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ORIGINAL RESEARCH

Accuracy of 1-hour plasma glucose during the oral glucose tolerance test in the diagnosis of type 2 diabetes in adults: a meta-analysis - Evidence review

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1. ABSTRACT

The analyzed study pooled 15 studies, totaling 35,551 adults and 2,705 cases of diabetes identified by the two-hour blood glucose level during the oral glucose tolerance test (OGTT, a test performed after the intake of 75 grams of glucose). It evaluated which one-hour blood glucose value was most accurate in identifying diabetes as defined by the two-hour blood glucose criterion.In the meta-analysis, the value of 11.6 mmol/L, corresponding to 209 mg/dL, had a sensitivity of 92% and a specificity of 91%. In the narrative of “The Choice to Live in Health or Illness” by Dr. A. Colonnese and R. Panzironi, this data primarily supports the diagnostic utility of one-hour blood glucose. Independent studies link elevated values to lower insulin sensitivity, reduced pancreatic beta-cell function, and a higher future probability of dysglycemia. However, the available material from the original study does not directly document all the pathophysiological correlations reported in the book, nor does it demonstrate that every positive result corresponds to clinically confirmed diabetes.

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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 OGTT could accurately identify type 2 diabetes detected using the traditional two-hour glycemia criterion. The hypothesis was that a single one-hour value could offer a useful compromise between the ability to identify cases and the ability to avoid misclassifications.The study is relevant to the section "The Choice to Live in Health or Illness" by Dr. A. Colonnese and R. Panzironi because it defines the performance of the 11.6 mmol/L threshold value, i.e., 209 mg/dL, for recognizing individuals who met the criteria for diabetes at the second hour of the OGTT. The work can therefore document a diagnostic concordance ratio between the one-hour measurement and the two-hour criterion. However, it cannot, on its own, demonstrate that one-hour glycemia is a more early indicator in every person, nor that elevated values cause diabetes or necessarily derive from a specific alteration in insulin secretion.

3. MATERIALS AND METHODS OF THE ORIGINAL STUDY

This is a meta-analysis, which is a statistical analysis that combines results from different studies. It included 15 observational studies with 35,551 participants from multiple ethnic groups; 53.8% were Caucasian. There were 2,705 cases of diabetes considered, identified when the two-hour blood glucose level from an OGTT was equal to or greater than 11.1 mmol/L, or 200 mg/dL.The authors excluded cases recognized exclusively through elevated fasting glycemia and/or elevated glycated hemoglobin. They then estimated three possible one-hour blood glucose thresholds, assigning different weights to sensitivity and specificity. Sensitivity indicates the proportion of people with diabetes according to the reference criterion that the test is able to identify; specificity indicates the proportion of people without diabetes according to that criterion that the test correctly classifies as negative.Only the abstract is available. The detailed inclusion and exclusion criteria for the individual studies, recruitment periods, distribution by sex and age, laboratory techniques, follow-up of the individual cohorts, and subgroup analyses are not reported in the available material.

4. RESULTS

The three identified thresholds showed a different trade-off between detecting more cases and reducing positive classifications not confirmed by the two-hour criterion. At 10.6 mmol/L, sensitivity was 0.95 and specificity was 0.86. At 11.6 mmol/L, sensitivity was 0.92 and specificity was 0.91. At 12.5 mmol/L, sensitivity decreased to 0.87, while specificity increased to 0.94.The value of 11.6 mmol/L was considered the trade-off with equal weight between sensitivity and specificity. In practical terms, it identified 92% of people with diabetes defined by two-hour glycemia and correctly classified 91% of people without diabetes as non-diabetic according to the same criterion. The area under the curve, or AUC, was 0.939: this is an indicator of the overall ability to distinguish between the two groups, where 1 represents perfect discrimination and 0.5 represents random classification.The reported positive predictive value was 45%. This means that, in the overall context analyzed, less than half of the people who tested positive at the 11.6 mmol/L threshold met the diabetes criterion based on two-hour glycemia. This value also depends on the frequency of the disease in the population examined and cannot be automatically transferred to every clinic or screening program.

5. INTERPRETATION

The main result indicates that one-hour glycemia provides useful information for identifying individuals who already have two-hour glycemia within the diagnostic range for diabetes. This data does not automatically replace clinical confirmation: a sensitivity of 92% means that some cases are not identified, while a specificity of 91% means that some people without diabetes according to the reference criterion test positive at the one-hour mark.The segment effectively documented by the publication subject to the Evidence Review is therefore: one-hour glycemia equal to or greater than 11.6 mmol/L good ability to identify diabetes as defined by two-hour glycemia. The available material does not report direct analyses of the correlation between one-hour glycemia, the Matsuda index, and beta-cell function. It also does not report data that would allow for direct verification of the claim that many apparent false positives exhibited impaired glucose tolerance. These

elements therefore require confirmation from separate research.From a biological perspective, it is plausible that elevated glycemia after one hour signals a less efficient response to the rapid entry of glucose into the blood. This response depends on both the early insulin secretion of pancreatic beta cells and the sensitivity of tissues to insulin. However, biological plausibility is not equivalent to demonstrating that a single elevated value represents the same alteration or the same stage of the disease in every individual.

