Review: Hyperglycemia after myocardial infarction increases the risk for death in patients with and without diabetes mellitus

Capes SE, Hunt D, Malmberg K, Gerstein HC. **Stress hyperglycaemia and increased risk of death after myocardial infarction in patients with and without diabetes: a systematic overview.** Lancet. 2000 Mar 4;355:773-8.

QUESTION

Is stress hyperglycemia associated with an increased risk for in-hospital death and congestive heart failure (CHF) after myocardial infarction (MI) in patients with and without diabetes mellitus?

DATA SOURCES

Studies were identified by searching MEDLINE (1966 to October 1998) with the terms blood glucose, myocardial infarction, hyperglycemia, euglycemia, hypoglycemia, incidence, mortality, follow-up studies, cohort studies, prognosis, natural history, course, and predict; searching Science Citation Index (1980 to September 1998); scanning bibliographies of relevant papers; and contacting experts in the field.

STUDY SELECTION

English-language studies were selected if original data were reported, the design was a cohort study or clinical trial, an inception cohort of patients with acute MI was used, ≥ 70% of patients had follow-up to hospital discharge, baseline blood glucose levels were measured within 24 hours of admission, and outcomes (in-hospital death, CHF, or cardiogenic shock) were reported in relation to blood glucose levels at admission.

DATA EXTRACTION

Data were extracted for study characteristics; patient characteristics, including diabetes status (diabetes or no diabetes) and presence of stress hyperglycemia on admission; and outcomes.

MAIN RESULTS

14 articles that included 15 cohort studies met the selection criteria. 11 studies (mean age range 50 to 68 y) were included in the meta-analysis; 4 studies were excluded because they only reported mean glucose levels associated with outcome. Among patients with diabetes (n = 688, 4 studies), those with stress hyperglycemia after MI had a greater risk for in-hospital death than did those without hyperglycemia (Table). Similarly, among patients without diabetes (n = 1856, 7 studies), those with stress hyperglycemia after MI had a greater risk for in-hospital death than did those without hyperglycemia (Table). Presence of stress hyperglycemia on admission was associated with an increased risk for CHF or cardiogenic shock after MI in patients without diabetes (relative risk range 1.51 to 8.82, 4 studies) but not in those with diabetes (1 study).

CONCLUSIONS

Stress hyperglycemia after myocardial infarction is associated with an increased risk for in-hospital death in patients with and without diabetes; an increased risk for congestive heart failure or cardiogenic shock is also seen in patients without diabetes.

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Weighted relative risk (RR) for the association between stress hyperglycemia and in-hospital {or at 1 month}* death after myocardial infarction

Patients	Definition of hyperglycemia† (mmol/L)	Weighted RR (95% CI)
With diabetes	Range ≥ 10 to ≥ 11	1.7 (1.2 to 2.4)
Without diabetes	Range ≥ 6.1 to ≥ 8	3.9 (2.9 to 5.4)

*Information supplied by author.
†Definition differs according to the study.

COMMENTARY

This systematic review by Capes and colleagues supports previous findings that hyperglycemia on admission is associated with increased in-hospital mortality after MI in patients with and without diabetes.

Elevated glucose levels may simply be a noncausal secondary marker of the severity of the hormonal stress response. Alternatively, higher glucose levels on admission may represent a greater preinfarction level of insulin resistance with increased hypercoagulability, decreased fibrinolysis, and poorer endothelial function, all of which might be causal in worsening the outcome after an MI.

Many trials using intravenous glucose-insulin-potassium or glucose-insulin infusions in acute MI have shown that supplying intravenous insulin may improve the outcome. The Swedish trial of insulin-glucose infusion, Diabetes Insulin-Glucose in Acute Myocardial Infarction (DIGAMI), showed a 1-year mortality decrease from 26% to 19% (P < 0.05) in patients with diabetes after an MI (1). A 30-year overview of 9 randomized, placebo-controlled trials of combined glucose-insulin-potassium therapy in acute MI among 1932 patients with and without diabetes showed that hospital mortality decreased from 21% to 16% (P = 0.004) (2).

A recent randomized trial done in South America of intravenous glucose-insulin-potassium infusion within 24 hours of an acute MI in 407 patients (16% with diabetes) decreased in-hospital death, severe CHF, and nonfatal ventricular fibrillation from 20.1% to 11.9% (P = 0.03) (3).

These data suggest that modifying the glucose-insulin metabolism is important to the outcome of MI. Further studies are needed to evaluate the magnitude of the effect of intravenous glucose-insulin and to encourage its use as part of the management of MI.

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References

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