Efficacy of Cognitive Behavioral Therapy for Heart Failure
A Meta-Analysis of Randomized Controlled Studies

Yan Peng, MD, Junjie Fang, MD, Wei Huang, MD and Shu Qin, MD

Summary

Cognitive behavioral therapy has emerged as an important approach to alleviate the depression of patients with heart failure. However, the use of cognitive behavioral therapy for heart failure has not been well established. We conduct a systematic review and meta-analysis to evaluate the efficacy of cognitive behavioral therapy for alleviating depression for heart failure.

PubMed, Embase, and the Cochrane Central Register of Controlled Trials are searched. Randomized controlled trials (RCTs) assessing the influence of cognitive behavioral therapy on heart failure are included. Two investigators independently have searched articles, extracted data, and assessed the quality of included studies. Meta-analysis is performed using the random-effect model.

Eight RCTs involving 480 patients are included in the meta-analysis. Compared with control intervention for heart failure, cognitive behavioral therapy can substantially decrease depression scale (Std. MD = −0.27; 95% CI = −0.47 to −0.06; \( P = 0.01 \)), but has no substantial influence on the quality of life (Std. MD = 0.21; 95% CI = −0.01 to 0.42; \( P = 0.06 \)), self-care scores (Std. MD = 0.12; 95% CI = −0.18 to 0.42; \( P = 0.44 \)), and 6-minute walk test distance (Std. MD = 0; 95% CI = −0.28 to 0.28; \( P = 0.99 \)).

Cognitive behavioral therapy is associated with significantly decreased depression scale, but with no substantial impact on the quality of life, self-care scores, and 6-minute walk test distance for heart failure.

(Int Heart J 2019; 60: 665-670)

Key words: Depression

Depressive symptoms have become ubiquitous in patients with heart failure, with the incidence of about 20%-40% among heart failure patients.\(^1\)\(^-\)\(^3\) Heart failure is mainly caused by hypertension, coronary heart disease, valvular heart disease, dilated cardiomyopathy, etc.\(^4\)\(^-\)\(^8\) The development of depression is caused by negative thoughts, rumination, feelings of hopelessness about loss of health and independence, as well as an uncertain future.\(^9\)\(^-\)\(^11\) These depressive symptoms can result in high morbidity and mortality and diminished self-care and health-related quality of life, and there is lack of effective treatment strategies to alleviate depressive symptoms for heart failure.\(^2\)\(^,\)\(^12\) These patients have a constant risk of hospitalization or death.\(^13\)\(^-\)\(^15\)

Talking therapies such as cognitive behavioral therapy become increasingly important for patients with heart disease.\(^14\) After cognitive behavioral therapy, these patients are reported to become active and perform tasks to modify negative thoughts and unhelpful behaviors and to decrease negative emotions.\(^16\) In heart failure patients, decreased depression is observed after face-to-face cognitive behavioral therapy for 6 months.\(^17\) In addition, Internet-based cognitive behavioral therapy is also an effective and time-efficient method for the treatment of depressive symptoms for heart failure.\(^18\)

However, the use of cognitive behavioral therapy for heart failure has not been well established. Recently, several studies on the topic have been published, and the results have been conflicting.\(^17\)\(^-\)\(^21\) Considering these inconsistent effects, we therefore conducted a systematic review and meta-analysis of RCTs to evaluate the efficacy of cognitive behavioral therapy in alleviating depression for heart failure patients.

Methods

Ethical approval and patient consent are not required since this is a systematic review and meta-analysis of previously published studies. The systematic review and meta-analysis are conducted and reported in adherence to PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses).\(^22\)

Search strategy and study selection: Two investigators have independently searched the following databases (inception to June 2018): PubMed, Embase, and the Cochrane Register of Controlled Trials. The electronic search

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Received for publication July 3, 2018. Revised and accepted September 19, 2018.

Released in advance online on J-STAGE May 17, 2019.
doi: 10.1536/hj.18-408

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strategy is performed using the following keywords: cognitive therapy and heart failure. We also have checked the reference lists of the screened full-text studies to identify other potentially eligible trials.

The following inclusive selection criteria are applied: (1) population: patients with heart failure; (2) intervention: cognitive behavioral therapy; (3) comparison: usual care or health education intervention; and (4) study design: RCT.

