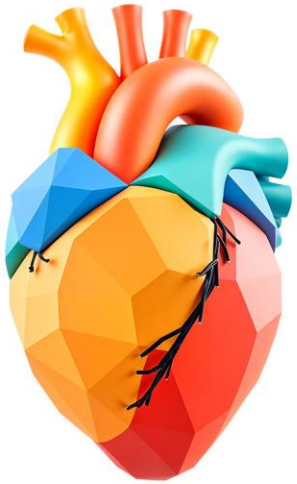

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Estimated Glucose Disposal Rate and the Risk of Major Adverse Cardio-Cerebrovascular Outcomes Following Percutaneous Coronary Intervention: A Retrospective Cohort Study

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None

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Background

- **PCI (Percutaneous Coronary Intervention)** improves survival in cardiovascular disease (CVD), but many patients remain at risk for future **adverse cardio-cerebrovascular events.**
- Identifying **high-risk individuals** is crucial for improving long-term outcomes and optimizing post-PCI management.
- **Insulin resistance (IR)** is an independent risk factor for poor CVD outcomes.
- **Estimated Glucose Disposal Rate (eGDR)** is a surrogate marker of **insulin resistance**, calculated utilizing:
  - **Waist circumference (WC)**
  - **Hypertension (HTN) history**
  - **HbA1c levels**

Background

- **Gaps in current research**: Limited data on the **effect of IR parameters as predictor factors in post-PCI patients**
- **Study aim**: Evaluate the predictive role of IR:
    - **Measured by eGDR**
    - Regarding **cardiovascular outcomes and mortality**
    - Across **different glycemic statuses** (DM, pre-DM, and normal glucose levels)
    - **Following PCI**

Materials and Methods

Study Design:

- **Single-center, retrospective, cohort study**

Population:

- **Patients** undergoing **PCI** in **Tehran Heart Center (2015–2020)**
- Stratified into:
  - **DM (n=1,735)**: Use of hypoglycemic drugs, or FBS ≥ 126 mg/dL, and/or HbA1c level ≥ 6.5%
  - **Pre-DM (n=236)**: FBS = 100-125 mg/dL in patients not using hypoglycemic drugs and HbA1c level 5.7–6.4%
  - **Normal glucose (n=173)**: FBS < 100 mg/dL in patients not using hypoglycemic drugs and HbA1c level < 5.7%

eGDR Calculation:

- **eGDR = 21.158 – (0.09 × WC) – (3.407 × HTN) – (0.551 × HbA1c)**

Quartile-Based Analysis:

- Patients divided into **Q1 (lowest eGDR) → Q4 (highest eGDR)**

Materials and Methods

Primary Outcomes:

- **MACCE** (as a composite of nonfatal myocardial infarction (MI), stroke, coronary artery bypass graft (CABG), target lesion revascularization (TLR), target vessel revascularization (TVR), and cardiovascular death)

Secondary Outcomes:

- **Non-fatal MI, stroke, hospitalization, repeated PCI, CABG, and all-cause mortality**

Statistical Analysis

- **Cox regression models (HR, 95% CI)** for eGDR-outcome relationships
- **Kaplan-Meier survival analysis**

Results

Patient Characteristics:

- **2,144 patients undergoing PCI**
  - **Mean age:** 64.1 ± 7.18 years
  - **61.2% male**
  - Median follow-up of **550 days**

Primary Outcomes:

- **MACCE in highest vs lowest eGDR quartile:**
  - **Pre-DM group**: Lower MACCE risk (HR: 0.099, 95% CI 0.012-0.816)
  - **Normal glucose group**: Lower MACCE risk (HR: 0.000, 95% CI 0.000-0.475)
  - **DM group**: No significant relationship between eGDR and MACCE
- **Kaplan-Meier Curves**: Show lower MACCE rates in **higher eGDR quartiles**

