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DEPRESSION IN PATIENT WITH HEART FAILURE: A SCOPING REVIEW

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ABSTRACT

Background: Heart failure is a primary health problem for people globally. Depression is the most commonly experienced as comorbid disease in heart failure patients. Depression is difficult to be recognized and poorly treated by patients or clinicians and potentially reduce the quality of life. **Purpose**: This study focused on exploring about the prevalence of depression and factors related to depression in heart failure patients. **Method**: This research was a scoping review with patients of heart failure as its population. The search was conducted through electronic databases such as PubMed, CINAHL, and Google Scholar using keywords: Heart Failure and Depression. Articles were published in English in 2010-2020. Data were analyzed using content analysis. **Results**: Based on article review, it found that ≥ 18% of the total sample in each studies met the criteria of depression. Eight of 19 articles related to depression of patient with heart failure had mild to moderate depression. The prevalence of depression in heart failure are related to 25 sub-factors which are categorized into 3 main factors, namely: biological factors (i.e. inflammatory biomarkers, NYHA functional class classification, physical symptoms of HF, etiology of HF, age, gender, and history of ischemic heart disease), behavioral factors (i.e. lifestyle, self-care behavior, smoking, obesity), and psychosocial factors (i.e. social support, spiritual well-being, personality, uncertainty, stress/history of depression, duration of illness, resuscitation history, quality of life, doctor visits, marital status, life situation, knowledge, economic conditions, recreational activities). **Conclusion**: This study shows that heart failure patients are at a high risk for developing depression so that managing associated factors to prevent depression symptoms is very urgent to prevent worsening disease prognosis.

Keywords: Depression; Heart Failure; Patients.

BACKGROUND

Heart failure (HF) is a major global public health problem. As many as 5.8 million people suffer from HF in developed countries, such as the United States and are predicted to continue increasing in 2030 to 8.5 million people. Not only in developed countries, the number of HF patients has also increased in developing countries like Indonesia (Ponikowski *et al.*, 2014). Indonesia becomes fourth ranked as the country with the most highly cases of congestive heart failure in Southeast Asia (Lam, 2015). The death rate for HF is 9.7% of all heart diseases in Indonesia (Kementerian Kesehatan RI, 2013).

Patients of HF also often suffer for comorbid diseases such as depression (Fan *et al.*, 2014). Depressive symptoms in HF patients are related to the appearance of physical symptoms that interfere their lives. The result of the study found that the symptoms experienced by HF patients interfere their daily activities, limit their activities, and lead them to feel loss of confidence (Fry *et al.*, 2016). Von Korff's

research (1992, in Lubis, 2016) shows that patients who experience decreased physical functions and patients who are under their treatment are prone to major depression. Based on the previous description, both physical symptoms and psychological stress in HF patients affect each other, causing depression.

Depression in patients with HF is difficult to be recognized by patients and clinicians because the symptoms are similar to the diseases so that the management of depression is slower or even untreated. A qualitative study conducted on HF patients found that patients did not recognize symptoms and even did not complain about physical symptoms related to depression (Dekker, 2014). Based on the diagnostic interview in Freedland (2011), it was proven that 17% of the total 60 elderly patients with HF experienced major depression and 50% of them died during *follow-up*. Another study conducted by dr. Ralph Stewart on 950 respondents with heart disease found that 4% of the total respondents experienced moderate to severe psychological stress during the first 4years and 4 times the risk of dying from heart disease compared to respondents without psychological stress (Stewart *et al.*, 2015). This shows that depression has the risk of worsening the patient's condition and potentially reducing the quality of life in HF patients (Zahid *et al.*, 2018).

Management of mental health in Indonesia is mostly centered in Asylum, even though mental health problems are also experienced by many patients in General Hospital. A study showed that 20-40% of inpatients and outpatients experienced psychiatric disorders and are encountered mainly by patients with chronic diseases such as diabetes mellitus, heart disease, HIV/AIDS, stroke, etc. The greater number of chronic diseases suffered, the greater risk of experiencing mental disorders (Widakdo & Besral, 2013). Cardiovascular disease is the most frequent disease accompanied by depression (28.6%) (Marsasina and Fitrikasari, 2016). That study also stated, the diagnosis of depression in primary care is often overlooked. Furthermore, the existance of chronic disease causes clinicians in primary healthcare to pay less attention to depression symptoms, not to recognize, and not to treat depression because they think that the symptoms appeared are part of the disease. It was also expressed by dr.Andri, Sp.KJ. that depression suffered by inpatients often goes undetected and based on the results of collected studies, it amounts to 50-86%. Therefore, recognizing factors associated with depression in chronic diseases is very important for patients and clinicians so that they are expected to be aware of depressive conditions. Early yet accurate recognition and therapy of depression can increase patients' prognosis and quality of life (Andri, 2011).

