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Effects of mindfulness-based stress reduction therapy on anxiety and depression in patients with maintenance hemodialysis: a meta analysis

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Highlights

The meta-analysis systematically evaluate the effects of mindfulness-based stress reduction therapy on anxiety and depression in patients with maintenance hemodialysis. A total of 9 articles were included. Meta-analysis results indicated that mindfulness-based stress reduction therapy has positive effects on depression, anxiety in patients with maintenance hemodialysis. However, limited by the quantity and quality of the included studies, the above conclusions need to be verified by more high-quality studies.

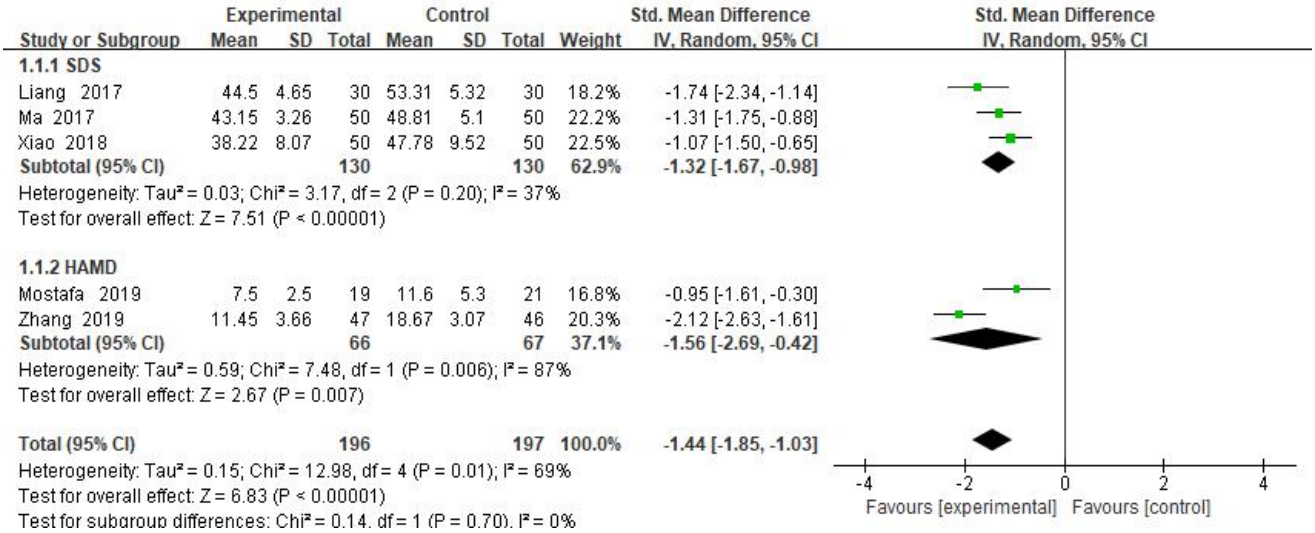

Figure 3 Forest plot for MBSR on depression. MBSR, mindfulness-based stress reduction.

Abstract

Objective: This study aimed to evaluate the effects of mindfulness-based stress reduction therapy on anxiety and depression in patients with maintenance hemodialysis. **Methods:** CNKI, VIP, WanFang, CBM, Embase, the Cochrane Library and PubMed databases were retrieved. Randomized controlled trials of intervention effects of mindfulness-based stress reduction combined with conventional hemodialysis education compared with conventional hemodialysis education on maintenance hemodialysis patients were collected. The retrieval period was from the establishment of the database to December 2019. Two researchers independently screened the literatures, extracted the data and evaluated the risk of bias in the included studies. RevMan 5.3 software was used for analysis. **Results:** A total of 9 studies, which comprised a total of 664 participants were included in the final meta analysis. The results showed that mindfulness-based stress reduction could reduce the anxiety of patients (SMD = −1.65, 95% CI: −2.29 to −1.01), reduce the depression (SMD = −1.44, 95% CI: −1.85 to −1.03). **Conclusion:** Mindfulness-based stress reduction therapy has positive effects on depression, anxiety in patients with maintenance hemodialysis.

