CASE REPORT

DOI: 10.4274/cmj.galenos.2025.30074
J Cau Med Sci 2025;3(2):26-27

Using Fasting Glucose and Glycated Hemoglobin in The Determination Prediabetes: A Case Report

Sevil Ismayilova

Azerbaijan State Advanced Training Institute for Doctors named after A.Aliyev, Department of Therapy, Bakü, Azerbaijan

ABSTRACT

Prediabetes (PD) is a serious health condition where glycemic levels are high, but not enough to be diagnosed as diabetes. There are still ambiguities in the diagnosis of PD. Although the borderline between PD and diabetes is recognized by all, to date, we cannot use this phrase for norma/PD. We report on a 55-year-old woman. Her blood tests at the time of admission showed that there was a rise in fasting glucose (115 mg/dL), glycated hemoglobin (41 mmol/mol), and a normal 2-hour glycemic level after a 75 g load oral glucose tolerance test (118 mg/dL). Based on these indicators of carbohydrate metabolism, a PD diagnosis was observed.

Keywords: Prediabetes, Fasting glucose, Glycated hemoglobin, Cut-off point

INTRODUCTION

Diabetes mellitus (DM) is recognized as one of the most significant global health challenges due to both its complications and socio-economic burden [1]. According to the 2021 data from the International Diabetes Federation, an estimated 537 million individuals aged 20-79 worldwide are affected by this disease. Projections indicate that this number will rise to 643 million by 2030 and further increase to 783 million by 2045. Urbanization, an aging population, decreased physical activity, and the rising prevalence of overweight and obesity in recent years are among the key factors contributing to the widespread increase in diabetes in the modern era [2].

Prediabetes (PD) refers to an intermediate stage of dysglycemia along the spectrum from normoglycemia to diabetes. This term is used to identify individuals at risk of developing diabetes; therefore, all diabetes-related complications can potentially be observed in PD [3].

The diagnostic criteria used for DM are being incorrectly applied to PD. Nevertheless, various diabetes organizations have defined non-uniform criteria for PD. The World Health Organization (WHO) characterizes PD as a condition of intermediate hyperglycemia, based on two specific measures: fasting glucose (FG) (110-125 mg/dL) and GL120 (140-199 mg/dL) [4]. Conversely, the American Diabetes Association (ADA), applies the same cut-off point for 2-hour plasma glucose (GL120) but adopts a lower cut-off for FG (100-125 mg/dL) and additionally includes HbA1c criteria, defining PD as a level of HbA1c that is 5.7-6.4% [5].

This case report details diagnosing of PD, which be helped to reduce risk of developing DM.

CASE REPORT

A 55-year-old woman was referred to the Azerbaijan Association of Endocrinology, Diabetology and Therapeutic Education (AAEDTE). The patient was asymptomatic, a nonsmoker, had no chronic disease, and was not on medications. The patient had a family history of DM, hypertension, and dyslipidemia. On the first visit, physical examinations revealed blood pressure of 110/90 mmHg, heart rate of 78/min, respiratory rate of 20/min, and the lungs were clear. She was 147 cm tall and weighed 71 kg, with a body mass index indicating obesity of 32.8 kg/m^2. Her waist circumference was 97 cm. Laboratory examination results showed FG levels 115 mg/dL, HbA1c level 5.9% (41 mmol/mol), 2-hour glycemic level after 75 g glucose loading, 118 mg/dL, HOMA IR index 2.5, raised low-density lipoprotein levels (220 mg/dL), normal high-density lipoprotein levels (61 mg/dL), and high triglyceride

Address for Correspondence: Sevil Ismayilova, Azerbaijan State Advanced Training Institute for Doctors named after A.Aliyev, Department of Therapy, Bakü, Azerbaijan
E-mail: sevilismailova981@gmail.com **ORCID ID:** 0000-0002-4845-818X
Received: 12.03.2025 **Accepted:** 27.08.2025 **Publication Date:** 29.08.2025

Cite this article as: Ismayilova S. Using fasting glucose and glycated hemoglobin in the determination prediabetes: a case report. J Cau Med Sci. 2025;3(2):26-27

Copyright© 2025 The Author. Published by Galenos Publishing House on behalf of Azerbaijan Gastroenterology and Invasive Endoscopy Society.
This is an open access article under the Creative Commons Attribution-Attribution-NonCommercial 4.0 (CC BY-NC 4.0) International License.

levels (150 mg/dL). Urea, creatinine, and liver function tests were normal.

