Effectiveness of cognitive behaviour therapy on depression among haemodialysis patients: A systematic review of literature

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Abstract: End-stage renal disease (ESRD) is a major public health issue in Malaysia and worldwide. Depression is highly associated with ESRD and with the increasing number of ESRD, the rate of depression will also grow. There are limited data on clinical trials of antidepressant medication on ESRD due to safety reasons. Due to that, psychological intervention is a preferred treatment for this population. Previously, studies on the effectiveness of cognitive behaviour therapy (CBT) have been focused more on patients with depression with no comorbid chronic medical illness. Therefore, the present article is set out to analyse the existing literature on the effectiveness of CBT on depression among ESRD undergoing haemodialysis treatment. Guided by the PRISMA Statement (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) review method, a systematic review on Scopus database has identified 10 studies. Further review of these articles resulted in two main themes—single-group trial and two-groups trial. The two-groups trial is further producing another two sub-themes. The discussion is mainly on the lack of randomized trial in the depression treatment among haemodialysis patients in Malaysia. Several recommendations are being highlighted, where are to compare

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Our group key research activity is to examine the effectiveness of cognitive behaviour therapy (CBT) in chronic kidney disease patients suffering from depression. In Malaysia, there is an increased rate of diabetes mellitus throughout the years and this resulted in the increasing rate of kidney disease too, and simultaneously rises the rate of CKD patients with depression. This paper discussed mainly the lack of randomized studies in Malaysia on the use of CBT on CKD patients with depression. Most of the studies were focusing on the cross-sectional studies where it is shown that depression is highly associated with those with chronic kidney disease. This paper demonstrated that more studies are required to be done on the effects of CBT on depression in CKD patients, especially in Malaysia.

PUBLIC INTEREST STATEMENT

Chronic kidney disease (CKD) is a serious matter since it is not only affecting one’s physical, but also mental health. With the increasing global rate of diabetes, the rate of chronic kidney disease is also increasing proportionally. It is proven that 50% of patients with CKD are prone to get depression, and thus can lower their quality of life, increase treatment non-adherence, and increase rate of hospitalization in a year compared to those with no depression. Less research was done on antidepressant medication on CKD patients due to safety reason, therefore, psychological intervention or specifically cognitive behaviour therapy (CBT) is a preferred treatment. Thus, this paper focuses on the 10 existing researches on the effectiveness of CBT on depression among patients with chronic kidney disease undergoing haemodialysis. Plus, the paper also highlighting the lack of experimental research in the psychological treatment of depression among CKD patients in Malaysia.
CBT treatment group with another active therapy and to use more than one database for the research searching tools.

Subjects: Counselling Psychology; Mental Health;; Counseling

Keywords: cognitive behaviour therapy; depression; haemodialysis; end-stage renal disease

1. Introduction
When an individual is said to be suffering from chronic kidney disease (CKD), it means they have abnormalities in the kidney function or structure which is presents for more than 3 months (The Renal Association, 2019). CKD is further classified into five stages, with stage 5 being called as end-stage renal disease (ESRD). ESRD is defined when its function is only at 10% of normal, where this is considered as end-stage and cannot be cured except by kidney transplantation (National Kidney Foundation, 2005). When this happens, kidneys fail to properly function and has no ability to filter waste products from the human’s body. Kidney transplantation and dialysis are types of renal transplantation therapy (RRT) that is required by patients with ESRD.

Depression is a mental disorder that affects more than 300 million people worldwide (World Health Organization, 2018). It is diagnosed clinically and provided the patient fulfilled the criteria listed on the Diagnostic and Statistical Manual of Mental Disorders 5th Edition (American Psychiatric Association, 2013) or International Classification of Diseases 11th Revision (ICD-11). In Malaysia, Ng (2014) believes that there are still numbers of undiagnosed depression. Some people refuse to seek adequate treatment due to various reasons, and some of the reasons may be related to the lack of awareness, the stigmatization among the culture, as well as the culture of seeking alternative treatment (Ng, 2014). This is further supported by WHO (2018) where in many countries, only few people affected by depression receive effective treatments. This is due to the barriers to effective care such as lack or resources, insufficient trained health-care professionals, and social stigma.

