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ORIGINAL RESEARCH

Diagnostic performance of 1-hour plasma glycemia and glycemic curve shape during the oral glucose tolerance test: a cross-sectional study in a Brazilian cohort - Evidence review

Dott. A. Colonnese[1]

1 Nutritional Biologist, Italy

1. ABSTRACT

The analyzed study compared plasma glycemia one hour after a 75-gram oral glucose load with fasting glycemia, glycated hemoglobin, and two-hour glycemia. It retrospectively examined 1,797 tests performed in a Brazilian laboratory between 2021 and 2024. Using the proposed thresholds for one-hour glycemia, the test classified more people with intermediate hyperglycemia or diabetes compared to the three conventional markers: 27.8% more than fasting glycemia, 26.7% more than glycated hemoglobin, and 16.8% more than two-hour glycemia.The result contributes to the section of “The Choice to Live in Health or Illness” by Dr. A. Colonnese and R. Panzironi, which is dedicated to the ability of one-hour glycemia to detect glycemic alterations not identified by traditional criteria. Meta-analysis, diagnostic studies, and independent longitudinal data support that this measure can identify people with a higher probability of developing dysglycemia earlier. However, the Brazilian cross-sectional design does not prove that all additional cases will develop diabetes, nor that an early diagnosis alone improves clinical outcomes. Furthermore, research in African populations suggests that the diagnostic threshold value may not be identical across all populations. The body of evidence therefore supports the complementary role of one-hour glycemia, with caution regarding the universal application of a single threshold.

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MISSION

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Through articles, reviews, in-depth analyses and expert contributions, the Journal champions evidence-based medicine and science, fostering a correct interpretation of scientific data and countering misinformation. Every piece of content is developed with the aim of translating the complexity of research into understandable, useful and applicable information, while keeping intact the principles of accuracy, transparency and scientific independence.

Free from political, industrial and commercial influence, the journal stands as an authoritative and independent editorial space, dedicated to promoting scientific culture, professional development and the growth of health awareness among the public.

2. ANALYZED STUDY

The research question was whether plasma glycemia measured one hour after the intake of 75 grams of glucose during an oral glucose tolerance test (OGTT, a test that evaluates how the body handles a sugar load) classified glycemic alterations more effectively than fasting glycemia, two-hour glycemia, and glycated hemoglobin (HbA1c, an indicator of average glucose exposure over the previous months).The hypothesis was that one-hour glycemia could identify individuals with intermediate hyperglycemia or type 2 diabetes not recognized by conventional markers. This is precisely the reason for the citation in the "1-hour plasma glycemia (1hPG)" section of "The Choice to Live in Health or Illness" by Dr. A. Colonnese and R. Panzironi: the publication documents, in a Brazilian cohort, a higher frequency of at-risk classifications using the one-hour value.The study can demonstrate that different methods classify the same tests differently and that one-hour glycemia identifies a greater number of people above the adopted thresholds. However, it cannot establish which method is definitively superior for clinical diagnosis, nor can it prove that the additional subjects identified will necessarily develop diabetes or complications.

3. MATERIALS AND METHODS OF THE ORIGINAL STUDY

This was a retrospective and cross-sectional observational study, meaning it was based on data already collected and evaluated at a single point in time, without following participants over time. Researchers examined 1,921 oral glucose tolerance test records performed in a laboratory in Northeast Brazil between 2021 and 2024. After excluding individuals under 18 years of age, pregnant women, and people treated with antidiabetic drugs, 1,797 records remained.The mean age was 49.6 ± 15.0 years, and 68.9% of the participants were female. The test involved at least eight hours of fasting and the intake of 75 grams of glucose. Glucose was measured at fasting, at one hour, and at two hours; HbA1c was available for only 844 people. Glucose was measured using the hexokinase method, and HbA1c was measured using high-performance liquid chromatography.For one-hour glycemia, thresholds of less than 155 mg/dL for normal, 155-208 mg/dL for intermediate hyperglycemia, and at least 209 mg/dL for diabetes were applied. For the other tests, the diagnostic criteria of the American Diabetes Association and the Brazilian Diabetes Society were applied. The authors used Cohen's kappa coefficient, a measure of agreement beyond what is expected by chance, and chi-square or McNemar's tests to compare the classifications. No clinical follow-up was conducted; therefore, the subsequent outcomes of the participants are not reported in the available material.

