Treatment Effects of Massage Therapy in Depressed People: A Meta-Analysis

Wen-Hsuan Hou, MD, MSc; Pai-Tsung Chiang, MD, MPH; Tun-Yen Hsu, MD; Su-Ying Chiu, BA; and Yung-Chieh Yen, MD, MSc, PhD

Objective: To systematically investigate the treatment effects of massage therapy in depressed people by incorporating data from recent studies.

Data Sources: A meta-analysis of randomized controlled trials (RCTs) of massage therapy in depressed people was conducted using published studies from PubMed, EMBASE, PsycINFO, and CINAHL electronic database from inception until July 2008. The terms used for the search were derived from medical subheading term (MeSH) *massage* combined with MeSH *depression*. Hand searching was also checked for bibliographies of relevant articles. Retrieval articles were constrained to RCTs/clinical trials and human subjects. No language restrictions were imposed.

Study Selection: We included 17 studies containing 786 persons from 246 retrieved references. Trials with other intervention, combined therapy, and massage on infants or pregnant women were excluded.

Data Extraction: Two reviewers independently performed initial screen and assessed quality indicators by Jadad scale. Data were extracted on publication year, participant characteristics, and outcomes by another single reviewer.

Data Synthesis: All trials showed positive effect of massage therapy on depressed people. Seventeen RCTs were of moderate quality, with a mean quality score of 6.4 (SD = 0.85). The pooled standardized mean difference in fixed- and random-effects models were 0.76 (95% CI, 0.61–0.91) and 0.73 (95% CI, 0.52–0.93), respectively. Both indicated significant effectiveness in the treatment group compared with the control group. The variance between these studies revealed possible heterogeneity ($\tau^2 = 0.06$, Cochran $\chi^2_{16} = 25.77$, $P = .06$).

Conclusions: Massage therapy is significantly associated with alleviated depressive symptoms. However, standardized protocols of massage therapy, various depression rating scales, and target populations in further studies are suggested.

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Corresponding author: *Yung-Chieh Yen, MD, MSc, PhD, Department of Psychiatry, E-Da Hospital and College of Medicine, I-Shou University, 1 Yi-Da Rd, Jiau-Shu Tsuen, Yan-Chau Shiang, Kaohsiung County, Taiwan 824 (jackycyen@yahoo.com).*

Depression is recognized as a major public health problem that has a substantial impact on individuals and society. Depressive disorders are also common in the general population.[1] The Global Burden of Disease study reported that, when measured by the disability-adjusted life years, unipolar major depression ranked as the leading cause of disease burden in adult women.[2] Despite the availability of drug and psychotherapeutic treatments, much depression remains undiagnosed or inadequately treated.[3]

Besides pharmacotherapy and psychotherapy, *massage therapy*, defined as manual manipulation of soft tissue and with a history extending back several thousand years, may provide beneficial effects for depressed patients.[4] Massage therapies have miscellaneous benefits, such as facilitating growth, enhancing immune function, reducing pain, increasing alertness, and diminishing stress, anxiety and depression.[5] However, the use of massage therapy in depressed patients is controversial and there is also no qualitative review of the treatment effect of massage therapy in depressed patients. We conducted a meta-analysis and systematic review of the related literature, in accordance with the statement issued by the Quality of Reporting of Meta-Analyses conference.[6] This study aims to address whether depressive symptoms improve in people receiving massage therapy.

METHOD

Searching

One of our authors (S.Y.C.) conducted a database search of the PubMed, EMBASE, PsycINFO, and CINAHL electronic databases, from inception to July 2008, using medical subheading term (MeSH) *massage* combined with MeSH *depression*. No language restriction was imposed. Besides, retrieved articles were restricted to human subjects and publication type was limited to randomized controlled trials (RCTs) or clinical trials while searching the databases of EMBASE and PsychoInfo. A hand search of the bibliographies of relevant articles was also carried out.

