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Retraction Note

Concordance and associated factors in diagnostic criteria for prediabetes and diabetes: An analysis of fasting glucose, postprandial glucose, and glycated hemoglobin

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ABSTRACT

Introduction: Diabetes and prediabetes are rising chronic health conditions globally. Early and accurate identification of these disorders is crucial for effective prevention and management.

Objective: To evaluate the concordance and associated factors of prediabetes and diabetes based on Fasting Glucose (FG), Postprandial Glucose (PPG), and Glycated Hemoglobin (HbA1c).

Materials and Methods: Primary analysis was conducted on patients from a polyclinic located in Lima, Peru. Prevalences were assessed, concordance was evaluated through the Kappa index, and multivariable analyses were performed to identify associated factors for each.

Results: A total of [illegible]4 participants were included. Isolated values of FG, PPG, and HbA1c for prediabetes accounted for 1[illegible], [illegible]5%, and [illegible]% of cases, respectively, while the intersection of all three accounted for 56% of the total. For Type 2 Diabetes (DM2), isolated values were represented [illegible]%, 16%, and 6% of cases, respectively, while the intersection of all three accounted [illegible]1%. The concordance between FG and PPG was 0.69[illegible] (p<0.001); between FG and HbA1c was 0.6163 (p<0.001); and between PPG and HbA1c was 0.6903 (p<0.001). Significant associations were found with factors such as gender, age, family history of DM2, alcohol consumption, and hypertension.

Discussion: The results revealed that PPG detected more cases in isolation, followed by FG and HbA1c. Comparison with previous studies showed variations in prevalence, underscoring the importance of considering multiple criteria in diagnosis.

Keywords: Diabetes mellitus, Prediabetic state, Epidemiologic factors, Public health (source: MeSH NLM).

INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized continually high amounts of sugar in the blood, resulting from changes in insulin production and/or action. This condition also impacts the processing of other carbohydrates, fats, and proteins. It poses a major public health issue due to its widespread nature and ongoing complications, making it one of the top sources of disability and death, in addition to affecting the quality of living of those suffering [1].

The incidence of T2DM has seen a considerable growth globally over the past few decades. In the United States

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around 13% of the population experiences the condition [2], while in China its incidence amongst adult inhabitants has climbed from 4.7% in 1980 to 8.5% according to estimates [3]. In Latin America an expected 62 million individuals are living with diabetes, a figure that has tripled throughout the region since 1980 [4], and in Peru the illness influences approximately 7% of the total population predominantly amongst those over 30 years of age [5].

Determining when a person possesses diabetes relies on blood glucose levels being notably high. There are three main methods for diagnosing diabetes mellitus: Fasting Glucose (FG), Glycated Hemoglobin (HbA1c), and Postprandial Glucose (PPG). Each path has its own strengths and constraints, and which route is chosen could depend on the distinct group of people and medical circumstance [6].

The agreement between these diagnostic techniques is crucial for ensuring precise and timely identification of T2DM. However, harmony may not always exist when utilizing these methods to diagnose the same patient as either diabetic or non-diabetic. Discrepancies can surface owing to variances in the sensitivity and particularity of each technique, along with transformations in the populace studied and in their medical circumstances. of the individuals [7-9]. Given the information among Peruvian residents remains limited [10], the objective of this manuscript is to determine the prevalence and concordance among the three diagnostic forms of diabetes mellitus in a Peruvian sample.

Materials and Methods

Study Design and Context

Concordance study. Primary patient analysis was conducted at a polyclinic in Lima, Peru, from March to June 10, 2023. The study followed the STARD (Standards for Reporting Diagnostic Accuracy Studies) guidelines [11].

Population, Sample, and Eligibility Criteria

No sampling frame was available. The unit of analysis was the patient attending the healthcare center. The standards to join the group were: 1) individuals needed to be at an age of [illegible] years or more; 2) persons must go through all three diagnostic exams for adult-onset diabetes; 3) living [illegible] to ensure returning for the next day results; and 4) compliance with the estimated time without food. Those not allowed were: 1) pregnant women; 2) refusal to sign the approved consent; 3) known medical problems affecting sugar levels; 4) using medicines that could change blood glucose amounts; 5) currently having treatment for elevated sugar; and 6) not being able to make an informed choice to participate.

Sample selection employed non-probabilistic consecutive sampling. All patients attending the clinic during the specified period and meeting the selection criteria were invited to participate.

Sample size

The sample size was calculated using a standard formula for estimating [illegible] in a finite population. Assuming an expected T2DM prevalence of 7% [12], and considering a 95% confidence interval and 2% precision, a sample size of 624 was calculated.

Anticipating a 50% rejection rate, a total of 936 participants were [illegible] for evaluation. To reach this number, and assuming 90% of approached individuals would meet the study's eligibility criteria, a total of 1,040 individuals were invited to participate.

Data collection logistics allowed for an average of 10 people to be evaluated each day, from Monday to Saturday. To reach the required total, approximately 104 evaluation days were needed, extending the total recruitment and data collection period to about 4 months.

Population, sample, and eligibility criteria

Sample selection employed non-probabilistic consecutive sampling. All patients attending the clinic during the specified period and meeting the selection criteria were invited to participate.