Keywords: Mindfulness-based stress reduction, Maintenance hemodialysis, Depression, Anxiety, Meta-analysis

***Abbreviations*:**

ESRD, End-stage renal disease; MHD, maintenance hemodialysis; MBSR, mindfulness-based stress reduction; RCTs, randomized controlled trials; HAMD, Hamilton Depression Scale; DASS-D, Depression, Anxiety, Stress Scale-21; SDS, Self-rating Depression Scale; PHQ-9, Patient Health Questionnaire; HAMA; Hamilton Anxiety Scale; SAS, Self-rating Anxiety Scale; GAD-7, General Anxiety Disorder-7; SMD, standardized mean difference.

***Competing interests*:**

The authors declare that there is no conflict of interest.

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Introduction

End-stage renal disease (ESRD) is a major global health problem. In recent years, the incidence of ESRD in the world has gradually increased, which has become a public health problem that seriously endangers human health and increases the economic burden [1, 2]. Meanwhile, hemodialysis and peritoneal dialysis have become one of the main methods of replacement treatment for patients with ESRD [3]. Patients with maintenance hemodialysis (MHD) are prone to a variety of psychological disorders due to various conditions such as disease status and economy [4]. Anxiety and depression are the most common and important mental disorders among hemodialysis patients, with adverse effects on the course of disease [5]. It is estimated that the incidence of depression in MHD patients is 30%–70%, and the incidence of anxiety is 25%–70%,both of which are much higher than that of the general population [6, 7]. Depression and anxiety can damage the physical and mental health of ESRD patients, reduce the quality of life and increase the hospitalization rate and mortality. If long-term application of drug treatment, patients will not only become dependent on drugs and have other adverse reactions, but may further increase the renal burden. Therefore, it is very important to take effective non-drug interventions to reduce the negative emotions of hemodialysis patients.

Mindfulness-based stress reduction (MBSR) is based on mindfulness, advocating patients for self-stress management, self-control and self-improvement. It can effectively reduce patients' perceptual pressure, relieve depression and anxiety, improve patients' physical, mental health and emotional regulation ability. It is a safe and effective alternative therapy, which has been applied to a variety of chronic diseases [8, 9]. Studies have shown that MBSR can improve depression and anxiety in patients with MHD. However, the conclusions of the study are not uniform, and the sample size of some studies is relatively small. With the increasing research on MBSR improving the mental state of MHD patients at home and abroad in recent years, this study aims to comprehensively evaluate the intervention effect of MBSR on depression and anxiety of MHD patients through systematic evaluation, so as to provide evidence-based medicine evidence for the clinical application of MBSR.

Methods

Basic requirements

Study eligibility. Randomized controlled trials (RCTs) and pilot studies that applied a randomized controlled design. The language was limited to Chinese and English.

Types of participants. Hemodialysis patients over 18 years old with dialysis duration ≥ 3 months and no limit on the primary disease. Patients with other mental illnesses and those taking other anti-depression and anxiety drugs were excluded.

Types of interventions. The intervention group was treated with MBSR combined with conventional therapy or relaxation therapy alone, while the control group was treated with conventional therapy, such as routine clinical monitoring or psychological nursing, etc. The main operation process of MBSR is that the first thing the subjects need to do is to choose an object to pay attention to for themselves, which can be a voice or their breathing, body feeling and movement feeling. After selecting the object of your attention, all you need to do is sit comfortably, close your eyes, do a simple abdominal breathing relaxation exercise, and then adjust your breathing to focus on the object of your attention. In the process of training, other thoughts, feelings or feelings appear in the subject's mind, which causes the subject's attention to be diverted. It doesn't matter, just return to the original attention at any time.

Types of outcome measures. Main outcomes: ① depression, the Hamilton Depression Scale (HAMD), Depression, Anxiety, Stress Scale-21 (DASS-D), Self-rating Depression Scale (SDS), Patient Health Questionnaire (PHQ-9) were used to assess the level of depression; ② anxiety, the Hamilton Anxiety Scale (HAMA), Self-rating Anxiety Scale (SAS), General Anxiety Disorder-7 (GAD-7) were used to assess the level of anxiety.

