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Clinical Application of Three-dimensional Speckle Tracking Echocardiography in Assessing Left Ventricular Myocardial Function in Diabetes: A Meta-Analysis

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ADMINISTRATIVE INFORMATION

Support - N/A.

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 79 September 2023 and was last updated on 79 September 2023.

INTRODUCTION

Review question / Objective To study the application value of three-dimensional speckle tracking technique (3D-STI) in assessing left ventricular myocardial contractile function (LVMCF) in diabetes mellitus (DM) by meta-analysis.

Condition being studied Diabetic cardiomyopathy (DCM) is regarded as an independent chronic complication, which is a critical reason of poor prognosis and even death in patients with DM. At present, the routine clinical parameter for evaluating cardiac function is LVEF. However, LVEF is greatly influenced by subjectivity, and some studies have shown that this parameter cannot identify the damage of LVSF in earlier DM. 3D-STI is a novel method for comprehensive assessment of cardiac motor function. It tracks myocardial motion from three-dimensional space by identifying myocardial echo speckle signals, which breaks through the angle dependence of Doppler

and the limitation of two-dimensional plane of 2D-STI and makes the evaluation of cardiac function more accurate. The aim of this study was to investigate the assessment of 3D-STI in estimating early left ventricular systolic dysfunction in DM by meta-analysis. Diabetic cardiomyopathy (DCM) is regarded as an independent chronic complication, which is a critical reason of poor prognosis and even death in patients with DM. At present, the routine clinical parameter for evaluating cardiac function is LVEF. However, identify the damage of LVSF in earlier DM. LVEF is greatly influenced by subjectivity, and some studies have shown that this parameter cannot.

METHODS

Search strategy (1) "Three-dimensional speckle tracking" or "3D-speckle tracking" or "3D-STI" or "3D- speckle tracking echocardiography" or "STE" (2)"Diabetes mellitus" or "DM" (3)"left ventricular" or "LV".

Participant or population 3D-STI assessment in DM patients.

Intervention The subjects had no history of cardiovascular illnesses such as coronary heart disorder, hypertension, valvular heart syndrome, and hepatic and renal insufficiency; Diagnostic method was 3D-STI; At least one noteworthy outcome was stated, including GLS, GCS, GRS, GAS.

Comparator Articles comparing LVMCF parameters in DM and control group.

Study designs to be included Randomized controlled trial (RCT) and cohort study.

Eligibility criteria Repeated records and reports that did not provide original description of interest, such as case report, meeting essay, review, fundamental study, and non-relevant studies were disqualified. Two researchers individually evaluated the elected studies according to the inclusion and exclusion criteria. Disagreements between researchers were determined by an agreement gotten from the assistance of a third investigator.

Information sources PubMed, Embase, Scopus databases, and the Cochrane library.

Main outcome(s) In conclusion, 3D-STI might precisely assess the early left ventricle systolic dysfunction in DM. The assessment of left ventricular strain in DM patients through 3D-STI might estimate the damage of LVSF in DM in the early stage.

Quality assessment / Risk of bias analysis Publication bias was evaluated through the Egger's test for involved studies. The random-effect approach was employed to deliberate the variability among the involved articles. The stability was assessed through sensitivity analysis by eliminating one by one into the study.

Strategy of data synthesis Weighted mean difference (WMD) and 95% confidence interval (CI) were used to describe the statistical results of continuous variables. The heterogeneity was measured through Revman 5.3 statistical analysis software and I² test method. I² statistic 50% implied high heterogeneity. The difference was statistically significant once $P < 0.05$.

Subgroup analysis Comparison of LVMCF between DMs and controls based on LVEF; Comparison of LVMCF between DMs and controls based on GLS;

Comparison of LVMCF between DMs and controls based on GCS;
Comparison of LVMCF between DMs and controls based on GRS;
Comparison of LVMCF between DMs and controls based on GAS.

Sensitivity analysis Sensitivity analysis was conducted to study the stability. None of the studies validated a marked influence on merged value, implying that the involved studies existed good stability.

Country(ies) involved China.

Keywords diabetes mellitus; left ventricular myocardial function; three-dimensional speckle tracking echocardiography.

Contributions of each author

Author 1 - Zheng Li - Methodology, Investigation, Data curation, original draft.

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