Original Article

The Effectiveness of Mindfulness-Based Intervention on Reducing Clinical Outcomes among Heart Disease Outpatients: A Systematic Review

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Abstract

Background: Heart disease is one of chronic diseases that causes the highest morbidity and mortality, manifestation of signs and symptoms that can affect quality of life. Implementing Mindfulness Intervention may be effective in reducing the signs and symptoms of patients, both psychological and physiological symptoms.
Aims: identify and evaluate the effectiveness of mindfulness intervention in reducing psychological symptoms in patients with heart disease, as well as knowing other benefits in reducing signs and symptoms of patients with heart disease.
Methods: This systematic review can be carried out by collecting the results of scientific publications in the range of 2009-2018 that obtained from PubMed, Proquest, Sage Journals, and Google Scholar. The review was conducted in October 2018. The studies that reviewed were English and full-text quantitative studies, as well as mindfulness intervention studies in adult patients with heart failure or coronary artery disease which has a psychological or physiological outcome or both.
Results: There were seven articles reviewed, 5 RCT studies, 1 quasi-experiment, and 1 cohort study. The results concluded that Mindfulness intervention can provide psychological and physiological effects on patients with heart disease.
Conclusion: Mindfulness Intervention can be a promising additional therapy in reducing the signs and symptoms of heart disease both from psychological effects and expected physiological effects.
Implications: Mindfulness Intervention training can be a part of cardiac rehabilitation programs in reducing stress, anxiety and depression as well as functional capacity in outpatient heart disease.

Keywords: *heart disease, mindfulness intervention, clinical outcomes, outpatient*

Introduction

Heart Disease is a leading cause of highest morbidity and mortality worldwide, characterized by a prevalence rate of 17.9 million people, and an estimated 31% of deaths (WHO, 2016). In the United States, about 11.5% of adults with heart disease (27.6 million people) which as the first ranks was coronary heart disease (44%) and heart failure as the fourth ranks as clinical compensation syndrome for other heart diseases (9%) (Benjamin *et al.*, 2018). Meanwhile, in the Asia Pacific region, there were 6.1% who has heart disease (Mozaffarian *et al.*, 2016). This high prevalence indicates the need for strategic efforts to

minimize the prevalence of these with primary prevention through risk factor modification (Piepoli *et al.*, 2016), and secondary prevention by minimizing recurring clinical manifestations of heart disease through cardiac rehabilitation programs (Pesah *et al.*, 2017).

There are several clinical manifestations of heart disease, such as fatigue, chest pain, dyspnea, sleep disorder, depression, and anxiety (Herr *et al.*, 2014; Conley, Feder and Redeker, 2015). In a meta-analysis study reported that high stress levels can increase the risk of heart disease by 27% with a risk ratio of 1.27 (Richardson *et al.*, 2012). In addition, 65% of recurrences of heart disease can be triggered by stress (Li *et al.*, 2014). The Guidelines from the European Society of Cardiology (ESC) has given recommendations that psychosocial interventions and pharmacological treatment and exercise, could help patients with heart disease. Cognitive behavioral therapy that was given beyond standard care and structured education programs in patients with heart disease and major depression can reduce the severity of depression, anxiety, and symptoms of fatigue, as well as improve social function and mental quality of patients (Ponikowski *et al.*, 2016). One additional therapy in chronic care such as heart disease which is now increasingly popular is mindfulness intervention.

Mindfulness Intervention is a therapeutic intervention that is described as a process to bring the focus of attention through the practice of mindfulness meditation (Kabat-zinn, 1982). Mindfulness was initially a therapy for patients with chronic pain (Kabat-zinn, 1982). But now, Mindfulness is an intervention that can overcome anxiety and mood problems in the clinical population (Hofmann *et al.*, 2010). This therapy has also been developed as an approach in increasing awareness and skills in responding to mental stress and maladaptive behavior, making it easier to manage and treat symptoms, improve the quality of life for patients with chronic diseases (Merkes, 2010).

As one of the chronic diseases, Heart disease indicates that the implementing of Mindfulness Intervention may be effectively applied in reducing symptoms of patients with heart disease, both psychological and physiological symptoms. Therefore, this review was conducted to identify and evaluate the effectiveness of mindfulness intervention in reducing psychological symptoms in patients with heart disease, as well as knowing other benefits in reducing signs and symptoms of patients with heart disease.