Variable definitions

Three different diagnostic methods for T2DM and prediabetes were evaluated. FG defined diabetes as a fasting glucose concentration of 126 mg/dL (7.0 mmol/L) or higher, and prediabetes as a concentration between 100 mg/dL (5.6 mmol/L) and 125 mg/dL (6.9 mmol/L). HbA1c diagnosed diabetes with a concentration of 6.5% or higher, and prediabetes with a concentration between 5.7% and 6.4%. PPG defined diabetes as a glucose concentration of 200 mg/dL (11.1 mmol/L) or higher, two hours after an oral glucose load, and prediabetes as a concentration between 140 mg/dL (7.8 mmol/L) and 199 mg/dL (11.0 mmol/L), two hours after an oral glucose load. These definitions are based on standard clinical practice guidelines, such as those from the American Diabetes Association (ADA) [6].

This study also assessed the concordance between various factors associated with T2DM and prediabetes. Evaluated factors included age (categorized as under 60 and over 60), gender (male *vs.* female), alcohol consumption in the last 30 days (yes *vs.* no), smoking activity in the last 30 days (yes *vs.* no), consumption of ≥5 servings of fruits/vegetables (yes *vs.* no), and physical activity, measured through the International Physical Activity Questionnaire (IPAQ) and categorized as light/moderate *vs.* vigorous. Family history of T2DM (yes *vs.* no), presence of obesity, measured by Body Mass Index (BMI), and presence of arterial hypertension were also considered.

Data collection and procedure

A campaign was organized offering a T2DM or prediabetes diagnostic program. Participants were instructed to arrive fasting, with a fasting period of 8 to 12 hours maximum. On Day 1, upon arrival, patients were directed to the laboratory for blood analysis, including the process for postprandial glucose. On Day 2, patients returned the next day to collect their test results. At that time, weight and height were measured, and they were evaluated by a physician who collected clinical history data and informed them of the test results. If any test showed values above the cut-off for diabetes, a retest was indicated. Finally, they were invited to participate in the study, explaining its details, and given the informed consent form. If they agreed to participate, they were invited to sign the document.

Regarding data collection, staff were trained in the proper collection of patient data, whether or not they eventually participated in the study. All collected data were recorded in a manually filled-out medical history. Height was measured with a stadiometer, while weight was measured with an electronic scale, after instructing the subject to wear light clothing. Blood pressure was measured after a five-minute rest period, using an [illegible] automatic monitor.

Blood samples were drawn by a specialized laboratory technical team. Before extraction, it was carefully verified that participants had complied with the required fasting period. A total of 5 [illegible] of venous blood sample was drawn to evaluate fasting glucose. Then, an oral load of 75 grams of anhydrous glucose, dissolved in a volume of 300 [illegible] was administered as part of the glucose tolerance test [6]. Two hours after glucose ingestion, a new blood sample was obtained to measure postprandial glucose. Immediately after extraction, in both cases, the blood sample was centrifuged for 5 minutes to separate the serum. This serum was then processed in an automatic Chemray 240 machine to obtain precise glucose measurements.

Statistical analysis

Statistical analyses were performed using R software version 4.0.5. Initially, a descriptive analysis was developed, summarizing categorical variables in absolute terms and percentages.

Factors associated with T2DM and prediabetes were evaluated through bivariate and multivariable regression analysis. Adjusted Prevalence Ratios (aPR) with their respective 95% Confidence Intervals (CI95%) were calculated. For these calculations, generalized linear models with robust variance estimation were used, assuming a Poisson distribution with logarithmic link functions.

Additionally, a Venn diagram and a concordance analysis were conducted to assess the consistency between different diagnostic methods for both outcomes.

Ethical Considerations

The study protocol was approved by the ethics committee of the Ricardo Palma University School of Medicine, and the corresponding permission was obtained from the [illegible] where the diagnostic campaign was conducted. The purchase of materials and reagents necessary for the campaign was funded by the principal investigator before the study began, ensuring that all resources were available and that there were no conflicts of interest related to funding. To ensure participant confidentiality and anonymity, no sensitive personal data (such as names, identity document numbers, etc.) were requested. The database was handled with the utmost discretion, being accessible only by the principal investigator and the authorized research team.

Each participant was given an informed consent form, detailing the study's purpose, procedures, risks, and benefits. Participants who agreed to participate had to mark the option "I have read the consent form and agree with it".

RESULTS

A total of 624 participants were included in the study. The prevalence of prediabetes was 22.60%, and the prevalence of diabetes was 11.38%. Physical activity showed a trend towards low activity, with 80.45% of participants falling into this category. Regarding BMI, 37.52% of participants were classified as obese. Alcohol and tobacco consumption were relatively low, at 26.28% and 26.92%, respectively. Additionally, 33.97% of participants reported consuming 5 or more servings of fruits/vegetables per day, and 24.52% were classified with Hypertension (HTN) (Table 1).

Table 1. Characteristics of the Study Sample.

