Acupuncture, Yoga and Meditation for quality of life of obese adults: a systematic review and meta-analysis

Acupuntura, Yoga e Meditação para a qualidade de vida de adultos obesos: uma revisão sistemática e metanálise

Acupuntura, Yoga y Meditación para la calidad de vida de adultos obesos: una revisión sistemática y metaanálisis

Juliede de Andrade Alves
ORCID: https://orcid.org/0000-0003-2389-3908
Universidade Federal da Bahia, Brazil
E-mail: Juliede.alves@gmail.com
Maria Inês Santo Campinho
ORCID: https://orcid.org/0000-0001-6680-6101
Universidade Federal da Bahia, Brazil
E-mail: ines.scampinho@gmail.com
Emile Miranda Pereira
ORCID: https://orcid.org/0000-0002-8157-1846
Universidade Federal da Bahia, Brazil
E-mail: emilenut@gmail.com
Gesner Francisco Xavier Junior
ORCID: https://orcid.org/0000-0001-5190-3523
Universidade Federal de Minas Gerais, Brazil
E-mail: gesner.pesquisa@gmail.com
Priscila Ribas de Farias Costa
ORCID: https://orcid.org/0000-0003-3809-9037
Universidade Federal da Bahia, Brazil
E-mail: prfarias@ufba.br
Lígia Amparo-Santos
ORCID: https://orcid.org/0000-0002-6925-6421
Universidade Federal da Bahia, Brazil
E-mail: amparo@ufba.br
Mônica Leila Portela de Santana
ORCID: https://orcid.org/0000-0002-2706-8238
Universidade Federal da Bahia, Brazil
E-mail: monicalportela@gmail.com

Abstract
This study aimed to assess the efficacy of acupuncture, yoga, and meditation on the quality of life of adults classified as obese. Eleven electronic databases (MEDLINE via PubMed, Embase, Cochrane Library, Scopus, LILACS, Chinese National Knowledge Infrastructure (CNKI), China Biomedical Literature (CBM), Theses and Dissertations Database (BDTD), Capes Theses and Dissertations Catalog, OpenGrey and Google Scholar) were systematically searched. The search strategies were developed using the MeSH, DeCS and Emtree descriptors. Randomized clinical trials that evaluated changes in the quality of life of healthy adults classified as overweight or obese who were treated with acupuncture, yoga or meditation were included. We identified 1369 records and 5 studies were included in this review. Of these, two were included in the meta-analysis. In the qualitative synthesis, four studies reported a higher quality of life for some scores in the intervention group than in the control groups. In the meta-analysis, lower scores were identified in the acupuncture intervention group when compared to the control group, and this difference was statistically significant (MD= - 4.79; 95%CI - 9.14; - 0.44). However, the global mean differences of the studies that evaluated the effect of acupuncture on the physical, social and environmental dimensions of quality of life did not identify a statistically significant association.
Keywords: Obesity; Quality of life; Acupuncture; Meditation; Yoga.

Resumo
Este estudo teve como objetivo avaliar a eficácia da acupuntura, yoga e meditação na qualidade de vida de adultos classificados como obesos. Onze bancos de dados eletrônicos (MEDLINE via PubMed, Embase, Cochrane Library, Scopus, LILACS, Chinese National Knowledge Infrastructure (CNKI), China Biomedical Literature (CBM), Banco

de Teses e Dissertações (BDTD), Catálogo Capes de Teses e Dissertações, OpenGrey e Google Acadêmico) foram sistematicamente pesquisados. As estratégias de busca foram desenvolvidas com os descritores MeSH, DeCS e Emtree. Foram incluídos ensaios clínicos randomizados que avaliaram mudanças na qualidade de vida de adultos saudáveis classificados com sobrepeso ou como obesos que foram tratados com acupuntura, yoga ou meditação. Identificamos 1.369 registros e 5 estudos foram incluídos nesta revisão. Destes, dois foram incluídos na metanálise. Na síntese qualitativa, quatro estudos relataram uma maior qualidade de vida para a maioria dos escores do grupo de intervenção, do que nos grupos de controle. Na metanálise foram identificados escores mais baixos no grupo intervenção com acupuntura, quando comparado ao grupo controle e essa diferença foi estatisticamente significativa (MD= - 4.79; 95%CI - 9.14; - 0.44). Entretanto, as diferenças médias globais dos estudos que avaliaram o efeito da acupuntura nas dimensões física, social e ambiental da qualidade de vida não identificaram associação estatisticamente significativa.

Palavras-chave: Obesidade; Qualidade de vida; Acupuntura; Meditação; Yoga.

Resumen
Este estudio tuvo como objetivo evaluar la efectividad de la acupuntura, el yoga y la meditación en la calidad de vida de adultos clasificados como obesos. Once bases de datos electrónicas (MEDLINE a través de PubMed, Embase, Biblioteca Cochrane, Scopus, LILACS, Infraestructura Nacional de Conocimiento de China (CNKI), Literatura Biomédica de China (CBM), Base de Datos de Tesis y Disertaciones (BDTD), Catálogo Capes de Tesis y Disertaciones, OpenGrey y Google Scholar) fueron buscados sistemáticamente. Las estrategias de búsqueda se desarrollaron utilizando los descriptores MeSH, DeCS y Emtree. Se incluyeron ensayos clínicos aleatorizados que evaluaron los cambios en la calidad de vida de adultos sanos clasificados como con sobrepeso u obesos que fueron tratados con acupuntura, yoga o meditación. Se identificaron 1369 registros y se incluyeron 5 estudios en esta revisión. De estos, dos se incluyeron en el metaanálisis. En la síntesis cualitativa, cuatro estudios informaron una calidad de vida más alta para algunas puntuaciones en el grupo de intervención que en los grupos de control. En el metaanálisis, se identificaron puntuaciones más bajas en el grupo de intervención de acupuntura en comparación con el grupo de control, y esta diferencia fue estadísticamente significativa (MD= - 4.79; 95%CI - 9.14; - 0.44). Sin embargo, las diferencias de medias globales de los estudios que evaluaron el efecto de la acupuntura en las dimensiones física, social y ambiental de la calidad de vida no identificaron una asociación estadísticamente significativa.