Selection

We selected articles that fulfilled the following criteria: (1) the study was described as a RCT or a clinical trial; (2) participants were not limited to patients with depressive disorders and hence included inpatients/outpatients of various illness, community elders, caregivers of patients undergoing transplantation, school-age children, medical faculties, and college students; (3) the intervention was focused on a single massage therapy, but not other manual therapies, such as aroma massage, manipulation or chiropractic; (4) the study design enabled the evaluation of the sole or additive benefit of massage therapy by using at least 1 appropriate control condition; (5) there was at least 1 measurement of depressive disorder both before treatment and at least once after treatment (physiologic outcomes were excluded); (6) the studies aimed at mother-to-infant or pregnant women's massage

were excluded; and (7) the presented data were sufficient to calculate the effect size (mean and standard deviation [SD], *F* or *t* statistics) for the depressive scale of each study.

Data Abstraction

Two reviewers (P.T.C. and Y.C.Y.) independently extracted data from all included studies after excluding 52 duplications from titles and abstracts. The data extracted corresponded with that in the above description and Figure 1. Disagreements between reviewers were resolved through discussion.

Validity Assessment

We used an 11-item instrument developed and validated by Jadad et al[7] for the quality assessment of included studies by 2 reviewers (T.Y.H. and W.H.H.). The 2 reviewers assessed study quality independently, with substantially good interrater agreement ($\kappa = 0.72$), following Landis and Koch's suggestion.[2,8] Disagreements were arbitrated by consensus and are shown on Table 1.

Study Characteristics

Participants included inpatients/outpatients of various illness, community elders, caregivers of patients undergoing transplantation, school-age children, medical faculties, and college students without limiting to patients of depressive disorders. Mean outcome scores for the major outcome of depression scale of the treatment and control groups were standardized by dividing the scores by their SD. The difference between these standardized outcome scores was calculated for each study. This approach is especially appropriate when studies measure the same concept but use a variety of continuous outcome scales.[9] By standardization, the study results were transformed to a common scale (SD units) that facilitated pooling. This method of evaluating outcomes is also known as *effect size*.[9]

Quantitative Data Synthesis

Comprehensive Meta-Analysis software (version 2; Biostat Inc, Englewood, New Jersey) was used for analyzing the included data. Assessment of publication bias was performed by using the methods of Egger et al[10] and heterogeneity was assessed with Q (χ^2) statistics using the methods of Mantel-Haenszel. Analysis of outcomes involved comparing summary standardized mean differences by fixed- and random-effects models.[11]

RESULTS

Trial Flow

Our literature search uncovered 246 articles, 31 of which were potential candidates for inclusion in the meta-analysis. Of the 31 articles, a total of 17 were excluded. Among them, 3 were excluded because they had no mean values, 3 owing to a lack of data, and 10 due to a lack of SD or *F* values. Two similar articles that reported different immune functions of massage therapy were duplications using the same subject pool confirmed by the corresponding author.[12,13] Hence, we chose the latest published article, which recruited more participants.[13] An additional 3 studies were included by hand searching the reference lists, as shown in Figure 1.

Study Descriptions

The 17 RCTs were of moderate quality, with a mean quality score of 6.4 (SD = 0.85, median = 6.5, range = 5–9). Using the 11 items of the Jadad scale, we found that none (0%) of the studies mentioned adverse effects after massage therapy or described the blinding method, which was technically difficult. All recruited studies described objectives, outcome measurements, interventions, analytic methods, and randomized or controlled conditions. Less than half of the RCTs had clear descriptions of withdrawals/dropouts (41.7%) and inclusion/exclusion criteria (33.3%). Only 1 (8.3%) justified the sample size with a power calculation. Although various mood and depression scales were used as outcome measurements between or within each trial, we chose the unique scale for depression measurement to evaluate the delayed effect of massage therapy.

Meta-Analysis Data

Massage therapy improved depressive scores by 0.76 (95% CI, 0.61–0.91) in the fixed-effects model and 0.73 (95% CI, 0.52–0.93) in the random-effects model (Figure 2). There was no statistical evidence of possible heterogeneity ($\tau^2 = 0.06$, Cochran $\chi^2_{16} = 25.77$, $P = .06$). Despite the lack of statistical heterogeneity, the funnel plot showed some missing smaller negative effect trials (figure not shown).