Características	**n=624**
Sex	
Female	316 (50.64%)
Male	308 (49.36%)
Age group	
45 to 59 years	301 (48.24%)
60 years and older	323 (51.76%)
History of T2DM	
No	431 (69.07%)
Yes	193 (30.93%)
Smoking activity	
No	456 (73.08%)
Yes	168 (26.92%)
Alcohol consumption	
No	460 (73.72%)
Yes	164 (26.28%)
Physical activity	
Low	502 (80.45%)
Moderate/Vigorous	122 (19.55%)
Obesity	
No	388 (62.48%)
Yes	233 (37.52%)
Consumption ≥5 servings of fruits/vegetables	
No	412 (66.03%)
Yes	212 (33.97%)
Arterial hypertension	
No	471 (75.48%)
Yes	153.00 (24.52%)
Glucose status	
Normal	412 (66.03%)
Prediabetes	141 (22.60%)
Diabetes	71 (11.38%)
n (%)	

The prevalence of prediabetes, according to FPG, PPG, and HbA1c, was 17.72%, 20.98%, and 16.64%, respectively. For diabetes, the prevalence was 7.21%, 8.17%, and 6.57%, respectively (Figure 1).

Significant associations with prediabetes were found based on the diagnostic criteria used in our study. Men showed a higher prevalence of prediabetes compared to women (aPR: [illegible] 16.7 for FPG, aPR: 2.04; 95% CI: 0.[illegible], 4.99 for PPG, and aPR: 2.57; 95% CI: 0.81, 8.09 for HbA1c). The age group of 60 years or older showed a higher prevalence compared to the 45 to 59 years group (aPR: 10.[illegible]; 95% CI: 1.60, 74.5 for FPG, aPR: 4.61; 95% CI: 1.52, 14.0 for PPG, and aPR: 1.81; 95% CI: [illegible]73, 4.51 for HbA1c). A family history of T2DM was associated with higher prevalence (aPR: 3.78; 95% CI: 1.40, 10.2 for FPG, aPR: 3.95; 95% CI: 1.79, 8.71 for PPG, and aPR: 6.59; 95% CI: 1.63, 26.6 for HbA1c). Daily smokers showed a higher prevalence (aPR: [illegible]; 95% CI: 1.53, 18.5 for FPG, aPR: 2.48; 95% CI: 1.10, [illegible]56 for PPG, and aPR: 1.77; 95% CI: 0.81, [illegible] for HbA1c). Alcohol consumption was also associated with higher prevalence (aPR: 2.05; 95% CI: 1.04, [illegible] for FPG, aPR: 4.41; 95% CI: 1.81, 10.8 for PPG, and aPR: 7.36; 95% CI: 2.19, 24.7 for HbA1c). HTN was associated with higher prevalence across all criteria (aPR: 4.34; 95% CI: 1.36, 13.9 for FPG, aPR: 3.12; 95% CI: 1.34, 7.25 for PPG, and aPR: 4.38; 95% CI: 1.18, 16.2 for HbA1c) (Table 2).

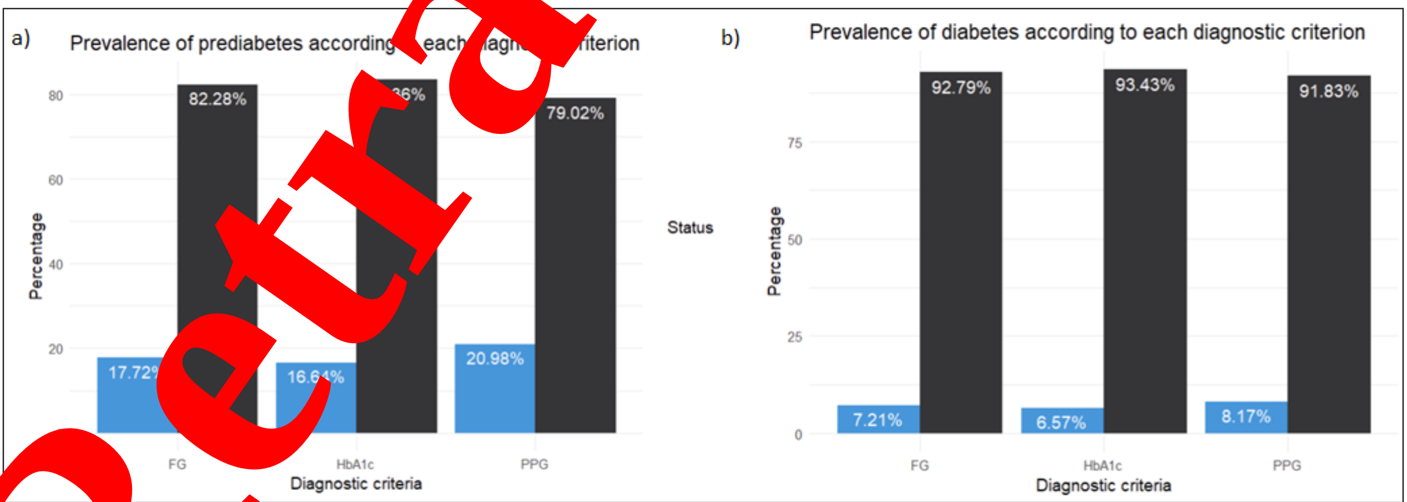

Figure 1. Prevalence of each diagnostic criteria for (a) prediabetes and (b) diabetes; **Note:** Altered: ( ); Normal: ( )

Table 2. Bivariate and multivariate analysis of the factors associated with prediabetes according to the GA, GPP and HBA1c.