Methods

Search Strategy

The search strategy was conducted by searching for several published studies through the database. PubMed, ProQuest, SAGE Journals and Google Scholar were used as databases. This strategy used combination of the MeSH terms and free terms. The research question was designed by using PICO principles. PICO review questions consisted of Population (Keywords used in the searching include Heart Disease, Heart Failure, Coronary Artery Disease), Intervention (Keywords used : Mindfulness, Mindfulness Based Intervention), Comparison (None), Outcomes (Keywords used: Depression, Heart Rate, Sleep Disorders, Fatigue, Stress, anxiety). The selected studies were published from the year 2009-2018, and the study searches were conducted on October 18, 2018 until October 23, 2018. In addition to the database, a manual search was conducted to find relevant studies with article keywords.

Inclusion Criteria

Studies were eligible if they met the following criteria:

1. Quantitative Study
2. Published in full-text and in English
3. Mindfulness intervention studies in adult patients with heart disease (heart failure or coronary artery disease) who have psychological or physiological effects or both.

Studies Selection

The total titles/abstracts identified in the database were 4343, and 2 additional titles/abstracts through manual searching outside of the databases. After excluding duplicated titles/abstract, remained 4120 and after a further removal of 4017 (97.5%) duplicated titles/abstract, obtained 103 titles/abstract. In the next stage, the full text articles were examined in more depth to be determined by EZ and checked by the SS. For the remaining 103 articles screened, 96 were excluded because 42 were not mindfulness intervention studies, 45 outcomes did not met the inclusion criteria, and 8 were not

in English. So that, the eligible articles was 7. The PRISMA flow diagram in figure 1 illustrates the inclusion process.

