

Meditation therapy for anxiety disorders (Review)

Krisanaparakornkit T, Sriraj W, Piyavhatkul N, Laopaiboon M



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[Intervention Review]

Meditation therapy for anxiety disorders

Thawatchai Krisanaprakornkit¹, Wimonrat Sriraj², Nawanant Piyavhatkul¹, Malinee Laopaiboon³

¹Department of Psychiatry, Faculty of Medicine, KhonKaen, Thailand. ²Department of Anaesthesiology, Khon Kaen University, Khon Kaen, Thailand. ³Department of Biostatistics and Demography, Faculty of Public Health, Khon Kaen University, Khon Kaen, Thailand

Contact address: Thawatchai Krisanaprakornkit, Department of Psychiatry, Faculty of Medicine, KhonKaen University, KhonKaen, 40002, Thailand. drthawatchai@yahoo.com. (Editorial group: Cochrane Depression, Anxiety and Neurosis Group.)

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ABSTRACT

Background

Anxiety disorders are characterised by long term worry, tension, nervousness, fidgeting and symptoms of autonomic system hyperactivity. Meditation is an age-old self regulatory strategy which is gaining more interest in mental health and psychiatry. Meditation can reduce arousal state and may ameliorate anxiety symptoms in various anxiety conditions.

Objectives

To investigate the effectiveness of meditation therapy in treating anxiety disorders

Search strategy

Electronic databases searched include CCDANCTR-Studies and CCDANCTR-References, complementary and alternative medicine specific databases, Science Citation Index, Health Services/Technology Assessment Text database, and grey literature databases. Conference proceedings, book chapters and references were checked. Study authors and experts from religious/spiritual organisations were contacted.

Selection criteria

Types of studies: Randomised controlled trials.

Types of participants: patients with a diagnosis of anxiety disorders, with or without another comorbid psychiatric condition.

Types of interventions: concentrative meditation or mindfulness meditation.

Comparison conditions: one or combination of 1) pharmacological therapy 2) other psychological treatment 3) other methods of meditation 4) no intervention or waiting list.

Types of outcome: 1) improvement in clinical anxiety scale 2) improvement in anxiety level specified by triallists, or global improvement 3) acceptability of treatment, adverse effects 4) dropout.

Data collection and analysis

Data were independently extracted by two reviewers using a pre-designed data collection form. Any disagreements were discussed with a third reviewer, and the authors of the studies were contacted for further information.

Meditation therapy for anxiety disorders (Review)

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Main results

Two randomised controlled studies were eligible for inclusion in the review. Both studies were of moderate quality and used active control comparisons (another type of meditation, relaxation, biofeedback). Anti-anxiety drugs were used as standard treatment. The duration of trials ranged from 3 months (12 weeks) to 18 weeks. In one study transcendental meditation showed a reduction in anxiety symptoms and electromyography score comparable with electromyography-biofeedback and relaxation therapy. Another study compared Kundalini Yoga (KY), with Relaxation/Mindfulness Meditation. The Yale-Brown Obsessive Compulsive Scale showed no statistically significant difference between groups. The overall dropout rate in both studies was high (33-44%). Neither study reported on adverse effects of meditation.

Authors' conclusions

The small number of studies included in this review do not permit any conclusions to be drawn on the effectiveness of meditation therapy for anxiety disorders. Transcendental meditation is comparable with other kinds of relaxation therapies in reducing anxiety, and Kundalini Yoga did not show significant effectiveness in treating obsessive-compulsive disorders compared with Relaxation/Meditation. Drop out rates appear to be high, and adverse effects of meditation have not been reported. More trials are needed.

PLAIN LANGUAGE SUMMARY

Meditation therapy for anxiety disorders

Although meditation therapy is widely used in many anxiety-related conditions there is still a lack of studies in anxiety disorder patients. The small number of studies included in this review do not permit any conclusions to be drawn on the effectiveness of meditation therapy for anxiety disorders. Transcendental meditation is comparable with other kinds of relaxation therapies in reducing anxiety, and Kundalini Yoga did not show significant effectiveness in treating obsessive-compulsive disorders compared with Relaxation/Meditation. Drop out rates appear to be high, and adverse effects of meditation have not been reported. More trials are needed.

BACKGROUND

Anxiety disorder is a state of pathological anxiety which is characterized by autonomy (spontaneous occurred or minimal trigger by stimuli, tension and autonomic nervous system overactivity), intensity (in which the severity exceeds the individual's capacity to bear the level of intensity), duration, which is usually persistent or chronic, and behaviour, in which coping ability is impaired, with disabling behaviour as a consequence. According to Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM-IV), anxiety disorders are classified into many types, including panic disorder, specific phobia, social phobia, obsessive-compulsive disorder(OCD), post-traumatic stress disorder(PTSD), acute stress disorder and generalised anxiety disorders (APA 1994).

Anxiety disorders are among the most prevalent psychiatric conditions in most populations studied. Studies have persistently shown that they produce inordinate morbidity, utilization of health care services, and functional impairment. Recent studies also suggest that chronic anxiety disorder may increase the rate of cardiovascular-related mortality (Horwath 2000). Two major studies in the United States have estimated the prevalence rates for a variety of anxiety disorders (the Epidemiological Catchment Area (ECA) study and the National Comorbidity Survey (NCS) study). The estimated lifetime prevalence rates for individual anxiety disorders are panic disorder (2.3-2.7%), generalized anxiety disorder (4.1-6.6%), OCD (2.3-2.6%), PTSD (1-9.3%), and social phobia (2.6-13.3%) (Blazer 1991, Kessler 1994, Eaton 1994, Kessler 1995). The prevalence of specific anxiety disorders appears to vary between countries and cultures. The lifetime prevalence rates for panic disorder ranged from 1.4 per 100 in Edmonton, Alberta, to 2.9 per 100 in Florence, Italy, with the exception of Taiwan which is 0.4 per 100 (Weissman 1997).

The debate over the primacy of biological or psychological factors in the pathophysiology of anxiety is gradually being replaced by a pragmatic approach based on research on the relative contributions of both. A parallel, unbiased approach in treatment research has begun to examine the merits of combined somatic and psychological treatments in anxiety. There has been tremendous progress in the nonpharmacologic treatment of anxiety disorders (Barrows 2002). Cognitive-behavioural therapies reflect a recent integration of the cognitive theories and methods invented by Aaron T. Beck and Albert Ellis, and behavioural theory based on the work of B.F.Skinner and Ivan Pavlov (Sadock 2003). Relaxation therapy is a behavioural approach which emphasises the development of a relaxation response to counteract the stress response of anxiety. Meditation is sometimes considered to be a form of relaxation therapy, however meditation not only creates a relaxation response but also produces an altered state of consciousness which facilitates the meta-cognitive mode of thinking which make possible the expectation of cognitive-behavioural benefits.

Growing scientific evidence, clinical experience and community attitudes are encouraging a shift to more natural and holistic

forms of therapy as alternatives or adjuncts to pharmacological approaches in a variety of conditions. Meditation has a wide range of applications, but it is especially useful in treating stress and related disorders. Meditation is easily adapted to the general medical setting by adequately trained practitioners who have first hand experience of this form of therapy (Hassed 1996). A Psychologically-oriented definition by John V. Davis states that "Meditation is a set of attentional practices leading to an altered state or trait of consciousness characterized by expanded awareness, greater presence, and a more integrated sense of self" (Davis 1998). Meditation originated long ago before the advent of contemporary psychology. It originated in ancient India more than 3000 years ago and has existed in the ritual practice of some major religions and in many secular organisations. There are two general types of meditation: concentrative meditation and mindfulness meditation (Barrows 2002). Concentrative meditation is best represented in modern medicine by two programs, Transcendental Meditation (TM), which was introduced to the West during 1960s, and the relaxation response of Herbert Benson (Bensonian meditation) which was developed subsequently (Benson 1975). Concentrative meditation emphasises focusing the attention onto an object and sustaining attention until the mind achieves stillness. Relaxation and clarity of mind are the results of continuous practice.

