The effect of exercise to improve quality of life among patients with heart failure: A literature review

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Abstract

Background: Nowadays, cardiovascular diseases are considered as the most prevalent disease in developed countries and are main cause of mortality in all ages and races. Heart failure (HF) is a major public health issue in the world. An exercise program, developed based on the physical conditions of patients, can promote the quality of life in heart failure patients.
Purpose: To examine the effect of exercise to improve quality of life among patient with Heart Failure.
Methods: The electronic databases of PubMed, CINAHL, Trip, and Cochrane Systematic Reviews were searched. These databases were chosen based on their inclusion of allied health and medical journals, and those that contain studies relevant based exercise.
Results: The search terms included "heart failure", "exercise", "quality of life". We found 272 articles in all databased and got 1 for PubMed, 2 for Trip database that fit in criteria.
Conclusion: Physical exercise has proved increasing quality of life among patients with heart failure. Improving patients exercise capacity and increasing their ability to perform more daily physical activity is expected to improve their quality of life. From the result finding of three evidences, we could see the significant finding on increasing quality of life after did physical exercise.

Keywords: Excercise; Quality of life; Heart failure

INTRODUCTION

Nowadays, cardiovascular diseases are considered as the most prevalent disease in developed countries and are main cause of mortality in all ages and races (Parkosewich, 2010). In the beginning of the 20th century, mortality caused by heart disease was less than 10% of the whole world's mortality (Braunwald, Douglas, Zipes, & Robert, 2015; Rakhshan, Kordshooli, & Ghadakpoor, 2015). Behavioral change (lifestyle) has been the major strategy to deal with and to decrease the number of case, readmission and reduce mortality. People with HF experience marked reductions in their exercise capacity, which has detrimental effects on their activities of daily living, health-related quality of life (HRQoL), and ultimately their hospital admission rate and mortality (Taylor, Sagar, Davies, Briscoe, Coats, Dalal, & Singh, 2014).

Prevalence and incidence rates of heart failure are high. In individuals aged 55, almost 1 in 3 will develop heart failure during their remaining lifespan. Heart failure continues to be a fatal disease, with only 35% surviving 5 years after the first diagnosis (Bleumink, Knetsch, Sturkenboom, Straus, Hofman, Deckers, & Stricker, 2004). Heart failure is a major public health issue in the world. An exercise program, developed based on the physical conditions of patients, can promote the quality of life in heart failure patients (Lewis, Shah, Shahzad, Camuso, Pappagianopoulos, Hung, & Semigran, 2007; Whellan, O'Connor, Lee, Keteyian, Cooper, Ellis, & Rendall, 2007). Lifestyle changes such as doing exercise, and managing stress and excitement by the health team in patients with heart failure can help to reduce signs and symptoms of disease progression and improve quality of life (Dunlay, Gheorghiade, Reid, Allen, Chan, Hauptman, & Spertus, 2010). This study aimed to examine the effect of exercise to improve quality of life among patient with Heart Failure.

RESEARCH METHODS

A litrature search using electronic databases of PubMed, CINAHL, Trip, and Cochrane was undertaken (Figure 1. The search was limited to journal articles published in English. There were three steps to search strategies: 1) Data sources and search strategy used PICO questions; the search terms included "heart failure", "exercise", and "quality of life". In each databased we found 177 PubMed, 13 CINAHL, 43 Cochcrane, and 39 in Trip, and the total 272 articles. 2) Read the heading; After finding journal, we read the heading to find a journal that fitted in key word (heart failure, exercise and quality of life) and removed the duplicated article. We found 4 journals in PubMed, 0 in CINAHL, 0 in Cochrane, and 3 in Trip database that in accordance with the keyword. 3) Read abstracts and reviewed; the next filter, we read abstract inclusion criteria applied consist of RCT/systematic review/meta-analysis, having control group, have the same intervention and outcome meassure. We got 1 for PubMed, 2 for Trip database that fit in criteria.