DISCUSSION

Massage therapy had potentially significant effects in alleviating depressive symptoms in this meta-analysis of 17 RTCs. In our study, *massage* was defined as the intentional and systemic hand motion practiced on the soft tissue of the body; that is, softening the spasm or releasing the tightness of soft tissues, to enhance health and healing.[14] It has been a part of many ancient cultures, including that of the Chinese, Egyptians, Greeks, Japanese, and Romans, which considered it to be a medical practice.[15] Therefore, not only Swedish/Esalen massage by stroking, effleurage, petrissage, friction, or myofascial manipulations but also Shiatsu and traditional Chinese massage were included.[16–19] All can decrease stress and muscle tension, increase pain thresholds, and positively affect the individual emotionally.[20]

Our finding that there is good evidence to suggest that massage therapy is an effective treatment of depression is similar to the conclusions of 4 previous reviews.[3,4,8,21] The earliest 1 pointed out that the sample size and treatment period were insufficient to judge the value of massage therapy for depression.[3] The second focused on all complementary and self-help treatments for depression and concluded there was a level II quality of evidence for short-term massage therapy in 2 RCTs.[8] The latest review contained 4 articles systematically reviewing massage therapy for the

Table 1. Characteristics of Included Studies

Study	Year	Country	Participants (experimental + control groups), n	Definition of Massage, Experimental Group	Definition of Massage, Comparison Group	Depression Diagnosis	Depression Scale	Treatment Effect	Jadad Quality Score (Total Score: 11)
Sharpe et al[17]	2007	USA	49 (25 + 24) Adults aged 60 y or older from the community	Duration: 50 min Frequency: 2/wk Period: 4 wk Sessions: 8 Protocol: specific	Duration: NA Frequency: NA Period: NA Sessions: 8 Type: guided relaxation	No	Depression subscale of GWB	Statistically significant *F* statistic for the group X time interaction	9
Zhou et al[19]	2006	China	166 (84 + 82) Insomnia of "deficiency of both the heart and spleen"	Duration: NA Frequency: 1/wk Period: 15 d Sessions: 15 Protocol: specific Three-part massage	Duration: NA Frequency: 1/wk Period: 15 d Sessions: 15 Type: 8 Chinese herb pills	No	SDS	Mean difference before and after treatment	7
Hernandez-Reif et al[13]	2005	USA	38 (22 + 16) Women diagnosed within the past 3 years with early stage (I–III) breast cancer	Duration: 30 min Frequency: 3/wk Period: 5 wk Sessions: 15 Protocol: specific	No intervention	No	(1) POMS-depression: immediate and longer term (2) SCL-90-R-depression: longer term	Changes of mean between (1) presession/postsession (immediate effects) (2) first and last days of the study	6
Diego et al[40]	2002	USA	20 (10 + 10) C5-C7 Spinal cord injuries for at least 1 year	Duration: 40 min Frequency: 2/wk Period: 5 wk Sessions: 10 Protocol: specific	Duration: 30 min Frequency: 2/wk Period: 5 wks Sessions: 10 Type: exercise with follow-up movement	No	CES-D	Mean difference between the first and last days	7
Field et al[18]	2002	USA	24 (12 + 12) Adult fibromyalgia patients from a local university hospital and bookstore discussion group	Duration: 30 min Frequency: 2/wk Period: 5 wk Sessions: 10 Protocol: specific	Duration: 30 min Frequency: 2/wk Period: 5 wk Sessions: 10 Type: progressive muscle relaxation therapy	No	(1) CES-D: longer-term effect (2) POMS-depression: immediate effects	Mean difference between the first and last days	
Rexilius et al[41]	2002	USA	26 (13 + 13) Healthy adults designated as primary caregivers by patients undergoing hematopoietic stem cell transplant	Duration: 20 min Frequency: 2/wk Period: 3 wk Sessions: 6 Protocol: specific	Duration: 20 min Frequency: 2/wk Period: 3 wk Sessions: 6 Type: 10-min visit	No	CES-D	Mean difference between the first and last days	
Diego et al[24]	2001	USA	24 (12 + 12) Female HIV seropositive adolescents	Duration: 20 min Frequency: 2/wk Period: 12 wk Sessions: 24 Protocol: specific	Duration: 20 min Frequency: 2/wk Period: 12 wk Sessions: 24 Type: progressive muscle relaxation routine	No	CES-D	Mean difference between the first and last days	7
Hernandez-Reif et al[42]	2001	USA	24 (12 + 12) Adults with low back pain of nociceptive origin with a duration of at least 6 mo	Duration: 30 min Frequency: 1/wk Period: 5 wk Sessions: 5 Protocol: specific	Duration: 30 min Frequency: 2/wk Period: 5 wk Sessions: 10 Type: progressive muscle relaxation exercise at home	No	(1) POMS-depression: immediate and long-term effect (2) SCL-90-R-depression: long-term effect	Mean difference between presession/postsession and first and last days	6