Based on this background, it can be concluded that identifying the prevalence of depression and factors related to depression in patients with chronic disease, especially in this case HF patients, are very urgent. It is also expected for patients and clinicians to be able to recognize and prevent depression in HF patients. There are quite a lot primary studies which discuss the prevalence of depression and factors related to depression in HF patients in various parts of the world, however, there are still few similar studies conducted in Indonesia. This study aims to explore the prevalence of depression in HF patients and factors associated with depression.

METHODS

This scoping review was conducted between May and August 2020. We adopted Arksey and O'Malley's methodological framework for this scoping

review (The Joanna Briggs Institute, 2015). The stages of scoping review are explained below.

Research Questions

The research question was "How is the prevalence of depression and what are factors associated with depression in HF patients?"

Identifying Relevant Studies

There are 3 stages to identify relevant studies based on The Joanna-Briggs Institute (2015), which are: First, screen articles by finding the words in the title, abstract, and article summary. Second, use keywords or other index terms that have been assigned to all databases included in the study. Third, include the analysis of the reference list from the results of identified studies or other additional studies.

The analyzed articles were obtained from electronic databases, such as Google Scholar, PubMed, and CINAHL. We screened words by titles, abstracts, and article summaries to find articles which match the research question. We searched the relevant articles in English using the keywords *"patient with heart failure"* OR *"heart failure"* OR *"chf"* OR *"chronic heart failure"* OR *"congestive heart failure"* AND *"depression"* OR *"depressive disorder"* OR *"depressive symptoms"* OR *"major depressive disorder"* AND *"factors"* OR *"predictors"*. After searching for articles in all databases, we obtained 30,655 articles which were then selected to find relevant articles.

Study Selection

The selection of study is carried out by researchers to find articles from various sources which are suited to the objectives and research questions. We included studies that met the following criteria: 1. The studies' population was patients diagnosed with HF; 2. The studies include topics relevant to the specific objectives of the review, which are the prevalence of depression or factors related to depression in HF patients; 3. Research used primary data (primary research); 4. Qualitative or quantitative research; 5. Research conducted on humans; 6. Articles published in English; 7. Research articles are available in full text; 8. Research was conducted during the last 10 years (2010-2020).

We obtained 30,655 articles from all electronic databases. After that, we selected appropriate articles using inclusion criteria of this study and got 28 articles. The next step is to conduct a critical assessment of 28 articles that fit the topic of this research using the Joanna Briggs Institute (JBI) instrument. The end result of the article search obtained 22 relevant articles to be analyzed.

Data Extraction

After determining the articles which met inclusion criteria, 22 articles were synthesized. A total of 22 articles that met the criteria were read and analyzed intensively using content analysis. We extracted data for each study regarding the author, year of publication, and research method. We also recorded information on location of study, samples, and results of study regarding depression and factors related to depression in patients with HF.
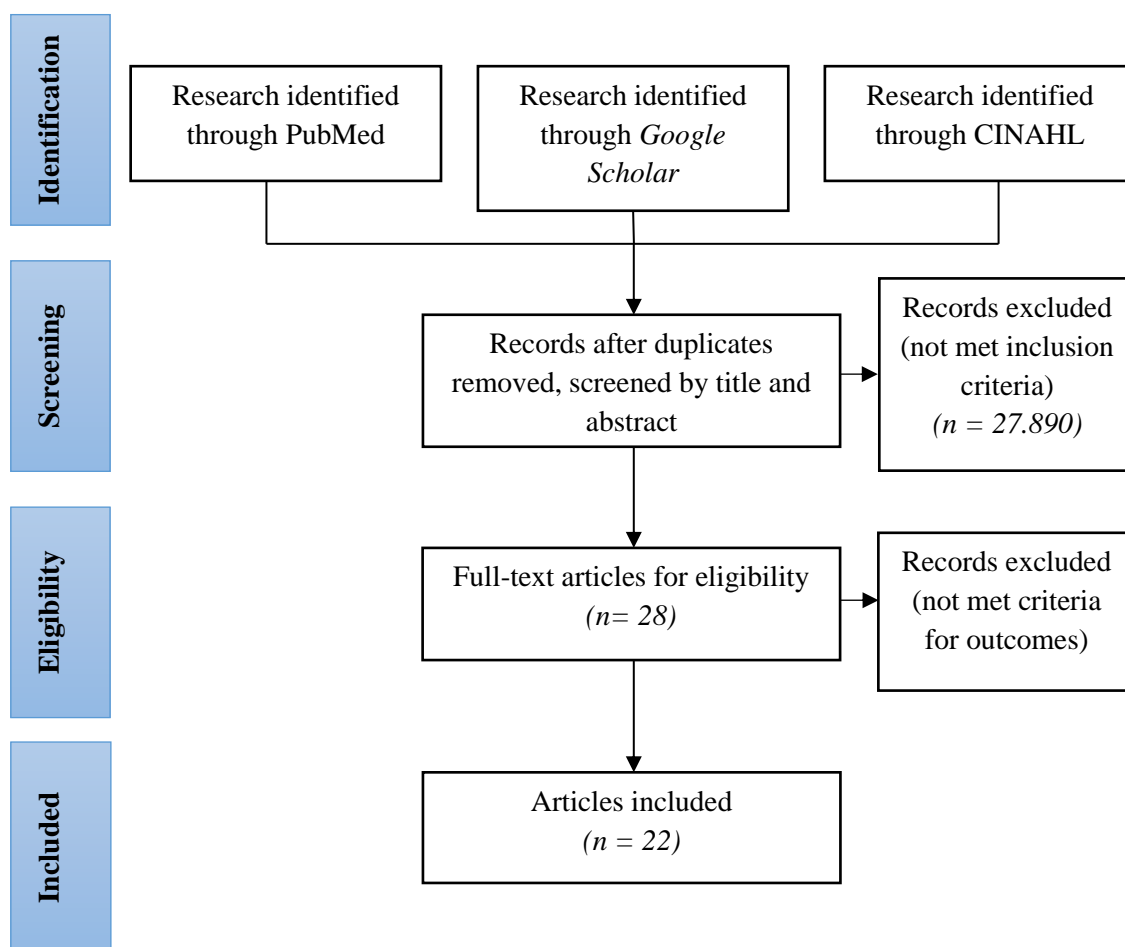
Collecting, Summarizing, and Reporting The Results