Patients undergoing haemodialysis is prone to get depression, with an estimated prevalence of 50% (Yoong et al., 2017). Feroze et al. (2012) also added up that besides depression, anxiety is also highly prevalent in patients with end-stage renal disease. Fortunately, depression is one of the risk factors that can be alleviated by psychological treatment (Kellerman et al., 2010). These psychiatric disturbances are negatively affecting ESRD patients in various ways, where they decrease quality of life (Cukor et al., 2014; Lerma et al., 2017), increase negative perceptions of the disease (Cukor et al., 2009), increase treatments non-adherence (Mellon et al., 2013), and increase rate of hospitalization in a year when compared to those without depression (S. S. Hedayati et al., 2012). Severe depression symptoms can increase mortality risk with the same magnitude as other medical risk factors (Kellerman et al., 2010). Therefore, it is crucial to conduct routine screening for ESRD patients to reduce or to avoid the negative effects of depression.

CBT has been proven to be effective to treat numbers of different mental disorders (Butler et al., 2006; Lovato et al., 2014) and it is a well-known and a widely used therapy for depression and anxiety in which was developed by Aaron T. Beck during the 1960s. In terms of depression and anxiety in haemodialysis patients, CBT was also proven to be effective in a few studies (Chan et al., 2016; Cukor et al., 2014; Lerma et al., 2017; Valsaraj et al., 2016). Apart from that, CBT led to significant improvements in quality of life in ESRD patients undergoing haemodialysis (Chan et al., 2016; Cukor et al., 2014; Lerma et al., 2017). Low quality of life that is commonly experienced by haemodialysis patients can contribute to non-adherence to medical treatment, which may exacerbate their existing medical condition (Christensen & Ehlers, 2002). Despite high prevalence of depression and anxiety in ESRD patients, the treatment for these psychological symptoms is poorly studied in the ESRD population, partly due to exclusion of medically complex patients from treatment trials (Pena-Polanco et al., 2017; S. S. Hedayati et al., 2012). S. S. Hedayati et al. (2012) added up that if a trial of medication is being
considered in ESRD patients, selective serotonin reuptake inhibitors (SSRI) should be chosen because of its established efficacy in cardiovascular patients. This is because large proportion of patients with ESRD suffer from cardiovascular disease, therefore if the use of such medication has been proven to be effective in cardiovascular patients, therefore it is the prudent choice in CKD and ESRD patients. However, aside from prescribing medication for the depression and anxiety in ESRD patients, they can undergo cognitive behaviour therapy to reduce their psychological symptoms.

1.1. The need for a systematic review

A systematic review is defined as method to identify, select, and making sense of large bodies of data, and finally to analyse data collected from the studies included in the review (Petticrew & Roberts, 2008). Higgins and Green (2011) said that the statistical methods may or may not be utilized to analyse the results of the collected studies. With more systematic ways of identifying, collecting and analysing the data, the review can be justified as rigorous and allowing for gap identification and future study recommendation.

There are limited data on safety and efficacy of antidepressant medications in this population, as those with ESRD have been generally being excluded from clinical trials involving antidepressant drugs therapy due to safety reasons (S. S. Hedayati et al., 2012). This potential safety concerns include decreased metabolite clearance, increased bleeding risk, and the possibility of drug interactions, which may or may not exacerbate the kidney condition. Due to this reason, more research on the psychological treatment of depression in ESRD patients should be done as there are no fixed guidelines in treating patients with ESRD suffering from depression.

In Malaysia, the predicted incidences of new dialysis patients in 2020 are 10,208 cases and will double up to 19,418 cases in 2040. Thus, the estimated prevalence of ESRD cases will be 51,269 in 2020 and 106,249 in year 2040 (Bujang et al., 2017). The prevalence of depression and anxiety was shown to be high in patients with dialysis in Malaysia, which is 36.3% and 46.6% respectively (Bujang et al., 2015). With the rising number of ESRD patients on dialysis in Malaysia, the prevalence of depression and anxiety among this population will be increasing too and this will cause a significant reduction in patient’s quality of life and thus will result in increased suicidal risk among haemodialysis patients (C.K. Chen et al., 2010). As mentioned before, there are limited data on clinical trials of antidepressant medication in ESRD patients (S. S. Hedayati et al., 2012), therefore psychological intervention is a preferred treatment and early psychological treatment can be done in patients with depression symptoms, simultaneously preventing them to regress to psychological disorder.