PRISMA DIAGRAM

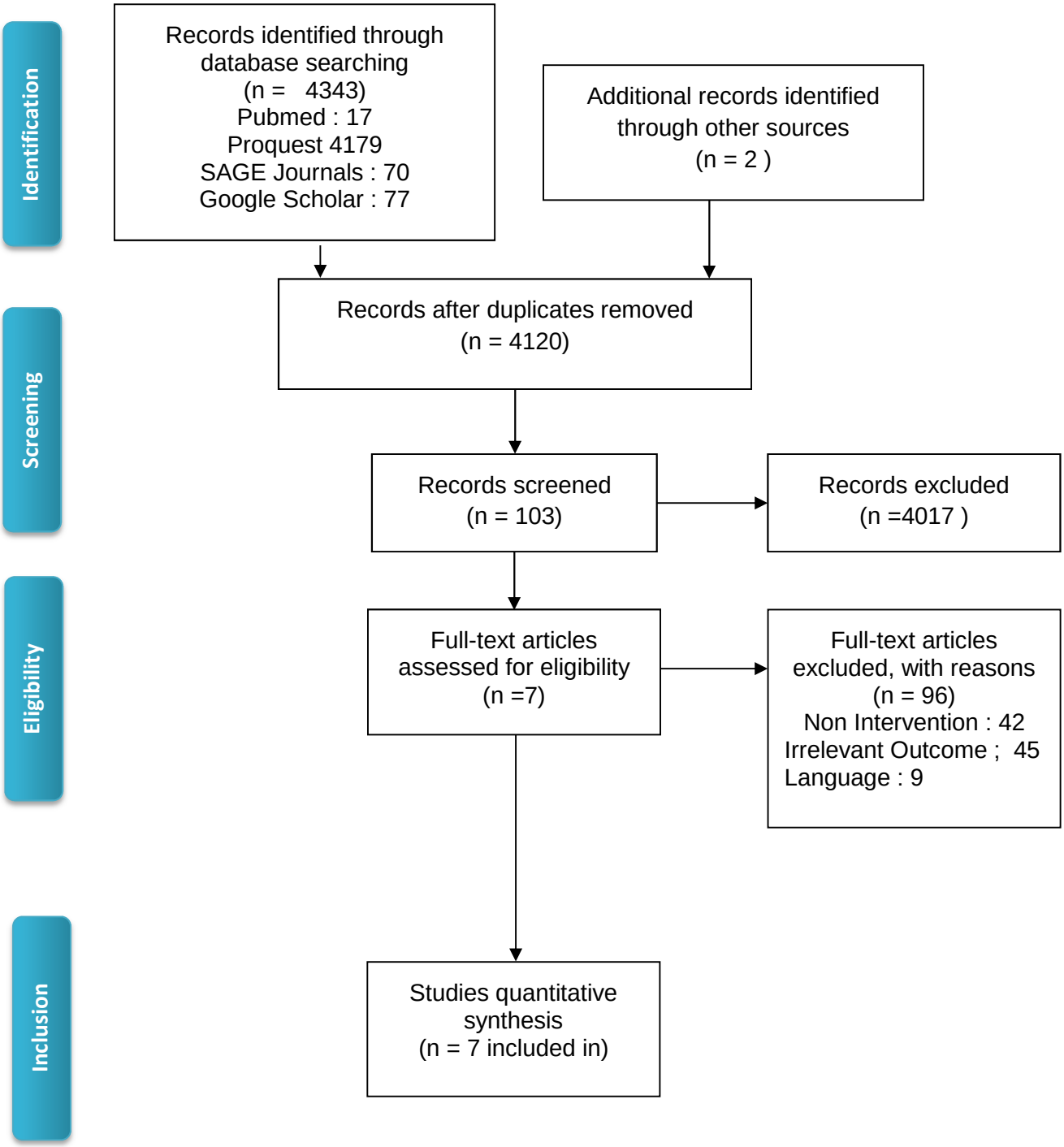

Figure 1

Tabel 1. SYNTESIS GRID

Author (Year); Country	Methods	Aims	Participant	Intervention	Outcome Measurement	Study results
Younge et al. (2015); Netherland	A pragmatic randomized controlled single-blind trial.	to determine the beneficial physiological and psychological effects of online mindfulness training in patients with heart disease.	324 patients were randomized (mean age 43.2 years, 53.7% male) with heart disease in a ratio of 2: 1 (215 male and 109 female participants)	Intervention group: mindfulness training consisting of a structured 12-week structured online program and Usual Care Control group: usual care	**Primary Outcome** : functional capacity measured by 6MWT **Secondary outcome :** other physiological parameters (heart rate, blood pressure, respiratory rate, and NT-proBNP), subjective health status (SF-36), perceived stress (PSS), psychological well-being (HADS), social support (PSSS12)	**Primary Oytcome**: Compared to usual care, it showed a significant limit of 6MWT increase (effect size, meter: 13.2, 95% CI: -0.02; 26.4, p = 0.050). **Secondary outcome**: There was also a significantly lower heart rate in favor of the mindfulness group (effect size, beats per minute: -2.8, 95% CI: -5.4; -0.2, p = 0.033). There were no significant differences seen in other results.
Nyklíček et al (2014); Netherland	MindfulHeart Randomized trial.	To examine the relative effectiveness of Mindfulness-based interventions the group	114 participants were randomized	The intervention group got a brief mindfulness training, while in the control group get a self-help booklet, asked to be read thoroughly theory and practice every day as shown in the booklet	**Primary Outcome:** - *The Symptoms of Anxiety-Depression index* (SAD-4) - *The Perceived Stress Scale* (PSS) - *Dutch Global Mood Scale* (GMS) **Secondary Outcome:** - WHOQoL-Bref - The Seattle Angina Questionnaire	**Primary Outcome :** For symptoms of anxiety, depression, perceived stress, this effect is evident only in patients younger than 60 years (p <0.01, partial η (2) = 0.10 and 0.15, respectively) **Secondary Outcome:** group intervention showed a greater increase in psychological and social quality of life (p <.05, partial η (2) = .04 and .05, respectively).
Jang et al.(2018); South Korea	RCT	To evaluate the effectiveness of treating MBAT in patients with CAD	44 Patients with CAD were randomized, the	The Intervention group received MBAT given in 12 sessions and usual	***Primary Outcome:*** *Beck Depression Inventory* (BDI) - *Trait Anxiety*	**Primary Outcome:** - Depression rate decreased significantly from mean ± SD, (pre 16.93 ± 9.52 to post 6.60 ±