Palabras clave: Obesidad; Calidad de vida; Acupuntura; Meditación; Yoga.

1. Introduction

Obesity is a chronic, complex condition with multifactorial etiology. According to the estimates of the World Health Organization (World Health Organization, 2021), obesity affects 13% of the world population $\geq$ 18 years of age and it is on the rise among adults in all regions of the world (FAO et al., 2021). Although associated with the risk of developing cardiovascular diseases, sleep apnea, osteoarthritis, generalized chronic pain, type II diabetes mellitus, and functional locomotor limitations, among others (Fontaine & Barofsky, 2001; Wharton et al., 2020), there are subjective social aspects (Taylor et al., 2013), morbidities and aesthetics associated with obesity such as a feeling of inferiority, difficulty with self-acceptance and social interaction, psychological and emotional alterations (anxiety, depression, and anguish) (Poulain, 2013; Vallis, 2016). These factors may contribute to researchers considering that obesity may negatively affect the quality of life (Fontaine & Barofsky, 2001)

The World Health Organization (World Health Organization, 2012) defines the quality of life "as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns". Quality of life can involve or be psychological, emotional, spiritual and physical, health, social relationships, environmental dimensions, and other life circumstances (World Health Organization, 2012).

Multisectoral and holistic strategies have not been conventionally encouraged without care for adults (World Health Organization, 2013), because these, in general, possess a perception of the human being as an individual unit and as part of two macro and micro universes that integrate. In this sense, it is accredited that non-conventional holistic therapies can act in promoting health and not increasing the quality of life of people with chronic conditions (National Center for Complementary and Integrative Health, 2021; Tesser, 2009; World Health Organization, 2013).

Among the various existing non-conventional therapies, yoga (57.4%), meditation (8.2%), and acupuncture (7.7%) are the most used for adults classified as obese (Sharpe et al., 2007) and, in general, yoga and meditation are among the most commonly used complementary approaches in adults.

Yoga is a therapy that adopts an integrative body-mind-spirit approach that makes it possible to achieve physical and mental benefits (Telles et al., 2021). Some evidence has led to the belief that yoga provides physical and mental benefits, via down-regulation of the hypothalamic-pituitary-adrenal axis and the sympathetic nervous system, associated with the development of obesity (Ross & Thomas S, 2010). Acupuncture is one of the techniques of traditional Chinese medicine and is characterized by stimulating body points for therapeutic purposes and triggering mid-effects and improving qi flow for neurotransmitter regulation (Hong et al., 2020). Meditation is a practice that includes techniques of relaxation, breathing, and detachment of two thoughts. Studies with meditative practices aim for better mental health in accordance with the self-regulation of emotions, including negative ones, that arise in everyday life (Sampaio et al., 2017).

Physical and psycho-emotional alterations are common in adult obesity and can affect well-being, health, and consequently quality of life. In this sense, evaluations of scientific evidence of the impact of non-conventional therapies can evaluate the scope and limits of interventions on quality of life, in addition to contributing to the establishment of comparisons between interventions.

Therefore, this systematic review sought to assess the efficacy of acupuncture, yoga, and meditation on the quality of life of adults classified as obese.

2. Methodology

We followed the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) statement (Page et al., 2021). The study protocol was performed based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols (PRISMA-P) and registered at PROSPERO database (CRD42021239496).

2.1 Eligibility criteria

1. *Types of participants*: This review considered studies that included healthy adults (aged between 18 and 65) classified as overweight (Body Mass Index [BMI] >25 kg/m²) or obese (BMI grade I: 30 to 34.9 kg/m²; grade II: 35 to 39.9 kg/m²; and grade III: ≥40 kg /m²). Participants with secondary or syndromic obesity (e.g., drug use, endocrine, polymorphism); participants who presented grade 3 hypertension, or uncontrolled hypertension, diabetes mellitus, cardiovascular disease, metabolic syndrome, polycystic ovary syndrome, cancer, any psychiatric illnesses (e.g depression), and eating disorders, and when overweight or obesity were comorbidities of diseases investigated in the trials, for example in studies investigating patients with osteoarthritis and obesity; pregnant women and individuals undergoing bariatric surgery were excluded.

2. *Types of intervention*: Acupuncture therapy (for instance, manual acupuncture, acupoint catgut embedding, electroacupuncture, and ear acupuncture), yoga, and meditation (including transcendental meditation and mindfulness techniques), which were reviewed separately from yoga, were eligible for inclusion. Acupuncture therapy associated with adjunctive therapies, such as moxibustion (direct moxibustion or heat-sensitive moxibustion), cupping, and herbal injections were also accepted. When they existed, all adjuvant treatments had to be the same among the groups, in order to establish fair comparisons.

3. *Types of outcome measures*: Primary outcome: this review considered studies that evaluated changes in quality of life. Secondary outcomes: 1. Adverse events, measured at the baseline and end of the study; 2. Overall dropout rate is documented as an indirect measure of overall treatment acceptability.

4. *Types of studies*: The review only included randomized controlled trials (RCTs). Published book chapters, systematic or narrative reviews, abstracts, and protocol studies, were not included.

2.2 Information sources and search strategy

Searches were carried out in MEDLINE via PubMed, Embase, Cochrane Library, Scopus, LILACS, Chinese National Knowledge Infrastructure (CNKI), China Biomedical Literature (CBM), Theses and Dissertations Database (BDTD), Capes Theses and Dissertations Catalog. Gray literature (Lefebvre C et al., 2022) was analyzed through OpenGrey and Google Scholar. Reference lists of included studies were checked and analyzed. Specific search strategies for each database were developed with the MeSH, DeCS and Emtree descriptors (see Table 1) by a librarian (GFXJ). The searches were performed in December 2020. A Health Sciences Librarian applied the search strategy to the databases and exported the results to the Covidence software to remove duplicates and perform the initial screening. There was no restriction on language or publication period.