Characteristics	Fasting glucose				Postprandial glucose				[illegible]cated hemoglobin			
	No, n=455	Yes, n=98	aPR*	95% CI	No, N=437	Yes, n=116	aPR*	95[illegible]I	No, n=461	Yes, n=92	aPR*	95% CI
Sex												
Female	299 (96.45%)	11 (3.55%)	Ref.	—	290 (93.55%)	20 (6.45%)	[illegible]ef.	[illegible]	294 (94.84%)	16 (5.16%)	Ref.	—
Male	156 (64.20%)	87 (35.80%)	4.44	2.51, 7.85	147 (60.49%)	96 (39.51%)	2.3[illegible]	1.[illegible].95	167 (68.72%)	76 (31.28%)	2.75	1.69, 4.48
Age group												
45 to 59 years	280 (95.56%)	13 (4.44%)	Ref.	—	266 (90.78%)	27 (9.[illegible])	Ref.	—	279 (95.22%)	14 (4.78%)	Ref.	—
60 years and older	175 (67.31%)	85 (32.69%)	4.28	2.56, 7.15	171 (65.77%)	89 (34.23[illegible])	1.98	1.38, 2.85	182 (70.00%)	78 (30.00%)	3.11	1.91, 5.08
History of T2DM												
No	364 (86.26%)	58 (13.74%)	Ref.	—	341 (80.81%)	81 (19.19%)	Ref.	—	372 (88.15%)	50 (11.85%)	Ref.	—
Yes	91 (69.47%)	40 (30.53%)	1.55	1.11, 2.14	96 (73.28%)	35 ([illegible].72%)	0.77	0.57, 1.04	89 (67.94%)	42 (32.06%)	1.66	1.23, 2.25
Smoking activity												
No	385 (86.13%)	62 (13.87%)	Ref.	—	375 (83.89%)	[illegible]6.11%)	Ref.	—	387 (86.58%)	60 (13.42%)	Ref.	—
Yes	70 (66.04%)	36 (33.96%)	1.4	1.03, 1.89	62 (58.49%)	44 ([illegible]%)	1.28	0.95, 1.74	74 (69.81%)	32 (30.19%)	0.99	0.66, 1.48
Alcohol consumption												
No	371 (83.75%)	72 (16.25%)	Ref.	—	3[illegible] (82.39[illegible]	78[illegible]17.61%)	Ref.	—	381 (86.00%)	62 (14.00%)	Ref.	—
Yes	84 (76.36%)	26 (23.64%)	1	0.69, 1.44	72 (65[illegible]45%)	[illegible] (34.55%)	1.43	1.02, 2.00	80 (72.73%)	30 (27.27%)	1.45	0.99, 2.11
Physical activity												
Low	352 (80.55%)	85 (19.45%)	Ref.	—	[illegible] (77.12%)	100 (22.88%)	Ref.	—	348 (79.63%)	89 (20.37%)	Ref.	—
Moderate/Vigorous	103 (88.79%)	13 (11.21%)	1.1	0.72, 1.69	[illegible]00 (8[illegible]%)	16 (13.79%)	0.95	0.62, 1.46	113 (97.41%)	3 (2.59%)	0.23	0.08, 0.67
Obesity												
No	341 (89.74%)	39 (10.26%)	Ref.	—	[illegible]0.53%)	36 (9.47%)	Ref.	—	348 (91.58%)	32 (8.42%)	Ref.	—
Yes	114 (67.06%)	56 (32.94%)	1.01	[illegible] 1.4[illegible]	[illegible] (54.71%)	77 (45.29%)	1.87	1.31, 2.68	113 (66.47%)	57 (33.53%)	1.15	0.80, 1.65
Consumption ≥5 servings of fruits/vegetables												
No	254 (73.41%)	92 (26.59%)	Ref[illegible]	[illegible]	235 (67.92%)	111 (32.08%)	Ref.	—	256 (73.99%)	90 (26.01%)	Ref.	—
Yes	201 (97.10%)	6 (2.90%)	[illegible]	0.15, 0.68	202 (97.58%)	5 (2.42%)	0.19	0.08, 0.46	205 (99.03%)	2 (0.97%)	0.09	0.02, 0.37
Hypertension												
No	424 (91.18%)	41 (8.82%)	Ref.	—	412 (88.60%)	53 (11.40%)	Ref.	—	425 (91.40%)	40 (8.60%)	Ref.	—
Yes	31 (35.23%)	57 (64.77%)	[illegible]	1.53, 3.38	25 (28.41%)	63 (71.59%)	2.12	1.54, 2.94	36 (40.91%)	52 (59.09%)	1.95	1.36, 2.78

Note: *Each variable has been independently adj[illegible]ted [illegible]or sex, age group, family history of T2DM, smoking activity, alcohol consumption, physical activity, obesity, Consumption of ≥5 servings of fruits/vegetables, and arterial hypertension; PRa: [illegible]ted [illegible]evalence ratio; 95% CI: 95% confidence interval