Search methods

We searched the following electronic databases from inception to December, 2019: PubMed, EMbase, Cochrane Library, CNKI, CBM, VIP and WanFang. The following search terms were employed: “Mindfulness”, “Mindfulness therap*”, “Mindfulness train*”, “Mindfulness-Based Stress Reduction”, “MBSR”, “Renal Dialys”, “Hemodialys*”, “Extracorporeal Dialys*”, “Haemodialys*”, “Maintained Hemodialys*”, “hemotodialys*”, “Blood Dialys*”, “HD”, “MHD”.

Data extraction

Two researchers independently extracted data from the included trials using standardized data extraction tables, including year, author, sample size, patient baseline characteristics, treatment duration, interventions and outcomes. Any differences were resolved through discussion.

Risk of bias assessment

The risk of bias in the included studies was assessed by 2 researchers using the Cochrane Collaboration Risk of Bias Tool, for risk assessment of bias in RCTs. Seven items were included: generation of random order,

concealment of random scheme allocation, blind method for research objects and intervention implementors, blind method for outcome evaluators, integrity of outcome indicator data, possibility of selective reporting of results, and other sources of bias. The evaluator should make a low bias risk, high bias risk and unclear judgment for each project.

Statistical analysis

RevMan 5.3 software was used for meta-analysis of the data. Firstly, the X^2 test was used to test the heterogeneity between literature results. If the test results were $P > 0.1$ and $I < 50\%$, the fixed effect model was used for meta-analysis. If $P < 0.1$, $I \geq 50\%$, and no clinical heterogeneity was determined, the random effect model was used for meta-analysis. If the source of heterogeneity could not be determined, descriptive studies were used. For continuous data, if the results obtained by the same measuring tool are adopted, the mean difference is used as the effect analysis statistics. If different measurement tools are used for the same variable, standardized mean difference (SMD) is used as the effect analysis .

Results

Search results

Through database search, a total of 102 potentially relevant studies were identified. Of those, 31 articles were duplicated. Of the remaining 71 articles, 35 were excluded by reading the title and abstract filters. In the remaining 36 articles, through searching and reading the full text, excluding non-randomized controls and research data to obtain fruitless clinical trials, 9 articles were finally included. These 9 articles included a total of 664 patients. Details of the selection process are illustrated in Figure 1. The characteristics of included studies were summarized in Table 1. A total of 664 patients were included in this study, except Maryam did not mention the number of men and women participating in the treatment, the remaining men were 358 and women were 246. The average age of the included patients was about 55 years old. During the course of receiving MBSR therapy, the patient's condition was stable, the consciousness was clear, and there was no serious underlying disease. The duration of dialysis was at least 3 months, and no mental illness occurred. The acceptance degree of dialysis treatment was good, and the patient could actively cooperate with the nurses to conduct training of MBSR therapy.

