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Heart-type fatty acid binding protein as a prognostic marker in heart failure: a systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 21 January 2025 and was last updated on 21 January 2025.

INTRODUCTION

Review question / Objective Heart-type fatty acid binding protein (H-FABP) has emerged as a potential biomarker for cardiac injury and heart failure (HF). This meta-analysis aimed to evaluate the prognostic value of H-FABP in patients with HF.

Condition being studied This meta-analysis aims to evaluate the prognostic value of H-FABP in HF systematically, addressing the lack of consensus on its clinical utility. By comprehensively synthesising available evidence, the study seeks to answer three key questions: 1) How do H-FABP levels change in response to HF treatment? 2) What is the relationship between H-FABP levels and the risk of cardiac events in patients with HF? 3) Can H-FABP levels predict adverse outcomes in patients with HF? Through this systematic examination, the meta-analysis strives to provide a clearer understanding of H-FABP's role in HF prognosis, potentially informing clinical decision-making and guiding future research directions in this critical area of cardiovascular medicine.

METHODS

Participant or population As this meta-analysis did not involve human or animal participants.

Intervention n/a.

Comparator n/a.

Study designs to be included Original research.

Eligibility criteria Studies were eligible for inclusion if they met the following criteria: (1) original research articles investigating the relationship between H-FABP levels and outcomes in patients with HF; (2) studies reporting at least one of the following outcomes – changes in H-FABP levels with treatment, association between H-FABP levels and cardiac events or comparison of adverse cardiac events between patients with

high and low H-FABP levels; (3) studies providing sufficient data for the calculation of effect sizes.

Information sources PubMed, Cochrane Library, Embase, Web of Science and the China National Knowledge Infrastructure (CNKI) database.

Main outcome(s) (1)The significant decrease in plasma H-FABP levels following HF treatment, with a large effect size (2)Association between higher H-FABP levels and an increased risk of cardiac events in patients with HF.

Quality assessment / Risk of bias analysis Our analysis of adverse cardiac events provides further support for the prognostic utility of H-FABP in HF. Patients with elevated H-FABP levels had a significantly higher risk of adverse cardiac events compared with those with lower levels (RR = 0.49). The relatively low heterogeneity in this analysis (I^2 = 28.8%) suggests that this finding is consistent across different study populations and clinical settings.
This result has important implications for risk stratification in patients with HF. The ability to identify patients at higher risk of adverse events based on H-FABP levels could inform clinical decision-making, including the intensity of monitoring, the aggressiveness of treatment and the timing of interventions such as device therapy or transplantation [6].
Moreover, the strong association between H-FABP levels and adverse outcomes raises the question of whether H-FABP could serve as a therapeutic target in HF. Although current HF therapies do not directly target H-FABP, interventions that reduce myocardial stress and injury may be expected to lower H-FABP levels. Future research could explore whether therapies that more effectively lower H-FABP levels are associated with improved clinical outcomes.
The heterogeneity observed in the analysis of cardiac event risk is likely due to differences in patient populations, definitions of cardiac events and follow-up durations across the included studies. For example, some studies defined cardiac events broadly, including hospitalisation for HF, whereas others focused on more severe outcomes, such as mortality. Additionally, variations in follow-up durations, ranging from several months to years, may have influenced the observed risk estimates. In contrast, the studies comparing adverse cardiac event rates were more homogeneous in their definitions and methodologies, resulting in lower heterogeneity. These findings highlight the importance of standardising the definitions of cardiac events and follow-up protocols in future research to reduce heterogeneity and improve the comparability of study results.

Strategy of data synthesis All statistical analyses were performed using RevMan 5.3 software (Cochrane Collaboration, London, UK). For continuous outcomes (changes in H-FABP levels and association with cardiac events), standardised mean differences (SMDs) with 95% confidence intervals (CIs) were calculated. For dichotomous outcomes (comparison of adverse cardiac events), risk ratios (RRs) with 95% CIs were computed. Random-effects models were used for all analyses due to anticipated clinical and methodological heterogeneity among studies. Statistical heterogeneity was assessed using the I^2 statistic, with values of 25%, 50% and 75% considered as low, moderate and high heterogeneity, respectively. Publication bias was evaluated using Egger's test and funnel plots when ≥3 studies were available for analysis. Sensitivity analyses were performed by sequentially excluding individual studies to assess the robustness of the results. A p-value of <0.05 was considered statistically significant for all analyses.

Subgroup analysis In this analysis, we did not perform subgroup analyses because two of the three analyses had low or moderate heterogeneity. For analyses with high heterogeneity, we explored possible sources of heterogeneity in the discussion section.

Sensitivity analysis We did not perform sensitivity analyses in this analysis mainly because most analyses showed low heterogeneity and the methodological quality of the included studies was high. For analyses with high heterogeneity, we explored possible sources of heterogeneity in the discussion section.

Country(ies) involved China.

Keywords Heart-type fatty acid binding protein,heart failure, meta-analysis, prognostic marker.

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