			intervention group consisted of 21 patients (Mean Age: 64.81), and the control group had 23 patients (Mean Age: 65.30)	care, while the control group was only given usual care	*Inventory* (TAI) ***Secondary Outcome:*** - *State-Trait Anger Expression Inventory* (STAXI)	3.56) - Anxiety level was decreased significantly (pre 16.51 ± 3.51 to 9.56 ± 4.31) **Secondary Outcom**e: - Anger score from mean ± SD, (13.73 ± 4.83 to 11.80 ± 3.39) - Trait Anger (21.67 ± 5.45 to 18.80 ± 3.08) showed a significant decrease in MBAT group - Anger out (12.13 ±3.85 to 7.33 ± 3.60) and Anger in 13.67 ± 4.08 to 6.60 ± 3.14) showed decrease in MBAT group - Anger control was significantly increased (16.40 ± 4.87 to 21.27 ± 5.99)
Parswani, et al. (2013); India	RCT	To examine the effects of the Mindfulness-Based Stress Reduction (MBSR) program on symptoms of anxiety and depression, perceived stress, BP and BMI in patients with CHD.	Thirty one male patients, age range (30-65 years) with CHD were randomly allocated to 2 groups, MBSR group (n =15), TAU group (n =15)	The therapy program consisted of eight weekly sessions of structured MBSR interventions for the MBSR group and one health education session for the control group.	**Primary Outcome** - The Hospital Anxiety and Depression Scale (HADS) - Perceived Stress Scale (PSS). **Secondary Outcome** - Physical parameters: BP and BMI.	**Primary Outcome**: Significant decrease was observed in symptoms of anxiety and stress (p value 0.001) and depression (p value 0.01) **Secondary Outcome**: Significant decrease of SBP (p value 0.05) and BMI was also declined but wasn't significant
Gotink (2017); Netherland	RCT	To find out whether mindfulness therapy can reduce stress, affect heart rate, breathing patterns	324 patients (mean age 43.2 years, 53.7% male) were randomized in a 2: 1 ratio for additional 3	The intervention group received usual care and mindfulness training consisting of structured online programs, while the control group	**Primary Outcome** 6MWT **Secondary Outcome:** BP, HR, RR, NT-proBNP, cortisol levels (scalp samples), mental and physical functions	**Primary Outcome :** At 12 months follow-up, participants showed a significant trend of increasing exercise capacity (6MWT: 17.9 meters, p = 0.055) compared to usual care **Secondary Outcome:**

		and blood pressure. This physiological effect can in turn increase exercise capacity and thus long-term results in cardiovascular patients	months awareness online training or normal care.	received usual care	(SF-36), anxiety and depression (HADS), perceived stress (PSS), and social support (PSSS12).	Cohen D showed a significant but little in exercise capacity (d = 0.22; 95% CI 0.05 to 0.39), systolic blood pressure (d = 0.19; 95% CI 0.03-0.36) , mental function (d = 0.22; 95% CI 0.05 to 0.38) and depressive symptomatology (d = 0.18; 95% CI 0.02 to 0.35). All other outcome measures did not change statistically significantly. In the as-treated analysis, systolic blood pressure decreased significantly with 5.5 mmHg (p = 0.045; d = 0.23 (95% CI 0.05–0.41).
Norman et al. (2018) ; Sweden	A prospective feasibility study	to explore the feasibility of MBI in the signs and symptoms of patients with chronic heart failure in clinical outpatient settings.	50 participants (n = 31 in the intervention group and n = 19 in the control group), randomized 38 people (n = 21 intervention groups and n = 17 in the control group) (Median Age 76 years)	In the intervention group namely MBI and usual Care While the control group received usual care	**Primary Outcome:** Fatigue severity scale. **Secondary Outcome :** *Karolinska Sleep Questionnaire,* The NYHA classification based on symptoms is self-reported at five points Likert scale, numerical rating scale, 6MWT, Clinical measure sign (HR, RR, and BMI)	**Primary Outcome**: MBI significantly reduces self-reported fatigue impact (size effect −8.0; p = 0.0165) **Secondary Outcome:** symptoms of unstable/dizzy (p = 0.0390) and shortness of breath/physical fatigue function (class NYHA) (p = 0.0087). No side effects found
Sullivan et al. (2009); USA	Prospective study, experimental cohort study	To assess the impact of mindfulness-based psychoeducation interventions on clinical outcomes, depression, and quality of life of patients with	208 CHF adults with ejection of left ventricular fraction ≤ 40%, 108 people in the intervention group (mean Age: 61.4), and 100 people in the control group (Mean Age 61.1).	The intervention group met every week for 8 consecutive weeks for mindfulness meditation training, coping skills, and group discussion support. The control group	**Primary Outcome**: - CES-D summary score **Secondary Outcome**: - KCCQ total symptom score - KCCQ clinical summary score - POMS tension-anxiety POMS	**Primary Outcome:** The intervention provided resulted in lower anxiety (Profile Mood States, P = 0.003), depression (Center for Epidemiology - Depression, P = 0.05) **Secondary Outcome:** Improvement in symptoms (Kansas City Cardiomyopathy Cardiography symptom scale, P =