Mindfulness meditation is another kind of meditation which emphasizes upon an open awareness to any contents of the mind that are emerging. After a period of practice, the patient will develop a sustainable attentive observational capability without reacting to their own thoughts and emotions. Mindful state with equanimity helps to retrain or decondition the previous pattern of reaction which is usually poorly adapted to external reality. It is represented by mindfulness-based stress reduction programs. The techniques of mindfulness meditation which focus on awareness to develop a detached observation of the contents of consciousness may represent a powerful cognitive behavioural coping strategy for transforming the ways in which we respond to life events (Astin 1997).

From preliminary review, Raskin conducted a controlled study comparing muscle biofeedback, transcendental meditation, and relaxation therapy. The study consisted of a six-week baseline period, six weeks of treatment, a six-week posttreatment observation period, and later follow-up (Raskin 1980). Kabat-Zinn conducted a study to determine the effectiveness of a group stress reduction program based on mindfulness meditation for patients with anxiety disorders. Patients were assessed using a structured clinical interview, and were found to meet the DSM-III-R criteria for generalized anxiety disorder or panic disorder with or without agoraphobia. They were trained in a Mindfulness-based stress reduction program and followed-up for 3 months (Kabat-Zinn 1992). Shannahoff-Khalsa reviewed two published clinical trials for treating obsessive-compulsive disorder(OCD) using a specific Kundalini Yoga protocol. This OCD protocol also included techniques that are useful for a wide range of anxiety disorders, as well as a tech-

nique specific for learning to manage fear, one for tranquilizing an angry mind, one for meeting mental challenges, and one for turning negative thoughts into positive thoughts (Shannahoff* 2004).

In terms of the adverse effects of meditation, Castillo reported that meditation can cause depersonalization and derealization (Castillo 1990), and there are several reports about the association between meditation and psychotic state (French 1975, Lazarus 1976, Walsh 1979, Chan-Ob 1999).

Though there is much research which has combined meditation therapy with conventional treatment in anxiety disorders, there is still a lack of reviews that provide substantial evidence on the effectiveness of meditation therapy programs, both for short-term and long-term effects and for acceptability in terms of practicality, feasibility, difficulty and concerns about the adverse effects.

OBJECTIVES

To investigate the effectiveness of meditation therapy programs (concentrative meditation and mindfulness meditation) which are specifically designed to treat anxiety disorders.

METHODS

Criteria for considering studies for this review

Types of studies

All relevant randomised controlled trials comparing meditation therapy alone or in combination with conventional treatment (consisting of drugs or other psychological treatment), or to another type of meditation or to conventional treatment alone or no intervention / waiting list control.

Exclusion: Open trials, case series, non-randomised controlled trials.

Types of participants

Inclusion criteria

Adults with a primary diagnosis of anxiety disorder (or corresponding to another diagnostic criteria including Diagnostic and Statistical of Mental disorders (DSM), International Classification of Disease -9(ICD-9) or ICD-10 clinical descriptions or research diagnostic criteria for neurotic disorders) with or without another comorbid psychiatric conditions, irrespective of gender, age, race or nationality.

Types of interventions

Operational definitions of meditation: The specific techniques of mind training which have two fundamental attentional strategies.

1. Concentrative meditation entails sustained attention directed toward a single object or point of focus. The aim is one-pointed attention to a single perception without distraction in order to produce the peaceful and one-mindedness state.

2. Mindfulness meditation (opening-up, insight meditation) involves the continual maintenance of a specific perceptual-cognitive set toward objects as they spontaneously arise in awareness with a nonreactive attitude. The salient features are full awareness or mindfulness of any contents of consciousness with equanimity.

Inclusion criteria

Meditation therapy, consisting of concentrative meditation, mindfulness meditation or combination of both.

For an intervention to be accepted as Meditation Therapy:

1. It must have been described in the trial report as: meditation, concentrative meditation, opening-up meditation, mindfulness meditation,insight meditation, mindfulness-based stress reduction program, Qiqong therapy, Pranayama (Hindu breathing meditation), Transcendental Meditation, Kundalini Yoga or Anapanasathi (Buddhist breathing meditation), Zen, ChunDoSup-Bup(Korean style meditation).
2. Meditation is the main intervention (in case of multi-component therapy).

Exclusion criteria

- 1) Meditation therapy that was not a well-organized program or was not specified to treat patients with anxiety disorders.
- 2) Meditation therapy that was a part of religious/ cult practice and was not specified to treat patients with anxiety disorders.

Comparison conditions: may be one or combination of

- 1) Pharmacological therapy: antianxiety agents mostly benzodiazepine compounds, antidepressants, adrenergic blocking agents etc.
- 2) Other psychological treatment : cognitive-behavioural therapy, insight-oriented psychotherapy, psychoanalysis , counseling etc.
- 3) Other methods of meditation.
- 4) No intervention or waiting list.

Types of outcome measures

Primary outcomes

1) Improvement in clinical scale of anxiety at the end of trial(continuous outcome):

Brief Outpatient Psychopathology Scale (Free 1977), Covi Anxiety Scale (Lipman 1976), Anxiety States Inventory (VanDercar 1980), Maudsley Obsessional-Compulsive Inventory (Rachman 1990), Hamilton Anxiety Rating Scale (Hamilton 1959), Yale-Brown Obsessive-Compulsive Scale (Goodman 1989), Symptom Checklist-90 (Derogatis 1973) etc.

2) Improvement in anxiety level specified by researcher or global improvement (categorical outcome: not improved, much improved or very much improved).

Secondary outcomes

1) Acceptability of treatment:

- (a) any adverse effects that were reported in the trials.
- (b) number of subjects who reported adverse effects.

2) Dropout (to be considered a proxy measure of adherence to trial

protocol).

3) Global impression of subjects to the program: Clinical Global Impression (CGI) (Guy 1970).

4) Number of experiences related to meditation (out of body, ecstatic feeling, depersonalisation, visual experience)

Search methods for identification of studies

1. Electronic databases:

The following electronic databases were searched:

CCDANCTR-Studies was searched on 13-06-2005 using the following strategy:

Diagnosis = (Anxiety or Anxious or Agoraphobia or "Phobic Disorder*" or "Panic Disorder" or "Obsessive-Compulsive Disorder" or "Post-Traumatic Stress Disorders" or "Combat Disorder" or "War Neurosis" or "Acute Stress Disorder" or Neurosis or Neuroses or Neurotic) and

Intervention = (meditation or "mindfulness-based stress reduction" or Vipassana or Zen or Yoga or yogic or Pranayama or Sudarshan or Kriya or Qi-gong or "Chi kung" or Kundalini or Chundosunbup) and not

Diagnostic Criteria = "Not Stated" or None

CCDANCTR-References was searched on 13-06-2005 using the following strategy:

Keywords = (Anxiety or Anxious or Agoraphobia or "Phobic Disorder*" or "Panic Disorder" or "Obsessive-Compulsive Disorder" or "Post-Traumatic Stress Disorders" or "Combat Disorder" or "War Neurosis" or "Acute Stress Disorder" or Neurosis or Neurotic) and

Free-text = (meditation or "mindfulness-based stress reduction" or Vipassana or Zen or Yoga or yogic or Pranayama or Sudarshan or kriya or Qi-gong or "Chi kung" or Kundalini or Chundosunbup) Complimentary and Alternative Medicine specific databases were searched:

CISCOM- Centralized Information Service for Complementary Medicine (CISCOM) to June 2005

System for Information on Grey Literature in Europe (SIGLE) search through June 2005

Terms used " Title= meditation AND title=anxiety", "Title= yoga AND Title = anxiety"

Health Services/Technology Assessment Text (HSTAT) database was searched.