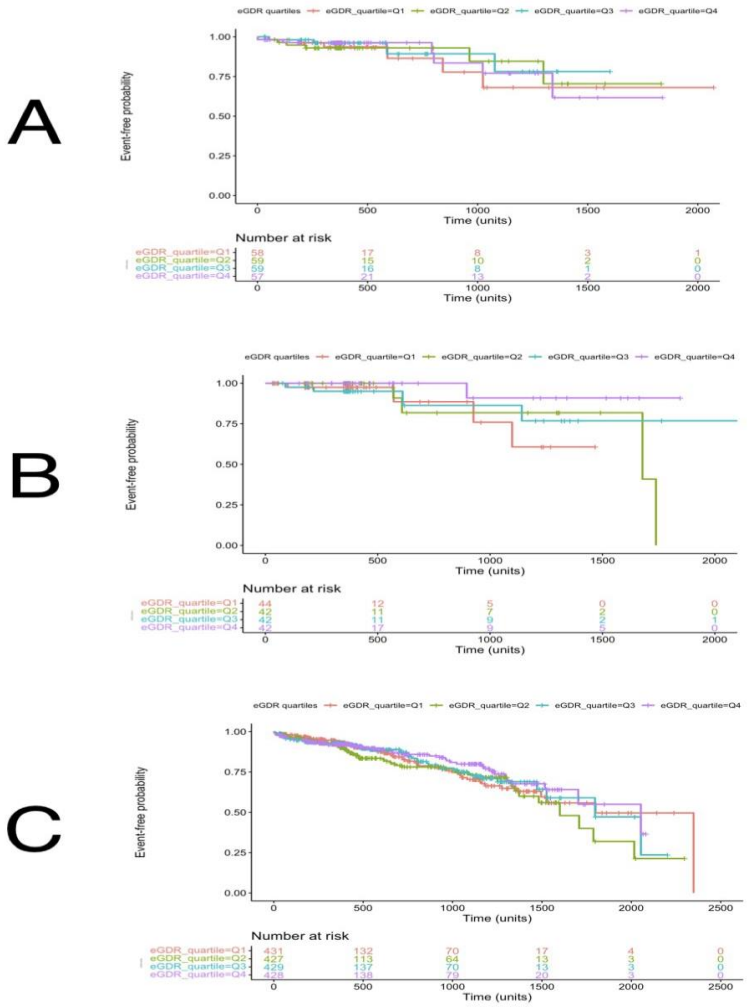
Results

Figure 1. Kaplan-Meier figures for

(A) Prediabetes group

(B) Diabetes group

(C) Normal glucose group



Results

Secondary Outcomes:

- **All-Cause Mortality:**
  - **Pre-DM group (Q3 vs Q1):** Lower mortality (HR: 0.100, 95% CI 0.012-0.792)
  - **DM group (Q3 vs Q1):** Lower mortality (HR: 0.376, 95% CI 0.161-0.878)
- **Hospitalization:**
  - **Reduced risk** in **Q2, Q3, Q4** compared to **Q1**
  - **HRs for hospitalization risk** (95% CI):
    - Q2: **0.123** (0.022-0.677)
    - Q3: **0.028** (0.000-0.915)
    - Q4: **0.009** (0.000-0.996)

Results

Table 1. Hazard ratio and 95% CI model

Confidence intervals (CIs), coronary artery bypass graft (CABG), Estimated glucose disposal rate (eGDR), hazard ratio (HR), major adverse cardio-cerebral events (MACCE), myocardial infarction (MI), number (n), patients with pre-diabetes (pre-DM), patients with diabetes mellitus (DM), patients with normal glucose (non-DM), percutaneous coronary intervention (PCI), quartile (Q)