		chronic heart failure		received regular care	- depression-dejection POMS anger-hostility - POMS confusion	0.033) and clinical score (Kansas City Cardiomyopathy Questionnaire clinical score, P = .024). There was no effect of treatment on death/ rehospitalization at 1 year.

Table 2 Risk of Bias

Study	Random sequence generation	Allocation concealment	Blinding of participants	Blinding of outcome assessment	Incomplete outcome data	Selective reporting
(Younge *et al.*, 2015)	**Low**	**Low**	**High**	**Low**	**Low**	**Low**
(Nyklíček *et al.*, 2014)	**Low**	**Low**	**Unclear**	**Unclear**	**Low**	**Low**
(Jang *et al.*, 2018)	**Low**	**Low**	**Low**	**High**	**Low**	**Low**
(Parswani, Sharma and Iyengar, 2013)	**Low**	**Low**	**Low**	**High**	**Low**	**Low**
(Gotink *et al.*, 2017)	**Low**	**Low**	**High**	**Low**	**Low**	**Low**

Table 3. Critical appraisal RCT

No	Appraisal Checklist	(Younge *et al.*, 2015)	(Nyklíček *et al.*, 2014)	(Jang *et al.*, 2018)	(Parswani, Sharma and Iyengar, 2013)	(Gotink *et al.*, 2017)	(Norman *et al.*, 2018)
1	Focused issue	Yes	Yes	Yes	Yes	Yes	Yes
2	Randomization	Yes	Yes	Yes	Yes	Yes	Yes
3	All of the patients properly accounted for at its conclusion	Yes	Yes	Yes	Yes	Yes	Yes
4	Blind	Yes (*Single Blind)*	Can't tell	Can't tell	Yes (Single Blind)	Yes (Single Blind)	Tidak
5	The groups similar at the start of the trial	Yes	Yes	Yes	Yes	Yes	Yes
6	the groups treated equally	Yes	Yes	Yes	Yes	Yes	Yes
7	Intervention effect accounted	Yes	Yes	Yes	Yes	Yes	Yes
8	the accuracy of the estimated effect of the intervention can be accounted	Yes	Yes	Yes	NO	Yes	Yes
9	the results can be applied to the local population, or in your context	Can't tell	Yes	Yes	Yes	Can't tell	Yes
10	all clinically important outcomes were considered	Yes	Yes	Yes	Yes	Yes	Yes

Table 4. CASP for Cohort Study

No	Appraisal Checklist	(Sullivan *et al.*, 2009)
1	Focused issue	YES
2	Recruited in an acceptable way	YES
3	Exposure accurately measured	YES
4	Outcome accurately measured	YES
5	Identified all important confounding factors	Can't tell
6	The follow up of subjects complete and long enough	YES
7	Reported the rate or The proportion between the exposed/unexposed, the ratio/rate difference	YES
8	How precise are the results	Can't tell
9	Believe the results	YES
10	Can the results be applied to the local population	YES
11	Fit with other available evidence	YES
12	Implication to nursing practice	YES

Data Extraction and Quality Assessment

Information extraction includes: researcher, year, method, purpose, participant, intervention, outcome measurement, and studies results. Meanwhile, to assess the quality of each study's method, specifically for RCT studies, we used a form of structured data collection, with parameters adapted from the Cochrane Risk of Bias Assessment Tool (Higgins *et al.*, 2011). The assessment criteria are determined by assessing the quality of high/low/unclear risk. Studies with a high risk of bias in all parameters evaluated were assessed as low quality studies. If this study has a high risk of bias in at least one of the other criteria, the study was considered a moderate quality study. The study has a low risk of bias in all parameters assessed in the format means rated as high-quality study. These studies were evaluated with several parameters such as random sequence generation and allocation concealment (selection bias), blinding of participants (performance bias), blinding of outcome assessments (detection bias),

incomplete outcome data (attrition bias), and selective reports (reporting bias).