Figure 1. Flowchart of literature search

RESULTS AND DISCUSSION

Heart failure is a common, costly, and disabling disease with a lot of suffering in patients and their families. Physical exercise has proved increasing quality of life among patients with heart failure. Improving patients exercise capacity and increasing their ability to perform more daily physical activity is expected to improve their quality of life. From the result finding of three evidences (Table 1), we could see the significant finding on increasing quality of life after did physical exercise. Currently there is no universal agreement on exercise prescription for patients with HF, and thus guidelines recommend an individualized approach with careful clinical evaluation, including behavioural characteristics, personal goals, and preferences (Jaarsma, Klompstra, Ben Gal, Boyne, Vellone, Bäck, & Chialà, 2015). Regarding these findings, the main emphasize is on behavioral change (lifestyle changes), involvement of patients and family and building awareness. These three ideas are the main purposes of treatment on chronic diseases such as heart failure. Since that evidence is come from RCT design, the golden standard of interventional study, so we can consider applying it in clinical setting.

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Table 1. Synthesis Table

Author	Level*	Year	Participant	Age (mean)	Study design	Intervention	Detail Topic and Activity	Major Finding
Dehkordi, & Far. (2015).	RCT/Level 2 (CEBM, 2011)	2012	I= 30 C= 31	I= 60 C= 58	RCT	Exercise program as long as 40 minutes consist of warm up 5-10 minutes, walking 25-30 minutes and cooling down 5 minutes.	a. The exercise program was performed three sessions per week for 24 weeks, Exercise started until heart rate reached equal to 60% of heart rate reserve. After 6 sessions, the duration of the exercise (walking) was increased to 30 to 35 minutes, and heart rate to 70% of heart rate reserve. b. Patients in the control group received educational support but no exercise protocol; they were asked to continue their individually prescribed cardiovascular medications and their usual lifestyle but not to do any physical activity that caused breathlessness	a. Independent t-test indicated that the quality of life score in eight dimensions was not significantly different between the two groups at the beginning of the studyp value > 0.13. b. Independent t-test also showed that there was a significant difference in the physical performance, activity limitation following physical problem, energy and fatigue, social performance, physical pain, and public health at the end of the exercise program in the experimental group and 24 weeks after in the control group p value < 0.05. c. The quality of life score was significantly different between before exercise program and at the end of the exercise program in the experimental group and 24 weeks after in the control group p value < 0.05.

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Chrysohoou, et al. (2014)	RCT/Level 2 (CEBM, 2011)	2014	I= 33 C=39	I= 63 C= 56	RCT	Exercise test on an electromagnetically braked cycle ergo meter.	a. After a 3-min of baseline measurement, followed by 3-min of unloaded pedalling, the work rate was increased every minute by 10 or 20W to the limit of tolerance while subjects maintained a pedalling of 60 rpm. b. Patients were instructed to exercise at an intensity equivalent to 80% WR peak and progressively to 100% of WR peak for 30 s alternated with30 s of rest for an accumulative period of 45 min/day, 3 days/week for 12 consecutive weeks.	a. At the end of intervention the MLHFQ score was lower among CHF patients in the exercise group as compared with the control group; in particular, patients in the exercise intervention group sub-tripled their MLHFQ score after 12 weeks of intervention, whereas patients in the control group had similar scores (P for between groups comparisons<0.001). b. Following rehabilitation, there was a significant improvement for CHF patients in the intervention group in exercise tolerance as indicated by the greater distance walked during 6MWT (by 13%, P < 0.05) and the higher _VO2max (by 31%, P < 0.001), _V CO2max (by 28%,P < 0.001) and WR peak (by 25%, P < 0.01), where as CHF patients in the control group had no changes in the aforementioned indices.

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Bocalini, et al. (2008)	RCT/Level 2 (CEBM, 2011)	2008	I= 22 C= 20	I= 61 C= 60	RCT	All subjects were submitted to ergo metric exercise testing for acceptance into the training program	a. The program was composed of three weekly sessions of 90 minutes duration each, over a period of 6 months. Each session was divided into aerobic conditioning, muscle strengthening and increasing joint flexibility activities. b. Aerobic conditioning consisted of walking on a treadmill for 20 to 40 minutes per session. Exercise intensity was controlled based on the individual pre-programmed target heart rate (50% of work in the maximal heart rate) and was monitored using a heart rate monitor (Polar Accurex Plus, Lake Success, NY, USA).	a. At the beginning of the study, and before the training program began, there were no significant differences between groups treatment and control. b. After 6 months of follow-up, there was some general improvement in the parameters of quality of life, but significant statistical differences were only noted for the exercised patients All domains, including physical (S: 2 ± 1 vs. T: 23 ± 4% improvement), psychological (S: 1 ± 1 vs. T: 20 ± 2% improvement), social (S: 3 ± 2 vs. T: 16 ± 1% improvement) and environmental (S: 2 ± 1 vs. T: 15± 2% improvement), were significantly improved in the T group ($p < 0.001$) in comparison to the S group. In conclusion physical exercise program is safe and beneficial for patients with heart failure with different etiologies.