Data extraction and outcome measures: We have used a piloted data-extraction sheet, which covers the following information: first author, number of patients, age, female, New York Heart Association (NYHA), previous ischemic heart disease, and detail methods in two groups. Data are extracted independently by two investigators, and discrepancies are resolved by consensus. We have contacted the corresponding author to obtain the data when necessary. No simplifications and assumptions are made.

The primary outcome is depression scale. Secondary outcomes include quality of life, self-care scores, and 6-minute walk test distance.

Quality assessment in individual studies: The Jadad scale is used to evaluate the methodological quality of each RCT included in this meta-analysis. This scale consists of three evaluation elements: randomization (0-2 points), blinding (0-2 points), dropouts and withdrawals (0-1 points). One point would be allocated to each element if they have been mentioned in the article, and another one point would be given if the methods of randomization and/or blinding had been appropriately described. If the methods of randomization and/or blinding were inappropriate, or dropouts and withdrawals had not been recorded, then one point was deducted. The score of Jadad scale varies from 0 to 5 points. An article with Jadad score ≤ 2 is considered to be of low quality. If the Jadad score is ≥ 3, the study is thought to be of high quality.

Statistical analysis: We have estimated standard mean differences (Std. MDs) with 95% confidence intervals (CIs) for continuous outcomes (depression scale, quality of life, self-care scores, and 6-minute walk test distance). A random-effects model is used regardless of heterogeneity. Heterogeneity is reported using the $I^2$ statistic, and $I^2 > 50\%$ indicates significant heterogeneity. Whenever significant heterogeneity is present, we search for its potential sources. Sensitivity analysis is performed to detect the influence of a single study on the overall estimate via omitting one study in turn when necessary. Owing to the limited number (< 10) of included studies, publication bias is not assessed. Results are considered as statistically significant for $P < 0.05$. All statistical analyses are performed using Review Manager Version 5.3 (The Cochrane Collaboration, Software Update, Oxford, UK).

Results

Literature search, study characteristics, and quality assessment: A detailed flowchart of the search and selection results is shown in Figure 1. Seven hundred and thirty eight potentially relevant articles are identified initially. Finally, eight RCTs that meet our inclusion criteria are included in the meta-analysis.

The main characteristics of the eight included RCTs are presented in the Table. The eight studies are published between 2010 and 2017, and sample sizes range from 17 to 158 with a total of 480. Cognitive behavioral therapy is performed by face-to-face or Internet-based approach.

Among the eight RCTs, five studies have reported depression scale, five studies have reported quality of life, two studies have reported self-care scores, and three studies have reported 6-minute walk test distance. Jadad scores of the eight included stud-
## Table. Characteristics of Included Studies

<table>
<thead>
<tr>
<th>No.</th>
<th>Author</th>
<th>Number</th>
<th>Age (years)</th>
<th>Female (n)</th>
<th>NYHA (II/IV)</th>
<th>Previous ischemic heart disease</th>
<th>Methods</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Redeker 2017</td>
<td>30</td>
<td>62.0 ± 13.3</td>
<td>16</td>
<td>-</td>
<td>-</td>
<td>cognitive behavioral therapy for insomnia in four biweekly sessions over an 8-week period with telephone calls on intervening weeks</td>
<td>21</td>
</tr>
<tr>
<td>2</td>
<td>Lundgren 2016</td>
<td>25</td>
<td>63.6 ± 13.9</td>
<td>10</td>
<td>5/0</td>
<td>8</td>
<td>9-week guided Internet-based cognitive behavioral therapy</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>Cajanding 2016</td>
<td>48</td>
<td>-</td>
<td>15</td>
<td>19/2</td>
<td>23</td>
<td>a 12-week nurse-led cognitive behavioral intervention program focusing on patient education, self-monitoring, skills training, cognitive restructuring, and spiritual development</td>
<td>52</td>
</tr>
<tr>
<td>4</td>
<td>Pressler 2015</td>
<td>13</td>
<td>66.8 ± 5.7</td>
<td>3</td>
<td>4/0</td>
<td>-</td>
<td>a computerized cognitive training program</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>Freedland 2015</td>
<td>79</td>
<td>56.2 ± 11.5</td>
<td>40</td>
<td>33/0</td>
<td>25</td>
<td>cognitive behavioral therapy delivered by experienced therapists plus usual care</td>
<td>79</td>
</tr>
<tr>
<td>6</td>
<td>Athilinam 2015</td>
<td>9</td>
<td>60.55 ± 8.12</td>
<td>2</td>
<td>2/1</td>
<td>4</td>
<td>computerized auditory cognitive training consisting of six auditory exercises aimed at enhancing speed and accuracy of auditory processing</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>Dekker 2012</td>
<td>20</td>
<td>68 ± 10</td>
<td>10</td>
<td>15/0</td>
<td>13</td>
<td>a brief, nurse-delivered cognitive therapy intervention, delivered during hospitalization and followed by a 1-week booster phone call</td>
<td>21</td>
</tr>
<tr>
<td>8</td>
<td>Gary 2010</td>
<td>19</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>a 12-week cognitive behavioral therapy</td>
<td>17</td>
</tr>
</tbody>
</table>