2. Hand searching of specialist journals:

The main journals have been searched by Cochrane Schizophrenia Group (CSG) and Cochrane Depression, Anxiety and Neurosis Group, Trial Search Coordinator (CCDAN TSC).

Searching of conference proceeding of Anxiety Disorders Association of America 2003-4.

Search for the relevant studies cited in book chapters on the treatment of anxiety disorders.

3. Personal communication:

3.1 The authors of the included studies and experts in the fields were consulted to find out whether they know about any published or unpublished RCTs/ CCTs of meditation therapy and anxiety disorders, which have not yet been identified. Personal contact was made with persons whose work related to meditation. The list of personal contacts are shown in acknowledgement section.

3.2 Religious/spiritual organizations around the world (Internet web sites were extensively searched including Internet mailing lists) to find out whether they have conducted or know of the application of meditation in anxiety patients. Lists of organizations are shown in the acknowledgement section.

4. Search for ongoing trials:

metaRegister of Controlled Trials (mRCT) - active registers which comprised 13 clinical trial registries to June 2005.

HSR PROJECT (National Information Center on Health Services Research and Health Care Technology) to June 2005 .

National center for Complementary and Alternative Medicine under NIH .

National research register 2005 issue2.

5. Checking and follow searching from references found in 1-3.

Science Citation Index of included and excluded studies were searched for further relevant studies.

Data collection and analysis

Selection of studies

Two reviewers (KT and KW) screened the abstracts of all publications obtained by the search strategy. A distinction was made between:

1) Eligible studies in which meditation therapy alone or in combination was compared to a different type of psychological treatment, meditation or any active drugs.

2) Non-eligible studies in which meditation therapy was examined without a control element (open trial), non-randomised trials.

For articles that appeared to be eligible RCTs, the full articles were obtained and inspected to assess their relevance, based on the pre-planned criteria for inclusion.

Quality assessment

In order to ensure that variation was not caused by systematic errors in the design of a study, the methodological quality of the selected trials were assessed by two independent reviewers (KT and KW), using the criteria described in the Cochrane Handbook. The criteria are based on the evidence of a strong relationship between

the potential for bias in the results and allocation concealment (Schulz 1995) and are defined below:

1. Were the inclusion and exclusion criteria clearly defined?
2. Was the allocation concealment properly done?
3. Were treatment programme, other than the interventions, identical?
4. Were important baseline characteristics reported and comparable?
5. Were the outcomes of patients who withdrew described and included in the analysis?
6. Were the outcome measures clearly defined, and valid?

Three quality categories were set:

High quality - all criteria met

Moderate quality - one or more criteria only partially met

Low quality - two or more criteria not met

According to The Cochrane Handbook for Systematic Reviews of Interventions, adequacy of allocation concealment was also judged (Higgins 2005).

A: Adequate

B: Unclear

C: Inadequate

D: Was not used

Data extraction and management

Data were independently extracted by two reviewers (KT and KW) using a predesigned data collection form. Any disagreements were discussed with a third reviewer (PN), the decisions documented and where necessary, the authors of the studies contacted to help resolve the issue. All exclusion/ drop outs were identified. In the case of trials using a crossover design, to exclude the potential additive effect in the second or more stages on these trials, only data from the first stage were analysed.

Data analysis

Dichotomous outcomes

Dichotomous outcomes were analysed by calculating the relative risk for each trial, with the precision in each result expressed using 95% confidence intervals. The relative risks from the individual trials were combined through meta-analysis if data available. When overall results were significant, the number needed to treat (NNT) was calculated (where no clinical, methodological or statistical heterogeneity was identified) by pooled analysis of the overall relative risk with an estimate of the event in the experimental group and control group of the trials.

Continuous outcomes

Data on continuous outcomes will be analysed in RevMan 4.2.7 (Review Manager 2004). Considering that the data using standardized mean difference are frequently skewed, the means not being the centre of the distribution. The statistics for meta-analysis are thought to be able to cope with some skew, but are formulated for parametric data. To avoid this potential pitfall the following standards were applied to all data before inclusion:

1. Standard deviations and means were reported or obtained from

authors.

2. For data with finite limits, such as the endpoint scale data, the standard deviation (SD), when multiplied by 2, is less than the mean. Otherwise the mean is unlikely to be an appropriate measure of the centre of the distribution (Altman 1996). The reviewers reported data that do not meet the first or second standard in the 'other data' tables.

For change data (endpoint minus baseline) in the absence of individual patient data, it is impossible to know if data are skewed. Where both change and endpoint data are available for the same outcome category, endpoint data only are presented. Authors of studies reporting change data only were contacted for endpoint figures. Non-normally distributed data were reported in the 'Other data types' tables.

Subgroup analysis

Due to clear differences in techniques and responses, rather than undertaking an overall pooled analysis, the data were analysed in subgroups according to the following categories:

1. type of meditation (concentrative or mindfulness meditation)
2. different type of anxiety disorders

Subgroup analyses would only be undertaken if a sufficient number of studies were identified.

Analysis of Heterogeneity

Heterogeneity can occur from many sources. An important aspect of every meta-analysis is to consider and emphasise the existence of heterogeneity and to take account of this in the interpretation of results. Sources of heterogeneity (clinical heterogeneity) can be divided in to two groups: biologic and methodologic.

Biological:

1. Characteristic of patients: age, socioeconomic status, education
2. Type of anxiety disorder: Generalised anxiety disorder, panic disorder, phobic disorder etc.
3. Disorder severity and chronicity: mild, moderate, severe

Methodological

1. Type of meditation
 - (a) Techniques: concentrative, mindfulness meditation or combination.
 - (b) Intensity of practice: daily, many times a day, duration of meditation per session.
2. Follow up period: at the end of trial or a period after trial.
3. Multi-component intervention: drugs, counseling, psychotherapy etc.

Strategies for exploring heterogeneity:

1. Identification of the methodological differences between studies.
2. Identification of the biological differences in study sample.
3. Subgroup analysis.
4. Meta-regression if enough data are available.

The test for homogeneity and I-square which provide an estimate of the percentage of variability due to heterogeneity were done

using Review Manager 4.2.7

In case of homogeneity of studies result, the fixed effect model was used in meta-analysis.

Sensitivity analysis:

A sensitivity analysis was planned to test the robustness of effects of assumptions by examining the influence of the following on the results of the statistical analyses:

1. the effect of the quality criteria
2. comorbid depressive disorder
3. concomitant physical disorder
4. blinding of raters

The sensitivity analysis in this study was not done due to the paucity of eligible studies.

Publication bias

The funnel plot (Light 1984, Egger 1997) was planned to determine publication bias, by plotting the effect size against sample size. Publication bias may result when trials with negative results are not published.

RESULTS

Description of studies

See: [Characteristics of included studies](#); [Characteristics of excluded studies](#).

At the preliminary phase of searching, 50 studies were found. The majority of these studies tested various meditation methods in anxiety subjects with a variety of anxiety conditions such as test anxiety, music performance anxiety, speech anxiety, complaints of anxiety, anxiety related to medical illnesses and psychoneuroses without any definite statement of diagnosis. Using the diagnostic criteria for psychiatric disorder (DSM or ICD classification) and limited to include only Randomised Controlled Trials, 46 studies were excluded from the early phase.

Two studies (Lu 1998; Sahasi 1989) were excluded from the reviews and put in the excluded studies section.

In Lu 1998 patients were diagnosed as having generalized anxiety disorder by a physician but no diagnostic criteria was stated. The selection of patients was done alternately (thus not a true randomisation technique). Sahasi 1989 used consultant psychiatrists to diagnose anxiety-neurotic patients on the basis of DSM-III. However the subject selection was not done using a true randomization method, it was by using an odd-even number and patients who were assigned to the yoga group were shifted to the drug group according to willingness of participants .

Raskin 1980 and Shannahoff* 1999 were the only 2 included studies according to the inclusion criteria.