Retraction Note

In our study on diabetes, several significant associations were found. Men showed a higher prevalence of diabetes compared to women (aPR: 4.6; 95% CI: 1.27, 16.7 for FPG, aPR: 2.04; 95% CI: 0.83, 4.99 for PPG, and aPR: 2.57; 95% CI: 0.81, 8.09 for HbA1c). The age group of 60 years or older showed a higher prevalence compared to the 45 to 59 years group (aPR: 10.9; 95% CI: 1.60, 74.5 for FPG, aPR: 4.61; 95% CI: 1.52, 14.0 for PPG, and aPR: 1.81; 95% CI: 0.73, 4.51 for HbA1c). A family history of T2DM was associated with higher prevalence (aPR: 3.78; 95% CI: 1.40, 10.2 for FPG, aPR: 3.95; 95% CI: 1.79, 8.71 for PPG, and aPR: 6.59; 95% CI: 1.63, 26.6 for HbA1c). Daily smokers showed a higher prevalence (aPR: 5.31; 95% CI: 1.53, 18.5 for FPG, aPR: 2.48; 95% CI: 1.10, 5.56 for PPG, and aPR: 1.77; 95% CI: 0.81, 3.87 for HbA1c). Alcohol consumption was also associated with higher prevalence (aPR: 2.05; 95% CI: 1.04, 4.05 for FPG, aPR: 4.41; 95% CI: 1.81, 10.8 for PPG, and aPR: 7.36; 95% CI: 2.19, 24.7 for HbA1c). Hypertension (HTN) was associated with higher prevalence across all criteria (aPR: 4.34; 95% CI: 1.36, 13.9 for FPG, aPR: 3.12; 95% CI: 1.34, 7.25 for PPG, and aPR: [illegible]8; 95% CI: 1.18, 16.2 for HbA1c) (Table 3).

In the Venn diagram of Figure [illegible], the values for FPG, PPG, and HbA1c for prediabetes were represented in isolation in 10%, 15%, and 7% of cases, respectively, while the intersection of the three criteria accounted for 56% of cases. For T2DM, they were represented in isolation in 10%, 16%, and 6% of cases, respectively. The intersection of the three criteria was 31% of the total (Table 4 and Table 5).

Table 3. Bivariate and multivariate analysis of the factors associated with diabetes according to the FG, GPP and HbA1c.

Characteristics	Fasting glucose				Postprandial glucose				Glycated hemoglobin			
	No, n=579	Yes, n=45	aPR*	95% CI	No, n=573	Yes, n=51	aPR*	95% CI	No, n=583	Yes, n=41	PRa*	95% CI
Sex												
Female	314 (99.37%)	2 (0.63%)	Ref.	—	311 ([illegible]42%)	3 ([illegible]58%)	Ref.	—	313 (99.05%)	3 (0.95%)	Ref.	—
Male	265 (86.04%)	43 (13.96%)	4.6	1.27, 16.7	262 ([illegible])	46 (14.94%)	2.04	0.83, 4.99	270 (87.66%)	38 (12.34%)	2.57	0.81, 8.09
Age group												
45 to 59 years	300 (99.67%)	1 (0.33%)	Ref.	—	2[illegible]8 (99.00%)	3. (1.00%)	Ref.	—	296 (98.34%)	5 (1.66%)	Ref.	—
60 years and older	279 (86.38%)	44 (13.62%)	10.9	1.60, 74.5	2[illegible] (85.14%)	48 (14.86%)	4.61	1.52, 14.0	287 (88.85%)	36 (11.15%)	1.81	0.73, 4.51
History of T2DM												
No	427 (99.07%)	4 (0.93%)	Ref.	—	[illegible]26 (98.84%)	5 (1.16%)	Ref.	—	429 (99.54%)	2 (0.46%)	Ref.	—
Yes	152 (78.76%)	41 (21.24%)	3.78	1.40, 1[illegible].2	1[illegible]6.17%)	46 (23.83%)	3.95	1.79, 8.71	154 (79.79%)	39 (20.21%)	6.59	1.63, 26.6
Smoking activity												
No	453 (99.34%)	3 (0.66%)	Ref.	—	[illegible]50 (98.68%)	6 (1.32%)	Ref.	—	450 (98.68%)	6 (1.32%)	Ref.	—
Yes	126 (75.00%)	42 (25.00%)	5.31	[illegible] 18.5	123 (73.21%)	45 (26.79%)	2.48	1.10, 5.56	133 (79.17%)	35 (20.83%)	1.77	0.81, 3.87
Alcohol consumption												
No	452 (98.26%)	8 (1.74%)	Ref.	—	454 (98.70%)	6 (1.30%)	Ref.	—	457 (99.35%)	3 (0.65%)	Ref.	—
Yes	127 (77.44%)	37 (22.56%)	2.05	[illegible]04, [illegible].05	119 (72.56%)	45 (27.44%)	4.41	1.81, 10.8	126 (76.83%)	38 (23.17%)	7.36	2.19, 24.7
Physical activity												
Low	460 (91.63%)	42 (8.37%)	Ref.	—	456 (90.84%)	46 (9.16%)	Ref.	—	463 (92.23%)	39 (7.77%)	Ref.	—