The results of this study are summarized and we made conclusions as the final results and recommendations for further research from this scoping review that has been carried out.

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│ Identification │ Research identified    Research identified    Research identified │
│                │ through PubMed         through Google          through CINAHL     │
│                │                        Scholar                                    │
│                                                                                    │
│ Screening      │ Records after duplicates        Records excluded                  │
│                │ removed, screened by title and  (not met inclusion               │
│                │ abstract                        criteria)                         │
│                │                                 (n = 27.890)                      │
│                                                                                    │
│ Eligibility    │ Full-text articles for eligibility    Records excluded            │
│                │ (n= 28)                               (not met criteria           │
│                │                                       for outcomes)               │
│                                                                                    │
│ Included       │ Articles included                                                 │
│                │ (n = 22)                                                          │
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Figure 1. Flow Diagram for Scoping Review Process

RESULTS

After following the stage of *scoping review*, we obtained 22 articles which relevant to the research topic. All articles were quantitative studies with 14 articles using *cross-sectional* design study and 8 articles are *cohort*, but no qualitative studies were found or met the inclusion criteria (Table 1). 19 of which included the prevalence of depression in patient with HF as well as explaining factors associated with its depression and the other 3 articles only listed factors related to depression in HF patients. We did not find articles that only discussed the prevalence of depression in HF patients and met the inclusion criteria.

Based on the results of article analysis, 7 articles were conducted in the United States (USA), 3 articles were conducted in the Netherlands, 2 articles were from Brazil, and 2 other articles in Taiwan. In addition, other countries such as Germany, Sweden, Greece, Pakistan, Iran, Ethiopia, Japan, and China where each country found 1 article that met the inclusion criteria (Table 1).

The research sample in all articles was HF patients in which 9 articles specifically stated that the study was conducted on outpatients, 5 studies were conducted on inpatients, and the other 8 articles did not mention specific criteria for HF patients (Table 1). The results of the analysis found that the majority of the sample in each study were men with an average sample age > 50 years.

Among 22 articles, 19 articles included prevalence of depression in HF patients and the results of the analysis found that ≥18% of the total sample of HF patients in each study were identified for the criteria of depression. In addition, 8 articles stated that the majority of HF patients experienced depression in the mild to moderate category, 2 articles provided a description of HF depression in the severe category, and 9 other articles did not mention a specific category of depression (Table 1).

This review found there are 25 factors associated with depression in HF patients, such as: inflammatory biomarkers, NYHA functional class classification, physical symptoms of heart failure, heart failure etiology, age, gender, history of ischemic heart disease, lifestyle, self care behavior, smoking, obesity, social support, spiritual well-being, personality factors, uncertainty, stress/history of depression, duration of illness, history of resuscitation, quality of life, doctor visits, marital status, life situation, knowledge, economic conditions, and recreational activities.