Table 1. Descriptors used in seachy strategies.

Yoga; Meditation; Transcendental Meditation; Meditation, Transcendental; Acupuncture Therapy; Acupuncture Treatment; Acupuncture Treatments; Treatment, Acupuncture; Pharmacoacupuncture Treatment;   Pharmacoacupuncture Therapy; Acupotomy; Acupotomies; Obesity; Weight Loss; Loss, Weight; Losses, Weight; Weight Losses; Weight Reduction; Reduction, Weight; Reductions, Weight; Weight Reductions; Overweight; Body Mass Index; Index, Body Mass; Quetelet Index; Index, Quetelet; Quetelet's Index; Quetelets Index; Sagittal Abdominal Diameter; Abdominal Diameter, Sagittal; Diameter, Sagittal Abdominal; Sagittal Abdominal Diameters; Abdominal Height; Height, Abdominal; Supine Abdominal Height; Abdominal Diameter Index; Adiposity.

Data source: prepared by the authors.

2.3 Selection and data collection process

Two reviewers (JAA and MISC) screened the title and abstract independently, using the Covidence. Full-text eligible articles were screened to evaluate for the inclusion and exclusion criteria. The selection process was presented through the PRISMA flowchart (Figure 1). Two reviewers (JAA and MISC) separately extracted data from each study: general information of the study (title, first author, publication year, study country, initial sample size, statistical analysis), population information (gender, age ranger, ethnicity/ nationality), interventions (type, frequency, duration), control intervention (type, frequency, duration), outcomes (measures of quality life, adverse effects, dropout rate), conflicts of interest and source(s) of research funding, if available. Disagreements were resolved by consensus or by the decision of a third review (MLPS).

2.4 Study risk of bias assessment

Two reviewers (JAA and MLPS) assessed the risk of bias independently using the Cochrane tool (Higgins et al., 2011) for randomized trials in Covidence and Review Manager 5.3. The domains of the risk of bias (selection bias, performance bias, detection bias, attrition bias, reporting bias, and other biases) were judged as high, unclear, or low.

2.5 Effect measures and synthesis methods

We considered the results that were shown with a mean difference and median for continuous data (quality of life). Adverse events and Overall dropout rate were evaluated by descriptive analysis.

Two studies evaluating the effect of acupuncture on the participants' quality of life were considered combinable, proceeding to meta-analysis. Means and respective standard deviations of continuous outcome measures were taken from the

intervention and control groups at the end of the intervention. Considering that both studies used the same instrument to assess the quality of life, the mean difference (MD) was calculated as a summary measure of the meta-analysis and its respective confidence interval (95% CI) (*Cochrane handbook for systematic reviews of interventions version 6.3 (updated February 2022)*, 2022). Four meta-analyses were performed, one for each dimension of quality of life presented in the included studies (physical, psychological, social, and environmental dimensions). The results were presented using the Forest Plot graph. The homogeneity of the studies was tested using the Cochran Q test and the extent of heterogeneity was interpreted using the I^2 statistic. The inconsistency test ($I^2 > 50\%$) was used as an indicator of high heterogeneity. Despite the low heterogeneity identified between the studies, the random-effects model was adopted to estimate the global effect measure, since, in the absence of heterogeneity, the summary measure calculated from random-effects models is the same that was calculated using the fixed-effects model (*Cochrane handbook for systematic reviews of interventions version 6.3 (updated February 2022)*, 2022).

Due to the small number of studies included in the meta-analysis, it was not possible to perform a subgroup analysis. Also due to the low number of studies included in the analysis, it was not possible to assess publication bias by inspecting the funnel plot. All statistical analyzes were performed using the Stata for MAC statistical package, version 16.0 (StataCorp, CollegeStaton, Tx, USA).

2.6 Certainty of assessment

We used the Grading of Recommendations Assessment, Development and Evaluation (GRADE) (Guyatt et al., 2008) to assess the overall certainty of the evidence for the included RCTs. This step consisted of the assessment of five factors (risk of bias, imprecision, indirect evidence, inconsistency, and publication bias) capable of reducing the certainty of the evidence in the RCTs. Levels of evidence were judged as high, moderate, low, or very low.

3. Results

3.1 Study selection

The data collection process is shown in Figure 1. The initial survey identified 1,369 records. After deleting any duplicates, 1,135 were screened using the titles and abstracts. At this stage, 8 potentially relevant studies were selected. Following the full-text reading stage, five RCTs (Chen et al., 2018; Cramer et al., 2016; Lien et al., 2012; Sebayang et al., 2020; Zanella, 2018) met the inclusion criteria and were subjected to qualitative analysis. Of these, two were included in the meta-analysis.

Three studies appeared to meet the inclusion criteria but were excluded at the full-text reading stage. One was excluded for not presenting the quality of life results for any of the groups following the intervention. Two were excluded since one of the adjuvant treatments was not the same in the control and intervention groups, preventing the establishment of a fair comparison.