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CONCLUSION

Reduced physical function and increased dependency have a significant negative impact on the quality of life of people who are terminally ill. The idea to applied physicalexercise in clinical settingis a great advantage for the patient. American Heart Association Scientific Statement for health professionals summarizes the evidence for the benefits of physical activity in the prevention and treatment of cardiovascular disease, provides suggestions to healthcare professionals for implementing physical activity programs for their patients, and identifies areas for future investigation. So physical exercise could become approach to prepare patients lifestyle change. Furthermore, concept of family partnership could be considered to increase benefits and positive impacts, could be prepared as applicative method in teaching patients and families. So, these findings can be basic informations to build policy and standard care, as integrative approaches in treating patients with heart failure disease

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ATTACHMENT "CRITICAL APPRAISAL"

I. Literature 1. Effect of exercise training on the quality of lifeand echocardiography parameter of systolic function in patients with chronic heart failure: a randomized trial (RCT)

NO	CRITICAL APPRAISAL CHECKLIST	RESULT
1	Did the trial address a clearly focused issue?	Yes (HF patients, exercise training, quality of life)
2	Was the assignment of patients to treatments randomized?	Yes (The randomization code was developed with a computer random-number generator to select random permuted blocks)
3	Were patients, health workers and study personnel blinded?	Yes(All of procedur in each participant exercise and monitoring by nurse and physician)
4	Were the groups similar at the start of the trial?	Yes (Inclusion and exclusion criteria had applied to select participants.Male and female patients of 65 ± 15 years with chronic heart disease and consent to participate in the study. Age 60 ± 4.25(I) 58 ± 4.22 (C) LVEF 32 ± 4 (I) 33 ± 5 (C))
5	Aside from the experimental intervention, were the groups treated equally?	Yes((I) The exercise program was performed three sessions per week for 24 weeks. (C) Patients in the control group received educational support but no exercise protocol; they were asked to continue their individually prescribed cardiovascular medications and their usual lifestyle but not to do any physical activity)
6	Were all of the patients who entered the trial properly accounted for at its conclusion?	Yes(The quality of life questionnaire was filled out and echocardiography was carried out on both groups by the researchers twice, before the exercise program at the hospital and 24 weeks after the exercise program, Assessed for eligibility n=66 participant and randomize after enrollment 61 participant, 5 participant was exclude because of death, 31 participant for control group and 30 participant for experimental group befor and after analyzed)
7	How large was the treatment effect? OR, RR, NNT, NNH	The quality of life score was significantly different between before exercise program and at the end of the exercise program in the experimental group and 24 weeks after in the control group p value < 0.05. The effect size was 0.45 (medium).
8	How precise was the estimate of the treatment effect?	There is no information about confident interval. However, the author provides the Mean ± Standard Deviation of Different Dimensions of Life Quality in Patients With Congestive Heart Failure in Case and Control Groups Prior to the Intervention (C; 62.34 ± 11.25, I; 61.01 ± 14.9) and After the Completion of the Intervention (C; 58.43 ± 8.67, I; 63.34 ± 12.69).
9	Can the results be applied in your context? (Or to the local population?)	Yes (it is still applicable for Indonesian patient with HF)
10	Were all clinically important outcomes considered?	Yes (Diseases diagnosis, Peak oxygen uptake, NYHA class, Ejection fraction, and Medications)
11	Are the benefits worth the harms and costs?	Yes (The benefit of physical exercise become the major output. As known, this study consider about the benefit of physical exercisetoimprove quality of life for patient with heart failure)

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II. Literature 2. High intensity, interval exercise improves quality of life of patients with chronicheart failure: a randomized controlled trial (RCT)