Result

Study Characteristic

Full review was conducted on screened articles, resulting in a total of 7 articles included in the study, of which 5 RCTs, 1 quasi-experiment and 1 was a cohort study. These articles were published between 2009 until 2018. The study was conducted in Sweden, India, South Korea, USA, and 3 studies in the Netherlands. Participants involved in these 7 studies were between 31-324 people (total: 1078 participants (male: 664, female 414)), with an age range of 30-76 years.

Description of Intervention

In 5 RCT studies, participants were grouped into two groups, the intervention group that received Mindfulness-Based Intervention and the control group had usual care (Parswani, Sharma and Iyengar, 2013; Younge *et al.*, 2015; Gotink *et al.*, 2017; Jang *et al.*, 2018) and there was 1 RCT study which control group received self-help intervention (Nyklíček *et al.*, 2014). Meanwhile, 1 other study in a feasibility study used also control groups that received usual care and intervention groups that gained mindfulness intervention (Norman *et al.*, 2018). The other 1 study was a cohort study (Sullivan *et al.*, 2009).
There were 3 studies specifically examining the effect of mindfulness on psychological aspects (Sullivan *et al.*, 2009; Nyklíček *et al.*, 2014; Jang *et al.*, 2018), and there was 1 study that focuses on the effect of mindfulness intervention on physiological aspects (Norman *et al.*, 2018). While 3 other studies discussed both aspects (physiological and psychological) where 2 primary outcome research were psychological aspects (Parswani, Sharma and Iyengar, 2013; Gotink *et al.*, 2017), and 1 study of primary outcomes was a physiological aspect (Younge *et al.*, 2015).

Risk of Bias

Based on the Risk of Bias assessment, the overall quality of the included RCT studies was moderate. All RCT studies reviewed, on selective bias parameters such as random sequence generation and allocation concealment was found low bias quality. In the blinding of participant parameters, there were 2 studies with a low risk of bias (Parswani, Sharma and Iyengar, 2013; Jang *et al.*, 2018), 2 studies with a high risk of bias (Younge *et al.*, 2015; Gotink *et al.*, 2017). While, parameters the assessment of the blinding of outcome assessment obtained 2 studies with high bias quality (Parswani, Sharma and Iyengar, 2013; Jang *et al.*, 2018). On the incomplete outcome data and selective reports on the 5 RCT articles reviewed, all low quality of bias was obtained. This can be seen in table 2.

Critical Appraisal on reviewed articles

In addition to Quality of bias (Higgins *et al.*, 2011), the quality of the studies that included in this review was carried out by performing critical appraisal using the Critical Appraisal Skills Program (CASP) checklist to assess validity, reliability, and whether these studies are acceptable, so that it is recommended to be used as Evidence Based (CASP, 2018b, 2018a).
The type of CASP used was adjusted to the study design. In CASP RCT, we included 1 quasi experiment feasibility study (Norman *et al.*, 2018) assessed in that format.
These RCT studies showed its validity because it was focused on the issue, the objectives were clearly explained, the sample selection was done randomly, all involved in the study were analyzed, 3 single blind studies, homogeneity characteristics, and all groups were treated equally.
These five RCT studies and 1 quasi experiment are also reliable and applicable because most studies report effect sizes and confidence intervals and the results were consistent across studies. The findings of all the review studies generally can be applied to the local context, but there were 2 who were hesitant in the application of the local context (Younge *et al.*, 2015; Gotink *et al.*, 2017), because the intervention was web-based. While the context of the local community has not been understood much regarding the secondary prevention of web-based education in patients with heart disease. Table 3 shown performed critical appraisal.
Although 1 cohort study which also conducted with CASP Cohort design, it shows that the study was valid, reliable and applicable. The critical appraisal can be seen in table 4.

