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Hemoglobin A1c association patterns with cardiovascular outcomes among patients with diabetes mellitus following percutaneous coronary intervention: A systematic review

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[Tariq, Ayesha](#)^a; [Bhatti, Zohra](#)^b ; [Akbar Chaudary, Muhammad Nabeel](#)^c; [Laghari, Madeeha](#)^d; [Khan, Amer Hayat](#)^e; +2 authors^a Department of Pharmacy, The University of Lahore, Lahore, Pakistan[Show all information](#)

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Abstract

Background: Cardiovascular complications are the leading cause of mortality in patients with diabetes mellitus (DM) undergoing percutaneous coronary intervention (PCI). This systematic review aims to evaluate the association between HbA1c levels and major adverse cardiovascular events (MACE) in patients with DM post-PCI. **Methods:** A comprehensive literature search was conducted following PRISMA guidelines. Eligible studies included randomized controlled trials, cohort studies, and observational analyses assessing the impact of strict, moderate, and poor glycaemic control on cardiovascular outcomes. Data extraction focused on HbA1c levels, MACE incidence, cardiovascular mortality, and cardiovascular complications. **Results:** Nine studies with 24,978 participants were

included. U-shaped and J-shaped relationships were found between HbA1c levels and cardiovascular outcomes. Moderate glycaemic control (HbA1c 6.5%–7.5%) was associated with the lowest risk of MACE and mortality. In contrast, strict glycaemic control (HbA1c <6.5%) and poor control (HbA1c >7.5%) were linked to increased cardiovascular risk. Patients with HbA1c below 5.5% exhibited a significantly higher risk of cardiovascular mortality, while HbA1c above 8% was also associated with poor outcomes. Conclusion: Maintaining HbA1c levels in the moderate range (6.5%–7.5%) appears to provide optimal cardiovascular protection for patients with DM post-PCI. Strict or poor glycaemic control increases the risk of adverse outcomes. © The Author(s) 2026. This article is distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits non-commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE and Open Access pages (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).

Author keywords

cardiovascular outcomes; diabetes mellitus; HbA1c; major adverse cardiovascular events; percutaneous coronary intervention

Indexed keywords

MeSH

Aged; Biomarkers; Blood Glucose; Cardiovascular Diseases; Coronary Artery Disease; Diabetes Mellitus; Female; Glycated Hemoglobin; Glycemic Control; Heart Disease Risk Factors; Humans; Incidence; Male; Middle Aged; Percutaneous Coronary Intervention; Risk Assessment; Risk Factors; Time Factors; Treatment Outcome

EMTREE drug terms

biological marker; glycated hemoglobin; hemoglobin A1c protein, human

EMTREE medical terms

adverse event; aged; blood; cardiovascular disease; coronary artery disease; diabetes mellitus; diagnosis; drug effect; drug therapy; female; glucose blood level; glycemic control; heart disease risk factor; human; incidence; male; metabolism; middle aged; mortality; percutaneous coronary intervention; risk assessment; risk factor; therapy; time factor; treatment outcome

Chemicals and CAS Registry Numbers

Unique identifiers assigned by the Chemical Abstracts Service (CAS) to ensure accurate identification and tracking of chemicals across scientific literature.

glycated hemoglobin

9062-63-9

Biomarkers

Blood Glucose

Glycated Hemoglobin

hemoglobin A1c protein, human

Corresponding authors

Corresponding
author

Z. Bhatti

Affiliation

Department of Pharmacy practice, Kulliyyah of Pharmacy, International
islamic university Malaysia, Kuantan, 25200, Malaysia

Email address

zohrabhatti@iium.edu.my

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