NYHA indicates New York Heart Association.
Primary outcome—depression scale: This outcome data is analyzed with the random-effects model; the pooled estimate of the five included RCTs suggested that compared with control group for heart failure, cognitive behavioral therapy is associated with significantly reduced depression scale (Std. MD = −0.27; 95% CI = −0.47 to −0.06; \( P = 0.01 \)), with no heterogeneity among the studies (\( I^2 = 0\% \), \( P = 0.49 \); Figure 2).

Sensitivity analysis: No heterogeneity is observed among the included studies for the primary outcome. Thus, we do not perform sensitivity analysis by omitting one study in each turn to detect the source of heterogeneity.

Secondary outcomes: Compared with control group for heart failure, cognitive behavioral therapy shows no substantial impact on quality of life (Std. MD = 0.21; 95% CI = −0.01 to 0.42; \( P = 0.06 \); Figure 3), self-care scores (Std. MD = 0.12; 95% CI = −0.18 to 0.42; \( P = 0.44 \); Figure 4), and 6-minute walk test distance (Std. MD = 0; 95% CI = −0.28 to 0.28; \( P = 0.99 \); Figure 5).

Discussion

Major depression is a common comorbidity in patients with heart failure and results in poor quality of life, an increased risk for hospitalization, and mortality. A vast majority of heart failure patients have symptoms of depression and anxiety. Depressive symptoms show a strong negative impact on quality of life. Depressive symptoms can be treated by psychotherapy or pharmacology. Many drugs such as sertraline and escitalopram have been developed to treat this depression, but they have no definite efficacy on depression, mortality,
morbidity, and mood. Talking therapies such as cognitive behavioral therapy may be preferred over pharmacological treatment.

Cognitive behavioral therapy is found to be superior to usual care at 6 months on the Beck Depression Inventory (BDI-II) and depression remission rate, and the gains of most patients can maintain for at least 12 months after initiating cognitive behavioral therapy. The intervention may also help to improve the quality of life among clinically depressed heart failure patients, but with no obvious impact on rehospitalization rates or death. These findings should be interpreted with caution and evaluated more definitively in future trials. Our meta-analysis suggests that compared with control intervention for heart failure, cognitive behavioral therapy results in significantly decreased depression scale, but with no substantial influence on quality of life, self-care scores, and 6-minute walk test distance. Different frequency of cognitive behavioral therapy treatment, level of depressive symptoms pre-intervention, and NYHA class may account for this inconsistence.

One recent meta-analysis has involved six studies including five RCTs and one observational study comprising 320 participants, and one of them is an abstract that combines data for two separate RCTs. The results conclude that cognitive behavioral therapy is associated with the improvement in depression scores and quality of life.

Eight RCTs are included in our meta-analysis involving 480 patients. Our meta-analysis further confirms the efficacy of cognitive behavioral therapy in reducing depression scores, but the quality of life is not significantly improved in heart failure patients. Regarding the sensitivity analysis, there is no heterogeneity among the included RCTs. However, the different frequency of cognitive behavioral treatment and detail methods may have some impact on the pooling results.

This meta-analysis has several potential limitations that should be taken into account. First, our analysis is based on eight RCTs, and five of them have small sample size (n < 100). Overestimation of the treatment effect is more likely in smaller trials compared with larger samples. Although there is no significant heterogeneity, different frequency of cognitive behavioral therapy treatment, level of depressive symptoms pre-intervention, age, and NYHA class may have some impact on the pooling results. Finally, we cannot perform the meta-analysis of some important outcomes such as hospitalization rate and mortality based on current included RCTs.

Conclusion

Cognitive behavioral therapy is effective to alleviate depression in patients with heart failure.

Disclosure

Conflicts of interest: The authors declare no conflict of interest.

References

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