Moderate/Vigorous	119 (97.54%)	3 (2.46%)	1.28	0.69, 2.38	117 (95.90%)	5 (4.10%)	1.73	0.65, 4.61	120 ([illegible]%)	2 (1.64%)	0.89	0.22, 3.57
Obesity												
No	383 (98.71%)	5 (1.29%)	Ref.	—	381 (98.20%)	7 (1.80%)	Ref.	—	38[illegible] (98.97%)	4 (1.03%)	Ref.	—
Yes	193 (82.83%)	40 (17.17%)	1.54	0.82, 2.87	189 (81.12%)	44 (18.88%)	1.52	[illegible]	19[illegible] (84.12%)	37 (15.88%)	1.83	0.83, 4.05
Consumption ≥5 servings of fruits/vegetables												
No	371 (90.05%)	41 (9.95%)	Ref.	—	366 (88.83%)	46 (11.17%)	Ref.	[illegible]	374 (90.78%)	38.00 (9.22%)	Ref.	—
Yes	208 (98.11%)	4 (1.89%)	0.85	0.47, 1.54	207 (97.64%)	5 (2.36%)	1.0[illegible]	[illegible]	209 (98.58%)	3.00 (1.42%)	0.79	0.41, 1.50
Hypertension												
No	468 (99.36%)	3 (0.64%)	Ref.	—	465 (98.73%)	6 (1.27%)	Ref.	—	468 (99.36%)	3.00 (0.64%)	Ref.	—
Yes	111 (72.55%)	42 (27.45%)	4.34	1.36, 13.9	108 (70.59%)	45 (29.41%)	3.12	1.34, 7.25	115 (75.16%)	38.00 (24.84%)	4.38	1.18, 16.2

Note: *Each variable has been independently adjusted for sex, age group, family history of T2DM, smoking activity, alcohol consumption, physical activity, obesity, Consumption of ≥ 5 servings of fruits/vegetables, and arterial hypertension; PRa: adjusted prevalence ratio; 95% CI: 95% confidence interval

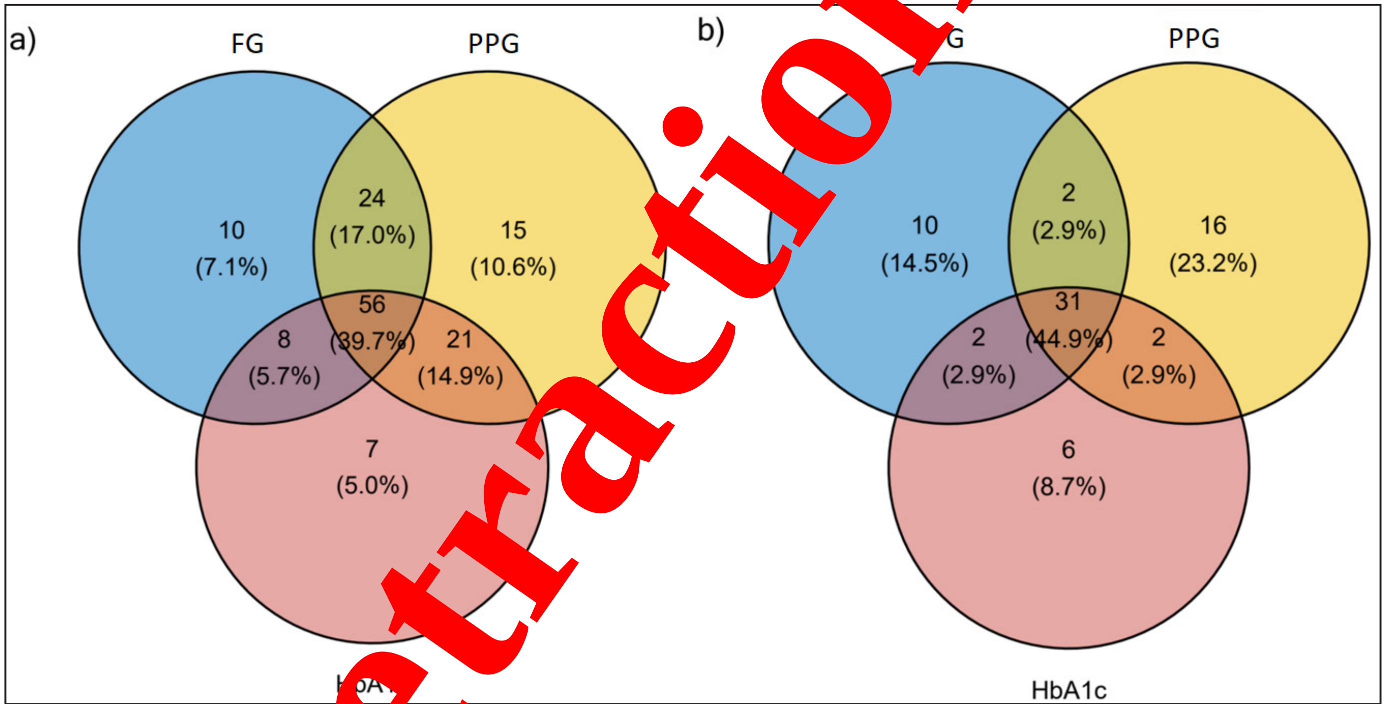

Figure 2. Venn Diagram of Diagnostic Criteria for Prediabetes (a) and Diabetes (b)

Table 4. Concordance of Prediabetes Diagnoses Considering FPG, PPG, and HbA1c.