NO	CRITICAL APPRAISAL CHECKLIST	RESULT
1	Did the trial address a clearly focused issue?	Yes (HF patients, interval exercise, quality of life)
2	Was the assignment of patients to treatments randomized?	Yes(Eligible patients who gave their consent were randomized to usual exercise or no exercise intervention. The Biostatistics Unit of the First Cardiology Department of our Institution performed the randomization of the participants using a block randomization design (by age group, sex, NYHA class, years of known CHF, and ischemic CHF);each CHF patient was allocated to one or other group from a randomization list that was created for this purpose)
3	Were patients, health workers and study personnel blinded?	Can't tell (the author not clear explained the procedur who have been gave the intervention to participant)
4	Were the groups similar at the start of the trial?	Yes (Inclusion and exclusion criteria had applied to select participants.CHF due to left ventricular systolic dysfunction (NYHA classes II–IV, ejectionfraction450%) were eligible for participation. Patients with heart stable stage of heart failure(I–III) due to ischemic or dilated heart failure, without several valve diseases were included in the study).
5	Aside from the experimental intervention, were the groups treated equally?	Yes (C: Patients in the usual care group were managed as usual by the admitting physician in the Heart Failure Unit, and no advice for any specific exercise protocol was given, I: exercise test on an electromagnetically braked cycle ergo meter).
6	Were all of the patients who entered the trial properly accounted for at its conclusion?	Yes [Among 150 invited participants exclude to be 100 participants (C; 50 participants, I; 50 participant), 11 participant in control group was discontinued (5 denied, 4 lack of time, 1 atrial flutter and 1 ventriculer tachicardia), for intervention 17 participant was discontinued (10 denied, 7 changed phone number) Then the data focused on 72 participant as total participant entered in statistical approach and analysed (33 participant intervention and 39 participant as a control group).
7	How large was the treatment effect? OR, RR, NNT, NNH	The MLHFQ score was 19_12 among patients in the control group and 21_7 in the intervention group (P = 0.46) with the effect size was -0.8 (high).
8	How precise was the estimate of the treatment effect?	Based on an a priori statistical power calculation(using East 3, 2003, Cytel Software Corporation, USA), the number of studied patients (n = 30 per group) was adequate to evaluate standardized differences of the investigated QoL and ZDRS scores between the groups of the study, >0.5 two-tailed, since a power of 85% at significance level of 0.05 was achieved.
9	Can the results be applied in your context? (Or to the local population?)	Yes (it is still applicable to apply in Indonesia but it need much effort to prepare the and involved family to join the family partnership).
10	Were all clinically important outcomes considered?	Yes(Exercise, NYHA class, Ejection fraction, and Medications)Exercise type has also been shown to exhibit different effects on muscular capacity, with the combination of moderate and high-intensity resistance training in the exercise program improving muscular strength and endurance by 25–100%
11	Are the benefits worth the harms and costs?	Yes (study consider about the benefit of physical exerciseto improve quality of life for patient with heart failure)

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III. Literature 3. Physical exercise improves the functional capacity and quality of life in patients with heart failure (RCT)

NO	CRITICAL APPRAISAL CHECKLIST	RESULT
1	Did the trial address a clearly focused issue?	Yes (HF patients, physical exercise,functional capacity and quality of life)
2	Was the assignment of patients to treatments randomized?	Can't tell (randomization design had allocated but it was not clear what method used)
3	Were patients, health workers and study personnel blinded?	Can't tell (researcher did not describe clearly how the participant have been treated)
4	Were the groups similar at the start of the trial?	Yes (Controlled study included 56 subjects, according to the following inclusion criteria: ejection fraction ≤45% (by echocardiography), x symptoms of NYHA functional class II or III, optimized pharmacological therapy established at least 4 weeks before inclusion in the study, and a compensated heart failure state at least 2 months prior. 7 patients declined to participate in the study and 16 presented one or more exclusion criteria. Accordingly, 33 patients with heart failure of NYHA functional class III were included and randomly divided into two distinct groups: Untrained (S, n = 25) or Trained (T, n = 28).
5	Aside from the experimental intervention, were the groups treated equally?	Can't tell(the author did not mentionthe treatment for control group, just describe that all subjects were submitted to ergo metric exercise testing for acceptance into the training program)
6	Were all of the patients who entered the trial properly accounted for at its conclusion?	Yes [at the beginning Untrained (S, n = 25) or Trained (T, n = 28), at the analyzesDuring the study period, 3 patients from the untrained group experienced an impairment of symptoms and were hospitalized. At the conclusion of the protocol, 2 others could not be found for outcome acquisition and their data were excluded from analysis. In the trained group, 2 patients dropped out of the study and 4 patients did not complete a minimum of 80% of the exercise program). Our results are based on data from 42 patients (S: n = 20; T: n = 22).
7	How large was the treatment effect? OR, RR, NNT, NNH	In this article the author did not provide the value of mean and standard deviation in both of participant control and intervention group. The author just provide bar chart to describe the result betwen after and before exercise.
8	How precise was the estimate of the treatment effect?	There is no information of confidential interval of result. However, the author provides the SD After 6 months of follow-up, there was some general improvement in the parameters of quality of life, but significant statistical differences were only noted for the exercised patients All domains, including physical (S: 2 ± 1 vs. T: 23 ± 4% improvement), psychological (S: 1 ± 1 vs. T: 20 ± 2% improvement), social (S: 3 ± 2 vs. T: 16 ± 1% improvement) and environmental (S: 2 ± 1 vs. T: 15± 2%improvement), were significantly improved in the T group ($p < 0.001$) in comparison to the S group.
9	Can the results be applied in your context? (Or to the local population?)	Yes (still applicable and suitable with clinical context of Indonesia)
10	Were all clinically important outcomes considered?	Yes (Physical exercise, functional capacity and quality of life, heart failure etiology, medication, NYHA).
11	Are the benefits worth the harms and costs?	Yes (study consider about the benefit of physical exerciseto improve quality of life for patient with heart failure)This improvement in aerobic fitness may be the basis for several beneficial physiological changes in the patients, including reductions in maximal heart rate, systolic blood pressure, and oxygen consumption required by the myocardium during activities of moderate and high intensity.