Recent report by Ismail et al. (2019) reported an estimation of total expenditure on ESRD treatment in Malaysia. They found out that within 7 years, total annual expenditure of ESRD by the public sector has grown from RM572 million in 2010 to RM1.12 billion in 2016, which is about 95% grow. And from the total ESRD expenditure, 94% was spent on dialysis and only the remaining 6% was spent on renal transplantation. The cost includes medical costs that is related to dialysis which are the medication, laboratory costs, and hospitalization costs. This rising number leads to a serious health and economic burden, since ESRD patients consume a vastly amount of financial and human resources, and will have a large impact on the country’s economy. Early treatment for the psychological symptoms in ESRD patients will not only help them not to regress further down, but will also helping them to have a more quality life and reduce the rate of hospitalization (S. S. Hedayati et al., 2008, 2005) and subsequently, reducing the ESRD expenditure.

To construct a relevant systematic review, the current article was guided by the main research question—what are the effects of cognitive behaviour therapy on depression in haemodialysis patients? The focus of the study was on patients suffering from end-stage renal disease currently undergoing haemolysis. A special focus was given to these population as this group is shown to have high association with depression and the symptoms of this psychological disturbance can worsen the medical condition (Bujang et al., 2015; C.K. Chen et al., 2010).
The study attempts to analyze the existing literature on the efficacy of CBT on depression in haemodialysis patients. The second section details out the methods involved and the PRISMA Statement (Preferred Reporting Items Systematic Reviews and Meta-Analyses) procedure that was used. The third section systematically reviews and synthesizes the scientific literatures to identify, choose, and critically appraised relevant research on the effectiveness of CBT on depression in haemodialysis patients. Finally, the last session identifies the need of future research.

2. Methodology
In this section, the method used to retrieve articles related to the effectiveness of cognitive behaviour therapy on depression among haemodialysis patients is discussed. The reviewers used PRISMA as the method which includes resource (Scopus) used to run the systematic review, eligibility, and exclusion criteria, steps involved in the review process (identification, screening, and eligibility), data abstraction, and data analysis.

2.1. PRISMA
This review was guided by the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) which was developed in 2009 by 29 review authors (Moher et al., 2010). The aim of PRISMA is to minimize the risk of flawed reporting of systematic reviews and to further improve the transparency in how the reviews are conducted (Liberati et al., 2009). The PRISMA guideline allows for rigorous search of terms and keywords related to haemodialysis patients who are suffering from depression, and the effects of cognitive behaviour therapy on this symptom.

2.2. Resources
The review utilized one journal database—Scopus. Scopus is a robust database consisting nearly 36,300 titles from approximately 11,600 publishers. All the articles were critically vetted and selected by an independent review board and all the journals covered in the database are reviewed each year in order to maintain the high-quality standards. Scopus consists of various subject areas such as health sciences, social sciences, physical sciences, and biological sciences.

2.3. Systematic review process

2.3.1. Identification
The systematic review process in selecting relevant articles consisted of three main stages. The first stage is identification. This is the step where the keywords similar and related to effects of CBT on depression in haemodialysis patients were identified and were being used to find the related articles in Scopus. Accordingly, search string on Scopus database was developed in October 2019 (Refer to Table 1) after all relevant keywords were determined. This resulted in a total of 54 articles.