Outcome

Effects of Mindfulness-Based Intervention on psychological aspects

In a review of the conducted articles, it was shown that mindfulness intervention can

significantly reduce levels of anxiety, stress, and depression in patients with heart disease (Sullivan *et al.*, 2009; Parswani, Sharma and Iyengar, 2013; Nyklíček *et al.*, 2014; Jang *et al.*, 2018). On the other way, anger control increased significantly and anger levels decreased significantly (Jang *et al.*, 2018). Through this intervention, the results of perceived stress levels can also be derived (Parswani, Sharma and Iyengar, 2013; Nyklíček *et al.*, 2014). Meanwhile in the other studies obtained the results of the effects of this intervention on psychological aspects can reduce anxiety, depression, and perceived stress levels, even though the results were not significant (Gotink *et al.*, 2015; Younge *et al.*, 2015).

Effects of Mindfulness-Based Intervention on physiological aspects

Based on a review of the included articles, it was found that Mindfulness intervention can increase exercise capacity (Gotink *et al.*, 2015; Younge *et al.*, 2015; Norman *et al.*, 2018), and decrease in systolic blood pressure. In another study also obtained significantly results for decreasing systolic blood pressure in patients who received Mindfulness therapy (Parswani, Sharma and Iyengar, 2013). Although, In a RCT study explained that some physical parameters such as blood pressure had changes but did not shown significant results (Younge *et al.*, 2015).

In addition, this intervention can also reduce heart rate (Younge *et al.*, 2015; Norman *et al.*, 2018), although study mentioned a minimal reduction in heart rate (Younge *et al.*, 2015). Mindfulness intervention can also potentially reduce symptoms of fatigue, dizziness, and tightness reported by patients with heart disease (Norman *et al.*, 2018).

Type of study setting

From the reviewed articles, participants were outpatients (patients who had been previously hospitalized) with a diagnosis of heart failure or coronary artery disease, and specifically in the study of Parswani et al. (2013) stated that in addition to outpatient with heart disease, participants who were also included were patients who had symptoms of heart disease in the last 1 year with echo results showing fraction of ejection > 35% (Parswani, Sharma and Iyengar, 2013).

Types of Mindfulness Intervention

Basically the principle of intervention was Mindfulness Intervention, but the local context influences the modification of this intervention. In a study conducted in Sweden which used modified interventions such as the Swedish Mindfulness Based Intervention, both Mindfulness Based Stress Reduction (MBSR) and Mindfulness Based Cognitive Therapy (MBCT) (Norman *et al.*, 2018). Study by Jang et al. (2018) also used intervention with the MBSR-Korean Version which was introduced as Mindfulness-Based Art Therapy (MBAT) (Jang *et al.*, 2018).

Meanwhile, web-based mindfulness therapy can also be applied (Younge *et al.*, 2015; Gotink *et al.*, 2017). Both were interrelated studies, because of Gotink et al. (2017)(Gotink *et al.*, 2017) was a 12-month follow-up from the study of Younge et al. (2015)(Younge *et al.*, 2015). Both of them focus on mindfulness training with an online structured program.

On the other hand, 2 studies used MBSR (Parswani, Sharma and Iyengar, 2013; Nyklíček *et al.*, 2014) developed by Kabat-Zinn (1990) (Kabat-Zinn, 1990). Although one of these studies used MBSR had modified the duration of the intervention (Nyklíček *et al.*, 2014). In another study used MBSR which was coupled with psycho-educational interventions (Sullivan *et al.*, 2009; Nyklíček *et al.*, 2014). This additional intervention seems to be contributed to the reduction of stress, anxiety and depression.

Duration and follow-up

From existing studies, there were those who carried out 8 weeks of training sessions (Sullivan *et al.*, 2009; Parswani, Sharma and Iyengar, 2013; Norman *et al.*, 2018). This is in accordance with the mindfulness therapy protocol (Santorelli, 2014), despite of modifications to the intervention. The duration of each session for each study was approximately 30 minutes (Sullivan *et al.*, 2009; Parswani, Sharma and Iyengar, 2013; Norman *et al.*, 2018) and there were 45 minutes per session (Jang *et al.*, 2018). While 3 other studies were conducted for 12 weeks (Gotink *et al.*, 2017)(Younge *et al.*, 2015)(Jang *et al.*, 2018). And one study only 3 weeks with the duration of each meeting compacted 90-120 minutes (Nyklíček *et al.*, 2014).

Several studies reviewed, followed up performed after carried out the intervention, there were follow-up after 3, 6 and 12 months (Sullivan *et*

al., 2009), 9-11 months follow-up (Norman *et al.*, 2018), follow -up after 12 months (Gotink *et al.*, 2017). The follow-up has been performed to ensure the consistency of the results that obtained after the implementation of mindfulness intervention.