Table 1 The Results of Article Analysis

Title and Author	Instrument	Location	Design Study	Sample	Findings
Depressive Symptoms and Spiritual Wellbeing in Asymptomatic Heart Failure Patients Author: (Mills *et al.*, 2015)	BDI	USA	Quantitative (Cross-sectional)	132 men and women with stage B asymptomatic heart failure (Age 66.5 ± 10.5 years).	This article identifies 32% of the sample showing the potential for clinical depression. 30 people (23%) had mild to moderate depression, and 12 people (9%) had major depression. The findings show that the factor known to be associated with depression in the sample of this study is spiritual well-being.
Depressive Symptoms in Outpatients with Heart Failure: Importance of Inflammatory Biomarkers, Disease Severity, and Personality Author: (Brouwers *et al.*, 2014)	HADS	Netherlands	Quantitative (Cohort)	268 outpatient heart failure patients (Male 75.6%; Mean age = 66.7 ± 8.7 years).	This study showed that 80 samples (28%) at study entry and 75 samples (29%) at 1-year follow-up met the criteria for depression. The factors associated with depression are the NYHA functional class classification and personality factors.
Predicting Depressive Symptoms and Self-care in Patients with Heart Failure Author: (Graven *et al.*, 2015)	-	USA	Quantitative (Cross-sectional)	201 outpatients with heart failure (62.6% male; mean age = 72.57 years).	This study only describes the factors associated with depression in heart failure patients. These findings indicated that physical symptoms of heart failure and social support were predictors of depression symptoms.

Cognitive/affective and Somatic/ affective Symptom Dimensions of Depression are Associated with Current and Future Inflammation in Heart Failure Patients Author: (Kupper, Widdershoven and Pedersen, 2012)	-	Netherlands	Quantitative (Cohort)	125 outpatients with heart failure (Men 76% (95/125); Mean age = 66.5 ± 8.7 years).	This article only aims to identify factors associated with depression in heart failure patients. Based on the results of the study, it was found that inflammatory biomarkers were associated with the appearance of depressive symptoms.
Correlations between Stress, Anxiety, Depression, Sociodemographic, and Clinical Characteristics among Outpatients with Heart Failure Authors: (Cirelli *et al.*, 2018)	BDI	Brazil	Quantitative (Cross-sectional)	309 outpatients with heart failure (Mean age = 53.0 ± 13.59 years).	The article found that the majority of the sample had depression, from criteria with no symptoms / minimal symptoms to moderate depressive symptoms. Outpatients had a lower depression score than hospitalized patients. Factors related to depression, namely: economic conditions including low income, housing conditions, and unemployment.
Depressive Symptoms and Inflammation in Patients Hospitalized for Heart Failure Author: (Johansson *et al.*, 2011)	CES-D	Sweden	Quantitative (Cohort)	517 hospitalized patients with heart failure (Mean age 71 years; Men 62%).	The study found 208 samples (40%) had depressive symptoms. These findings suggest that inflammatory activity was associated with depressive symptoms and that increased study activity at baseline was associated with decreased depressive symptoms during 18 months of follow-up.
Depressive Symptoms are Associated with Obesity in Adults with Heart Failure: An Analysis of Gender Differences Author: (Hawkins *et al.*, 2015)	PHQ-9	USA	Quantitative (Cross-sectional)	348 heart failure patients (39% women; mean age = 68.7 ± 9.7 years).	This article finds that the total sample has a mean PHQ-9 score <10 and that women have a higher PHQ-9 score than men. The factor associated with depression in heart failure patients in this article is BMI (Body Mass Index).

Factors Associated with Depression and Anxiety of Hospitalized Patients with Heart Failure Author: (Polikandrioti, 2015)	HADS	Greece	Quantitative (Cross-sectional)	190 hospitalized patients with heart failure (65.3% male; mean age => 70 years (46.8%)).	A total of 17.4% of the sample had mild depression; 24.2% of the sample experienced major depression. Disease duration and marital status were significantly associated with depression.
Factors Associated with Depressive Symptoms in Patients with Heart Failure Author: (Graven *et al.*, 2014)	CES-D	USA		50 outpatients with heart failure (31 (62%) Male; mean age = 55-92 years).	The mean CES-D score in the sample found that the incidence of depression was negligible / very small in the majority of the sample. 7 samples (14%) were included in the criteria for mild to moderate depression & 11 samples (22%) suffered from major depression. Factors found to be associated with depression include: physical symptoms of heart failure and social support.
Frequency and Predictors of Depression in Congestive Heart Failure Author: (Zahid *et al.*, 2018)	PHQ-9	Pakistan	Quantitative (Cross-sectional)	170 outpatients with heart failure (73.5% male; mean age = 64.3 years).	The prevalence of depression in this finding was very high where 60% of the sample had depression. 43 people (42.2%) mild depression; 31 people (30.4%) had moderate depression; 15 people (14.7%) moderate-severe depression; 13 people (12.7%) had major depression. Age, NYHA functional class, marital status, and life situation were predictor variables for depression in heart failure patients.
Gender Differences in the Predictors of Depression Among Patients with Heart Failure Author: (Kao *et al.*, 2014)	BDI	Taiwan	Quantitative (Cross-sectional)	147 heart failure patients (54.4% male; mean age = 71.04 ± 13.29 years).	This article found that 96 samples (65.3%) had mild to severe depression symptoms. The predictors of depression found in this study were: marital status, unemployment, high perceptions of uncertainty, and perceptions of poor quality of life.