2.3.2. Screening
In this step, inclusion and exclusion criteria were determined. First, regarding literature type, only article journals as the primary sources with empirical data were selected. There is only one literature type available after searching the keywords which is article journals. Secondly, to avoid any misinterpretation and confusion, the searching efforts only included articles published in English. Thirdly, with regards to timeline, a period of 11 years was selected (between 2009 and 2019), this is to ensure an adequate amount of time to observe the evolution of research and at the same time able to retrieve the appropriate journal articles. Coincidently, the year 2009 is the

| Table 1. Keyword and searching information strategy |
|-----------------------------------------------|
| **Database** | **Keywords used** |
| Scopus       | TITLE-ABS-KEY(“cognitive behaviour therapy” OR “cognitive behavioural therapy” OR “cognitive therapy” OR “CBT”) AND (“haemodialysis” OR “hemodialysis” OR “dialysis”)|
Table 2. The inclusion criteria

| Criterion          | Inclusion criteria                      |
|--------------------|----------------------------------------|
| Literature type    | Journal (research articles)             |
| Language           | English                                 |
| Time Line          | Between 2009 and 2019                  |

eldest year of publication available in Scopus. Therefore, the articles remained are 54 in total since the screening process was unable to exclude any articles.

2.3.3. Eligibility
A total of 54 articles were prepared for the third stage of systematic review process. Eligibility is the step where further screening is done manually by the reviewers. This is done by thoroughly examining the titles, abstracts, and main contents of each article to make sure they fulfilled the inclusion criteria and objective of this review. At this stage, only studies with experimental design that research on the effectiveness of CBT on depression among haemodialysis patients plus with empirical data will be included. Finally, only ten articles were included and 44 articles were excluded because they do not have empirical data, and most of them do not utilize the CBT treatment in their studies, while some do not consider the depression symptoms or dialysis patients in their studies (see Figure 1).

2.4. DATA abstraction
The remaining 10 articles were assessed and analysed to extract statements or data that can answer research question. This process involves the in-depth examination of the content of articles to identify appropriate themes and sub-themes. Qualitative analysis was performed using content analysis to identify themes related to the practising cognitive behaviour therapy on depression among haemodialysis patients. In other words, this step converts raw data into useable and
practical data through the identification of themes or ideas (Patton, 2002). Eventually, this process has resulted in a total of two main themes namely single-group trial and two-groups trial. Within these created main themes, any concepts or ideas that have the same connection with each other within that themes will be developed as sub-themes. This process eventually had resulted in a total of another two sub-themes under the two-groups trial (Refer Table 3).

3. Results

3.1. General findings and background of the studies included in the review

The analysis resulted in a total of two themes and two sub-themes under the two-groups trial theme. These themes are related to the effectiveness of CBT in reducing depression symptoms among haemodialysis patients. The two main themes are single-group trial and two-groups trial (two sub-themes) (refer Table 3).

A total of five studies focused on Asia’s haemodialysis patients to see the efficacy of CBT on their depression symptoms. The countries studied are Jordan (Al Saraireh et al., 2018), India (Valsaraj et al., 2016), Taiwan (H. Y. Chen et al., 2011), Iran (Marvi et al., 2011), and China (Hou et al., 2014). Only one study focused on Australia’s patients (Chan et al., 2016). Another four studies concentrated on the effectiveness of CBT in western countries such as Mexico (Lerma et al., 2017), United States of America (Cukor et al., 2014; Mehrotra et al., 2019) and Brazil (Duarte et al., 2009) (Refer Figure 2).

Haemodialysis can be done either in the hospital or at the dialysis centre. Half of the studies reviewed focused on patients in the dialysis centres (Cukor et al., 2014; Duarte et al., 2009; Hou et al., 2014; Lerma et al., 2017; Mehrotra et al., 2019) and another half were in the hospitals (Al Saraireh et al., 2018; Chan et al., 2016; H. Y. Chen et al., 2011; Marvi et al., 2011; Valsaraj et al., 2016) (Refer Figure 3).

3.2. Main findings

In this section, the discussion revolves around two main themes which are the single-group trial and two-groups trial, along with the two sub-themes (Refer Table 3).