Figure 1. PRISMA flow diagram of studies throughout the review process.
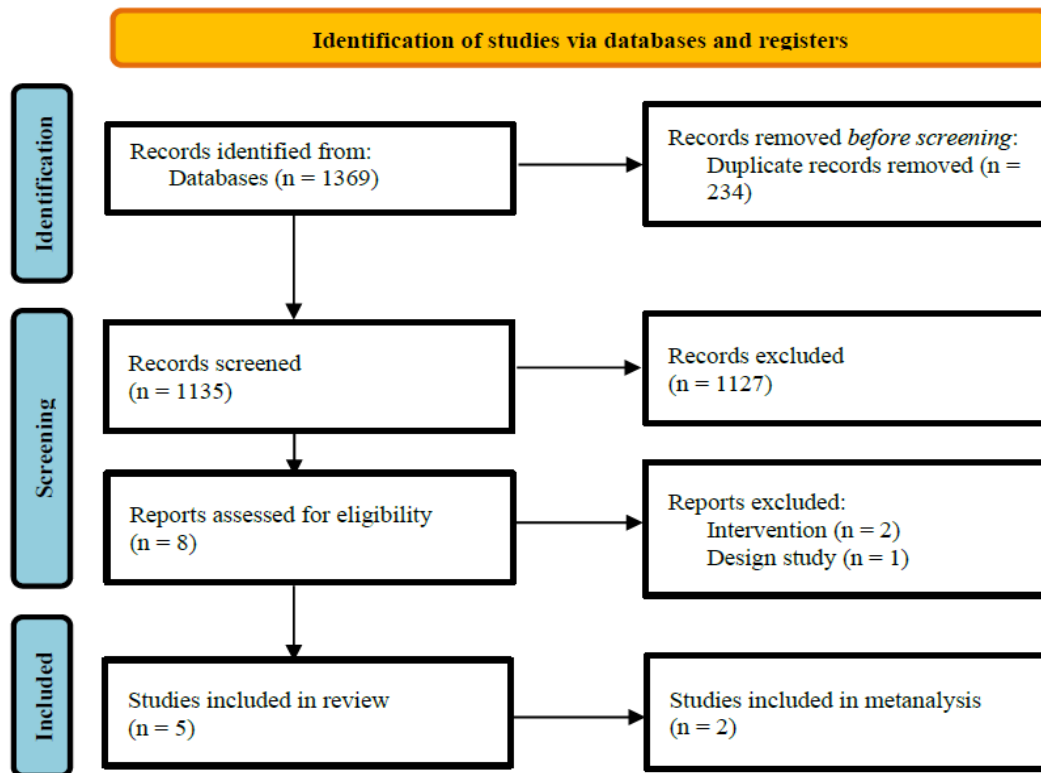
Data source: prepared by the authors.

3.2 Study characteristics and characteristics of study participants

The study characteristics and characteristics of study participants are listed in Table 2. The BMI before and after the intervention is shown in Table 3. Only people classified as obese participated in the studies. No study found had participants classified as overweight as part of the sample.

Four of the five studies (Chen et al., 2018; Cramer et al., 2016; Lien et al., 2012; Zanella, 2018) included only women and two of the four studies (Cramer et al., 2016; Zanella, 2018) justified the choice of female gender considering that: 1. There are differences in basal metabolic rate between men and women; 2. The prevalence of obesity is higher among women.

The sample size ranged from 32 to 90. Of the three studies on acupuncture, two were developed in Taiwan (Chen et al., 2018; Cramer et al., 2016; Lien et al., 2012) and one in Indonesia (Sebayang et al., 2020). The study on meditation (Zanella, 2018) was produced in Brazil and the one on yoga was conducted in Germany (Cramer et al., 2016).

Table 2. Characteristics study characteristics and characteristics of study participants.

Author (Y) Country	Study Arms/ No	Mean age (year)	Female (%)	BMI (kg/m²)	Instrument used	Interventions	Acupoints	Frequency (period)
					ACUPUNCTURE			
Lien et al. (2011) Taiwan	Auricular acupuncture (24)	39.2 (11.6)	100	29.9 (3.2)	WHOQoL-BREF life-quality scores	Standardized stainless auricular acupuncture needles with a 0.2-cm tip and a 1.0-cm annular-shaped body.	Acupoints on the ear: Shenmen; Stomach; Hunger; Endocrine	Once per week for a duration of 4 weeks
	Auricular stimulation by metal bead (24)	42.2 (12.4)		30.0 (2.2)		0.2-cm diameter magnetic metal beads attached to a water-proof pad.	Acupoints on the ear: Shenmen; Stomach; Hunger; Endocrine	
	Sham (24)	40.7 (9.7)		30.6 (4.1)		Needles with the tips removed.	Acupoints on the ear: Shenmen; Stomach; Hunger; Endocrine	
Chen et al. (2018) Taiwan	Acupoint catgut embedding (40)	39.9 (9.8)	100	30.7 (3.9)	WHOQOL-BREF Taiwan version	Laser acupuncture activated at each acupuncture point with continuous waves at 4 Joules for each point, and a 50mW-power density.	Points on the abdomen: REN6, REN9, bilateral ST28, bilateral KI-14, and bilateral ST-36.	Once per week for a duration of 6 weeks
	Sham catgut embedding (40)	43.7 (9.3)				Laser acupuncture not activated at each acupuncture.	Points on the abdomen: REN6, REN9, bilateral ST28, bilateral KI-14, and bilateral ST-36.	
Sebayang et al. (2020) Indonesia	Laser acupuncture plus dietary intervention (19)	42(26-59)	89,47	32.5 (4.1)	QoL score	Catgut embedded to a depth of 1.5 cm in the abdomen, and a depth of 1 cm in both feet, using a syringe.	Body acupoints: CV-12, bilateral ST-36, bilateral SP-6, bilateral ST-25, and bilateral ST-40.	3 times for 4 week (12 sessions)
	Sham acupuncture plus dietary intervention (19)	41 (25-55)	84,21	30.2 (3.7)		Similar procedure, without catgut.	Body acupoints: CV-12, bilateral ST-36, bilateral SP-6, bilateral ST-25, and bilateral ST-40.	

Table 2 (Continued)

Author (year)	Study arms/ No	Mean age (year)	Female (%)	BMI (kg/m²)	Instrument used	Interventions and frequency (period)
MEDITATION						
Zanella (2018) Brazil	Meditation plus diet (16)	44.6 (12.3)	100	38.7 (6.2)	WHOQOL-BREF	1st month – three 10-minute meditations (each one for 10 days); 2nd month – three 15-minute meditations (each for 10 days); 3rd month – three 20-minute meditations (each for 10 days), amounting to 90 days of guided meditation.
	Control plus diet (16)	39.75 (10.2)		38.4 (4.2)		None (3 months)

Author (year)	Study Arms/ No	Mean age (year)	Female (%)	BMI (kg/m²)	Instrument used	Interventions	Frequency (period)
YOGA							
Cramer et al. (2016) Germany	Yoga (40)	48.5 (7.9)	100	32.9 (4.1)	Health related quality of life (SF-36)	[b]Theoretical introduction; Body poses (asana); Breathing exercises (pranayama); Deep relaxation (savasana); Meditation (dhyana); Positive thinking	Two weekly 90-minute classes over for 12 weeks
	Waiting list (40)	46.4 (8.9)		36.9 (6.6)		None	12 weeks

[a]Data presented as median (min – max).
[b]For further details, see Cramer et al. (2016).