Raskin(1980) compared 3 treatment modalities: Transcendental Meditation(TM), Electromyography-Feedback (EMG-FB) and Relaxation Therapy(RT).

Shannahoff* 1999 compared Kundalini Yoga with Mindfulness Meditation.

Design

Both studies were randomised controlled trials using active control comparisons (another type of meditation, relaxation, biofeedback). Antianxiety drugs were used as usual. No placebo or waiting list control were used. The duration of trials ranged from 3 months(12 weeks) in Shannahoff* 1999 to 18 weeks in Raskin 1980.

Settings

Both studies were conducted in United States of America. Using out-patient group setting, one group of participants in the Raskin 1980 study was sent to the Transcendental Meditation Centre and returned to have electromyographic measures at the study site.

Participants

In Raskin 1980 participants were diagnosed with anxiety neurosis according to DSM-II (1968) and the Taylor Manifest Anxiety Score(TMAS) were at least 21(above 80 percentile). Individuals with medical problems that complicated their anxiety, alcohol/substances abuse were excluded. Participants who had received prior formal training of either EMG-Biofeedback, Transcendental Meditation(T.M.) or Relaxation Training (RT)were also excluded. Patients in the T.M.and the RT group had a longer duration of severe anxiety than the EMG-FB group. The T.M. group were predominantly female(F:M=9:1) compared to 4:7 in EMG group and 3:7 in RT group.

In Shannahoff* 1999), participants were diagnosed Obsessive-Compulsive Disorders according to DSM-III-R with a minimum score of 15 on the Y-BOCS for the total 10 items.The minimum age for inclusion was 14 years old. Patients were excluded if they smoked, had a substance abuse disorder, spinal/physical problems (overweight, seizure disorders, pulmonary disorders, hypertension and other cardiovascular problems). Patients with psychiatric disorders which were considered to be the primary diagnosis i.e. schizophrenia, major depressive disorder, bipolar disorder, mental retardation, anorexia / bulimia nervosa, Tourette syndrome, patients with trichotillomania or nail biting as their only compulsion were also excluded. Patients who were unable to maintain regular transportation to the study site were excluded. In the Kundalini Yoga group, patients had more associated physical disease (4:1) and more previous behaviour therapy (5:1) when compared to Relaxation/Mindfulness Meditation. Patients in the Relaxation/Mindfulness Meditation group had more psychiatric history (7:4).

Outcomes

Most outcomes used well established psychiatric rating scale (Symptom Checklist-90, Taylor Manifest Anxiety Scale, Y-BOCS, Profile of Mood Scale etc.). The study by Raskin 1980 also used

electromyography from different parts of the body.

All outcome measures were in continuous variables.

The outcome data of Raskin 1980 were described by covariate adjusted means and F-statistics, p-value and graphs. The standard deviation of the endpoint score could not be calculated from the data given. All data were put into the "other data" category.

The outcome data of Shannahoff* 1999 were adequately given for analysis. The study provided both 3 month end-point scores and change scores. In spite of the baseline Y-BOCS seeming to be unequal (but not reaching statistical significant difference $p > 0.05$), the change score with SD were used in analysis.

Risk of bias in included studies

According to the quality criteria, the study by Raskin (1980) was classified as "Moderate quality" as the inclusion and exclusion criteria were clearly defined. Randomisations were assigned to each patient, but the allocation concealment was not explicitly described (unclear) = "B". The participants gave the commitment not to begin any treatment which would affect their anxiety levels. The important baselines were comparable except the T.M. group had more female patients M:F = 1:9. The dropouts were not described and were not included in the analysis. The outcome measures were clearly defined and valid.

The study of Shannahoff* 1999 was classified as "Moderate quality". The inclusion and exclusion were clearly defined. Using coin toss for each individual patients separately, the allocation of treatment for the next patients could not be predicted, so the allocation concealment was automatically done in this case = "C". One of the important baselines (previous Behavioural Therapy) in 2 groups was very different (Kundalini:Relaxation/Mindfulness Meditation = 5:1) and the data of dropouts were not included in analysis at the 3rd month. The treatment programme, other than the interventions, were controlled to be identical. However, patients would be allowed to reduce or eliminate their established medications, the number of cases who dropped their medications and the effects of medications were not reported. The outcome measures were well accepted and properly done.

Masking/Blinding was not used in quality criteria.

Dropouts

The rate of dropouts in these 2 studies were high.

In Raskin(1980), at the early phase, the dropouts were 18 from 55 (33%) no details given for these 18 dropouts.

Further drop out during the treatment phase were 6 out of 37 (16%) 1 dropped out from EMG-FB, 3 from T.M. and 2 from RT group. The total drop out rate was 44%.

In Shannahoff* 1999 the drop out rate was 7 out of 21 (33%), 4 from Kundalini and 3 from Relaxation/Meditation group.

Effects of interventions

Transcendental meditation versus Muscle Biofeedback and versus Relaxation Training in anxiety neurosis

Improvement in symptoms

One study compared the effectiveness of transcendental meditation, muscle biofeedback and relaxation training (Raskin 1980). Due to limitations in the data, with the authors unable to provide any further numeric data (Chan-Ob 2004) it was only possible to report the findings narratively. The study showed the effectiveness of three parallel group treatments in an 18 week program. At baseline, the Taylor Manifest Anxiety Scale Score (TMAS) was significantly different between the three groups and a covariate analysis with repeated measures was used to adjust baseline differences. Participants in all three groups had improved on the TMAS scale (F=7.26; df= 1,27; P<0.01), Current Mood Checklist(CMC) by periods (F=24.03; df= 1,27; P<0.01) and by weeks (F=4.43; df= 10, 280; P<0.05). Situational anxiety and symptomatic distress were also improved significantly (P<0.01). Sleep disturbance had not significantly improved. Electromyography which represented the degree of muscle relaxation had also reduced indiscriminately in the three groups by periods (F=4.4; df = 2,54; P<0.05) and by measures (F=90.25; df = 2,54; P<0.001). In the Social Ratings Scale, there was improvement in work, social functioning and relations with their family of origin (P<0.05), however marital relations and sex life were not significantly changed. The 13 top-rank of patients (N=31) who showed substantial improvement accounted for 40% of all patients who received treatment. There was no differential effect between the 3 treatments in reducing anxiety in any of measurements. Raskin 1980 also stated that the three treatments were similar with respect to both the time course for obtaining therapeutic results and the subjects' ability to maintain the results which were obtained. The precision of the results could not be determined as 95% confidence intervals were not reported, and could not be calculated due to lack of data.

Acceptability of treatment

There were no reports of adverse events.

Dropout

In the early treatment phase, the dropouts comprised 18 out of 55 participants (33%). No reasons were given for these 18 dropouts. A further 6 of the 37 remaining participants (16%) dropped out during the treatment phase. 1 dropped out from EMG-FB, 3 from TM and 2 from the RT group. The total dropout rate was 44%.

Kundalini Yoga versus Relaxation/Mindfulness meditation in Obsessive-Compulsive Disorders

Improvement in symptoms

One study (Shannahoff* 1999) compared Kundalini Yoga, specifically designed to treat OCD to Relaxation/Mindfulness Meditation, considered to be less active. The baseline of the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) scores of the two groups seemed to be equal, even when re-calculated after excluding those who dropped out. From six scales of measurement change, endpoint scales at 3 months were used. The Y-BOCS, considered to

be the primary outcome, showed no statistically significant difference between groups (WMD -2.57 95%CI = -7.67 to 2.53). But another 2 scales, the Perceived Stress Scale and Purpose In Life, showed significant differences favouring Kundalini Yoga over Relaxation/MM (WMD -7.57, 95% CI= -13.06 to -2.08; WMD 17.15 , 95%CI= 0.80 to 33.5, respectively). The end-point scores of Symptom Checklist-90-R(SCL-90-R), Global Severity Index and Profile of Mood Scale were markedly skewed so that the data could not be included in a meta-analysis.