3.2.1. Single-group trial

Single-group trial only involves the CBT treatment group with no comparison with control group or other treatment group. Chan et al. (2016) showed that internet-delivered CBT (iCBT) is effective in reducing depression symptoms in ESRD patients undergoing haemodialysis. Even though many

| Authors               | Single-group trial | CBT ≥ efficacy compared to control group | CBT < efficacy compared to control group |
|-----------------------|--------------------|----------------------------------------|------------------------------------------|
| Al Saraireh et al. (2018) | /                  | /                                      |                                          |
| Chan et al. (2016)     | /                  | /                                      |                                          |
| H. Y. Chen et al. (2011) | /                | /                                      |                                          |
| Cukor et al. (2014)    | /                  | /                                      |                                          |
| Duarte et al. (2019)   | /                  | /                                      |                                          |
| Hou et al. (2014)      | /                  | /                                      |                                          |
| Lerma et al. (2017)    | /                  | /                                      |                                          |
| Marvi et al. (2011)    | /                  | /                                      |                                          |
| Mehrotra et al. (2019) | /                  | /                                      |                                          |
| Valsaraj et al. (2016) | /                  | /                                      |                                          |
studies have shown the efficacy of face-to-face CBT, there are still presence of some barriers in this traditional way of delivering CBT. These barriers can be due to patients' strict dialysis schedules and even transportation to the treatment place, especially when CBT is scheduled on non-dialysis days, where they have to spend extra time, money, and energy. By utilizing iCBT, it can save a lot of cost, time, energy as well as overcoming the barriers faced in the traditional face-to-face CBT. However, despite the proven efficacy of iCBT in improving depression symptoms in HD patients, there are still limitations to this method of delivery such as technological issues and poor internet connection that can affect the sessions.

3.2.2. Two-groups trial
A total of nine studies used two groups trial in their research to observe on the comparison and the effectiveness between the two groups. Out of this nine, only one group was comparing treatment
group using CBT versus antidepressant medication using sertraline (Mehrotra et al., 2019). The remaining eight groups focused on comparing CBT treatment group with another group, either it is control group using conventional haemodialysis (Cukor et al., 2014; Hou et al., 2014; Lerma et al., 2017; Marvi et al., 2011) or using active control group, where one study used psychoeducation (Al Sarafreh et al., 2018), one using non-directed counselling (Valsaraj et al., 2016), another using individualized psychological consultation (Duarte et al., 2009), and the other using sleep hygiene education (H. Y. Chen et al., 2011).

3.2.2.1. CBT treatment group shows more or equal effectiveness compared to control group. H. Y. Chen et al. (2011) did a study among sleep-disturbed haemodialysis patients and found out that CBT treatment group is proven to be more effective in reducing depression symptoms compared to the control group who underwent sleep hygiene education (H. Y. Chen et al., 2011). Even though all participants in the study only had mild depression symptoms, only those in the CBT group experienced a significant reduction in depression symptoms, where the control group did not. The improvement in depression symptoms might be associated with the items regarding sleep quality in Beck Depression Inventory-II (BDI-II), where the intervention’s efficacy of correcting disorganized sleep patterns may influence this item in BDI-II.

Following that, another randomized trial by Hou et al. (2014) also used haemodialysis patients with insomnia as the study population. In contrast with H. Y. Chen et al. (2011), Hou et al. (2014) used Symptom Checklist 90 (SCL-90) to measure the depression symptoms and reported that there is significant improvement of depression in the CBT treatment group compared to the control group who underwent normal haemodialysis treatment. The behavioural part of CBT that involves the progressive muscle relaxation and sleep-related behaviour modification were showed to be effectively improving the depression symptoms and the sleep quality of the haemodialysis patients.

Cukor et al. (2014) reported that CBT administered at chairside during the dialysis treatment led to significant reductions in depression and improvements of quality of life. Not many studies had been done in determining the efficacy of chairside counselling and this study had proven that this method is beneficial in terms of energy and time-saving. Cukor et al. (2014) highlighted that by doing trial at chairside, there were few missing data and this method can minimize the barrier of getting a proper mental health care. This barrier includes the additional burden to get another appointment and for those who might have not have been motivated enough to go seek mental health professional. This is not only time-saving, but this method is applicable too to other medical patients with reduced mobility. The study reported that depression symptoms were significantly improved in the treatment group and further reductions of the symptoms at 4 weeks follow-up, compared to the control group. In the same vein, Valsaraj et al. (2016) in their study reported that improvements were observed in depression symptoms in the experimental group undergoing CBT as compared to the control group whom underwent non-directed counselling. These symptoms were also maintained at 6 months follow-up and CBT is proven to be effective in long-term treatment for haemodialysis patients with depression.