Title	Instrument	Country	Method	Sample	Results
Depression Status and Related Factors in Patients with Heart Failure Author: (Ghanbari *et al.*, 2015)	CDS	Iran	Quantitative (Cross-sectional)	239 heart failure patients (68.6% male; mean age = 59.04 ± 9.91 years).	The results of this study found that 138 samples (57.7%) had symptoms of depression. Sociodemographic factors, including gender, marital status, education, employment status, and NYHA functional class were associated with depression.
Factors Associated with Depression among HF Patients at Cardiac Follow-up Clinics in Northwest Ethiopia, 2017: A Cross-sectional Study Authors: (Yazew *et al.*, 2019)	PHQ-9	Ethiopia	Quantitative (Cross-sectional)	422 outpatients with heart failure (234 (58%) men; mean age = 52.3 (19.1) years).	The prevalence of depression in heart failure patients is 51% of the sample. Gender, self-care behavior, social support, knowledge, smoking history, duration of heart failure were predictors of depression in this study.
Incidence Rates and Predictors of Major and Minor Depression in Patients with Heart Failure Author: (Lossnitzer *et al.*, 2013)	PHQ-9	Germany	Quantitative (Cohort)	839 heart failure patients (76.6% male; mean age = 62.5 ± 12.6 years).	This article identified 61 incidents (7.3%) of minor depression and 47 incidents (5.6%) of major depression. 7 variables that predict minor or major depression in heart failure patients, namely: history of previous depression, meorkok, NYHA functional class, physical disorders due to heart failure, history of resuscitation, and doctor visits> 4 visits / year.
Leisure Activity, Mobility Limitation, and Stress as Modifiable Risk Factors for Depressive Symptoms in the Elderly: Results of A National Longitudinal Study Author: (Lee *et al.*, 2012)	CES-D	Taiwan	Quantitative (Cohort)	1481 heart failure patients (54% male; mean age = 73.44 years).	The prevalence of depressive symptoms at follow-up was 312 samples (21.1%). 3 independent risk factors for depressive symptoms in this finding, namely: lack of recreational activities, limited functional / mobility, and high stress.
Patients with Stable Heart Failure, Soluble TNF-Receptor 2 is Associated with	PHQ-9	USA	Quantitative (Cross-sectional)	55 outpatients with heart failure (74.5% male; mean age =	The results showed that 22 samples (40%) met the criteria for depression. 17 people (30.9%) had mild depression; 2 people (3.6%)

18

Increased Risk for Depressive Symptoms Author: (Moughrabi *et al.*, 2014)				71.6 ± 11.3 years).	had moderate depression; 3 people (5.5%) had major depression. The inflammatory biomarker (sTNFR2) was significantly associated with depressive symptoms.
NGAL and Other Markers of Information as Competitive or Complementary Markers for Depressive Symptom Dimensions in Heart Failure Author: (Naudé *et al.*, 2015)	-	German y	Quantitativ e (Cohort)	104 heart failure patients (72% male; mean age = 65.8 (8.4) years).	This article only identifies factors associated with depression in heart failure patients. The results showed that NGAL serum levels were significantly associated with BDI scores and somatic depression symptoms, but not with cognitive depression symptoms.
Personal Characteristics Predictive of Depression Symptoms in Hispanics with Heart Failure Author: (Sin, 2012)	PHQ-9	USA	Quantitativ e (Cohort)	87 hospitalized patients with heart failure (54% women; mean age = 73 years (SD = 9.23, range: 53–94).	At study entry, 80 samples (99%) had symptoms of depression. Meanwhile, the follow-up period of 6 months only 54 samples (62%) were depressed. factors associated with depression in this article, namely: the life and NYHA functional class.
Predictors of depression in Outpatients with Heart Failure: An Observational Study Authors: (Graven *et al.*, 2017)	CES-D	USA	Quantitativ e (Cross-sectional)	201 outpatients with heart failure (62.6% male; mean age = 72.57 (SD, 8.94) years).	This study found that 22.4% of the sample met the criteria for depression. This study states that there are 3 predictors of depression in heart failure patients, namely: marital status, symptoms of heart failure, and social support.
Prevalence and Variables Predictive of Depressive Symptoms in Patients Hospitalized for Heart Failure Author: (Pena *et al.*, 2011)	BDI	Brazil	Quantitativ e (Cross-sectional)	103 hospitalized patients with heart failure (63.1% female; mean age = 65.4 ± 13.6 years).	This study found 67 samples (67%) identified as having depressive symptoms. 35 people (34%) had mild depression; 22 people (21.3%) had moderate depression; 12 people (11.6%) had major depression. Factors related to depression in this study, namely: gender, lifestyle, and etiology of heart failure.