Test	Normal	Prediabetes	Total	Concordance (Kappa)	Expected agreement	Agreement
FPG and PPG	419	36	455	0.6877	68.74%	[illegible]%
FPG and HbA1c	427	28	455	0.6061	71.54%	88.[illegible]
PPG and HbA1c	422	15	437	0.6812	69.37%	[illegible]0.24%
Total	461	92	553			
Note: FG: Fasting Glucose; PPG: Postprandial Glucose; Hb1Ac: Hemoglobin glycosylated						

Table 5. Concordance of Diabetes Diagnoses Considering FPG, PPG, and HbA1c.

Test	Normal	Diabetes	Total	Concordance (Kappa)	Expected agreement	Agreement
FPG and PPG	561	18	579	0.6616	[illegible]5.79%	95.19%
FPG and HbA1c	571	8	579	0.7503	8[illegible]7%	96.79%
PPG and HbA1c	565	8	573	0.6952	86.33[illegible]	95.83%
Total	583	41	624			
Note: FG: Fasting Glucose; PPG: Postprandial Glucose; Hb1Ac: Hemoglobin glycosylated						

DISCUSSION

Main Findings

Our comprehensive look at how the signs agree and things tied to each test for not-quite or all the way diabetes showed us clear designs and ties that bind. [illegible] centered on checking how well different tests, like FPG, PP[illegible] and HbA1c, match. What we found showed big chang[illegible] in how many have not-quite or all the way dia[illegible]s depending on the test, along with ties to things like [illegible]her someone was male or female, their age, family hi[illegible] tobacco and alcohol use, and high blood pr[illegible]sure. These results underline how important it is to u[illegible] many ways to check and think hard about diagnosis, [illegible]hing what others found about how twisted the tests ca[illegible]

Comparison with Other Studies

A research in Chinese individuals with [illegible]on-s[illegible]den coronary syndrome contrasted th[illegible]DA a[illegible] diagnostic requirements for diabetes an[illegible] prediabetes. Myself alone.t was revealed that the A[illegible]nchmarks, which involve HbA1c testing, uncove[illegible]ed m[illegible]ts with previously unknown diabete[illegible] prediabet[illegible] compared to WHO guidelines [7]. This [illegible] that regular HbA1c screening may be vital for [illegible]specting [illegible]nts with glucose metabolism irregular[illegible]es [illegible]ore arranged coronary angiography.

In a group s[illegible]n Chi[illegible], the ability of early pregnanc[illegible]c levels [illegible]ast gestational diabetes was investig[illegible]. It was uncovered that HbA1c levels at the beginni[illegible]ancy could be applied to anticipate [illegible] diabetes, and the chance of gestational di[illegible] substantially expanded in expecting ladies with early [illegible]cy HbA1c levels past 5.9% [13].

An ex[illegible]ration i[illegible]e divergent attributes and evaluations [illegible]betes [illegible]y diverse standards amid numerous eras found [illegible]amongst more seasoned persons, the [illegible]er glucose test furnished the most precise outcomes. [illegible] examination inspected the contrasts in clin[illegible] highli[illegible]nts and rates of being analyzed with diabetes [illegible]as per shifting principles between age gatherings. It was seen that amongst those further along in [illegible]s, the blood glucose level after dinner was the most precise sign of whether the individual had the illness. The investigation looked at the distinctions between the clinical attributes and how regularly diabetes was analyzed subject to changing benchmarks separated into various age bunches. It was discovered that for more established patients, when assessing expenses and ease, employing both FPG and HbA1c could significantly boost the ability to diagnose relative to exclusively utilizing FPG [9].

The research led by Menke along with others in America discovered the fasting plasma glucose reading played the most notable role in how common prediabetes was for most people there, followed by the hemoglobin A1c level and then the postprandial glucose level. Variances also appeared regarding how much each sign added depending on gender, age, ethnicity or race, and weight classifications [14].

In closing, these investigations propose that each diagnostic approach has its own strengths and weaknesses. In some scenarios, combining various methods can boost the correctness of identifying diabetes. In the recent document, it was uncovered that glucose after eating detected more persons solely, accompanied by glucose in the morning and after that glucose after eating. These discoveries assist the notion that the selection of a diagnostic approach may rely on the exact population and medical situation.

It was noticed that PPG was most adept at picking up on instances by themselves regarding both conditions, accompanied by FPG and HbA1c. This pattern can be credited to PPG's responsiveness in perceiving shifts in glucose policy that might not be noticeable in FPG and HbA1c calculations. Indeed, preceding investigations have realized the capability that PPG possesses. For example, in the work by Cowie et al., [15], NCD-RisC [16], and Aekplakorn et al., [17], it was found that, for undiagnosed diabetes, PPG identifies quite a more significant group with the disagreement, counting most people who were recognized utilizing HbA1c or PPG. Additionally, classically, PPG has been considered the gold standard for the diagnosis of T2DM in some studies, as it has been shown to be an important indicator of glycemic control in diabetic patients [18]. Physiologically, it more directly reflects the body's response to glucose intake, which can reveal dysfunctions in glucose regulation that other methods do not detect [19].

