [1,2,7].
- The identification of drug treatment criteria for prediabetic patients was incomplete: BMI was assessed in 29.4%; family history of type 2 diabetes in 27.6%; HDL <0.9 mmol/L in 71.5% [1,4].
- Treatment was not implemented as recommended: only 3 patients (1.4%) received pharmacological therapy, despite 91.1% meeting criteria for drug treatment [1,8,10].

In conclusion, the diagnosis and management of prediabetes at Hai Phong Medical University Hospital remain inadequate compared with ADA, IDF, and Vietnamese Ministry of Health guidelines [1,2,7]. Strengthening adherence to evidence-based recommendations is essential to prevent progression to type 2 diabetes and reduce the future burden of disease in Vietnam [3,6].

RECOMMENDATIONS

In clinical practice, it is necessary to strictly follow the Ministry of Health guidelines on the diagnosis and management of patients with prediabetes to avoid missing the opportunity to intervene in this high risk group. Because a single fasting plasma glucose measurement is less sensitive for detecting prediabetes compared with HbA1c or the oral glucose tolerance test (OGTT) [1], clinicians should not rely solely on FPG but should combine it with HbA1c and/or OGTT when indicated. This comprehensive approach will improve early detection, ensure appropriate risk stratification, and allow timely initiation of lifestyle and pharmacological interventions to prevent progression to type 2 diabetes.

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