We conducted the study to evaluate carbohydrate metabolism in accordance with the AAEDTE Standards proposed for discussion, assessing the patient's carbohydrate metabolism following these standards (Table 1).

Based on these standards, she had impaired fasting glucose, with an FG level ≥110 mg/dL (115 mg/dL) elevated HbA1c, with an HbA1c level ≥5.7 (5.9%), and normal oral glucose tolerance test. According to the criteria defining PD in nonpregnant individuals, one prediabetic result can confirm the diagnosis of PD/ADA.

DISCUSSION

PD is associated with an increased risk of diabetes, cardiovascular events, and mortality. Each year, 5-10% of individuals with PD progress to diabetes [4]. Therefore, early detection, accurate diagnosis, and effective management of PD can reduce the risk of complications and mortality [3]. According to the recommendations of the ADA, this patient meets two diagnostic criteria for PD: FG (115 mg/dL) and HbA1c (5.9%). However, based on the WHO guidelines, PD can be confirmed using FG (115 mg/dL). Nevertheless, to date, the WHO does not recommend the use of HbA1c in the determination of PD. On the other hand, according to the guidelines of the Canadian and Australian Diabetes Societies, the prediabetic range for HbA1c is defined as 6.0%-6.4% [6,7].

In our study, we first examined the relationship between diagnostic criteria. The correlation coefficient (r) was +0.63 (95% confidence interval (CI) +0.516; +0.722) between FG and HbA1c, and +0.61 [95% CI +0.492; +0.706] between FG and GL120. Accordingly, all three diagnostic criteria were applied in establishing the diagnosis of PD. Therefore, we calculated the diagnostic "cut-off" point for FG and HbA1c in PD using multiple linear regression equations [8,9].

FG=-4.2439+0.1927*GL120+15.462*HbA1c

HbA1C=12.3514+2.2549*FG+1.5751*GL120

According to the recommendations of the AAEDTE, all three diagnostic criteria are suggested for detecting PD.

Table 1. Diagnostic criteria for NGM, DM and PD according to AAEDTE [6]

Parameters	Units	NGM	PD	DM
HbA1c	%	≤ 5.6	5.7-6.4	≥6.5
	mmol/mol	≤38	39-47	≥48
FG	mg/dL	<110	110-125	≥126
	mmol/L	<6.1	6.1-6.9	≥7.0
2-hour OGTT	mg/dL	≤139	140-199	≥200
	mmol/L	≤7.7	7.8-11.0	≥11.1

NGM: Normal glucose metabolism, DM: Diabetes mellitus, PD: Prediabetes, AAEDTE: Azerbaijan Association of Endocrinology, Diabetology and Therapeutic Education, OGTT: Oral glucose tolerance test

Ethics

Informed Consent: Informed consent was obtained from the patient for publication of this case report, including any accompanying images and data.

Footnotes

Financial Disclosure: The authors declared that this study received no financial support.

REFERENCES

1. Hossain MJ, Al-Mamun M, Islam MR. Diabetes mellitus, the fastest growing global public health concern: early detection should be focused. Health Sci Rep. 2024;7:e2004.
2. IDF Diabetes Atlas. 10th edition. 2021. www.diabetesatlas.org.
3. Echouffo-Tcheugui JB, Selvin E. Prediabetes and what it means: the epidemiological evidence. Annu Rev Public Health. 2021;42:59-77.
4. World Health Organization. Classification of diabetes mellitus 2019. https://www.who.int/health-topics/diabetes
5. American Diabetes Association Professional Practice Committee. 2. Diagnosis and classification of diabetes: standards of care in diabetes-2025. Diabetes Care. 2025;48:S27-49.
6. Bell K, Shaw JE, Maple-Brown L, Ferris W, Gray S, et al. A position statement on screening and management of prediabetes in adults in primary care in Australia. Diabetes Res Clin Pract. 2020;164:108188.
7. Diabetes Canada Clinical Practice Guidelines Expert Committee; Punthakee Z, Goldenberg R, Katz P. Definition, classification and diagnosis of diabetes, prediabetes and metabolic syndrome. Can J Diabetes. 2018;42:S10-5.
8. Ismayilova S, Sultanova S, Huseynova A, Mirzazade V. Definition of norma / prediabetes cut-off point for fasting glycaemia on the basis of glucose tolerance test and HbA1c interrelationships. J Endocr Soc. 2021;5:A320.
9. Ismayilova S, Sultanova S, Huseynova A, Mirzazade V. Definition of norma / prediabetes cut-off point for glycated hemoglobin on the basis of glucose tolerance test and fasting glucose interrelationships. Endocrine Practice. 2021;65:S45.