Distinctions have emerged between characteristics i[illegible] certain groups. Several previous analyses had revealed an inequitable finding that HbA1c tended to ru[illegible]her amidst Black people in comparison to non-Hispani[illegible] individuals inclusive of those both with and wi[illegible]out dia[illegible]betes, even at equivalent levels of FPG an[illegible] PPG [20–22]. Additionally, some studies displayed that F[illegible] could be higher in males and PPG higher in females a[illegible] fol[illegible] without diabetes [23]. These average va[illegible]es in glucose markers may indicate a difference i[illegible] whi[illegible]ker identifies the biggest proportion with p[illegible]ediabetes [illegible] diverse subgroups within the populatio[illegible]

Associated factors

Our investigation into the co[illegible] of prediabetes uncovered several no[illegible] connecti[illegible]hat highlight the complexity of this iss[illegible]der age, [illegible]sage of alcohol and tobacco, obesity, and hig[illegible]essure were linked to a higher occurr[illegible] prediabetes across diverse diagnostic standar[illegible] Th[illegible]e discoveries align with earlier examinations tha[illegible]ointed similar elements as key risks fo[illegible]etes. F[illegible]ple, one study in the nation of [illegible]orea fo[illegible] differences between sexes in the factors re[illegible]ted to p[illegible] where a family ancestry of kind two [illegible] and a lower level of learning in females demonstr[illegible] higher chance [24-26]. An alternate examination in the c[illegible] of Malaysia emphasized the importance of early detection and lifestyle changes to stop the [illegible]ment of diabetes [27]. Understanding thes[illegible]mponen[illegible] crucial for developing powerful preventi[illegible]emedies in public health.

The diabetes-linked elements diffe[illegible]ed d[illegible]ent on the diagnostic standards applied. Tho[illegible] with a [illegible]ily history, daily smokers, drin[illegible] and i[illegible]als [illegible]cing high blood pressure were more su[illegible]eptible, [illegible] more men had it and so too did groups in their [illegible] who have advanced in years. These [illegible] knowledge. For instance, one exa[illegible]ination in Vietnam detected age, weight index numbers, [illegible]aist measurement differences, high blood pressure, educa[illegible] levels, and occupations as things straight joined to dia[illegible]etes [28]. The frequency of diabetes and prediabetes in Bangladesh correlated with age, ident[illegible] male, overweightness/obesity, and high blo[illegible] pressu[illegible] Recognizing these linked factors is ess[illegible] early [illegible]scovery and interference in diabetes, which c[illegible]e a major influence on public health a[illegible]ing lon[illegible]-term problems.

[illegible]blic hea[illegible] importance

Ou[illegible]ries from analyzing how prediabetes and di[illegible]abetes are defined have major importance for peoples' [illegible]ing. It is truly vital to correctly and promptly realize [illegible]ese energy troubles for keeping future major issues li[illegible]e heart issues, kidney sickness, and diabetic eye illness [illegible]rom happening or becoming worse.

The outcomes relating to how well any individual standard could singlehandedly identify those impacted emphasizes the necessity of employing multiple metrics in diagnostic evaluation, as each possesses its own strengths and constraints. Furthermore, comprehending the alignment between these benchmarks can advise health policies and clinical guidelines, making certain that assets are utilized productively and those suffering receive the proper care initially in the condition's progression. Ultimately, these discoveries can contribute to improving quality of life for those impacted and decreasing the monetary burden of diabetes on healthcare systems.

CONCLUSIONS

In summary, our study provides detailed insights into the concordance and associated factors in the diagnosis of prediabetes and diabetes using different diagnostic criteria. The findings highlight the importance of PPG as a more effective isolated screening method, followed by FPG and HbA1c. Early and accurate detection of prediabetes and diabetes is crucial for the prevention and effective management of these conditions, and our study contributes to the understanding of how different criteria can be applied in different public health contexts. The implementation of evidence-based screening strategies, along with the consideration of epidemiological and public health factors, can further enhance the detection and management of these chronic diseases, which are a growing concern in global health.

LIMITATIONS

The limitation included the use of ultrasound, which is the conventional method, noninvasive, and of low cost for screening of NAFLD as against liver biopsy which is considered the gold standard method of screening for NAFLD. Quantity of savory snacks was not taken therefore it is difficult to quantify the percentage of calories coming from these snacks. Alcohol intake was self-reported which may lead to reporting bias.

First, the outcomes may only apply to this group and area, limiting how it could help elsewhere. Second, knowing where each person was in the disease adds complexity since no one knew they had it yet. This affects how we view the results. Third, as it screened for prediabetes and diabetes, it may have drawn folks with suspici[illegible] or health worries more, perhaps skewing the high number[illegible] seen for both conditions. These restrictions point t[illegible] a need for more studies and approaches to fully gra[illegible]ow well diagnosis matched prediabetes and diabet[illegible] what factors were linked.

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