Data source: prepared by the authors using data from Lien et al. (2011), Chen et al. (2018), Sebayang et al. (2020), Zanella (2018) and Cramer et al. (2016).

One hundred and seven people belonged to the acupuncture group and eighty-three to the sham acupuncture group (control) (Chen et al., 2018; Lien et al., 2012; Sebayang et al., 2020). Lien et al. (Lien et al., 2012) had three strands and two intervention groups, and the studies by Chen et al. (Chen et al., 2018) and Sebayang et al. (Sebayang et al., 2020) had two strands. The acupuncture intervention groups were: auricular acupuncture (Lien et al., 2012), auricular stimulation by a metal

bead (Lien et al., 2012), acupoint catgut embedding (Chen et al., 2018), and laser acupuncture plus dietary intervention (Sebayang et al., 2020). There were eighty-two individuals in the acupuncture study control groups, which consisted of sham acupuncture (Lien et al., 2012), sham catgut embedding (Chen et al., 2018), and sham laser acupuncture plus dietary intervention (Sebayang et al., 2020). Sixteen people participated in the hypo-energetic diet plan meditation group (intervention group) and sixteen were in the hypo-energetic diet plan group (control group) (Zanella, 2018). Forty individuals participated in the yoga group and forty were placed on the waiting list (Cramer et al., 2016).

Quality of life was examined as a secondary outcome in two studies (Chen et al., 2018; Cramer et al., 2016). Three different instruments were used to assess the quality of life. Three RCTs (Chen et al., 2018; Lien et al., 2012; Zanella, 2018) used the WHOQOL-BREF questionnaire, one of which used the WHOQOL-BREF Taiwan version, which has two culturally relevant items: "being respected/accepted", incorporated in the social domain; and "eating/food", in the environmental domain, totaling 28 items (Chen et al., 2018). One study (Sebayang et al., 2020) measured quality of life using the QoL score. One RCT used the Health-Related Quality of Life (SF-36) instrument (Cramer et al., 2016).

Table 3. BMI before and after the intervention.

Study	Group	BMI - kg/m² (before) [a]	BMI - kg/m² (after) [a]
Lien et al. (2011) [22]	Auricular acupuncture group	29.9 ± 3.2	29.4 ± 3.2
	Auricular stimulation by metal bead	30.0 ± 2.2	29.6 ± 2.0
	Control group	30.6 ± 4.1	30.4 ± 4.1
Chen et al. (2018) [23]	Catgut embedding acupuncture group	30.7 ± 3.9	29.9 ± 3.9
	Control group	30.2 ± 4.3	29.3 ± 6.3
Sebayang et al. (2020) [24]	Laser acupuncture	32.5 ± 4.1	1.4516 kg/m² [b]
	Control group	30.2 ± 3.7	0.0001 kg/m² [b]
Zanella (2018) [25]	Meditation group	38.7 ± 6.2	37.8 ± 6.3
	Control group	38.4 ± 4.2	37.7 ± 4.7
[a]**Cramer et al. (2016)** [26]	Yoga group	32.9 ± 4.1	32.4 ± 4.2
	Control group	36.9 ± 6.6	37.2 ± 6.4

[a]Mean ± standard deviation.
[b]Median decrease in BMI.

Data source: prepared by the authors using data from Lien et al. (2011), Chen et al. (2018), Sebayang et al. (2020), Zanella (2018) and Cramer et al. (2016).

3.3 Risk of bias in studies

The risk of bias assessment for each study is shown in Figure 2. All studies (Chen et al., 2018; Cramer et al., 2016; Lien et al., 2012; Sebayang et al., 2020; Zanella, 2018) described the randomization method used in detail. Allocation concealment methods were not described in three studies (Lien et al., 2012; Sebayang et al., 2020; Zanella, 2018) and therefore were considered as having an uncertain risk of bias. Two studies (Cramer et al., 2016; Zanella, 2018) were considered as having a high-performance bias. In these two cases, the outcome was likely to be influenced by the lack of blinding. The shielding of participants and professionals was incomplete in two studies (Lien et al., 2012; Sebayang et al., 2020), but the authors of this review found that the outcome did not change on account of the professionals' lack of blinding. The shielding of outcome evaluators was not described in two studies (Chen et al., 2018; Sebayang et al., 2020) and, therefore, they were considered as having an uncertain risk of bias. Two studies (Lien et al., 2012; Zanella, 2018) had a high risk of detection bias, due to the nature of the intervention. Two studies (Cramer et al., 2016; Zanella, 2018) were considered to be at high risk of attrition bias, due to data imputation (Cramer et al., 2016) and an imbalance in the loss of patients in the intervention group,
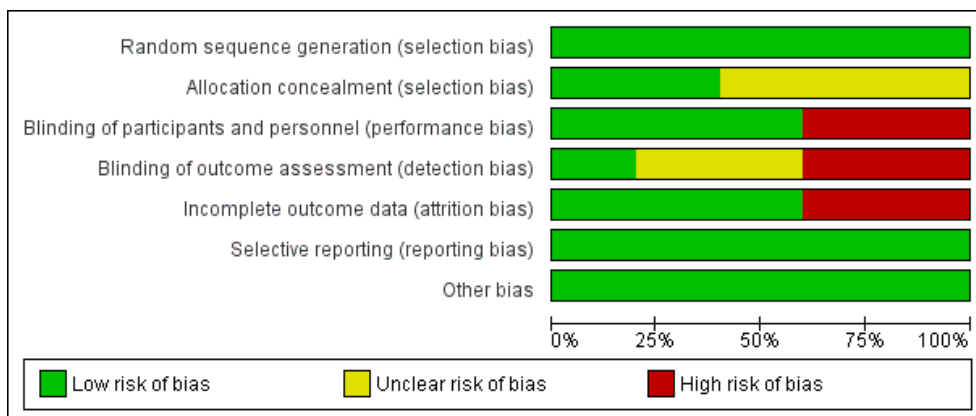
compared to the loss in the control group (Zanella, 2018). None of the studies presented other sources of bias. The risk of bias in the two studies was low (Chen et al., 2018; Zanella, 2018). Therefore, three RCTs (Cramer et al., 2016; Lien et al., 2012; Zanella, 2018) were considered as having a high bias. A summary of the assessment for each domain is shown in percentages in Figure 3.