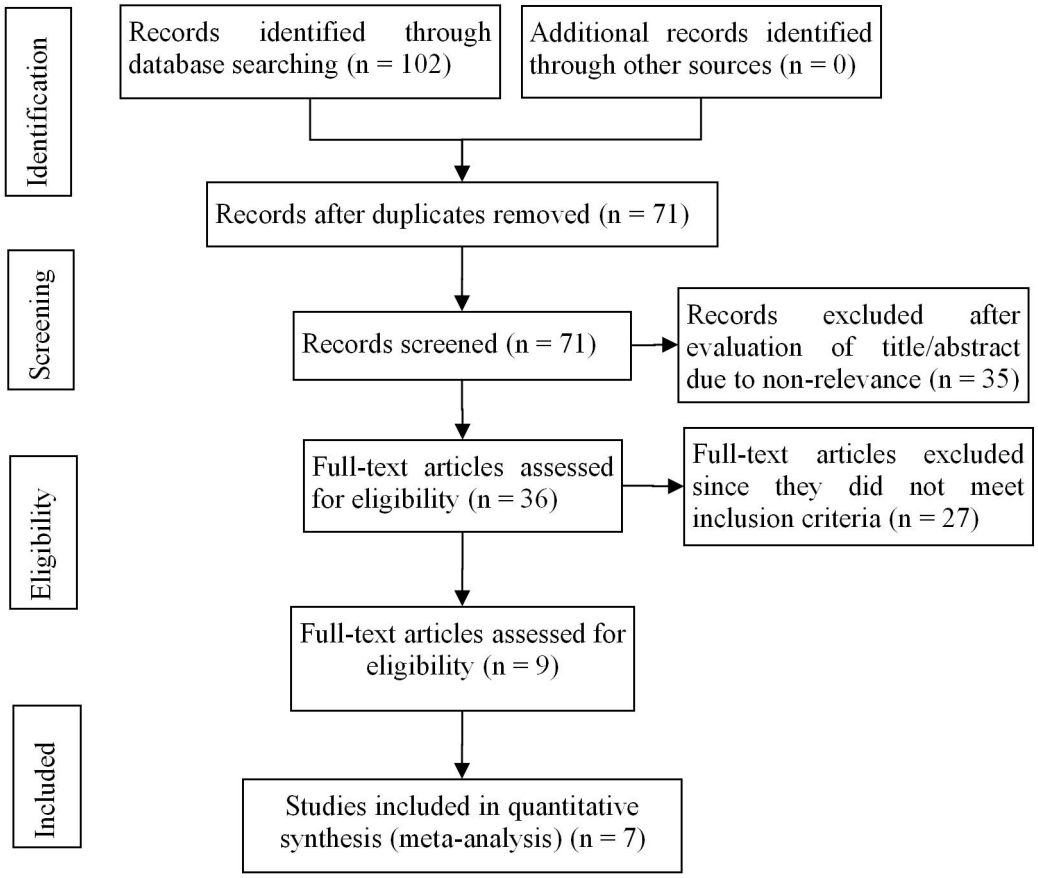

Figure 1 Flowchart of the study

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Table 1 Characteristics of the included studies

Author/Year	Number (T/C)	Sex (M/F)	Mean age, years	Intervention	Frequency and duration of intervention	Outcomes
Liang [10] 2017	30/30	36/24	50.50 ± 10.30	T: MBSR C: Routine health education and psychological intervention	2 h/time, 1 time/week, 6 weeks	SAS, SDS
Ma [11] 2017	50/50	T: 31/19 C: 33/17	T: 46.92 ± 11.25 C: 49.85 ± 10.07	T: MBSR C: Conventional therapy	40 min/time, 8 weeks	SAS, SDS
Thomas [12] 2017	21/20	T: 14/7 C: 13/7	T: 66.00 ± 13.00 C: 64.00 ± 14.00	T: Mindfulness Meditation C: Psychological education	10–15 min/time, 3 times/week, 8 weeks	PHQ-9, GAD-7
Xiao [13] 2018	50/50	T: 29/21 C: 31/19	T: 46.80 ± 12.10 C: 45.60 ± 11.30	T: MBSR C: Conventional therapy	30 min/time, 2 times/day	SAS, SDS
Amini [14] 2018	20/28	T: 6/14 C: 14/14	T: 64.25 ± 10.14 C: 61.61 ± 15.40	T: MBSR C: Conventional therapy	15–20 min/time, 3 times/week, 8 weeks	DASS-21
Maryam [15] 2018	30/30	–	55.45 ± 11.60	T: MBSR C: Conventional education	2 h/time, 1 time/week, 8 weeks	GHQ-28
Zhang [16] 2019	47/46	T: 27/20 C: 28/18	T: 61.52 ± 4.60 C: 60.73 ± 5.17	T: MBSR C: Conventional intervention	2 h/time, 1 time/week, 12 weeks	HAMA, HAMD
Mostafa [17] 2019	19/21	T: 12/7 C: 15/6	T: 46.86 ± 11.66 C: 46.26 ± 11.71	T: MBSR C: Conventional therapy	2 h/time, 1 time/week, 8 weeks	HAMA, HAMD
Zhu [18] 2019	62/60	T: 38/24 C: 31/29	T: 54.30 ± 9.10 C: 44.5 ± 10.55	T: MBSR C: Routine health education	30–40 min/day, 6 weeks	SAS, SDS

T, experimental group; C, control group; –, not mentioned; MBSR, mindfulness-based stress reduction; SAS, Self-rating Anxiety Scale; SDS, Self-rating Depression Scale; HAMD, Hamilton Depression Scale; PHQ-9, Patient Health Questionnaire; HAMA, Hamilton Anxiety Scale; GAD-7, General Anxiety Disorder-7; DASS-21, Depression, Anxiety, Stress Scale-21; GHQ-28, 28-Item General Health Questionnaire.