	Q1	Q2 HR (95% CI)	Q3 HR (95% CI)	Q4 HR (95% CI)
MACCE				
Pre-DM	1	0.553 (0.166; 1.842)	0.160 (0.033; 0.782)	0.099 (0.012; 0.816)
DM	1	1.081 (0.708; 1.650)	0.797 (0.440; 1.441)	0.594 (0.235; 1.504)
Non-DM	1	0.114 (0.010; 1.265)	0.005 (3.11e-05; 0.999)	0.000 (1.9e-07; 0.475)
All-cause mortality				
Pre-DM	1	0.481 (0.108; 2.131)	0.100 (0.012; 0.792)	0.064 (0.003; 1.148)
DM	1	0.625 (0.334; 1.170)	0.376 (0.161; 0.878)	0.301 (0.083; 1.086)
Non-DM	1	0.644 (0.006; 62.313)	0.344 (1.7e-05; 6877.9)	8.962e-10 (N/A)
Hospitalization				
Pre-DM	1	0.953 (0.289; 3.137)	1.174 (0.217; 6.333)	1.302 (0.141; 11.945)
DM	1	1.050 (0.741; 1.488)	0.889 (0.541; 1.463)	0.699 (0.316; 1.543)
Non-DM	1	0.123 (0.022; 0.677)	0.028 (9.06e-04; 0.915)	0.009 (8.8e-05; 0.996)
Non-fatal MI				
Pre-DM	1	1.8e+09 (1.5e+08; 2.2e+10)	1.5e+08 (1.2e+07; 1.8e+09)	7.649e-09 (N/A)
DM	1	1.314 (0.648; 2.665)	1.061 (0.383; 2.939)	0.901 (0.185; 4.396)
Non-DM	1	0.001 (3.4e-07; 4.13)	4.07e-19 (5.6e-17; 29.2)	1.275e-19 (N/A)
Repeated PCI				
Pre-DM	1	0.824 (0.275; 2.468)	0.790 (0.215; 2.896)	0.724 (0.145; 3.616)
DM	1	1.020 (0.736; 1.412)	0.891 (0.565; 1.406)	0.876 (0.432; 1.774)
Non-DM	1	0.285 (0.056; 1.437)	0.202 (0.007; 5.188)	0.300 (0.004; 21.228)
CABG				
Pre-DM	1	1.610e-319 (N/A)	N/A	N/A
DM	1	2.039 (0.474; 8.766)	7.497 (1.225; 45.873)	9.296 (0.574; 150.419)
Non-DM	1	8.977e-10 (N/A)	0.275 (9.4e-06; 7998.7)	1.651e-10 (N/A)
Stroke				
Pre-DM	1	N/A	N/A	N/A
DM	1	8.505e-09 (N/A)	6.196 (0.072; 526.871)	4.507e-08 (N/A)
Non-DM	1	N/A	N/A	N/A

Conclusion

- **Higher eGDR predicts lower MACCE and mortality risk** in Pre-DM and Normal glucose patients.
- **Predictive power** in **DM patients** appears **limited.** → Suggests **different risk mechanisms** in long-standing diabetes.
- **Potential explanations**:
  - Higher eGDR = **Better insulin sensitivity & metabolic stability**
  - **Reduced inflammation, endothelial dysfunction, and thrombosis risk**
- **Clinical Impact**:
  - **eGDR could serve as a valuable tool** for identifying **high-risk PCI patients**, particularly in **pre-DM and normal glucose** groups.

Conclusion

- Further studies are needed to evaluate its role in **personalized treatment strategies** for **DM patients.**
- **Strengths**:
  - ✔ Large sample size & extended follow-up
  - ✔ Comprehensive glycemic stratification (DM, Pre-DM, Normal glucose)
  - ✔ Non-invasive, cost-effective use of eGDR with the holistic view of cardiovascular risk factors
- **Limitations**:
  - ✘ Retrospective single-center study which limits generalizability
  - ✘ Lack of data on medication adjustments post-PCI
  - ✘ No comparison with alternative insulin resistance markers (e.g., HOMA-IR, TyG Index)

Take home message

- **Higher eGDR predicts better post-PCI outcomes, except in diabetes patients.**