19

Risk Factors for Onset of Depression after Heart Failure Hospitalization Author: (Shimizu *et al.*, 2014)	HADS	Japan	Quantitative (Cohort)	131 hospitalized patients with heart failure.	In the early period of this study, there were 131 heart failure patients without depressive symptoms, however after a 1 year follow-up period, 29 samples (22.1%) had significant depressive symptoms. The risk factors for depression in this study were: a history of ischemic heart disease, low levels of participation and social support.
The Mediation Effect of Health Literacy between Subjective Social Status and Depressive Symptoms in Patients with Heart Failure Authors: (Zou *et al.*, 2016)	HADS	China	Quantitative (Cross-sectional)	321 heart failure patients (51% male; mean age = 63.6 ± 10.6 years).	A total of 58 samples (18%) were classified as having depressive symptoms. Health literacy and social support were significantly associated with depressive symptoms.

DISCUSSION
Prevalence of Depression in HF Patients

The results of this review show that the prevalence of depression in HF patients varies widely. The differences in prevalences and categories of depression in patients with HF are likely due to differences in sampling techniques, instruments used, definition and classification of depression, patients' severity, demographic conditions and study locations (Polikandrioti, 2015; Zou *et al.*, 2016).

Depressive symptoms in HF patients can develop, both inpatient and outpatient basis. This is shown by the result of Shimizu *et.al.* (2014) that among 131 HF patients without depressive symptoms at the beginning of the study, 29 (22.1%) patients experienced significant depressive symptoms after ≥ 1 year of discharge from hospital. This means that outpatients with HF (post-hospitalization) are also at risk for depression. However, outpatients had

lower depression scores than inpatients (Cirelli *et al.*, 2018).

The characteristics of HF patients with depression are having a low level of education, low economic status, a history of chronic disease (heart disease, arthritis, diabetes), impaired physical mobility, having great pressure, and low social support (Lee *et al.*, 2012). Sin (2012) found that high-comorbid patients had more severe depressive symptoms. In addition, HF patients with depression are denoted by being older and having a high classification of functional class NYHA (NYHA III/IV).

A cohort study conducted in the USA found at the beginning of the study, the leading symptoms of depression with the highest scores are fatigue/lack of energy followed by a risk of falling and falling asleep or sleeping too much. Meanwhile, the leading symptoms at the *follow-up* 6 months period, patients felt easily tired/lack of energy accompanied by a lack of appetite or overeating (Sin, 2012). Based on the results of this study, it can be

concluded that the leading symptom of depression which appears in HF patients is fatigue. In addition, depressed patients showed lower adherence of self care treatment, low self-monitoring, and do not follow the recommended lifestyle (Shimizu et al., 2014).

Factors Associated with Depression in HF Patients

Stuart (2016) stated that HF patients often suffered depression as a comorbid disease. Biological, behavioral, and psychosocial factors are known to be involved in the process of depression in individuals with HF (Wallenborn and Angermann, 2013). The relationship between psychological factors and body physiology can be influenced by social factors (Jane Upton, 2013).

Biological factors

Biological variables are considered to appear as potential markers of depression (Tiemeier, 2003). This factor is also known as the non-modifiable factor. Biological factors for depression include physical illness, the aging process, and gender (Walsh, 2010). We classified 7 sub-factors which are inflammatory biomarkers, NYHA functional class classification, physical symptoms of HF, HF etiology, age, gender, and history of ischemic heart disease as biological factors.

The appearance of depressive symptoms is thought to be related to biological factors that occur in the body of HF patients. TNF α and leukocytes are known to play an important role in NGAL production during the inflammatory process. The findings of Moughrabi et.al. (2014) proved that in patients with HF with depression, there was an increase in the inflammatory process mainly marked by an increase in TNF α levels. This study proves that inflammatory activity in depressed HF patients is not only a marker of disease severity, but also the increased

inflammatory activity can be a sign of poor prognosis in depressed HF patients.

NYHA classification is a significant predictor of depressive symptoms (Brouwers et al., 2014). The NYHA classification can be used as a clinical parameter for both HF and depression, so that HF patients with a high functional class of NYHA can be a potential target for early detection of continuous depression. Other findings reveal that individuals who experience a large burden related to HF symptoms have 1.9 times greater risk of developing depression (Graven et al., 2017). This suggests that the potential for increased psychological distress will continue as the symptoms develop.

A history of ischemic heart disease is a risk factor for depression. The prospective study of Shimizu et.al. (2014) stated that symptoms of depression were experienced by 22% of HF patients without depression upon discharge from hospital and patients with a history of ischemic heart disease had a 70% higher risk of developing depression after being discharged from hospital for >1 year. Routine and repeat screening for depression should be increased for post-hospitalization patients of HF.

In addition, age and gender act as predictors of depression in HF patients. Research by Zahid et.al. (2018) stated that age, worsening health status, impaired body strength, and social isolation are considered as the cause of depression in the elderly with HF. Research by Ghanbari et.al. (2015) and Pena et.al. (2011) found that women are more at risk of experiencing depression than men. Women are 2.7 times more likely to develop depression than men. This is probably caused by hormonal factors and genetic predisposition in women that can lead to depression (Yazew et al., 2019).