(continued)

Table 1 (continued). Characteristics of Included Studies

Study	Year	Country	Participants (experimental + control groups), n	Definition of Massage, Experimental Group	Definition of Massage, Comparison Group	Depression Diagnosis	Depression Scale	Treatment Effect	Jadad Quality Score (Total Score: 11)
Hernandez-Reif et al[25]	2000	USA	30 (15 + 15) Adults with a medical diagnosis of hypertension for a duration of at least 6 mo	Duration: 30 min Frequency: 2/wk Period: 5 wk Sessions: 10 Protocol: specific	Duration: 30 min Frequency: 2/wk Period: 5 wk Sessions: 10 Type: progressive muscle relaxation exercise	No	(1) CES-D (2) SCL-90-R-depression	Mean difference between first and last days	8
Hernandez-Reif et al[43]	2000	USA	24 (12 + 12) Young women from gynecologic practices who fulfilled the DSM-IV diagnostic criteria for premenstrual dysphoric disorder	Duration: 20 min Frequency: 2/wk Period: 5 wk Sessions: 10 Protocol: specific	Duration: 30 min Frequency: 2/wk Period: 5 wk Sessions: 10 Type: progressive muscle relaxation therapy	Yes	CES-D	Mean difference between first and last days	7
Ahles et al[36]	1999	USA	33 (16 + 17) Patients scheduled for autologous bone marrow transplantation at a medical center	Duration: 20 min Frequency: NA Period: 3 wk Sessions: 8~9 Protocol: specific "Swedish/Esalen" massage combined effleurage and petrissage	No intervention	No	(1) 11-item brief POMS (2) BDI	Analysis equivalent to a repeated-measures analysis of variance between preadmission, midtreatment, and predischarge	8
Brattberg[27]	1999	Sweden	48 (23 + 25) Fulfilling the diagnostic criteria of fibromyalgia on full-time or part-time sick leave	Duration: NA Frequency: NA Period: 10 wk Sessions: 15 Protocol: specific	NA	No	Depression subscale of HAD	Mean difference between first and last days	8
Hernandez-Reif et al[38]	1998	USA	24 (12 + 12) Adults with MS from MS clinic and community support group	Duration: 45 min Frequency: 2/wk Period: 5 wk Sessions: 10 Protocol: specific	Duration: 45 min Frequency: 2/wk Period: 5 wk Sessions: 10 Type: standard medical treatment	No	POMS-depression: immediate and longer term effects	Mean difference between presession/postsession and first and last day	7
Field et al[35]	1997	USA	20 (10 + 10) Subjects with chronic fatigue immunodeficiency syndrome	Duration: 30 min Frequency: 2/wk Period: 5 wk Sessions: 10 Protocol: specific	NA	No	(1) POMS-depression (2) CES-D	Mean difference between first and last sessions	7
Field et al[44]	1996	USA	60 (30 + 30) grade 1~5 school-age children after hurricane	Duration: 30 min Frequency: 2/wk Period: 1 mo Sessions: 8 Protocol: specific (back massage)	Duration: 30 min Frequency: 2/wk Period: 1 mo Sessions: 8 Type: video attention control	No	CES-D	Mean difference between first and last days	

