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ORIGINAL RESEARCH

Efficacy of fasting glycemia in community screening for diabetes and prediabetes in sub-Saharan Africa

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1. ABSTRACT

The analyzed study evaluated how well fasting plasma glycemia can identify undiagnosed diabetes and prediabetes compared to glycemia measured two hours after the intake of 75 grams of glucose during an oral glucose tolerance test (OGTT). In a cross-sectional survey conducted on 1,550 adults in Ethiopia and Nigeria, fasting glycemia showed a high capacity to rule out diabetes, but it would have missed 44.4% of diabetes cases and 34.1% of prediabetes cases identified when considering both tests.The research contributes to the passage from “The Choice to Live in Health or Illness” by Dr. A. Colonnese and R. Panzironi, which clarifies how a normal fasting glycemia value does not always exclude an alteration in glucose metabolism. Independent studies in African populations, large international studies, and meta-analysis confirm that fasting glycemia and the response to a glucose load partially identify different people. The high specificity of fasting glycemia maintains its practical utility, but its lower sensitivity requires caution in subjects with high clinical risk.

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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 fasting plasma glycemia, i.e., the concentration of glucose in the blood after an overnight fast, was sufficient to identify people with undiagnosed diabetes or prediabetes in the community. The hypothesis was that this test, which is simpler and less expensive than the oral glucose tolerance test, could have good accuracy compared to glycemia measured two hours after a glucose load.The relevance to the book's paragraph is precise. The publication does not demonstrate that every person with normal fasting glycemia has a hidden metabolic disease. Instead, it documents that, in a sub-Saharan African population, some people with diabetes or prediabetes identifiable after a glucose load would not have been recognized using only fasting glycemia. This is the segment of the narrative directly supported by the study.As a cross-sectional study, i.e., a snapshot of the population at a given time, it can estimate the concordance and diagnostic accuracy of the tests. It cannot establish whether using one test instead of another reduces cardiovascular complications, mortality, or the future development of diabetes.

3. MATERIALS AND METHODS OF THE ORIGINAL STUDY

The study analyzed data collected between November 2020 and October 2021 as part of a multicenter community survey. Participants came from six villages in the Butajira area of Ethiopia and three administrative areas in Enugu State, Nigeria. Recruitment was conducted using multi-stage cluster random sampling, a method that progressively selects areas, households, and individuals.Of the 1,727 people initially considered, 1,550 adults were included in the analysis. Thirty subjects with previously known type 2 diabetes and 147 people without available results for either fasting glycemia or two-hour glycemia were excluded. Pregnant women, people with acute illness, and subjects on medications that can alter glycemia—including corticosteroids, second-generation antipsychotics, and protease inhibitors—were also excluded.After a 10-12 hour Fasting period, participants underwent a blood draw for fasting glycemia. They then drank a solution containing 75 grams of glucose, and a second venous blood draw was performed after two hours. Newly identified diabetes was defined by a fasting glycemia of at least 126 mg/dL, a two-hour glycemia of at least 200 mg/dL, or both criteria. Prediabetes included impaired fasting glycemia, between 100 and 125 mg/dL, and impaired glucose tolerance, with a two-hour value between 140 and 199 mg/dL.The authors compared the two tests using concordance statistics, including kappa statistics, which indicate how consistently two methods classify the same individuals. They also used ROC curves, which are analyses that measure the trade-off between sensitivity—the ability to identify existing cases—and specificity—the ability to correctly recognize those who do not have the condition. No further exclusion criteria beyond those described are reported in the available material, nor are there data on subsequent follow-up, which was not provided for in the cross-sectional design.