Risk of bias assessment

The bias risks of the included studies are shown in Figure 2. Each study reported that patients were randomly divided into experimental and control groups, but only three studies provided details of the randomization process. Three studies reported allocation concealment. Due to the nature of the intervention, it is impossible to use blind methods on patients. In four studies, the outcome assessors were blinded to the allocation, while the remaining studies did not provide sufficient information to allow this judgment to be made. With regard to selective reporting bias, we judged that expected outcomes were stated in all trials.

Efficacy analysis

Depression. Five articles reported patient depression [10, 11, 13, 16, 17]. SMD was used to standardize the study results. Significant heterogeneity between these studies was observed (P = 0.01, I^2 = 69%), a random effects model was conducted and results showed that the MBSR group improved patients' depression mood better than the control group, with a significant difference (SMD = −1.44, 95% CI (−1.85, −1.03), P < 0.00001) (Figure 3). Subgroup analysis of different measurement was conducted. Three of the articles used SDS, random effect model results showed that the MBSR group was better than the conventional treatment group in improving depression, the difference is statistically significant (SMD = −1.32, 95% CI (−1.67, −0.98), P < 0.00001) [10, 11, 13]. Two article used HAMD, random effect model result showed that the MBSR group is improving depression better than the conventional treatment group, the difference was statistically significant (SMD = −1.56, 95% CI (−2.69, −0.42), P = 0.07) [16, 17]. Amini used

DASS-A to measure improvement in depression. Using descriptive analysis, this study found that the MBSR group was significantly superior to the control group in improving depression. In addition, one study (Zhang 2019) was deleted for sensitivity analysis, and the results showed: $P < 0.00001$, SMD and 95% CI were −1.26 and (−1.56, −0.96), suggesting that the evaluation results were stable compared with the results of previous studies.

Anxiety. Six articles reported patient anxiety [10, 11, 13, 16–18]. The heterogeneity test results were significant heterogeneity exists between studies ($P < 0.00001$, $I^2 = 90\%$), asdifferent measurement cause heterogeneity mainly, and subset analysis for different scales were conducted to improve the heterogeneity. Four of the articles used SAS, random effect model results showed that the MBSR group was better than the conventional treatment group in improving anxiety, the difference is statistically significant (SMD = −1.35, 95% CI (−1.87, −0.82), $P < 0.00001$) [10, 11, 13, 18]; two article used HAMA, random effect model result showed that the MBSR group is improving anxiety better than the conventional treatment group, the difference was statistically significant (SMD = −2.26, 95% CI (−3.92, −0.59), $P = 0.008$) [16, 17].

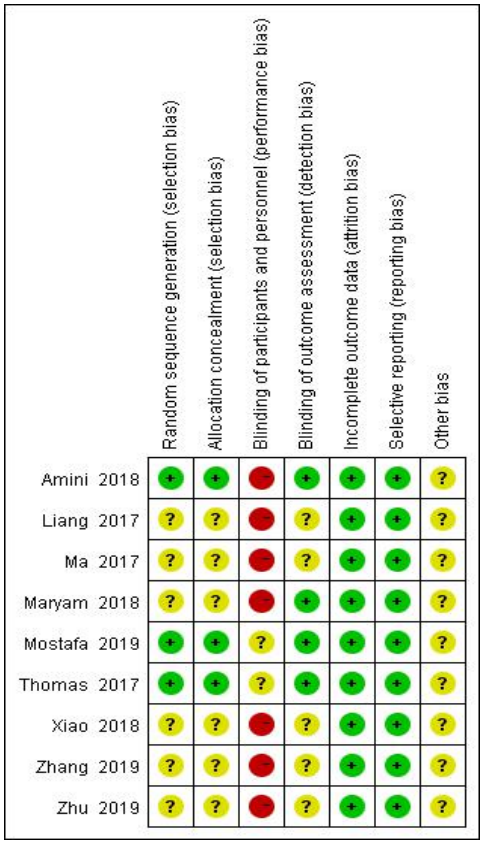

Figure 2 Risk of bias summary. Green circles, indicate a low risk of bias; Yellow circles, indicate an unclear risk of bias; Red circles, indicate a high risk of bias.