Intervener

Mindfulness Intervention in these studies included using professional trainers/therapists who have been certified to do this therapy. In addition, various health professionals were involved in this intervention, including cardiology nurses, cardiologists, psychologists, psychiatrists, or rehabilitative counselors. In the study of Norman et al., (2018), a training program was held for specialist RN nurses for 6 days to become mindfulness instructors, who were trained directly by professional trainers in this field (Norman *et al.*, 2018).

Discussion

This is a systematic review that focuses on reducing the signs and symptoms of heart patients by looking at the effectiveness of Mindfulness Intervention. The results of the analysis of the reviewed research articles emphasize that Mindfulness intervention can have a positive effect on heart patients both psychologically and physiologically. The psychological effects that obtained are anxiety, depression, and stress levels which decreased significantly, on addition level of anger decreases and control of anger increases.

While the physiological effects of Mindfulness intervention are functional capacity increases, systolic blood pressure decreases, and potentially reduces symptoms of fatigue, dizziness, and tightness reported by patients with heart disease.

Psychological factors are risk factors for heart disease, where depression and anxiety contribute 36% compared to other factors (Palacios *et al.*, 2018). On the other hand when a person is diagnosed with heart disease the level of depression increases 7 times, and the anxiety level increases 3 times (Park, Tahk and Bae, 2015).

And most studies reviewed, it seems that Mindfulness intervention shows potential mediators in reducing stress, anxiety, and depression in patients with heart disease, and seems to have a better effect when combined with psycho-educational intervention.

Mindfulness intervention can be a solution, especially in the studies that were reviewed, followed up several times and still obtained significant results on the psychological aspects, namely decreasing levels of anxiety, depression, and stress.

Nowadays, especially the psychological aspect is now considered an important factor that affects health in general and as an independent factor that affects the work of the heart (Alsubaie *et al.*, 2017). In this context, cardiac rehabilitation in outpatients seems to be the right time to manage psychological disorders through the implementation of mindfulness intervention.

While, it is related to the physiological effects of mindfulness intervention, it seems that the effects positively increase functional capacity and reduce fatigue levels. After mindfulness intervention, the walking distance increased 10.6 meter compare to usual care (Younge *et al.*, 2015). Similar result obtained, that the walking distance on SMWT increased significantly to 17.9 meters compared to usual care (Benjamin *et al.*, 2018).

Through Mindfulness Intervention, the patient's fatigue rate can also be significantly reduced (effect size -8.0; $p = 0.0165$) (Norman *et al.*, 2018). Fatigue is a problem that is often complained by patients with heart failure with a percentage of 54% (Conley, Feder and Redeker, 2015). Fatigue can reduce the quality of life of patients, because there is a decrease in functional capacity in carrying out daily activities (Schjoedt, Sommer and Bjerrum, 2016). Through this intervention, the feasibility of usage can be considered to be applied.

Regarding of sleeping disorders, it turns out that the results obtained are not significant in reducing it. For this reason, further research is needed regarding the effect of mindfulness intervention on sleep problems in cardiac patients with larger participants. From this explanation, this evidence shown that through mindfulness intervention promises to provide better results, although it seems more dominant to provide psychological effects than physiological effects in patients with heart disease.

Conclusion

Based on the analysis of the results of the seven articles studies in systematic review, it can be concluded that Mindfulness Intervention can be a promising additional therapy in reducing the

signs and symptoms of heart disease both from psychological effects and expected physiological effects.

Limitations

This systematic review still has many limitations, and other questions that can be developed for further study. The limitation does not specify the type of mindfulness intervention that being used, so that the effectiveness of more specific interventions may produce different results.
It is necessary for an in-depth study regarding the participants with different age ranges between participants over the age of 60 years and under 60 years to find out the psychological and physiological effects of mindfulness intervention.

Implications for nursing

Mindfulness intervention can be a promising additional therapy for patients with heart disease (outpatients) in reducing the signs and symptoms experienced by the implementation of methods that can be adapted according to existing conditions and populations, and may be part of future heart rehabilitation programs. In addition, cardiology nurse can be involved as a facilitator or instructor in implementing this intervention, surely through a series of structured training for the nurse itself.

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