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Efficacy and safety of coenzyme Q10 in heart failure: a meta-analysis of randomized controlled trials

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Data extraction.

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 18 December 2023 and was last updated on 18 December 2023.

INTRODUCTION

Review question / Objective Study design: Studies published in the Chinese and foreign medical journals on the effects of coenzyme Q10 on chronic heart failure.
Participants: Patients with chronic heart failure over 18 years of age, regardless of their race, nationality, or duration of illness.
Interventions: The experimental group received coenzyme Q10 as an adjuvant therapy in addition to conventional heart failure treatment. As a control group, heart failure patients received only conventional treatment or placebos in addition. In both groups, the drugs were administered at any dosage and for a minimum of one month.
Outcomes: The primary outcomes were all-cause mortality, and hospitalizations for heart failure. The secondary outcomes were left ventricular ejection fraction, NYHA classification, brain natriuretic peptide (BNP), 6-minute walk test (6MWT), and adverse events.

Condition being studied In spite of not being the primary recommended treatment, coenzyme Q10 had been proven effective and safe in improving heart failure. However, its effectiveness and adverse effects could not be accurately measured due to the small sample size and variation in the quality of the studies.

METHODS

Search strategy To identify randomized control trials investigating the effects of coenzyme Q10 on patients with heart failure, we searched EMBASE, PubMed, Web of science, CINAHL Scopus, Cochrane Central Register of Controlled Trials, VIP, Wanfang, and CNKI. Coenzyme Q10 and heart failure concept groups were developed by a skilled

librarian using medical subject headings (MeSH) and keywords for PubMed. Without applying any additional filters or limits, Cochrane RCT filter for PubMed was combined with the concept groups for coenzyme Q10 and heart failure. On September 12, 2023, all selected databases were searched using the search strategies provided in Appendix. To report systematic reviews and meta-analyses, we followed the recommendations in the PRISMA statement (Moher et al. 2009).

Participant or population Patients with chronic heart failure over 18 years of age, regardless of their race, nationality, or duration of illness.

Intervention The experimental group received coenzyme Q10 as an adjuvant therapy in addition to conventional heart failure treatment. As a control group, heart failure patients received only conventional treatment or placebos in addition. In both groups, the drugs were administered at any dosage and for a minimum of one month.

Comparator The experimental group received coenzyme Q10 as an adjuvant therapy in addition to conventional heart failure treatment. As a control group, heart failure patients received only conventional treatment or placebos in addition. In both groups, the drugs were administered at any dosage and for a minimum of one month.

Study designs to be included Studies published in the Chinese and foreign medical journals on the effects of coenzyme Q10 on chronic heart failure.

Eligibility criteria Non-Chinese and English language studies, duplicate published studies, studies without full text, studies with incomplete data, and non-randomized controlled trials were excluded.

Information sources We searched EMBASE, PubMed, Web of science, CINAHL Scopus, Cochrane Central Register of Controlled Trials, VIP, Wanfang, and CNKI. Coenzyme Q10 and heart failure concept groups were developed by a skilled librarian using medical subject headings (MeSH) and keywords for PubMed. Without applying any additional filters or limits, Cochrane RCT filter for PubMed was combined with the concept groups for coenzyme Q10 and heart failure.

Main outcome(s) The primary outcomes were all-cause mortality, and hospitalizations for heart failure.

Additional outcome(s) The secondary outcomes were left ventricular ejection fraction, NYHA classification, brain natriuretic peptide (BNP), 6-minute walk test (6MWT), and adverse events.

Quality assessment / Risk of bias analysis Two evaluators independently assessed the risk of bias of the included RCT studies using the Cochrane Handbook 5.1.0 Risk of bias assessment tool (Higgins et al. 2011). A third party was also consulted when necessary to ensure the accuracy of the final study results. Seven perspectives were used to assess quality: (1) random sequence generation; (2) allocation concealment; (3) blinding of participants and personnel; (4) blinding of outcome assessment; (5) incomplete outcome data; (6) selective reporting; and (7) other biases were discovered. According to the criteria of "low risk of bias," "unknown risk of bias," and "high risk of bias," the quality of the included studies was comprehensively assessed.

Strategy of data synthesis Meta-analysis was performed using Review Manager 5.4 software. For count data, the relative risk (RR) was used as the effect indicator, and for measurement data, the mean difference (MD) or standardized mean difference (SMD) was used. Statistically significant effects were estimated with the point estimates and 95% confidence intervals. Heterogeneity among the included studies was analyzed using the $\chi 2$ test (test level: $\alpha=0.1$) and I^2 quantification was used to estimate its magnitude. If there was no statistical heterogeneity among the results of the studies, a fixed-effects model was used for meta-analysis. In the case of statistical heterogeneity between the results of the studies, the source of heterogeneity was further analyzed, and after excluding the impact of significant clinical heterogeneity, randomization was employed. Meta-analysis test level was set at $\alpha=0.05$. A funnel plot was drawn for the included studies and publication bias was assessed by the distribution.

Subgroup analysis A subgroup analysis or a descriptive analysis alone, was used when there was evident clinical heterogeneity.

Sensitivity analysis A sensitivity analysis, or a descriptive analysis alone, was used when there was evident clinical heterogeneity.

Language restriction Non-Chinese and English language studies were excluded.

Country(ies) involved China (School of Nursing, Nanjing University of Chinese Medicine, Nanjing, Jiangsu).

Keywords Heart failure; Safety outcomes; Coenzyme Q10; Meta analysis; Randomized controlled trial.

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