Acceptability

There were no reports of adverse events .

Dropout

Seven out of 21 participants (33%), dropped out of the study by (Shannahoff* 1999), 4 from the Kundalini Yoga group and 3 from Relaxation/Meditation group.

DISCUSSION

This review investigated the effectiveness of meditation therapy programs (concentrative meditation and mindfulness meditation), which have been designed specifically to treat anxiety disorders. There are some points regarding meditation and the studies included in this review that need some consideration.

The number of participants who adhered to the protocol is an important first point to consider. In the study by Shannahoff* 1999, 14 out of 21 (67 %) participants completed the treatment program and in the study by Raskin (1980), 31 out of 55 participants (56%) completed the whole course of treatment program. The dropout rate was quite high in both studies, therefore adherence to meditation therapy in the clinical setting may be a major issue. An interesting comment is made by a consumer on the RemedyFind Website: "The problem with meditation, as with exercise, is that depression and anxiety can prevent you from trying them.... if you can't sit still long enough to close your eyes and relax, you can't meditate. If you can't drag yourself out of the house to exercise, you don't do it. If you can, however, both work well when done on a regular basis -- that's the key, though, to their effectiveness" (Morgan 2005). When implementing meditation in the clinical setting, adherence is one significant determinant of effectiveness. The intensiveness and adherence to doing regular meditation are other points of consideration, as with dose-response in medication studies. Delmonte 1998 found that by the end of two years, roughly half (54%) of the patients had terminated meditation. Following the success of psychopharmacological treatment of anxiety disorders, the use of psychosocial treatment prescriptions for anxiety disorder, not only relaxation/meditation but also cognitive-behavioural therapy and dynamic psychotherapy, is reported to have declined between 1991-1996 (Goisman 1999). Unfortunately the reasons for dropout were not provided in the trials in-

cluded in this review, which preclude further interpretation of the findings.

A second point of consideration in this review is the scarcity of research. We did not find any eligible studies from eastern countries, considered to be the origin of most meditation techniques, especially India, China and Thailand. On the contrary, the only two included studies were done in the United States, following the spread of eastern spirituality to the West in later half of the last century (Snaith 1998). The first well known meditation technique, called Transcendental Meditation (TM) was brought to the United States by Maharishi Mahesh Yogi during the 1960s (Barrows 2002) and it was considered to be the beginning of well systematised meditation practice in the West. The lack of studies from eastern countries might be due to unpublished studies, or studies published in non-indexed journals or studies with negative findings (file drawer effect), which may not yet have been identified.

Thirdly, the eastern religions and meditation techniques have been developed for many thousands of years and were taught both in the old scriptures and through guru (master)-disciple relationships, which are very deeply connected beyond the intellectual understanding of science. The teachings of authoritative masters have not previously needed to be proved. Scientific methods based on hypothetico-deductive reasoning were developed much later. In some organisations, it is discourteous and sometimes inappropriate to question the teaching of the guru. In comparison, the diagnostic system of mental disorders, was developed in the last century. DSM-I, the original manual published by the American Psychiatric Association to set forth diagnostic criteria, was published in 1952. It was replaced in 1968 by DSM-II and followed with DSM-III , DSM-III-R,DSM-IV in(1994) and DSM-IV-TR (2001) respectively (Moon 2004). After the diagnostic systems were formally established, the treatments in modern medicine were concurrently developed and tested, leaving the age-old self help strategies untested or inadequately verified. It may need time and enthusiastic interests to bring this age old traditional wisdom to be tested and accepted in the new frame of western-oriented medicine . As Herbert Benson said " no innovation but a scientific validation of an age old wisdom" (Benson 1976). Although meditation was historically associated with religious or spiritual movements, this is no longer always the case. It is now very necessary to confirm the effectiveness of these meditation techniques if we want to adopt their use for psychiatric patients. Nowadays there are increasing numbers of organisations which use more scientific-based, less mystical terms to identify their techniques.

The best way to prove the effectiveness of meditation techniques should be based on non-cult, faith-free and specifically designed methods to treat patients.

When considering the 2 studies included in the review, the overall number of patients totalled only 45 subjects, and the studies

compared different methods of meditation, therefore it was not appropriate to pool the effects together. The study by [Raskin 1980](#) showed a reduction in anxiety scale and EMG score which reflected the effectiveness of treatment of all 3 treatment strategies. No superiority among methods was found. It could be said that any method which helps patients sit calmly in a low arousal environment and induces a relaxation response in various means would equally bring benefit to patients with anxiety disorders. However, participants in this study were highly motivated to practice a self regulatory method which is not always the case for anxiety patients in other settings. Several studies reported that yoga may reduce anxiety and stress and improve mood in healthy people who practice yoga several times per week for 30 to 60 minutes. The mechanism of meditation and another relaxation techniques in decreasing arousal state have been studied. Solberg reported that meditation reduced the level of heart rate and within participant variability of heart rate more than rest but blood pressure was unaffected ([Solberg 2004](#), [Canter 2004](#)). If comparing TM to EMG-biofeedback, TM would have some advantages, in that it does not require sophisticated equipment and can be practiced at home. However TM is bound with cult/spiritual organisations and uses a specific Sanskrit mantra, which has to be kept secret. The aims of TM are not only a state of well-being, but also the spiritual development of individuals, which is beyond the scope of this review.

The study by [Shannahoff* 1999](#) showed no statistically significant difference in favour of Kundalini Yoga but the finding was of low precision (the confidence interval was large). After excluding dropout cases, the newly calculated baseline Y-BOCS scores showed a non-significant difference between groups with higher scores for the Kundalini group and the authors had tried to use two-way mixed model analysis of variance to adjust the baseline difference. Post hoc statistical adjustment might not be appropriate because of the small number of subjects (n=7). Due to higher baseline scores, the Kundalini group had the potential to achieve a larger treatment effect than the Relaxation/Mindfulness Meditation group when using the change scores. When calculating the treatment effect by using the end-point score, Kundalini Yoga patients showed no statistically significant improvement in Y-BOCS. However, further larger well designed studies using intention-to-treat analysis are needed before a firm conclusion could be drawn.

Shannahoff-Khalsa has described a specific technique called "The Obsessive-Compulsive Disorder Breath (OCDB)", by blocking the right nostrils and inhaling slowly and deeply through the left nostril; hold in long; exhale slowly and completely through the same nostril. The mental focus should be on the sound of the breath ([Shannahoff* 2003](#)). This slow breathing technique is one of many methods of pranayama (Yogic breathing meditation) which are widely practiced and long known in the East. In an anxiety state, the respiration becomes faster and more shallow. As in hyperventilation syndrome, breathing control could inhibit the vicious cycle of hyperventilation. In the case of OCD, there is

a question regarding the mechanism of how OCDB can relieve OCD symptoms. A study by Arambula, showed more alpha-EEG (more relaxed state) activity during Kundalini Yoga meditation, compared to the pre-meditation and post-meditation ([Arambula 2001](#)). Increasing of alpha rhythm might related to relaxed state. It is suggested that Right Nostril Yogic Breathing (RNB), increases the function of the brain on the right side, implying a possible application of RNB in certain psychiatric disorders with cerebral hemispheric imbalance ([Raghuraj 2004](#)). Further explanations need to be explored.

The trials included in this review used 4-18 month follow-ups with a high dropout rate. The adverse events associated with meditation were not reported in either trials. Although meditation has a face value of safety, there are many reports about the adverse events. Castillo reported that meditation can cause depersonalization and derealization ([Castillo 1990](#)), and there have been several reports about the association between meditation and psychotic state ([French 1975](#), [Lazarus 1976](#), [Walsh 1979](#), [Chan-Ob 1999](#)). The majority of the meditation induced psychosis had underlying schizophrenia or other psychosis ([Chan-Ob 2004](#)). However from the 3 year follow up study by Miller, there were no adverse effects among the practitioners of Mindfulness Meditation using Kabat-Zinn's methods ([Miller 1995](#)).