Discussion

Meta analysis results show that MBSR therapy can significantly relieve the depression and anxiety of patients with MHD. Thomas [12] used PHQ-9 and GAD-7 to assess the improvement of patients' depression and anxiety, it showed that the patient's adverse mood improved subjectively, but there was no statistical difference in the score, which may be related to the difference caused by short intervention time, insufficient treatment time, too few participants and different quantitative criteria of the scale. It suggests that a larger sample size is needed in the future to extend the duration of intervention. When Maryam [15] used GHQ-28 to assess the improvement of depression and anxiety in patients, the results showed that MBSR can significantly improve the patients' bad mood and improve the quality of sleep. Amini [14] used the DASS-A scale to measure the improvement of patients' depression, showing that the improvement of depression in the intervention group was significantly higher than that in the control group. Since different scales were used in this paper to evaluate the improvement of depression and anxiety in patients, and the differences caused by different quantitative standards in different scales resulted in a large heterogeneity of the study, the use of scales should be standardized in future studies. Studies have shown that the average rate of non-adherence to treatment for MHD patients is about 50% [19]. The main reasons for the decline in patient compliance include lack of attention to the disease, lack of hemodialysis-related knowledge and excessive economic burden caused by the disease [20, 21]. The low treatment adherence not only increased the patients the incidence of complications and death, and seriously affect the quality of their daily life. Depression and anxiety affect patient's cognition and attitude towards disease and treatment, and affect treatment compliance [22]. The researchers assessed the compliance of MHD patients from the aspects of diet, medication and dialysis compliance. Studies have shown that MBSR therapy can change patients' perceptions and behaviors of the disease, establish a correct understanding of renal failure, change bad lifestyles, and improve treatment compliance while improving negative emotions [23].

Although MBSR therapy cannot avoid the generation of negative emotions, but through the stepwise strengthening of mindfulness thoughts in patient exercises, combined with mindfulness breathing and mindfulness meditation can improve the patient's negative emotions and maintain inner peace. Combined with body scanning, patients can better pay attention to physical symptoms, feelings and emotions through the enhancement of sensory perception, and learn to deal with emotional changes correctly [24, 25]. Studies have found that MBSR intervention

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significantly increases the activation of the prefrontal brain region of the left brain, and this part of the brain is related to emotional regulation [26]. Therefore, MBSR therapy has a positive impact on anxiety, depression, fatigue and quality of life of patients [27]. It can be used as an auxiliary means to help patients manage their emotions and improve their quality of life. At present, mindful stress reduction therapy has been widely used in mental illness and pain management, it has become an important stress reduction system [28, 29]. In recent years, in the field of nursing research in China, MBSR has received more and more attention. Studies have proved that mindfulness intervention can be mastered by clinical nurses and applied to all of the field of nursing with ideal effect [30, 31].

There are also limitations in this paper. The quality of the included literature is moderate. The generation, allocation, hiding, withdrawal and loss of follow-up of random schemes are not mentioned in some literature. The intervention time and scale of the included studies are different, which may lead to certain risk of bias. Follow-up of patients was not mentioned in the included literature, so the long-term effect could not be evaluated. Therefore, large sample size, high-quality studies and prolonged evaluation time of outcome indicators were needed to support the study. In the future, unified measurement scale, duration of intervention and intervention plan are needed to provide reliable evidence for the application of MBSR therapy in MHD patients.