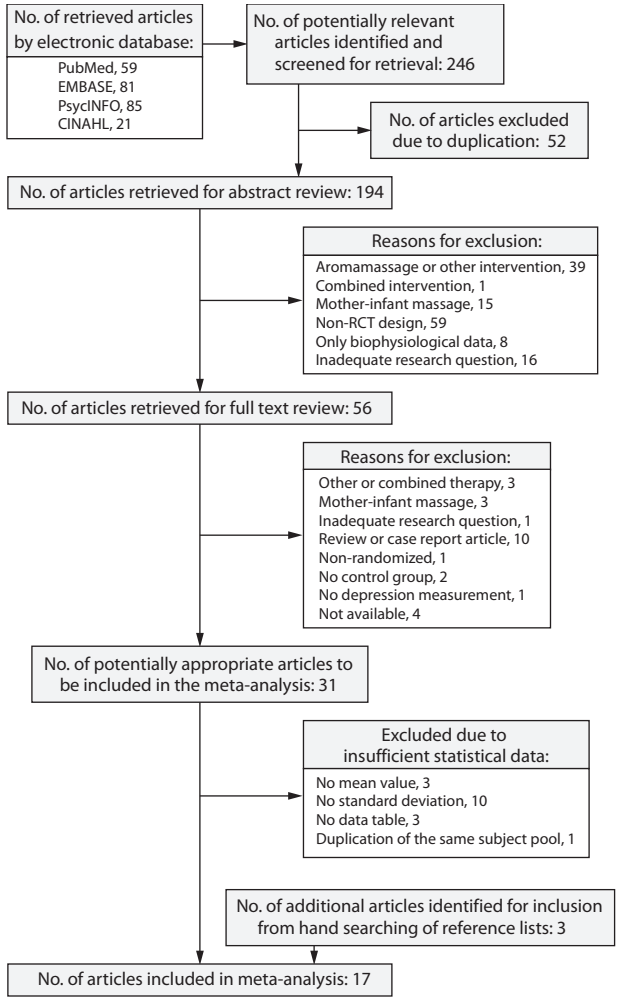
(continued)

Table 1 (continued). Characteristics of Included Studies

Study	Year	Country	Participants (experimental + control groups), n	Definition of Massage, Experimental Group	Definition of Massage, Comparison Group	Depression Diagnosis	Depression Scale	Treatment Effect	Jadad Quality Score (Total Score: 11)
Field et al[45]	1996	USA	50 (26 + 24) Medical faculty and staff members	Duration: 15 min Frequency: 2/wk Period: 5 wk Sessions: 10 Protocol: specific (Swedish massage)	Duration: NA Frequency: NA Period: NA Sessions: NA Type: relaxation	No	POMS-depression	Mean difference between first and last sessions	8
Weinberg et al[46]	1988	USA	96 (40 + 56) Students in physical activity courses at a university	Duration: 30 min Frequency: NA Period: NA Sessions: 1 Protocol: specific (Swedish massage)	Duration: 30 min Frequency: NA Period: NA Sessions: 11 Type: rest and/or read	No	POMS-depression	Mean difference between first and last sessions	5

Abbreviations: CES-D = Center for Epidemiologic Studies Depression scale, GWB = general well being, HAD = Hospital Anxiety and Depression Scale, HIV = human immunodeficiency virus, MS = multiple sclerosis, NA = not available, POMS = Profile of Mood States, SCL-90-R = Symptom Checklist-90-revised, SDS = Sleepless Depression scale.

Figure 1. Flowchart of Retrieved Articles for Meta-Analysis



Abbreviation: RCT = randomized controlled trial.

treatment of depression, but none of them was adopted in our study due to the lack of data or different research questions.[21] The only meta-analysis[4] of 10 clinical trials, which identified 8 of the RCTs included herein, revealed the statistically significant improvement of depression (effect size = 0.62) after multiple-dose massage therapy, which is a similar but smaller effect size compared to our results.