There is a known report of spontaneous pneumothorax caused by pranayama (forced respiration). Adverse side effects can occur when the body is pushed to physiologic extremes ([Johnson 2004](#)). In the method of Kundalini Yoga described by Shannahoff-Khalsa, the patient is instructed to make every effort to maximize the four phase of the breath cycle until the complete breath cycle equals 1 minute, with four respective phase each lasting 15 seconds ([Shannahoff* 1999](#); [Shannahoff* 2004](#)), the patients had to hold breathing in the state of relative hypercapnia and hypoxia. Miyamura reported that the ventilatory response to hypercapnia and arterial blood gases during Ujjayi respiration (victorious breath) of once per minute for an hour were determined in a professional hatha yogi ([Miyamaru 2002](#)). The results suggested that lower chemosensitivity to hypercapnia in yoga practitioners may be due to an adaptation to low arterial pH and high Pa-CO₂ for long periods ([Miyamaru 2002](#); [Spicuzza 2001](#)). We do not yet know the risk/benefit of this adaptation in the long term and should be aware that this may be an important issue that could not be addressed in the current review due to lack of data on adverse events provided in the two included studies.

Due to a lack of available studies for inclusion, the current review is unable to directly address whether meditation or medication exerts a larger effect in anxiety disorders. It is acknowledged that caution has to be taken when studying the effect of meditation with the other care without medication, as nowadays medication use in the treatment of anxiety disorders is well established.

AUTHORS' CONCLUSIONS

Implications for practice

1. For patients with anxiety disorders

The small number of included studies and lack of high quality trials in this review do not permit firm conclusions to be drawn. In one moderate quality trial, the use of meditation therapy in anxiety disorder was associated with some reduction of anxiety symptoms in general, which was comparable to another form of relaxation therapy. Motivation and adherence to practice under supervision of a qualified therapist are essential ingredients. There is a lack of evidence to demonstrate the effectiveness of meditation therapy over drug therapy, standard care or another psychotherapy. It is important to delineate between meditation that is a part of religious/spiritual practice and meditation for psychiatric treatment. One randomised controlled trial of small sample size and of moderate study quality suggests that Kundalini Yoga is no more effective than Relaxation/Mindfulness meditation. Kundalini Yoga needs physical effort and is not suitable for patients with cardiovascular disease, respiratory disease or physically unfit people. Patients must be supervised by skilled therapists. Patients should consult their health care provider if they are considering starting yoga or meditation (MC 2003).

2. For clinicians

There is slight supporting evidence for the effectiveness of meditation therapy in anxiety disorder patients, but it is not yet strong enough for any firm conclusions to be drawn. To apply meditation therapy the knowledge, attitude and skill of the therapists should be considered. The value judgement and willingness of individual patients are important factors which should not be overlooked and should always be taken into account. Many methods of meditation have not yet been proven effective for anxiety disorders. Kundalini Yoga for the treatment of OCD shows no benefit for obsessive-compulsive symptoms and more large trials are still needed. Such techniques need proper training and practice, they may encounter some cultural barriers, and may not be applicable in every setting. The names of specific techniques derived from old scripture language might inevitably be an obstacle, because patients might not want to get involved with some strange-sounding mystical religions. Some techniques have adapted to use more religious-free and scientific-based terms such as Consciousness Transformation, Mindfulness-Based Stress Reduction Program (Kabat-Zinn 1992), Heartmath etc which might be more accepted by patients (Heartmath 2005). If meditation proves to be effective for anxiety disorders, it would have biological plausibility to generalize to anxiety in various clinical contexts.

3. For policy makers

Meditation therapy might hold some promise of providing a useful adjunct to traditional treatment for patients with anxiety disorders, however the scarcity of randomised controlled trials, limited

to only two small trials at this time, demand caution to implement it on a large scale basis. There is still a need for data from large randomised controlled trials to verify these initial findings. A cost/benefit analysis would enable clinicians and funders to manage an efficient service and make the best use of resources. The advantage of self-management using meditation includes the reduction in therapists' time, which has not only financial implications but also confers the ability to offer help to large numbers of people (Snaith 1998).

4. For funders of research

More large well designed clinical trials are needed. Comparisons of meditation therapy with other psychotherapy would seem of particular interest. As patients attending for meditation therapy could develop a self regulatory strategy to cope with anxiety in the long term, this may help preserve medical care resources.

Implications for research

It is challenging to do research in meditation therapy. Meditation therapy could be applied to be a form of non-pharmacologic treatment which can promote a sense of mastery and control which usually has been lost in chronic anxiety patients.

Future trials should be registered on a clinical trials registry before recruiting patients into the study. The informed consent process should be adhered to for best understanding and compliance to treatment of the patients. Use of well established diagnostic criteria systems that are properly implemented by trained personnel would help guarantee clinical homogeneity. Diagnosis should be done by physicians familiar with diagnostic systems in psychiatry. Structured or semi-structure diagnostic interviews i.e. Structured Clinical Interview for DSM-III-R (Skre 1991), Composite International Diagnostic Interview (Janca 1994), Schedules for Clinical Assessment in Neuropsychiatry (Wing 1990) or Mini-International Neuropsychiatric Interview (Sheehan 1998) could help enhance the validity and reliability of diagnosis. DSM classification is assumed to be a theoretical approach to psychiatric disorders, whereas phenomenology of symptoms is used to differentiate between different types of anxiety disorders. However, pooling the results from different types of anxiety disorders might cause significant heterogeneity and make it difficult to interpret the results. Using binary outcomes would help the interpretation of clinical improvement and determine the number needed to treat. Merely reporting the statistically significant difference is not enough, and the clinical level of significance should be pre-defined to ensure the true clinical benefits and the strength of association are represented. More objective outcomes should be used i.e. EMG, respiratory rate and variability, heart rate and variability, EEG-alpha feedback etc.

Another important issue in designing meditation trials is to ensure that patients assimilate the techniques properly and adhere to the technique under investigation without the use of another

intervention which might pre-exist in the patient's routine life eg prayer, chanting, Yoga Asana (body posture of yogic practice) etc.

It remains crucial to determine the factors which predict the response to meditation, and to delineate whether certain meditations are more effective for particular symptom sets (including symptoms such as generalized anxiety, panic, obsessive-compulsive or phobic). Due to the variety of meditation techniques, it is essential to define the active ingredients of each method. Trials should also study levels of adherence to treatment. The motivating factors of practitioners that could affect effectiveness are also important. The long term benefits of meditation practice for anxiety disorders and mental health in general are also of interest.

Hopefully additional randomised controlled trials of meditation in anxiety disorders will be included in this review in future. Given the high prevalence of anxiety disorders, the suffering of the patients, its chronicity and morbidity, and the enormous personal and societal costs, additional prospective research on meditation therapy is clearly required.

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List of contacted organizations:

Association for the Advancement of Psychosynthesis Meditation Groups, Inc.