Behavioral Factors

Depression is known to appear not only as a psychological disorder, but also as a comorbid disease in patients with cardiovascular disease (Gigantesco *et al.*, 2015). The result of a study found that depression is also influenced by behavioral factors, such as alcohol, smoking, obesity, lack of physical activity, and certain eating habits (Emerson *et al.*, 2018). Poor health-related behavior can be a risk factor for depression. There are 4 sub-factors grouped by the researcher as behavioral factors, those are lifestyle, self-care behavior, smoking, and obesity.

Study by Pena *et.al.* (2011) stated that lifestyle is a predictor variable for depression symptoms. Lifestyle in HF patients was associated with self-care behavior which was significantly associated with depressive symptoms. Poor self-care behavior is 1.6 times more likely to have depressive symptoms (Yazew *et al.*, 2019). This occurs because poor self-care behavior is prone to depression due to complications of the disease and this behavioral mechanism is related to the relationship between psychological factors and disease outcomes (i.e. poor quality of life caused by poor self-care behavior which ultimately leads to increased depression).

Smoking is also a risk factor of depression in HF patients, both major and minor. Yazew *et.al.* (2019) revealed that the probability of developing depression is 4.96 times higher among patients with a history of smoking compared to patients without a history of smoking. This occurs because smoking is also considered as an indicator of poor self-control and adherence of self-care management.

In addition, Hawkins *et.al.* (2015) stated that BMI is associated with depressive symptoms. In that study, although women had higher depression scores than men, it found that male patients with HF who were severely obese (≥ 40 kg/m^2) had significantly high mean scores of depressive symptoms. Meanwhile, there was no significant difference between depression scores and BMI in female patients with HF. This finding suggest that obese patients with HF experience greater depressive symptoms than patients with lower body weight.

Psychosocial Factors

Psychosocial is a short term for the combination of psychological and social factors which shows that sometimes the effects of social processes influence psychological understanding. Examples of psychosocial factors include social support, loneliness, marital status, social status, work environment, mourning, and social integration (Jane Upton, 2013). Psychosocial factors consist of 14 sub-factors grouped by researchers, those are social support, spiritual well-being, personality, uncertainty, stress/history of prior depression, duration of illness, history of resuscitation, quality of life, doctor visits, marital status, life situation, knowledge, economic conditions, recreational activities.

Social support was found to be significantly associated with depression. The study found that HF patients with poor social support were more likely to be depressed. The emergence of psychological pressure is influenced by negative stressors (Yazew *et al.*, 2019). Lack of social support has a high risk of developing depressive symptoms and independently predicts poor quality of life in HF patients (Zou *et al.*, 2016). In addition, the results of a 1 year prospective study indicated that personality factors (type D personality and loneliness) are clinical predictors of depression symptoms. The term type-D personality refers to individuals who are more likely to experience negative emotions and often cover up self-expression (harboring emotions) during social interactions.

Personality factors can influence individuals through dysfunctional beliefs, social role deviations, and low levels of coping. The same research also suggested that loneliness may arise because of the misperception about social support in HF patients with depression. Therefore, a focus on building adequate social interaction and support is useful for the well-being of patients (Brouwers *et al.*, 2014).

Spiritual well-being was also found to be independently associated with depressive symptoms. Mills et.al. (2015) found that the components of spiritual well-being that had a significant effect are "Meaning" (reason for life and life purpose) and "Peace" (feeling inner peace and harmony). Meanwhile, the "Faith" component had no significant effect. These findings were consistent in HF patients with the NYHA II-IV functional class which suggested that the greater "Meaning" and "Peace" were associated with less depressive symptoms. This study found no correlation between a person's faith and mental disorders.

Recurrent depression occurred in 3.7% of patients from one-third of cases of incident depression. Prior history of depression is associated with the onset of depression. The study found that the presence of a history of depression in a patient beforehand increased the risk of three times higher for the occurrence of current depression (Lossnitzer *et al.*, 2013). In addition, high stress levels are also a risk factor for depression symptoms. Stress is often experienced by HF patients with old age. The results of the same study found that stress was related to stress on perceived health status, financial stress, stress due to worry about family health/economic/work status, and stress due to conflict in the family (Lee *et al.*, 2012). Another predictor of depression, especially in women with HF, is the perception of uncertainty (Kao *et al.*, 2014). Uncertainty is the result of the perception that the patients have lost control of themselves and are unable to carry out their role, especially woman. HF patients who do not have sufficient information about their disease and feel that they have lost control of themselves are at risk of developing depressive symptoms. Therefore, early detection of depressive symptoms in HF patients is very important so that clinicians are able to identify previous history of depression as well as review the level of stress that is being felt by the patient at that time and the patient's perception of the disease to prevent depression as a comorbid disease in HF patients.