6. INDEPENDENT CONFIRMATORY EVIDENCE

Confirmation of this pathophysiological transition comes from a cross-sectional study of 166 people with formally normal glucose tolerance. Compared to subjects with one-hour glycemia below 143 mg/dL, those with higher values showed a reduction in the insulinogenic index—an estimate of early insulin secretion—and lower values of the Matsuda index, which estimates how effectively the body responds to insulin. For example, the Matsuda index decreased from 11.2 in the group with lower one-hour glycemia to 5.5 in the group with values equal to or greater than 155 mg/dL. This confirms the biological consistency of the idea that elevated one-hour glycemia may be associated with a lower efficiency of the insulin response, but the observational study does not prove causality [1].A retrospective cohort of 1,356 people initially with normal glucose tolerance evaluated the subsequent risk of dysglycemia, i.e., prediabetes or diabetes. During follow-up, 318 participants, or 23.4%, developed prediabetes after a median of 3.5 years, while 134, or 10%, developed diabetes after a median of 5.6 years. One-hour glycemia showed greater discriminative capacity compared to fasting and two-hour glycemia for both prediabetes and diabetes; adding the other glycemic values did not significantly improve this capacity. The result confirms the prognostic association, but it derives from medical records of a specialized center and does not prove that measuring earlier or treating based on this value improves clinical outcomes [2].Another independent prospective cohort followed 5,703 Korean adults with normal glucose tolerance for 12 years. During this period, 593 people, or 10.3%, developed diabetes. One-hour glycemia had an AUC of 0.74 for predicting incident diabetes, higher than that of fasting glycemia, which was 0.61, and two-hour glycemia, which was 0.63. A one-hour value equal to or greater than 8.0 mmol/L was associated, after adjustment for major risk factors, with a 2.84 times greater probability of developing diabetes and lower beta-cell function. This result reinforces the hypothesis of an early phase of metabolic vulnerability, but the prognostic threshold of 8.0 mmol/L does not coincide with the diagnostic threshold of 11.6 mmol/L from the original study [3].A Brazilian cross-sectional analysis of 1,797 OGTTs provided verification in a distinct population. Applying the thresholds of 155 mg/dL for intermediate hyperglycemia and 209 mg/dL for diabetes, one-hour glycemia classified 27.8% more people as being at high glycemic risk compared to fasting glycemia, 26.7% more than glycated hemoglobin, and 16.8% more than two-hour glycemia. These data confirm that the one-hour measurement captures a population partially different from that identified by conventional markers. However, they do not prove that all additional cases are undiagnosed diabetes or that they will necessarily evolve toward diabetes [4].

7. CONFLICTING EVIDENCE

No directly conflicting evidence of sufficient relevance has been identified; this does not prove the absence of contrary results. The main caveats stem from the different purposes of the thresholds studied. The 11.6 mmol/L value from the original study was designed to identify diabetes as defined by the two-hour glycemia, whereas prognostic studies have used lower thresholds to identify a higher future probability of dysglycemia [2,3].Furthermore, the available studies differ in terms of population, prevalence of metabolic risk, design, and diagnostic criteria. The reduction in insulin function observed in cross-sectional studies is an association and does not allow us to establish whether it is the cause of the increase in one-hour glycemia, a consequence of it, or a parallel phenomenon. Finally, the classification of additional cases in cross-sectional studies requires prospective validation with clinical outcomes and independent diagnostic confirmation [1,4].

8. QUADRO COMPARATIVO E SINTESI DELLE EVIDENZE

The table distinguishes the publication under review from independent evidence that confirms individual biological, prognostic, or diagnostic steps.

Quadro comparativo

Reference	Study type	Population or model	Main result	Direction of evidence	Strength of evidence
Original study	Diagnostic meta-analysis	15 studies, 35,551 adults, 2,705 cases of diabetes defined by two-hour glycemia	The 11.6 mmol/L threshold at one hour showed 92% sensitivity and 91% specificity for diabetes defined at two hours	direct confirmation	moderate
[1]	Cross-sectional observational	166 subjects with normal glucose tolerance	Higher one-hour glycemia associated with lower early insulin secretion and lower insulin sensitivity	biologically consistent evidence	moderate
[2]	Retrospective longitudinal observational	1,356 initially normoglycemic subjects	One-hour glycemia predicted future dysglycemia better than fasting and two-hour glycemia	indirect confirmation	moderate
[3]	Prospective cohort	5,703 normoglycemic Korean adults, 12-year follow-up	One-hour glycemia equal to or greater than 8.0 mmol/L associated with a 2.84-fold higher risk of incident diabetes	indirect confirmation	moderate
[4]	Cross-sectional observational	1,797 OGTTs in a Brazilian cohort	Classification using one-hour glycemia identified more subjects at high glycemic risk compared to conventional markers	indirect confirmation	low

9. SINTESI EDITORIALE E CONCLUSIONI

CONCLUSIONS

The analyzed publication specifically argues that a plasma glycemia level of 11.6 mmol/L or higher at one hour during an OGTT has good accuracy in identifying diabetes as defined by the two-hour glycemia level. The broader narrative regarding metabolic earliness is moderately supported by independent studies that associate high values with lower efficiency of the insulin response and a higher future risk of dysglycemia. Prospective validations in diverse populations and studies clarifying whether the systematic use of this parameter truly improves diagnosis, prevention, and clinical outcomes remain necessary.

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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