Brahma Kumaris World Spiritual University

Holistic Online.com

Institute of HeartMath

Scandinavian Yoga and Meditation School

Sri Ram Chandra Mission

The Art of Living Foundation

Transcendental Meditation organization and sub-organization

Vipassana Research Institute

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies [ordered by study ID]

Raskin 1980

Methods	Randomised Controlled Trial 3 parallel group Analysis by analysis of variance with repeated measure, using baseline measures as covariate, factors were groups, time, weeks, period no Intention to treat analysis
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Participants	<p>Diagnosis of Anxiety Neurosis (DSM-II) have had symptom for 1 year or more + Taylor Manifest Anxiety Scale (TMAS) score at least 21(80 percentile)</p> <p>Subjects who taking anti-anxiety medication were included</p> <p>Baseline demographic</p> <p>Age (SD) : EMG Feedback(EMG) = 32(6.4) , Transcendental Meditation (TM) = 32(10.2) Relaxation Training(RT) = 37(11.5)</p> <p>Duration of severe anxiety EMG = 10(8.4) TM = 32(10.2) Rt = 37(11.5)</p> <p>Receive medication EMG = 2 TM= 2 RT = 2</p> <p>Gender M:F EMG = 4:7 TM = 1:9 RT = 3:7</p> <p>Prior therapy for anxiety EMG = 9 TM = 10 RT = 10</p> <p>n =55 , 18 drop out early during baseline or immediate after treatment were assigned</p> <p>Further 6 drop outs during treatment periods (3 TM, 2 RT, 1 EMG-BF)</p> <p>Excluded : medical problems that complicated anxiety, alcohol or substance abuse , prior formal training in either EMG-BF, TM, RT</p>
Interventions	<p>Group1 : Muscle Biofeedback (n=11) 3 times/week , 1 hr session used own strategies to relax, modified progressive relaxation , visual imagery , practice twice daily for 20 mins.</p> <p>Group2 : Transcendental Meditation (n=10) 4 consecutive days of individual instruction, lecture , weekly checked by TM trainer, practice twice daily for 20 mins.</p> <p>discourage the use of meditation to relieve anxiety at specific times</p> <p>Group3 : Relaxation Therapy (n=10) similar to Muscle biofeedback but no feedback were provided , practice twice daily for 20 mins</p> <p>The period of treatment consists of 6 weeks baseline , 6-weeks treatment , 6 weeks posttreatment , later follow up at 3,6,12,18 months</p>
Outcomes	<p>1. Anxiety Measures</p> <p>Trait Anxiety - Taylor Manifest Anxiety Scale at prior to treatment, the end of treatment, post treatment observation period</p> <p>State Anxiety - Current Mood Checklist (CMCL)</p> <p>Situational Anxiety- 4 point scale (absent, mild, moderate and severe)</p> <p>Anxiety Symptoms - 4 points scale</p> <p>Sleep disturbance - record daily for sleep latency, time awake, use of sedatives</p> <p>2. Electromyographic Recordings 3 times a week in all participants</p> <p>Frontalis m., dominant forearm extensor, nondominant forearm flexor - calculated mean peak to peak of EMG waves</p> <p>3. Social Ratings</p> <p>The Structured and Scaled Interview to Assess Maladjustment</p>
Notes	<p>Participants using anti-anxiety drugs were equally distributed</p> <p>no details given for 18 drop outs at the early phase, the total drop outs are 24 from 55 (44%)</p> <p>Dropouts during the treatment phase 6 in 37 (16%)</p> <p>Data from follow up period were mixed up all treatment so that it could not be differentiate effects of each treatments</p>

Risk of bias

Raskin 1980 (Continued)

Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

Shannahoff* 1999

Methods	<p>Randomised Controlled Trial using coin toss by each participants at the beginning</p> <p>2 phase of treatment : phase 1 RCT 3months + phase 2 uncontrolled trial 12 months</p> <p>blinded participants to treatment group during phase 1</p> <p>Analysis : two tailed student's t-test with change score for phase 1</p> <p>repeated measure ANOVA for phase 2</p> <p>5. The Intention -to-treat analysis were done by LOCF in each group by paired t-test</p>
Participants	<p>Diagnosis of Obsessive-Compulsive Disorder (DSM-III-R)</p> <p>N = 21 (phase 1)</p> <p>Gender distribution : Kundalini(K) M 3: F 8 Relaxation/ Meditation(R/M) M 4: F 6</p> <p>Age (SD) K= 38.55 (13.25) R/M= 40 (14.3)</p> <p>Baseline score(Y-BOCS)n=10 K = 22.75(5.15) R/M = 22.80(5.39)</p> <p>Associate physical dz. K = 4 R/M= 1</p> <p>Psychiatric history K= 4 R/M= 7</p> <p>Depression K= 3 R/M= 5</p> <p>Bipolar K=0 R/M=1</p> <p>ADD K=1 R/M=0</p> <p>Anorexia-bulimia : K= 1 R/M=1</p> <p>Previous Behavioural Therapy K =5 R/M = 1</p> <p>Relative with OCD K = 3 R/M =3</p> <p>Medication K= 8 R/M = 9</p>
Interventions	<p>Group 1 : Kundalini Yoga practice weekly meeting with instructors, Protocol required approximate 1 hour to complete and daily practice to the best of their ability(n=11)</p> <p>Group 2 : Relaxation Response 30 mins + Mindfulness Meditation 30 mins , and daily practice to the best of their ability.(n=10)</p>
Outcomes	<p>Yale-Brown Obsessive Compulsive Scale : obsession , compulsion , total score : self rating after explanation in group</p> <p>SCL-90 R include obsessive-compulsive scale , GSI composite(total)</p> <p>Profile of Mood Scale (POMS) represented by Total Mood Disorder index(TMD)</p> <p>Perceived Stress Scale (PSS)</p> <p>Purpose In Life (PIL)</p>
Notes	<p>This review include only phase 1 which was RCT. After phase 1 all patients were merged into one group Kundalini</p> <p>Attrition rate 7 in 21 (33%) , 4 from Kundalini and 3 from Relaxation/Meditation group</p> <p>The baseline score of Y-BOCS were re-calculated for the remaining participants(n= 7 in each group) K= 24.57(4.68) , R/M = 20.57(3.36)</p> <p>The end point score(Mean(SD)) at 3 months obtained from remaining 7 participants in each group</p>

Shannahoff* 1999 (Continued)

<i>Risk of bias</i>		
Item	Authors' judgement	Description
Allocation concealment?	No	C - Inadequate

Characteristics of excluded studies [ordered by study ID]

Lu 1998	Pseudo-randomization , alternate patients
Sahasi 1989	Pseudorandomization , odd-even number and subject to willingness , some participants in group yoga if unable to practice moved to drug group

DATA AND ANALYSES

Comparison 1. Kundalini Yoga versus Relaxation Response/Mindfulness Meditation

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Symptom improvement (Y-BOCS) at 3 months	1	14	Mean Difference (IV, Fixed, 95% CI)	-2.57 [-7.67, 2.53]
2 Perceived Stress Scale at 3 months	1	14	Mean Difference (IV, Fixed, 95% CI)	-7.58 [-13.06, -2.08]
3 Purpose in Life at 3 months	1	14	Mean Difference (IV, Fixed, 95% CI)	17.15 [0.80, 33.50]
4 Symptoms Checklist-90-Revised			Other data	No numeric data
5 Global Severity Index Scale			Other data	No numeric data
6 Profile Mood States			Other data	No numeric data

Comparison 2. EMG-feedback versus Transcendental Meditation versus Relaxation training

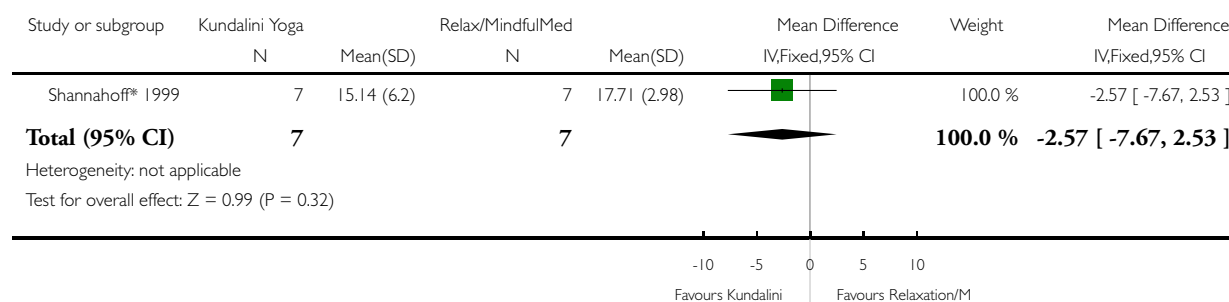
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Taylor Manifest Anxiety Scale			Other data	No numeric data
2 Current Mood Checklist			Other data	No numeric data
3 Situations, Symptoms and Sleep			Other data	No numeric data
4 Electromyography			Other data	No numeric data
5 Social Ratings			Other data	No numeric data

Analysis 1.1. Comparison 1 Kundalini Yoga versus Relaxation Response/Mindfulness Meditation, Outcome 1 Symptom improvement (Y-BOCS) at 3 months.

