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ADMINISTRATIVE INFORMATION**Support** - None.**Review Stage at time of this submission** - Completed but not published.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY202430080**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 19 March 2024 and was last updated on 19 March 2024.**INTRODUCTION**

Review question / Objective The aim of the study was to investigate the association between stress hyperglycemia ratio (SHR) and the prognosis of patients with heart failure (HF) in a meta-analysis.

Rationale Heart failure (HF) is a clinical syndrome characterized by the impairment of cardiac systolic and/or diastolic function, and related insufficient perfusion for peripheral organs and tissues. Hyperglycemia has been revealed to play an important role in the development and progression of HF. Besides the influence of chronic hyperglycemia, accumulating evidence suggests that stress-induced hyperglycemia (SIH), a physiological response to acute or severe illness such as HF, may also be a key pathophysiological process in the deterioration of cardiac function.

However, previous clinical studies evaluating the association between SIH as indicated by admission blood glucose (ABG) and prognosis of patients with HF showed inconsistent results. One of underlying reason is that an increment in ABG may not truly reflect SIH in substantial patients because ABG does not take the influence of chronic glyceimic status into account. Recent research suggests that the stress hyperglycemia ratio (SHR), which is calculated as the ratio of ABG to the average chronic glucose level estimated by hemoglobin A1c (HbA1c), could provide the most accurate definition of SIH by integration of both acute and chronic glyceimic status.

Condition being studied Heart failure (HF) is a clinical syndrome characterized by the impairment of cardiac systolic and/or diastolic function, and related insufficient perfusion for peripheral organs and tissues. With global aging and advancements

in the treatments for various cardiovascular diseases, the number of patients with HF is expected to continue increasing worldwide.

METHODS

Search strategy ("stress hyperglycemia" OR "stress hyperglycaemia" OR "stess-induced hyperglycemia" OR "stess induced hyperglycemia" OR "stess-induced hyperglycaemia" OR "stess induced hyperglycaemia" OR "admission hyperglycemia" OR "admission hyperglycaemia" OR "admission glucose" OR "stress hyperglycemia ratio" OR "stress hyperglycaemia ratio" OR "glycemic ratio" OR "stress-hyperglycaemia ratio" OR "stress-hyperglycemia ratio" OR "glycemic gap" OR "relative hyperglycemia" OR "acute-to-chronic glycemic ratio" OR "acute-to-chronic glycemia ratio") AND ("heart failure" OR "cardiac failure" OR "cardiac dysfunction") AND ("mortality" OR "death" OR "hospitalization" OR "rehospitalization" OR "prognosis" OR "survival" OR "major adverse cardiovascular events" OR "MACE").

Participant or population Patients with HF.

Intervention A high SHR at baseline.

Comparator A low SHR at baseline.

Study designs to be included Cohort studies.

Eligibility criteria Fulltext in peer-reviewed journals.

Information sources PubMed, Web of Science, Embase, Wanfang, and CNKI.

Main outcome(s) All-cause mortality.

Additional outcome(s) Cardiovascular mortality; HF-rehospitalization; Major adverse cardiovascular events.

Data management Predefined excel for data extraction.

Quality assessment / Risk of bias analysis Newcastle-Ottawa Scale (NOS) for cohort studies.

Strategy of data synthesis A random-effects model was used for result aggregation considering the influence of heterogeneity.

Subgroup analysis Additionally, multiple subgroup analyses were performed to evaluate the influences of study characteristics on the results,

such as in acute or chronic HF, in diabetic or non-diabetic patients, as well as subgroup analyses according to the cutoffs of SHR and follow-up durations of the included studies.

Sensitivity analysis The sensitivity analysis by omitting one study at a time was performed to evaluate the robustness of the finding.

Language restriction English and Chinese.

Country(ies) involved China.

Keywords Stress hyperglycemia ratio; heart failure; meta-analysis.

Contributions of each author

Author 1 - Liang Li.

Author 2 - Zhikun Zhao.

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