In contrast to Cukor et al., Duarte et al. (2009) administered the CBT sessions only after the patients had finished with their haemodialysis treatment. This randomized trial was conducted in Brazil where the 12 weekly CBT was done in group setting and included only haemodialysis patients diagnosed with major depressive disorder. Same as previous studies mentioned before, this research had found significant reductions in depression symptoms at posttreatment and at 9 months follow-up. However, this research included patients who are currently on pharmacotherapy for their depression. Even though it is only 10% of the patients were on antidepressant medication, this small number can have an influence on the results since the medication alone has an effect on the depression symptoms. Marvi et al. (2011) also supported the findings of the previous studies where participants in the CBT treatment group showed a significant improvement in depression symptoms compared to the control group that underwent normal dialysis treatment. However, the paper by Marvi et al. (2011) has
a limited information on the CBT intervention, whether it is in group or individual settings and whether the intervention occurred during or after the dialysis treatment.

Randomized control trials such as that conducted by Lerma et al. (2017) have shown that brief CBT is effective in reducing depression symptoms in haemodialysis patients. Brief CBT in this study was done in group setting and all patients underwent 5 weekly sessions. At posttreatment and at 4 weeks follow-up, there is further reductions in depression symptoms. Lerma et al. (2017) pointed out that in their study, they only include haemodialysis patients with mild to moderate depression symptoms as according to BDI-II scores between 10 and 29. It is important to include patients with severe depression symptoms in the study too since severe depression symptoms can increase mortality risk like other medical risk factors.

3.2.2.2. CBT treatment group shows less effectiveness compared to control group. Conversely with previous studies in the other sub-theme, Al Saraireh et al. (2018) reported that psychoeducation is more effective in the management of depression in dialysis patients, compared to CBT. Although both groups were reported to show a significant decrease in depression scores, psychoeducation group showed a greater alleviation of their depression. Authors suggested that in psychoeducation, more emphasizes are on the disease education, its treatment and rehabilitation. This is in contrast with CBT, where it followed CBT sessions protocol and more emphasize on changing the underlying negative automatic thoughts. This might be the reason why the psychoeducation group showed more efficacy in reducing depression in haemodialysis patients compared to CBT treatment group.

This is agreed by Mehrotra et al. (2019) who did a randomized clinical trial on haemodialysis patients. The participants in CBT treatment group were being compared with those prescribed with antidepressant medication—sertraline. The result showed sertraline treatment caused a lower depression symptoms compared to CBT treatment group at posttreatment. However, the authors noted that the adverse effects in sertraline to be more frequent compared to CBT group.

4. Discussion

This review has attempted to systematically analyse the existing literatures on the efficacy of CBT on depression symptoms among haemodialysis patients. Haemodialysis is one of the renal replacement therapy where majority of end-stage renal disease patients undergo in order to sustain their life. A rigorous review sourced from one database has resulted in 10 articles related to this study’s objective. Within this scope of review, two themes and two sub-themes emerged. The two main themes are single-group trial and two-groups trial, where majority of the studies are in the latter group. The two-groups trial were further sub-themed into two, where one theme showed CBT group is more or equally effective compared to control group and the other one is where CBT group is less effective compared to control group.

This discussion will be mainly focusing on the lack of randomized trials in the depression treatment among haemodialysis patients in Malaysia. Most research in Malaysia were focusing on the cross-sectional studies that investigated on the incidence, prevalence, and association of depression, anxiety, and quality of life in haemodialysis patients (Bujang et al., 2017, 2015; N. Ibrahim et al., 2013, 2015, 2016; Surendra et al., 2019).