A longer duration of illness was associated with a greater likelihood of developing depression. Research by Yazew *et.al.* (2019) stated that the possibility of depression in patients with experience of HF> 1 year since diagnosis are 1.64 times higher compared to patients who experienced the disease <1 year since diagnosis. The duration of disease is considered to be able to describe the severity of the disease, which is indicated by the physical impairments in HF patient that prevent them from carrying out daily activities.

Longitudinal study conducted by Lossnitzer *et.al.* (2013) proved that resuscitation and frequent doctor visits> 4 times a year are associated with major or minor depression incidence. A history of resuscitation that has been experienced causes anxiety and psychological distress. Wachelder said 38% of patients who survived heart attacks suffered from depression/anxiety. Meanwhile, frequent doctor visits are considered as a substitute for dissatisfaction with the patient's health status. The failure of the coping mechanism in the patient can lead them to depression.

The risk of depression also increases in unmarried individuals. Graven *et.al.* (2017) stated that unmarried HF patients are 2.8 times more likely to experience depression. A similar finding was found by Polikandrioti (2015) in Greece, HF patients who were single/divorced were more likely to experience major depression than married patients. The study found that unmarried individuals are more likely to experience anxiety disorders, panic, and mood disorders. Depression may be experienced by HF patients due to the unavailability of someone to share their feelings with or a lack of support or emotional encouragement from themselves or from their closest. In addition, patients with HF experience functional limitations due to their disease so that the level of dependence of patients with other people is very high. Lack of assistance in maintaining an independent life has the potential to increase the incidence of depression.

Research in Pakistan and the USA found that individuals with HF who live alone are more prone to experience depression (Sin, 2012; Zahid *et al.*, 2018). This occurs due to the lack of support for some individuals who live alone (single) or those who do not live with their families. Although the article states that there is a relationship between life situations and depression, the results of Sin's (2012) proved that HF patients who live with someone actually have a higher depression score than those who live alone. The difference in results of those study is that some individuals with HF who live with someone may feel that they are a burden to other people with high disease severity or they need to live with other people because of the severity of the disease. Moreover, living alone does not necessarily lead to the development of depression in patients with HF. This can be chosen and perceived as positive if the individual really wants to live alone (Shimizu *et al.*, 2014).

Patients who have adequate information about their health and care are less likely to experience depression (Yazew *et al.*, 2019). The odds of depression are 1.67 times higher in patients with low knowledge of the disease when compared to patients with sufficient knowledge. Therefore, the provision of adequate and equitable health information at various levels of education is very important and beneficial to increase patient understanding of the disease and prevent possible symptoms of depression.

Depression status is also associated with low income, housing conditions, and unemployment (Cirelli *et al.*, 2018). In economic terms, unemployed individuals and poor economic conditions may have impact on mental disorders and increase stress. This is supported by the research of Lee *et.al.* (2012) stated that high stress levels in HF patients are related to economic problems.

Research by Kao *et.al.* (2014) in Taiwan found that perceptions of poor quality of life lead to depression in both men and women. Perceptions of poor quality of life arise because of the disease symptoms and the functional limitations of HF patients. The result of this study indicated that, for both men and women, patients with severe functional limitations have a high risk of developing depression.

Finally, a prospective study conducted in Taiwan revealed that a lack of recreational activities is an independent risk factor for the emergence of depressive symptoms in the elderly. Recreational activities are fun activities that involve individuals volunteering such as gardening, chatting while drinking tea with relatives/friends/family/neighbors, reading books/newspapers, outdoor activities, and participating in group activities (Lee *et al.*, 2012). Recreational activities are very

important and can be an alternative intervention for HF patients to have fun activities to reduce the risk of developing depression.

Limitation

The limitation of this study that it does not include research that published in Indonesian for the inclusion criteria so the articles with similar topics and using Indonesian cannot be analyzed. Therefore, the analyzed studies in this *review* cannot yet be generalized in Indonesia.

CONCLUSION

Depression in HF patients varies widely. This study shows that patients with HF are at highly risk for developing depression. The results of the overall analysis found that the prevalence of depression in HF patients is influenced by 25 sub-factors which are categorized into 3 main factors, namely: biological factors (i.e. inflammatory biomarkers, NYHA functional class classification, physical symptoms of HF, etiology of HF, age, gender, and history of ischemic heart disease), behavioral factors (i.e. lifestyle, self-care behavior, smoking, obesity), and psychosocial factors (i.e. social support, spiritual well-being, personality, uncertainty, stress/history of depression, duration of illness, resuscitation history, quality of life, doctor visits, marital status, life situation, knowledge, economic conditions, recreational activities). So that, managing associated factors to prevent depression symptoms is very urgent to prevent worsening disease prognosis, especially for those who have all the factors related to depression in HF.

The results of this study are expected to become the basis for further research to conduct systematic reviews with similar research topics and use Indonesian articles. In addition, further research can conduct a qualitative study of which depression factor has the strongest influence on HFpatients.

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