Figure 2. Risk of bias summary.

Data source: prepared by the authors.

Figure 3. Risk of bias graph.

Data source: prepared by the authors.

3.4 Results of individual studies

3.4.1 Quality of life

Table 4 displays the quality of life score following the intervention. Chen et al. (Chen et al., 2018) observed an improvement in the physical domain score following acupuncture with the inclusion of catgut, whereas the control group (sham acupuncture) had an increase in the psychological domain score. Sebayang et al. (Sebayang et al., 2020) observed that there was a difference in the total quality of life score for laser acupuncture + diet. Lien et al. (Lien et al., 2012) observed that there were increased scores in the psychological domain for participants in the ear acupuncture group, but there was no significant difference in relation to the ear stimulation, metal bead, and control groups (sham acupuncture).

Nonetheless, there was an increase in physical domains in the auricular stimulation by the metal bead group in the study by Lien et al. (Lien et al., 2012). Zanella (Zanella, 2018) reported that there was a difference in the meditation group`s quality of life and observed improvements in the physical and psychological domains. Cramer et al. (Cramer et al., 2016) observed more expressive improvements in the physical and psychological domains following yoga, but there was also a difference in a further seven domains, from a total of ten. No increase in health-related quality of life was observed by Cramer et al. (Cramer et al., 2016) in the "emotional role functions" subscale.

Table 4. Quality of life per study following intervention.

	Sebayang et al (2020)	Lien et al (2011)			Zanella (2018)		Cramer, et al (2016)	
	QoL scoring	WHOQoL-BREF			WHOQoL-BREF		SF-36	
		Δ VAS						
	Sham laser + diet	Auricular acupuncture	Auricular stimulation by metal bead	Sham	Meditation + diet	Control + diet	Yoga	Waist list
	-	0.1	4.4	1.6	11.11	0.23	-	-
	-	2.5	0.3	-0.6	10.4	8.30	-	-
	-	1.0	-0.2	-0.4	6.26	-4.16	-	-
	-	-1.0	0.9	-3.6	2.16	-1.56	-	-
	0.00	-	-	-	10.18	-0.44	-	-
	-	-	-	-	-	-	7.4	0.0
	-	-	-	-	-	-	8.9	2.1
	-	-	-	-	-	-	3.0	0.9
	-	-	-	-	-	-	5.4	1.0
	-	-	-	-	-	-	12.5	2.8
	-	-	-	-	-	-	1.7	-2.7
	-	-	-	-	-	-	2.9	0.1
	-	-	-	-	-	-	10	0.0
	-	-	-	-	-	-	2.6	0.2
	-	-	-	-	-	-	4.0	0.1

[a]See Table 1 for the basic study characteristics.
[b]Data presented in Median (min - max) for non-parametric distributions.
Data source: prepared by the authors using data from Lien et al. (2011), Chen et al. (2018), Sebayang et al. (2020), Zanella (2018) and Cramer et al. (2016).

Publication	Instruments	Domains/ Group	Acupoint Catgut	Sham catgut embedding	Laser acupuncture + diet
Chen, et al (2018)	WHOQoL-BREF	Physical	6.00	2.2	-
		Psychological	-1.2	6.0	-
		Social	-0.4	1.5	-
		Environmental	-2.0	0.1	-
		Global	-	-	-
		Total	-	-	8.000
		Physical functioning	-	-	-
		Physical role functioning	-	-	-
		Bodily pain	-	-	-
		General health perception	-	-	-
		Vitality	-	-	-
		Social functioning	-	-	-
		Emotional role functioning	-	-	-
		Mental health	-	-	-
		Physical component score	-	-	-
		Mental component score	-	-	-

3.4.2 Adverse events and overall dropout rate documented as an indirect measure of overall treatment acceptability

No studies reported severe adverse effects after the interventions, but three reported experiences with mild adverse effects (Chen et al., 2018; Cramer et al., 2016; Lien et al., 2012). Dropout information was described in three studies (Chen et al., 2018; Cramer et al., 2016; Lien et al., 2012). There were no dropouts in the two studies (Sebayang et al., 2020; Zanella, 2018). Refer to Table 5 for further details.

Table 5. Adverse effects and overall dropout for studies.

| Study	Group	Adverse effects	Overall dropout rate
Lien et al. (2011) [22]	Auricular acupuncture group	Dizzy (1).	20% of which: withdrew (5); discontinued (1).
	Auricular stimulation by metal bead	No side effects reported.	20% of which: withdrew (6).
	Control group	No side effects reported.	23.33% of which: withdrew (4); discontinued (3).
Chen et al. (2018) [23]	Catgut embedding acupuncture group	Bruises at the application site (14); felt local pain (10); stinging and itching (5).	11.11% of which: procedure intolerable (1); ineffective treatments (2); unable to coordinate times (2).
	Control group	Local pain (11); local hematoma (17).	11.11% of which: ineffective treatment (3); unable to coordinate times (2).
ªCramer et al. (2016) [26]	Yoga group	Including transient back or neck pain (7); mild strains (2); abdominal pain (2); a fall (1); a broken toe (1); transient edema (1); toothache (1); transient dyspnea (1).	7.5% of which: scheduling problem (1); not reasons given (2)
	Control group	Back and neck pain (2), tendonitis (1), torn ligament (1), bronchitis (1) and toothache (1).	5% of which: loss of interest (1)

ªThe authors consider that two adverse effects (the broken toe and one case of abdominal pain) were likely related to yoga.