End-stage renal disease patients undergoing haemodialysis are not only highly associated with depression, but also with anxiety and their quality of life. Bujang et al. (2015) had done a cross-sectional study that aims to investigate the association of depression, anxiety, and stress towards quality of life in dialysis patients. All these psychological symptoms had caused a significant reduction in patients’ quality of life in terms of physical and psychological health, social impact and perceived environment. Moreover, the same study has demonstrated that there is high prevalence of depression and anxiety among patients undergoing dialysis in Malaysia, which is 36.3% and 46.6% respectively.
In 2017, Bujang et al. (2017) did another study that forecasted on the incidence and prevalence of dialysis patients in Malaysia until the year 2040. The data was taken from the Malaysian Dialysis and Transplant Registry from 1993 to 2013, where the numbers of new and current dialysis patients was used in univariate forecasting. These univariate models were used to predict the number of new dialysis patients from 2020 to 2040. Bujang et al. (2017) predicted that in 2020 and 2040, the number of new dialysis patients will be 10,208 and 19,418 cases, respectively, and the estimated prevalence is 51,269 and 106,249 cases. With the predicted increment in new dialysis patients, there will be increment in the estimated costs for the treatment too. The predicted growth in the costs of treatment are USD 384,517,500 and USD 796,867,500 in the years 2020 and 2040, respectively. This result is very useful for further actions to be taken to improve mental health among dialysis patients. Since it is reported by Bujang et al. (2015) that dialysis patients are highly associated with depression, anxiety, and stress, thus predicted increment in the number of ESRD will highly resulted in the increase in depression and anxiety too.

Another cross-sectional study was done by N. Ibrahim et al. (2016) that examined on the prevalence of depression and anxiety in chronic kidney disease (CKD) patients in Malaysia. This study is different from the previous studies mentioned before since it investigated on the prevalence of these psychological distress on three different stages of chronic kidney disease patients which are stage 3–5, and not only focusing on the end-stage renal disease. The study found out that prevalence of depression and anxiety increased with the CKD stages, and health related quality of life also declined with the increased CKD stages. Percentage of depression increased from 4.9% in stage 3–12.5% in stage 4 and 14.5% in stage 5. N. Ibrahim et al. (2016) added up that this increasing pattern of psychological disturbance in CKD patients is associated with impaired health related quality of life. However, since this study is not a randomized trial, it could not detect changes in depression symptoms in different stages of CKD patients across time.

Besides looking at the incidence and prevalence of psychological symptoms on dialysis patients, Surendra et al. (2019) did a cross-sectional study to compare the health-related quality of life between patients undergoing haemodialysis (HD) and continuous ambulatory peritoneal dialysis (CAPD). The quality of life in this study was measured by EQ-5D-3 L questionnaire which consists of five health dimensions; mobility, self-care, usual activity pain/discomfort, and anxiety/depression. Among the five dimensions, only the usual activity domain showed a significant difference between CAPD and HD patients. CAPD patients reported to be less problems (15.6%) compared to HD patients (35.1%) in the usual activity domain. This significant difference might be due to that CAPD is perceived as being less burdensome dialysis modality since it can be performed at home. This is in contrast with HD patients where they have to travel thrice weekly to the dialysis centres to get the treatment and have to stay there for four hours, thus consuming a lot of their time and restricting their activities (Surendra et al., 2019).

5. Recommendations
The findings and systematic review process of this study have contributed to numbers of recommendations that can be used for future studies. First, future scholars should focus on the randomized controlled trials of CBT that is compared with other active therapy, such as acceptance and commitment therapy (ACT), solution-focused brief therapy, or any other therapies that is shorter in duration. By comparing two types of therapies, we can observe which one is more effective or whether they are having the same efficacy. Shorter duration of therapy is not only can save a lot of time and energy, but also money spent on the sessions.

Meanwhile, more improvement can be made for the future review where more than one database could be used as the searching tools. According to Xiao and Watson (2019), there is not one perfect or complete database and they suggested to use more than one. This is supported by Younger (2010) in which if we use more than one database, they will cover each other weaknesses.
6. Conclusion
This systematic review has highlighted on the efficacy of CBT in improving depression symptoms among haemodialysis patients. Haemodialysis patients are prone to get depression, where this psychological symptom can negatively affect the patients in various ways, such as decreasing their quality of life, increasing non-adherence to treatment, and increasing rate of hospitalization as compared to those without depression. Based on the systematic reviews performed, authors have identified two main themes which are single-group trial and two-groups trial. The two-groups trial was further extended into two sub-themes. The review suggests a few recommendations for future studies. First, more randomized trial in the treatment of depression to be done among haemodialysis patients and to be compared to other active therapies. Second, future studies should consider using more than one database as the searching tools to increase the searching coverage.

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