4. RESULTS

The average age of the 1,550 participants was 44.5 years, and 49.6% were women. Considering the results of the two tests together, 72 people, or 4.6%, had previously undiagnosed diabetes. Another 261 people, or 16.8%, had prediabetes. Prevalence does not equate to individual future risk: it describes the frequency of the conditions detected in the examined population.The two tests were positively associated, but not overlapping. The correlation between fasting glycemia and two-hour glycemia was 0.57; in simple terms, higher fasting values tended to be accompanied by higher values after the load, but the relationship did not allow for precise prediction of individual results. Concordance was moderate for diabetes, with a kappa of 0.56 (95% confidence interval from 0.51 to 0.61), and more limited for prediabetes, with a kappa of 0.45 (95% confidence interval from 0.40 to 0.50).The most relevant result for the book concerns cases not recognized by fasting glycemia alone. Out of 72 people classified as having diabetes using one of the two tests, 32—or 44.4%—had an abnormal value only after the oral glucose load and would therefore have been missed by a screening based exclusively on fasting glycemia. For prediabetes, fasting glycemia would have missed 89 of the 261 cases, or 34.1%.However, fasting glycemia showed a high ability to identify those who did not have diabetes according to the reference based on the two-hour value. The negative

predictive value was 97.9%; this indicates that, in this population and with this prevalence of the disease, almost all subjects with a negative result did not have diabetes detected by the two-hour test. This does not mean that a single normal value excludes diabetes in every clinical context or in every population.At the conventional diagnostic threshold of 126 mg/dL, the authors report a sensitivity of 44.3% and a specificity of 99.3% for diabetes identified by the two-hour glycemia test. By lowering the threshold to 105 mg/dL, sensitivity increased to 67.2%, while specificity decreased to 94.0%. In other words, a lower threshold found more cases but also increased the probability of classifying people without diabetes as positive according to the reference test.The differences between subgroups are consistent with the statement in the book but must be interpreted with caution because the total number of diabetes cases was limited. Fasting glycemia alone missed a higher proportion of diabetes cases in women compared to men (58.6% versus 34.9%, with P=0.047). It also missed more diabetes cases in non-obese subjects compared to obese ones (60.0% versus 30.6%, with P=0.013). For prediabetes, the proportion missed by fasting glycemia was higher in people aged 65 or older compared to younger ones (49.2% versus 29.7%, with P=0.006).

5. INTERPRETATION

The practical implication is that fasting glycemia and the oral glucose tolerance test observe different moments of glucose regulation. The former primarily captures metabolic balance during fasting. The latter verifies how effectively the body manages a standardized amount of sugar consumed over a short period. A person may therefore maintain fasting glycemia below the diagnostic threshold while still showing an excessive increase in glycemia after the load.The study documents this lack of overlap directly: fasting glycemia alone identified fewer cases compared to the combination of the two criteria and, in particular, missed a portion of the cases defined by the increase in glycemia at two hours. However, it does not demonstrate that the load test should be performed indiscriminately by everyone, nor that a threshold of 105 mg/dL should replace international diagnostic thresholds. The choice of a threshold depends, in fact, on the purpose—screening or diagnostic confirmation—as well as the availability of resources and the characteristics of the population.In the section "The Choice to Live in Health or Illness" by Dr. A. Colonnese and R. Panzironi, the point being made is therefore limited: a normal fasting glycemia value does not necessarily exclude metabolic impairment that could be detected with complementary tests. The work does not demonstrate the entire pathophysiology of the differences observed between women, the elderly, and non-obese individuals; instead, it shows that, in the cohort studied, these groups more frequently presented a discordant classification between the two tests.

6. INDEPENDENT CONFIRMATORY EVIDENCE

A previous analysis of 11 surveys conducted in Cameroon, South Africa, and Tanzania provided directly relevant confirmation in sub-Saharan Africa. The study included a total of 15,616 participants with fasting glycemia and two-hour post-75-gram glucose load glycemia. Impaired fasting glycemia was less frequent than impaired glucose tolerance in 10 of the 11 surveys, and the concordance between these two categories was low, with a kappa of no more than 0.26. The result confirms that fasting and post-load measurements partially select different individuals; however, it does not quantify the missed cases with a single strategy in the same way as the original study [1].A meta-analysis of diagnostic accuracy, based on 37 population studies in adults without known diabetes, confirmed that the fasting glycemia threshold significantly influences the balance between identified cases and false positives. The optimal threshold estimated by the authors for diabetes was 104 mg/dL, with a sensitivity of 82.3% (95% confidence interval 74.6-88.1%) and a specificity of 89.4% (95% confidence interval 85.2-92.5%). This synthesis supports the plausibility of the original work's finding, according to which lower thresholds increase case detection, but it does not prove that the same threshold is valid across all populations [2].A further study conducted on 216 African adults living in the United States compared fasting glycemia, glycated hemoglobin, and their combination with the OGTT. Glycated hemoglobin estimates the average glucose exposure over the previous months. To identify impaired glucose tolerance defined by the two-hour value, the sensitivity of fasting glycemia alone was 32%; the