Data source: prepared by the authors using data from Lien et al. (2011), Chen et al. (2018), Sebayang et al. (2020), Zanella (2018) and Cramer et al. (2016).

3.5 Meta-analysis results

The meta-analysis results are shown in Figures 4, 5, 6 and 7. The meta-analysis included a total of 127 individuals. The global mean differences of the studies that evaluated the effect of acupuncture on the physical, social and environmental dimensions of quality of life did not identify a statistically significant association (Figure 4, Figure 6, and Figure 7). For the psychological dimension, lower scores for this outcome were identified in the intervention group, when compared to the control group and this difference was statistically significant (Figure 5: MD= - 4.79; 95%CI - 9.14; - 0.44), suggesting that acupuncture reduces the psychological dimension scores for quality of life.

Figure 4. Meta-analysis comparing physical domain changes in the intervention and control groups following intervention.
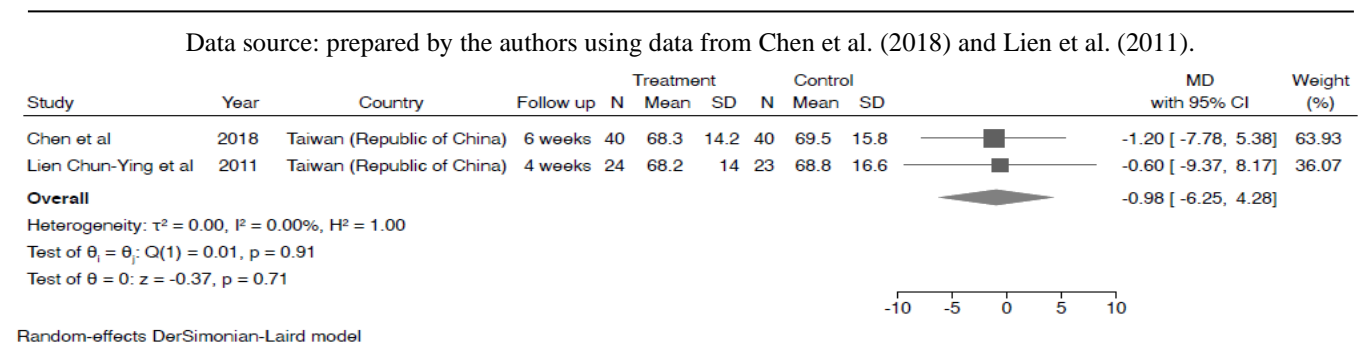
Data source: prepared by the authors using data from Chen et al. (2018) and Lien et al. (2011).
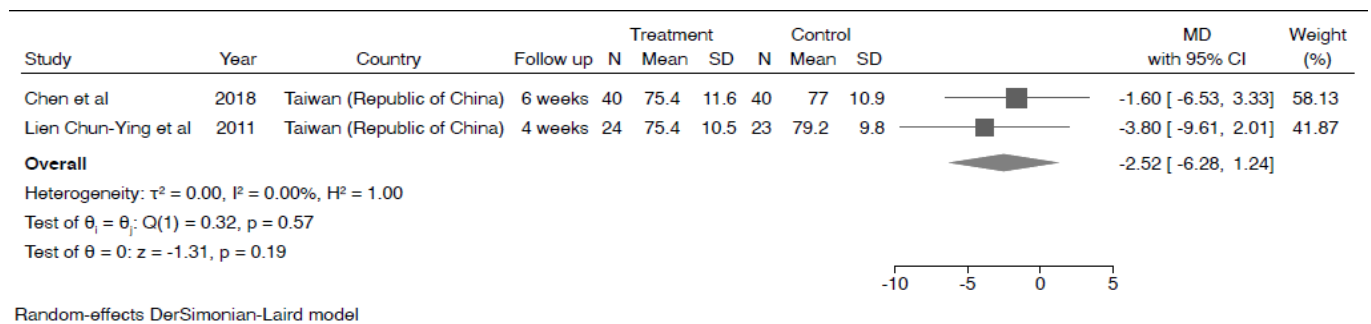

Data source: prepared by the authors using data from Chen et al. (2018) and Lien et al. (2011).

Figure 5. Meta-analysis comparing psychological domain changes in the intervention and control groups following intervention.
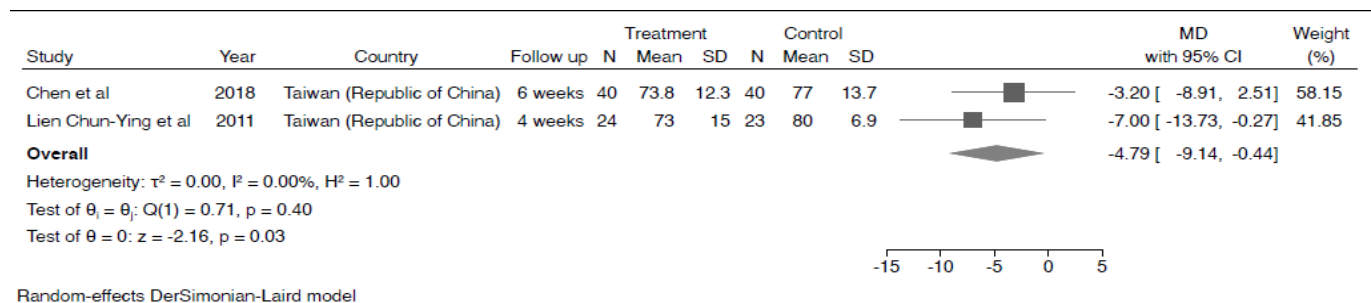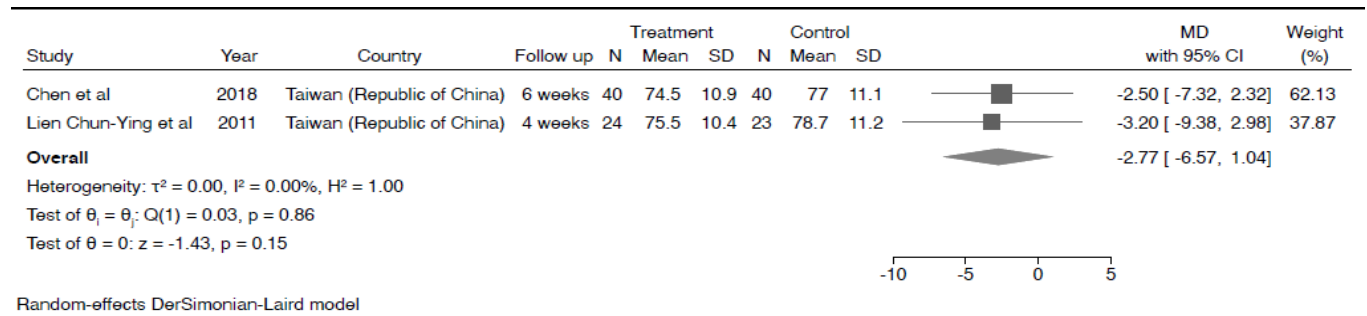