Theories of Massage Therapy's Effect on Depression

One of the most popular theories that accounts for the effectiveness of massage therapy on depression was raised by Ebner[22] who, in 1978, suggested massage therapy triggers a reduction of the hypothalamic pituitary adrenal axis, which results in decreasing stress hormones, blood pressure, and heart rate due to increasing parasympathetic activity.[23–25] The second theory pointed that massage therapy may provide benefits in a way that parallels the common-factors model of psychotherapy,[26] and the development of an alliance between the therapist and client are considered to be

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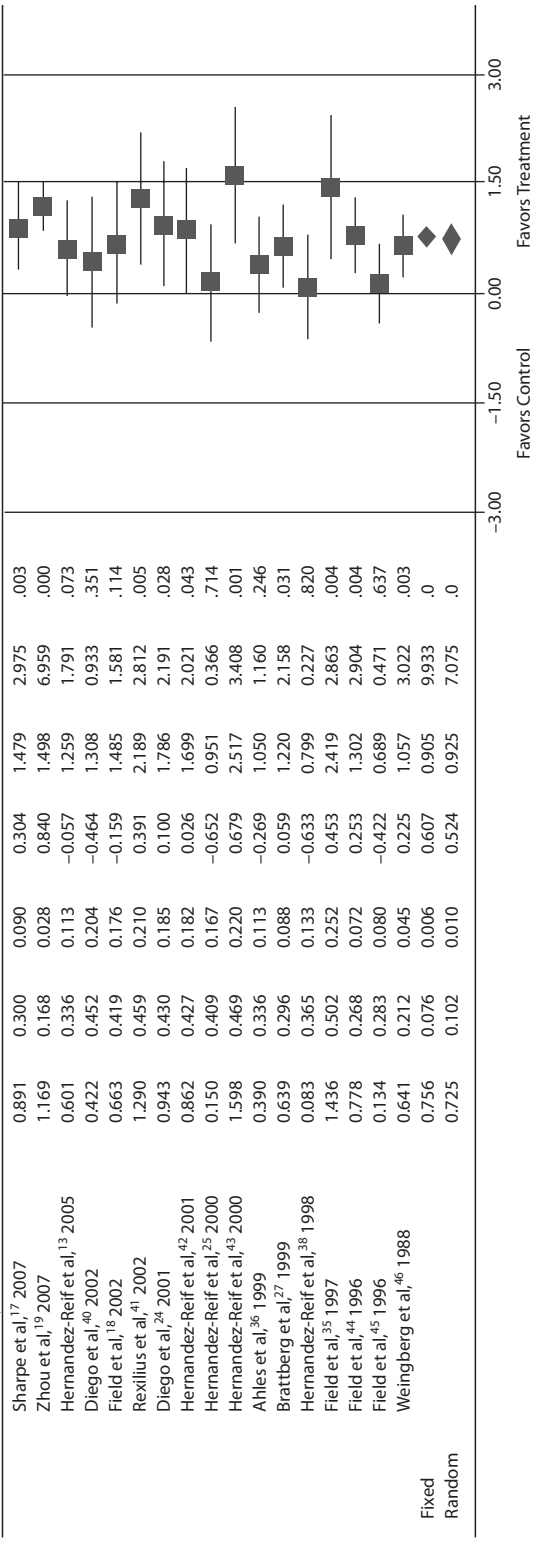
Figure 2. Progress Through the Stages of Meta-Analysis



Abbreviation: SE = standard error.

more important than adherence to a specific modality of psychotherapy.[4] Another theory considered that the positive effect on depression follows the current pain-relieving effect,[27] which is asserted that massage stimulates the parasympathetic nervous system, resulting in relaxation and a reduction in pain via a neural-gating mechanism and an increase in body awareness.[14] Three other theories account for reduced pain by Gate Theory of Pain Control[28] and theories related to increased serotonin[29,30] and decreased substance P.[31] The last theory might be the therapeutic touch effect of massage therapy, basing on that touch has an immediate calming and comforting mediated by the production of oxytocin.[32,33] and touch as a way to retain a sense of meaningful and reassuring communication respectively.[34]