Review: Meditation therapy for anxiety disorders

Comparison: 1 Kundalini Yoga versus Relaxation Response/Mindfulness Meditation

Outcome: 1 Symptom improvement (Y-BOCS) at 3 months

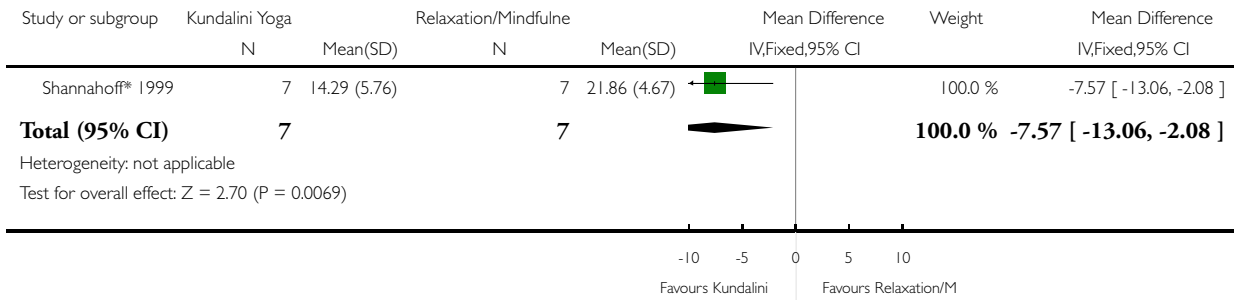


Analysis 1.2. Comparison 1 Kundalini Yoga versus Relaxation Response/Mindfulness Meditation, Outcome 2 Perceived Stress Scale at 3 months.

Review: Meditation therapy for anxiety disorders

Comparison: 1 Kundalini Yoga versus Relaxation Response/Mindfulness Meditation

Outcome: 2 Perceived Stress Scale at 3 months

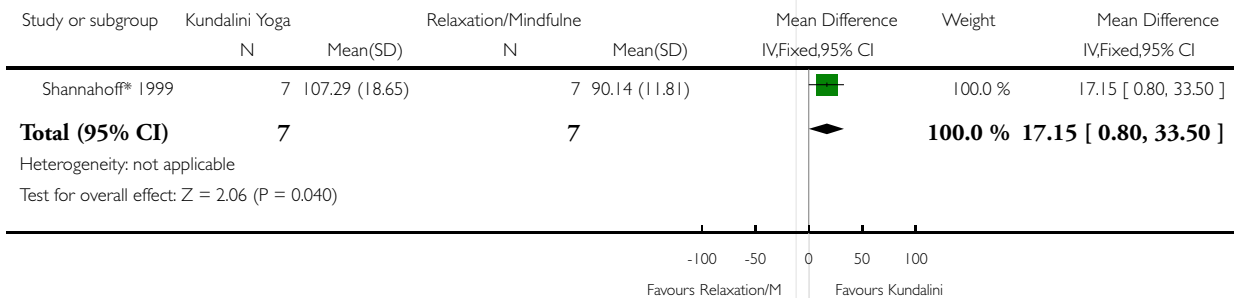


Analysis 1.3. Comparison 1 Kundalini Yoga versus Relaxation Response/Mindfulness Meditation, Outcome 3 Purpose in Life at 3 months.

Review: Meditation therapy for anxiety disorders

Comparison: 1 Kundalini Yoga versus Relaxation Response/Mindfulness Meditation

Outcome: 3 Purpose in Life at 3 months



Symptoms Checklist-90-Revised

Shannahoff* 1999	changed score shown statistical significant different favoured Kundalini Yoga	Endpoint score gr1: 0.957 (0.635)(1.54 to 0.37) gr2 : 1.929 (0.512)(2.40 to 1.46) n = 14 (7/7)	Skewed data
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Global Severity Index Scale

Shannahoff* 1999	Changed score shown Statistical significant different (p<0.05) favoured Kundalini Yoga	Endpoint score gr1: 0.497 (0.328)(0.800 to 1.93) gr2: 1.106 (0.390)(1.46 to 0.74) n =14 (7/7)	Skewed data
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Profile Mood States

Shannahoff* 1999	Changed score shown statistical significant different (p<0.05) favoured Kundalini Yoga	Endpoint score gr1: 16.43 (29.71)(43.90 to 11.05) gr2: 70.14 (31.47)(99.25 to 41.04)	Skewed data
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Taylor Manifest Anxiety Scale

Raskin 1980	- There was no significant group effect, - The test time were significant different	(F =7.26; df= 1,27; P<0.1)	- Covariance adjusted means decrease significantly by time - no different between different type of treatment
Raskin 1980			

Current Mood Checklist

Raskin 1980	- no significant group effect , period of treatment were significant different , - weeks by periods also significant different	- periods F= 24.03; df = 2,56 ; P<0.01 - weeks by period F =4.43; df = 10,280; P<0.05	
Raskin 1980			

Situations, Symptoms and Sleep

Raskin 1980	<ul style="list-style-type: none"> - No significant group effect - Situational anxiety and symptomatic distress decreased significantly - Sleep disturbance was no significant improvement 	<ul style="list-style-type: none"> - Situational and Symptomatic distress : $P < 0.01$ from baseline to post-treatment period 	
Raskin 1980			

Electromyography

Raskin 1980	<ul style="list-style-type: none"> - EMG scores from each muscle were averaged to give one score ; - The factors were groups, periods, and measures - There were no significant group effect or interaction . - Periods were significant different. Measures were significant different -The posttreatment period frontalis scores remained significant lower than baseline period 	<ul style="list-style-type: none"> - Periods ($F = 4.4$; $df = 2,54$; $P < 0.05$) - Measures ($F = 90.25$; $df = 2,54$; $P < 0.001$) and rose significantly from treatment period to post-treatment period ($P < 0.01$) - The posttreatment period frontalis scores $P < 0.01$ 	
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Social Ratings

Raskin 1980	<ul style="list-style-type: none"> - In all ratings, the groups were not statistical different. - Work, social functioning, relations with family significant improve from pre-treatment - marital relations and sex life , no significant change were found 	$P < 0.05$	
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WHAT'S NEW

Last assessed as up-to-date: 24 August 2005.

2 November 2008	Amended	Converted to new review format.
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HISTORY

Protocol first published: Issue 4, 2004

Review first published: Issue 1, 2006

25 August 2005	New citation required and conclusions have changed	Substantive amendment
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CONTRIBUTIONS OF AUTHORS

TK 04 : develop protocol, searching, quality assessment, data collection, analysis,

WK04 : searching, quality assessment, data collection

NP04 : searching , quality assessment

ML04 : analysis

DECLARATIONS OF INTEREST

TK runs the Meditation Therapy Clinic for various types of patients at the Department of Psychiatry, Faculty of Medicine, KhonKaen University, Thailand.

No potential conflict of interest for other authors.

SOURCES OF SUPPORT

Internal sources

- Thai Cochrane Network, Thailand.
- Faculty of Medicine , KhonKaen University, Thailand.
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External sources

- Thailand Research Fund (TRF), Thailand.

INDEX TERMS

Medical Subject Headings (MeSH)

Anxiety Disorders [*therapy]; Biofeedback (Psychology); Meditation [*methods]; Obsessive-Compulsive Disorder [therapy]; Randomized Controlled Trials as Topic; Relaxation Techniques; Yoga

MeSH check words

Humans