4. RESULTS

The main practical takeaway is that the one-hour glucose value classified significantly more people as having intermediate hyperglycemia or diabetes compared to other tests. Out of 1,797 participants, one-hour glycemia identified 463 additional cases compared to fasting glycemia, representing 27.8% of the sample; it identified 302 more cases than two-hour glycemia, representing 16.8%. Among the 844 participants with HbA1c available, it identified 225 additional cases compared to HbA1c, representing 26.7%.The agreement between tests was limited. Between one-hour glycemia and fasting glycemia, the agreement was 66.4% and the kappa was 0.219, a value interpreted as modest. Between one-hour glycemia and two-hour glycemia, the agreement was 75.7%, with a kappa of 0.479, which is moderate. The comparison with HbA1c showed an agreement of 66.3% and a kappa of 0.155, indicative of poor agreement. All these comparisons had a P-value of less than 0.001, indicating that the classification differences were unlikely to be attributable to chance.Considering intermediate hyperglycemia and diabetes together as "high glycemic risk," one-hour glycemia classified 37.6% of the 1,797 participants as high risk, compared to 15.7% for fasting glycemia and 24.0% for two-hour glycemia. In the 844 participants with HbA1c available, the percentages were 34.8% for one-hour glycemia and 12.9% for HbA1c. Even compared to combinations of conventional markers, the one-hour value identified higher proportions, with all comparisons being statistically significant.When all four tests were available, 57.0% of the classifications coincided. However, one-hour glycemia identified intermediate hyperglycemia in 8.9% and diabetes in 0.6% of people who were normoglycemic according to fasting glycemia, HbA1c, and two-hour glycemia. This data

describes a diagnostic discordance; it does not, by itself, prove that these additional classifications correspond to clinically confirmed diabetes.The study also analyzed the shape of the glycemic curve in 1,361 tests with at least five blood samples. Biphasic curves, in which glucose rises, falls, and then presents a second increase, were associated with the lowest mean glycemic values. Monophasic curves, with a single peak followed by a descent, were predominant in 85% of participants with intermediate hyperglycemia and in 87% of those classified with diabetes by one-hour glycemia. This association was significant, but remains observational.

5. INTERPRETATION

In simple terms, one-hour glycemia provides a snapshot of the initial phase of the body's response to a defined amount of glucose. If glucose levels remain higher than expected after one hour, this may be consistent with a less effective early insulin response, reduced tissue sensitivity to insulin, or both. The key technical finding of the study is that, using the adopted thresholds, this indicator identified more people at risk compared to traditional markers.The segment of the book's narrative that is directly documented is quantitative: in the Brazilian cohort, one-hour glycemia detected 27.8% more cases compared to fasting glycemia, 26.7% compared to HbA1c, and 16.8% compared to two-hour glycemia. However, the publication does not prove that one-hour glycemia is an infallible test, that all additional subjects have a disease destined to progress, or that the test should universally replace other examinations.The main limitation is the cross-sectional design. This study does not provide a prospective verification of the future incidence of diabetes, retinopathy, or kidney or cardiovascular disease. There are also limitations regarding generalizability: these are individuals referred to a laboratory for an OGTT, not a random sample of the entire Brazilian population. The higher prevalence detected with the one-hour value may therefore represent greater biological sensitivity, but it may also include individuals who would not subsequently meet conventional criteria for diabetes.

6. INDEPENDENT CONFIRMATORY EVIDENCE

A meta-analysis of 15 studies, involving 35,551 participants and 2,705 new cases of diabetes defined by two-hour glycemia, evaluated the diagnostic capacity of one-hour glycemia. The value of 11.6 mmol/L, equivalent to 209 mg/dL, showed 92% sensitivity and 91% specificity in identifying diabetes defined by the two-hour value; the area under the curve, a measure of the ability to distinguish between people with and without the outcome, was 0.939. This directly confirms the passage in the book regarding the 209 mg/dL threshold and the ability of one-hour glycemia to recognize many cases classified by the two-hour reference. However, the positive predictive value was 45%, meaning a portion of the positive results did not coincide with the two-hour criterion; the meta-analysis itself recommended further evaluations in different ethnic groups [1].An independent longitudinal analysis of 1,356 initially normoglycemic people addressed the question that the Brazilian study, being cross-sectional, could not resolve: who develops dysglycemia over time? After a median follow-up of 3.5 years, 318 participants (23.4%) had developed prediabetes; after a median follow-up of 5.6 years, 134 (10.0%) had developed diabetes. One-hour glycemia had a higher predictive capacity than fasting glycemia and two-hour glycemia for both prediabetes and diabetes; adding the other two values did not significantly improve predictive capacity beyond the one-hour value. This is a prospective confirmation of the narrative that the one-hour value can signal an alteration before traditional criteria, but it comes from an Indian clinical cohort and does not establish a causal relationship [2].A third diagnostic study, conducted on 212 people at high metabolic risk, directly compared one-hour glycemia and HbA1c to recognize prediabetes defined by the OGTT. One-hour glycemia equal to or greater than 155 mg/dL showed greater agreement with the reference test compared to HbA1c criteria and better discriminatory capacity: area under the curve 0.79 versus 0.65. Furthermore, the one-hour value was more closely associated with indices of insulin sensitivity and pancreatic beta-cell function. This result supports the pathophysiological passage in the book: the early glycemic peak reflects aspects of the insulin response that HbA1c, an average over months, may capture less