combination of fasting glycemia and glycated hemoglobin reached 64%. This data reinforces the section of the book regarding integration with complementary diagnostic tools, although it concerns a migrant African population and a broader definition of impaired glucose tolerance [3].A network meta-analysis of 73 studies confirmed the central trade-off observed in the analyzed publication. Compared with the OGTT, fasting glycemia of at least 126 mg/dL had an estimated sensitivity of 49% (95% credibility interval 43-55%) and a specificity of 98% (95% credibility interval 97-98%). The authors placed particular value on its high specificity and positive likelihood ratio. The evidence therefore confirms the utility of fasting glycemia for confirming many positive cases, but also signals that this utility does not coincide with a high capacity to intercept all cases detected by the load test [4].

7. CONFLICTING EVIDENCE

No directly conflicting evidence has been identified that is sufficiently relevant to the observation that fasting glycemia and OGTT may classify a portion of individuals differently. The available evidence converges on the fact that the two tests are not fully interchangeable.However, there is a difference in the clinical interpretation of the trade-off between sensitivity and specificity. The cited network meta-analysis concluded that fasting glycemia at the 126 mg/dL threshold may be preferred when the priority objective is high specificity, even though the estimated sensitivity was found to be less than 50% compared to diabetes defined by the OGTT [4]. This is not a refutation of the original study's data, but an alternative interpretation of their implications: for some diagnostic programs, reducing false positives may be the priority; for others, reducing missed cases may be the priority.Differences between studies also depend on the chosen threshold, age, body composition, geographic origin, prevalence of diabetes, and the test used as a reference. For this reason, the results do not justify defining fasting glycemia as universally insufficient, nor do they establish that the OGTT is necessary for every person with a normal fasting value.

8. QUADRO COMPARATIVO E SINTESI DELLE EVIDENZE

The table distinguishes the publication subject to the review from independent research and shows the different roles of accuracy, confirmation, and interpretation of the results.

Quadro comparativo

Reference	Study type	Population or model	Main result	Direction of evidence	Strength of evidence
Original study	Cross-sectional diagnostic accuracy study	1,550 adults in Ethiopia and Nigeria	Fasting glycemia alone missed 44.4% of diabetes cases and 34.1% of prediabetes cases detected when considering both tests.	direct confirmation	moderate
[1]	Multicenter cross-sectional observational study	15,616 adults in 11 surveys in Cameroon, South Africa, and Tanzania	Impaired fasting glycemia was less frequent than impaired glucose tolerance in 10 surveys; low concordance.	direct confirmation	moderate
[2]	Systematic review and meta-analysis of diagnostic accuracy	37 studies in adults without known diabetes	A threshold of 104 mg/dL balanced 82.3% sensitivity and 89.4% specificity for diabetes.	indirect confirmation	moderate
[3]	Observational diagnostic accuracy study	216 African adults living in the United States	The sensitivity of fasting glycemia alone was 32%; the combination with glycated hemoglobin was 64%.	direct confirmation	moderate
[4]	Systematic review and network meta-analysis	73 studies compared with OGTT	Fasting glycemia at least 126 mg/dL: 49% sensitivity and 98% specificity.	discordant evidence	moderate

9. SINTESI EDITORIALE E CONCLUSIONI

CONCLUSIONS

The study analyzed directly supports the idea that fasting glycemia is a useful but incomplete test for describing all alterations in glucose metabolism. In the population examined, relying exclusively on fasting glycemia would have missed a significant proportion of diabetes and prediabetes cases identified after an oral glucose tolerance test.Independent evidence confirms quite clearly that fasting and post-load tests do not identify the exact same individuals. However, fasting glycemia maintains significant value due to its simplicity and high specificity. Integration with other tests appears moderately supported in subjects selected based on clinical risk, individual characteristics, or borderline results, while it is not proven to be necessary for universal screening of the entire population.

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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