Summary Graph

Estimated Glucose Disposal Rate and the Risk of Major Adverse Cardio-cerebrovascular Outcomes and Mortality in Patients Undergoing Percutaneous Coronary Intervention: A Retrospective Cohort study

Methods

Patients undergoing PCI (2144 patients with a mean age of 64.1 years)

Patients were classified into three categories based on FBS and HBA1C:

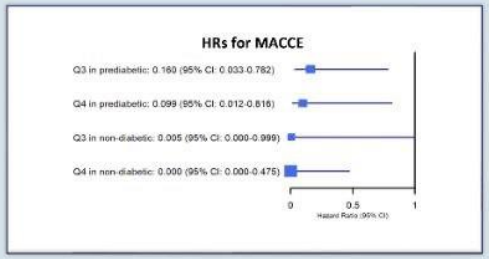
- Diabetic (DM)
- Prediabetic (PreDM)
- Non-Diabetic (Non-DM)

eGDR = 21.158 - (0.09 × WC) - (3.407 × HT) - (0.551 × HbA1c)

Results

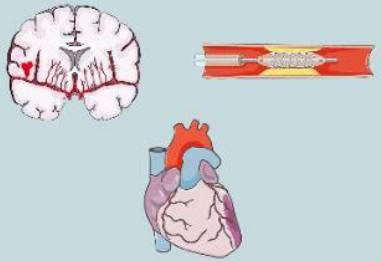
Risk of MACCE was significantly lower in preDM and non-DM individuals with higher eGDR.

Higher eGDR was associated with reduced all-cause mortality in individuals with preDM and DM, and lower hospitalization rates in the non-DM group.



Conclusion

eGDR may serve as a valuable prognostic marker for cardiovascular outcomes and mortality, particularly in preDM and non-DM populations undergoing PCI.



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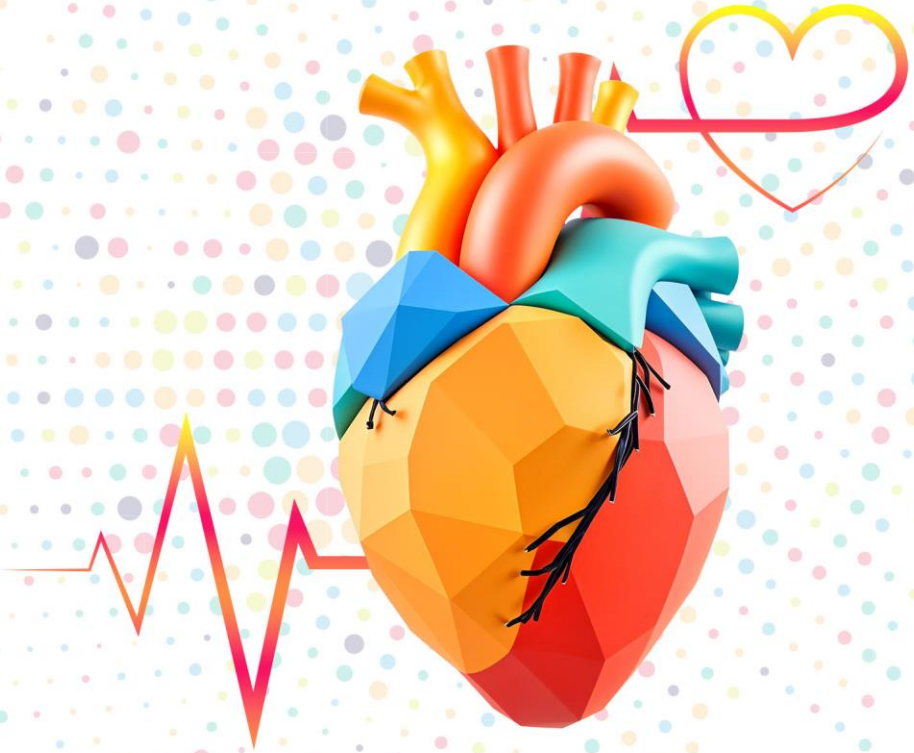

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