directly. However, the small sample size and the cross-sectional nature require caution [3].

7. CONFLICTING EVIDENCE

One element of caution concerns the universal application of thresholds. In a cross-sectional study of 605 African-born adults living in the United States, the one-hour value that best identified diabetes as defined by two-hour glycemia was 183 mg/dL, not 209 mg/dL. The 209 mg/dL cutoff had a specificity of 96%, meaning few false positives compared to the two-hour criterion, but a sensitivity of 67%, meaning it missed about a third of the cases defined by that reference. In non-obese individuals, sensitivity dropped to 58% [4].This does not contradict the Brazilian result that the one-hour value identifies additional classifications compared to conventional markers. Instead, it indicates that the clinical significance of a single threshold may depend on the population, body composition, and the prevailing mechanism of glycemic impairment. The African study was also cross-sectional and does not by itself define new universal thresholds, but it reduces the certainty that 209 mg/dL performs identically across all ethnic groups.No directly conflicting evidence sufficiently relevant to the general direction of the association between elevated one-hour glycemia and a higher probability of dysglycemia has been identified; this does not prove the absence of contrary results.

8. QUADRO COMPARATIVO E SINTESI DELLE EVIDENZE

The table distinguishes the publication that is the subject of the review from the independent research used to evaluate the book's narrative.

Quadro comparativo

Reference	Study type	Population or model	Main result	Direction of evidence	Strength of evidence
Original study	Retrospective cross-sectional observational	1,797 OGTTs in a Brazilian laboratory cohort	One-hour glycemia classified more cases of intermediate hyperglycemia or diabetes compared to fasting, HbA1c, and two-hour values.	direct confirmation	moderate
[1]	Diagnostic meta-analysis	15 studies; 35,551 adults; 2,705 diabetes cases defined by the two-hour value	At 209 mg/dL, 92% sensitivity and 91% specificity for diabetes defined by two-hour glycemia.	direct confirmation	high
[2]	Longitudinal observational	1,356 initially normoglycemic Indian individuals	One-hour glycemia predicted prediabetes and diabetes better than fasting and two-hour values.	indirect confirmation	moderate
[3]	Diagnostic accuracy study	212 adults at high metabolic risk	One-hour glycemia discriminated prediabetes better than HbA1c and was more associated with insulin sensitivity and beta-cell function.	biologically consistent evidence	moderate

[4]	Cross-sectional observational	605 African adults born in Africa and residing in the United States	The 209 mg/dL threshold had 67% sensitivity; the optimal cutoff compared to the two-hour value was 183 mg/dL.	discordant evidence	moderate

9. SINTESI EDITORIALE E CONCLUSIONI

CONCLUSIONS

The Brazilian study directly supports the claim that one-hour glycemia identifies more people with intermediate hyperglycemia or diabetes compared to fasting glycemia, HbA1c, and two-hour glycemia. Independent evidence makes this narrative quite well-supported: the parameter is associated with greater recognition of dysglycemia and, in longitudinal cohorts, a higher probability of developing it over time.It remains essential to distinguish the identification of a risk or an additional classification from the demonstration of future disease. The one-hour value appears promising as a supplement to the OGTT, but its clinical use requires prospective confirmation regarding outcomes and attention to differences between populations.

Aggiornato al 17/11/2026. Questo contenuto riflette una sintesi divulgativa delle evidenze scientifiche al momento della pubblicazione e non sostituisce il parere medico.

10. TRANSPARENCY AND SCIENTIFIC RESPONSIBILITY

Artificial Intelligence was used solely as a tool for editorial and documentary support. All content, interpretations, bibliographic citations and conclusions have been verified, reviewed and approved by the author, who assumes full scientific responsibility for them.

The manuscript was also subjected to independent peer review prior to publication.

To ensure the greatest transparency, the complete history of the article, including the dates of submission, revision, acceptance and publication, as well as information on the peer review process, is available on the dedicated Article History page.

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