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IV. Summary Table of Appraisal

No	Appraisal Checklist	Dehkordi, & Far [9]	Chrysohoou, et al. [10]	Bocalini, et al. [11]
1	Did the trial address a clearly focused issue?	Yes	Yes	Yes
2	Was the assignment of patients to treatments randomized?	Yes	Yes	Can't tell
3	Were patients, health workers and study personnel blinded?	Yes	Can't tell	Can't tell
4	Were the groups similar at the start of the trial?	Yes	Yes	Yes
5	Aside from the experimental intervention, were the groups treated equally?	Yes	Yes	Can't tell
6	Were all of the patients who entered the trial properly accounted for at its conclusion?	Yes	Yes	Yes
7	How large was the treatment effect? OR, RR, NNT, NNH	The quality of life score was significantly differ-ent between before exercise program and at the end of the exercise program in the experimental group and 24 weeks after in the control group p value < 0.05. The effect size was 0.45 (medium).	The MLHFQ score was 19_12 among patients in the control group and 21_7 in the intervention group (P = 0.46) with the effect size was -0.8 (high).	In this article the author did not provide the value of mean and standard deviation in both of participant control and intervention group. The author just provide bar chart to describe the result betwen after and before exercise.
8	How precise was the estimate of the treatment effect?	There is no information about confident interval. However, the author provides the Mean ± Standard Deviation of Different Dimensions of Life Quality in Patients With Congestive Heart Failure in Case and Control Groups Prior to the Intervention (C; 62.34 ± 11.25, I; 61.01 ± 14.9) and After the Completion of the	Based on an a priori statistical power calculation(using East 3, 2003, Cytel Software Corporation, USA), the number of studied patients (n = 30 per group) was adequate to evaluate standardized differences of the investigated QoL and ZDRS scores between the groups of the study, >0.5 two-tailed, since a power of 85% at	There is no information of confidential interval of result. However, the author provides the SD After 6 months of follow-up, there was some general improvement in the parameters of quality of life, but significant statistical differences were only noted for the exercised patients All domains, including physical (S: 2 ± 1 vs. T: 23 ± 4% improvement), psychological (S: 1 ± 1 vs. T: 20 ± 2% improvement), social (S: 3 ± 2 vs. T: 16 ± 1% improvement) and environmental (S: 2 ± 1 vs. T: 15±

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		Intervention (C; 58.43 ± 8.67, I; 63.34 ± 12.69).	significance level of 0.05 was achieved.	2%improvement), were significantly improved in the T group ($p < 0.001$) in comparison to the S group.
9	Can the results be applied in your context? (Or to the local population?)	Yes	Yes	Yes
10	Were all clinically important outcomes considered?	Yes	Yes	Yes
11	Are the benefits worth the harms and costs?	Yes	Yes	Yes

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