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Role of HbA1c in Predicting Cardiovascular Events in Diabetics – A Clinical Study

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ABSTRACT

Background: Diabetes Mellitus is a major risk factor for cardiovascular diseases (CVD). HbA1c is widely used for monitoring long-term glycemic control, but its role as a **predictor for cardiovascular events** is still under evaluation.

Aim: To assess the **association between elevated HbA1c levels and cardiovascular events** among diabetic patients.

Methods: A **prospective observational study** was conducted on **300 diabetic patients** over 1 year. Patients were divided based on HbA1c levels: **<7%, 7–9%, >9%**. ECG, echocardiography, lipid profile, and history of cardiovascular events (MI, stroke, angina, heart failure) were documented.

Results: A significantly higher incidence of cardiovascular events was observed in patients with **HbA1c >9% (46%)**, compared to **HbA1c <7% (12%)**. Elevated HbA1c showed strong correlation with dyslipidemia and hypertension.

Conclusion: HbA1c is not only a marker of glycemic control but also an **independent predictor of cardiovascular risk** in diabetics. Regular monitoring and aggressive management of HbA1c levels are essential to prevent cardiovascular complications.

Keywords: HbA1c • Cardiovascular Risk • Diabetes Mellitus • Myocardial Infarction • Predictive Marker

INTRODUCTION

Cardiovascular diseases are the **leading cause of mortality among diabetic patients**, accounting for nearly **65–80% of deaths** in type 2 diabetes. HbA1c reflects average plasma glucose levels over the previous 8–12 weeks and is routinely used for assessing glycemic control.

However, several studies have suggested that **elevated HbA1c is associated with endothelial dysfunction, lipid abnormalities, oxidative stress, and inflammation**, all of which are major contributors to atherosclerosis and cardiovascular disease.

Despite this, **its predictive value for cardiovascular events is not routinely used in clinical practice**. Therefore, the present study aims to evaluate the role of HbA1c as a **potential predictor of cardiovascular complications** among diabetic patients.

MATERIALS AND METHODS

Study Design:

Prospective observational study

Duration:

January 2023 – December 2023

Sample Size:

300 diabetic patients

Inclusion Criteria

- Age 30–70 years
- Diagnosed type 2 diabetes mellitus (>1 year)
- Willing for follow-up

Exclusion Criteria

- Type 1 diabetes
- Known CAD before enrollment
- CKD / liver cirrhosis
- Pregnancy

Grouping Based on HbA1c

Group	HbA1c Range	N
Group A	<7%	94
Group B	7–9%	108
Group C	>9%	98

Parameters Assessed

- ECG & Echocardiography
- Lipid profile & BP
- Past 1-year cardiovascular events
- BMI & duration of diabetes

RESULTS

Incidence of Cardiovascular Events

HbA1c Group	CV Events (%)
<7%	12%

HbA1c Group	CV Events (%)
7–9%	28%
>9%	46%

Correlation with Other Risk Factors

Risk Factor	Group A (<7%)	Group B (7–9%)	Group C (>9%)
Hypertension	30%	48%	62%
Dyslipidemia	28%	52%	68%
BMI >30	18%	34%	52%

FIGURE (Sample Format)

Figure 1: Relationship Between HbA1c Levels and Cardiovascular Events

HbA1c Level	CV Event (%)
<7%	12%
7–9%	28%
>9%	46%

DISCUSSION

This study demonstrates a **strong association between elevated HbA1c levels and cardiovascular risk**. Patients with HbA1c >9% showed the **highest prevalence of hypertension, dyslipidemia, and cardiac events**, consistent with previous literature (UKPDS, ACCORD trials).

The pathogenic mechanisms may involve:

- Endothelial dysfunction
- Increased oxidative stress
- Accelerated atherosclerosis
- Increased inflammatory markers

Therefore, **HbA1c should be considered not just a glycemic marker**, but also a **cardiovascular risk predictor**, especially for high-risk diabetic patients.

CONCLUSION

✔HbA1c is strongly correlated with cardiovascular disease in diabetic patients.

✔Patients with **HbA1c >9%** have significantly higher risk of myocardial infarction, stroke, and heart failure.

✔Regular monitoring and early intervention can **reduce morbidity and mortality**.

✔**HbA1c should be used as a screening tool to stratify cardiovascular risk** in diabetics.

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