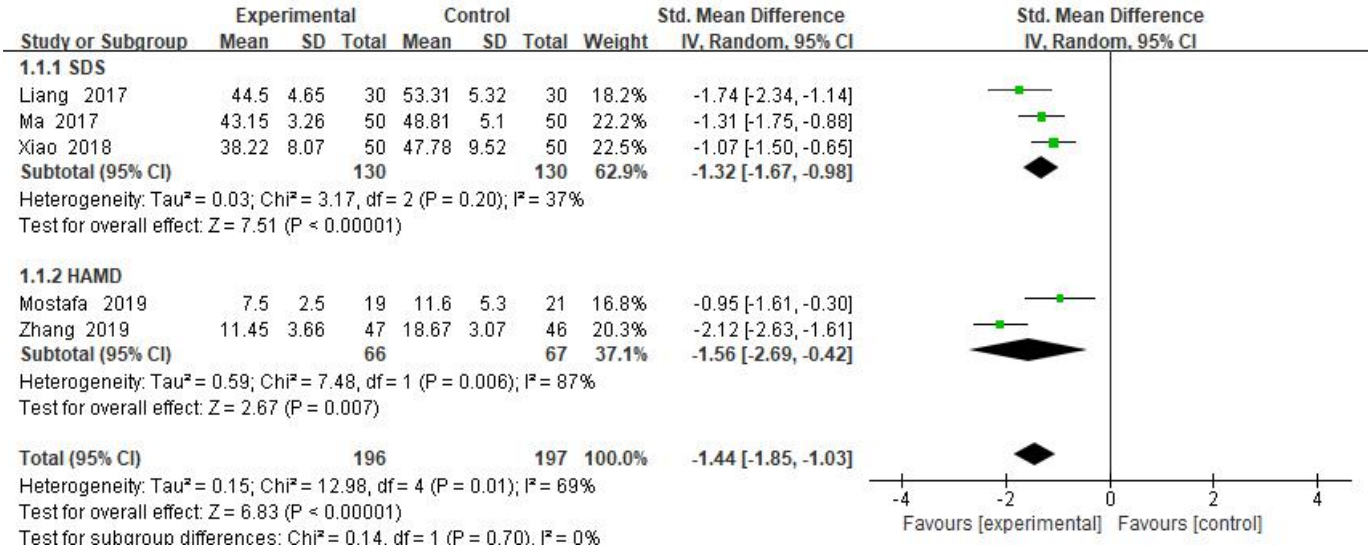

Figure 3 Forest plot for MBSR on depression. MBSR, mindfulness-based stress reduction.

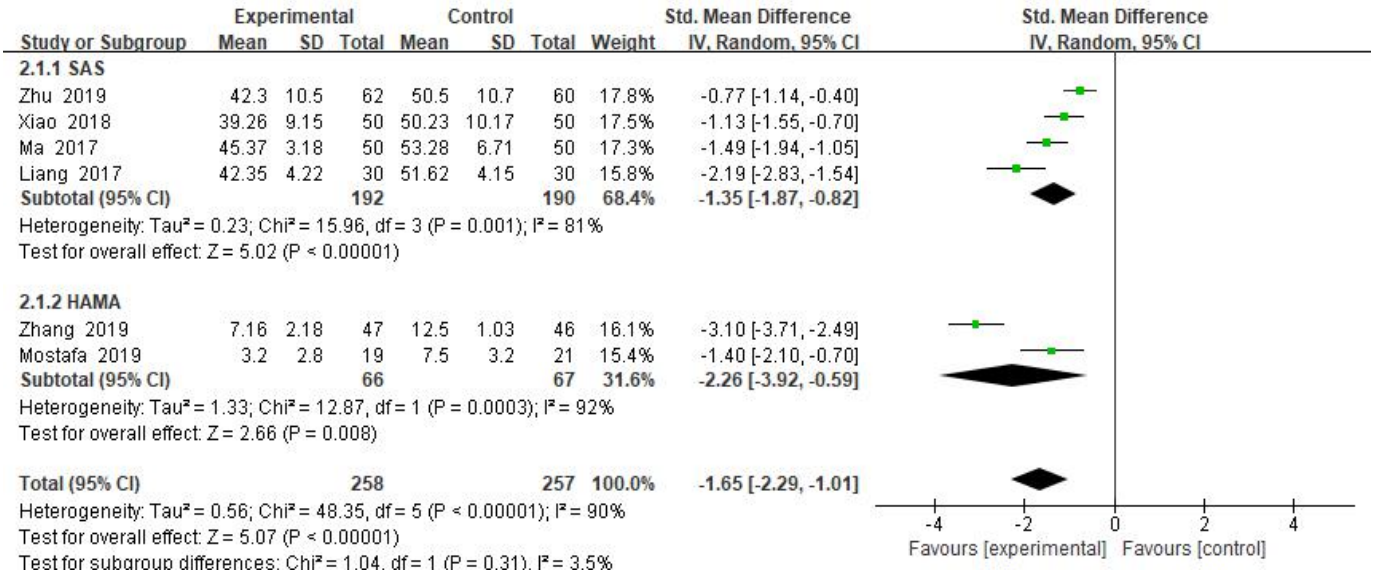

Figure 4 Forest plot for MBSR on anxiety. MBSR, mindfulness-based stress reduction.

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