Effects of Single- and Multiple-Dose Massage Therapy

A previous study[35] showed that depression not only decreased immediately after receiving the first massage but also continued to decrease over the treatment period as shown by the last day versus first day comparison. So, our study examined the immediate effect of massage therapy on the first and last days. Statistically significant decreases in depression between the presession and postsession of massage therapy were noted in all 4 trials on the first day, and in 1 of the 3 trials on the last day. Previous studies reported the strongest effects were seen immediately after massage, when patients experienced a reduction in diastolic blood pressure, nausea, distress, anxiety, and depression.[30,36] Stress hormone (cortisol) also showed an immediate reduction in other studies.[30,37] As for the multiple-dose effect of massage therapy, the average massage therapy participants experienced greater than 73% decrease in depression than comparison group participants.[4] Although there was a significant reduction from the first to the last massage, no further follow-up assessments were conducted to examine the long-term effect of massage therapy. Thus, some experts hypothesize that a regular massage therapy schedule may be necessary to maintain the positive effects, while others suggest further research to investigate the persistence of effects after a series of sessions.[17,38]

Limitations

Several limitations to this study should be mentioned. First, despite the restriction of all study groups to a single massage intervention by therapists, there is still a great diversity of massage techniques, protocols, duration, and frequency, and the study periods varied, even though a uniform manual and process of massage therapy between several therapists in each study was mandated. Measurements also varied among or within each trial, with instruments such

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as the Center for Epidemiologic Studies Depression Scale, the depression subscale of the Profile of Mood States, the Symptom Checklist-90-Revised, the Beck Depression Inventory, and the Hospital Anxiety and Depression scales being used. That is why we used effect size to facilitate the pooling of the various outcome scales for the same concept. Study populations also differed, varying from community dwelling elderly, low back pain adults, patients with hypertension, and those with spinal cord injuries, to cancer patients, etc. However, patients in only 1 study were selected after a psychiatric diagnosis of premenstrual dysphoric disorder.

Secondly, though our search strategy was limited to RCTs, one-fourth of the studies were appraised to have an inadequate randomization design. All included RCTs contained at least 1 control group, but 13 of 17 trials had an active control group, using methods such as muscle relaxation exercises, interview visits, Chinese herb pills, or rest. Therefore, the magnitude of the massage effect might be underestimated in our results. In addition, since blinding of the patient and provider is impossible or irrelevant, as seems generally to be the case with massage therapy interventions, it would be questionable to consider its absence as a lack of quality.

Thirdly, none of the trials reported adverse or harmful effects of the interventions, although in a few cases, a patient was reported to find the treatment uncomfortable and/or withdraw from the study. Some adverse effects, such as worsening of a condition, unwanted destruction of tissue, spreading of infection or edema, internal bleeding, or subcutaneous hematoma formation have been reported.[39] Therefore, the safety of massage intervention is an important issue that must be carefully monitored.

Finally, 4 of 17 trials examined the immediate effects between premassage and postmassage therapy, and all 17 trials detected changes between the treatment periods, but none of them measured depression scores beyond the treatment period. Besides, without further description of the exact time of evaluating depression severity during the presession/postsession of the first and last day, there should be some disagreement in calculating the individual data. Since massage therapy for depressed patients alone is rarely reimbursed, it is important that the potential long-term efficacy of this modality has to be established scientifically for future health insurance policy making.[39] Thus, further well-designed and longer follow-up studies, including accurate outcome measures, are needed.

Author affiliations: Department of Physical Medicine and Rehabilitation (Dr Hou), Department of General Surgery (Dr Chiang), Department of Otolaryngology (Dr Hsu), Department of Library and Information Science (Ms Chiu), and Department of Psychiatry (Dr Yen), E-Da Hospital; and College of Medicine, I-Shou University (Drs Hou and Yen), Kaohsiung, Taiwan.
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