Data source: prepared by the authors using data from Chen et al. (2018) and Lien et al. (2011).

Figure 6. Meta-analysis comparing social domain changes in the intervention and control groups following intervention.

Data source: prepared by the authors using data from Chen et al. (2018) and Lien et al. (2011).

Figure 7. Meta-analysis comparing environmental domain changes in the intervention and control groups following intervention.

Data source: Prepared by the authors using data from Chen et al. (2018) and Lien et al. (2011).

3.6 Certainty of evidence

With regards to the quality of life study certainty of evidence (see Electronic Supplementary Material 1 in: https://1drv.ms/w/s!Aqaos7DxnYhLhb0wIBLS2MbXGId6Ug), the acupuncture intervention studies were considered as having a low certainty of evidence. The certainty of the evidence for the same outcome was considered very low in the meditation study (Zanella, 2018) and low in the yoga study (Cramer et al., 2016). There were no reports of adverse effects in the laser acupuncture study (Sebayang et al., 2020) and the meditation study (Zanella, 2018). Two acupuncture studies (Chen et al., 2018; Lien et al., 2012) were submitted for narrative evidence certainty analysis. Both studies were considered as having very low evidence of adverse effect outcomes and very low evidence in the yoga study (Cramer et al., 2016).

4. Discussion

Five eligible RCTs (Chen et al., 2018; Cramer et al., 2016; Lien et al., 2012; Sebayang et al., 2020; Zanella, 2018) were retrieved, however, the low number of studies included in this review prevented us from estimating the size of the effect on the quality of life of people classified as obese, for two (meditation and yoga) (Cramer et al., 2016; Zanella, 2018) of the three practices analyzed (acupuncture, meditation and yoga).

The small number of studies found may be a reflection of weight loss as the main care objective for people with obesity since the number of studies evaluating the effectiveness of meditation (Katterman et al., 2014), yoga (Lauche et al., 2016), and acupuncture (R. Zhang et al., 2017; Zhong et al., 2020) for weight loss is considerably higher than those evaluating the use of these therapies in the quality of life of people with obesity. Still, there are proposals that encourage the care process to be centralized on the person, or instead be centralized on body weight (Ralston et al., 2018).

In contrast, Scott (Scott, 1999) and Ning (Ning, 2018) observed that alternative and complementary practices can also intensify, or become a further axis of medicalization, by assuming a reductionist perspective of care. With regards to caring for people classified as obese, this reductionism occurs when treatment is restricted to weight loss. Furthermore, in contrast to the holistic perspective attributed to the MAC, when the focus is on the individual sphere, the neoliberal logic of holding people responsible for their conditions is reinforced, neglecting the macro-social aspects of those that affect health (Ning, 2018).

Gillett (Gillett, 2006) analyzes the presence of CAM in open health spaces, for these medical rationales to be submitted to the effectiveness validation processes used by biomedicine, which produces "truths" based on statistics. Thus, the methodological approaches adopted in randomized clinical trials, such as those selected in this review, subject everyone allocated to a group to the same intervention, and therefore, disregard the existence of individual otherness, being limited to the dimensions of illness subjectivity and the complexities surrounding CAM. In this context, the medical focus is on the physical disease, and not the sick person, which represents a contrast in the health-disease-care understanding advocated by CAM

(Cochrane & Possamai-Inesedy, 2013), which also demonstrates the need for methodological designs that are able to include this complexity. Therefore, the results should be analyzed, understanding the existence of conflicting dimensions between the methodology used and the peculiarities of CAM.

Despite the results of our study, traditional knowledge and approaches, such as acupuncture (Traditional Chinese Medicine), meditation, and yoga, towards health and well-being have been considered fundamental, to strengthen strategies that focus on coping with syndemic problems, such as obesity. It is recommended that actions and decisions for the benefit of humanity are guided by traditional knowledge (Swinburn et al., 2019).

The effectiveness of acupuncture (Chen et al., 2018; Lien et al., 2012) on quality of life was assessed using meta-analysis. The laser acupuncture study (Sebayang et al., 2020), meditation (Zanella, 2018), and yoga RCTs (Cramer et al., 2016) were subjected to qualitative analysis. The results of this meta-analysis, performed using two RCTs (Chen et al., 2018; Lien et al., 2012), suggest that acupuncture reduces the psychological quality of life dimension scores. However, no association was identified between acupuncture and improvements in the physical, social and environmental dimensions. Chen et al. (Chen et al., 2018) justified that the higher increase in the psychological domain score in the control group (sham catgut embedding) compared to the intervention group (acupoint catgut embedding) can be explained by the placebo effect. Patients can create treatment expectations and this produces a significant effect, even when undergoing sham acupuncture, due to the somatosensory component (Pariente et al., 2005). However, the fact that the effect of sham acupuncture is attributed to the placebo effect makes it possible to question whether the effect of real acupuncture (sham catgut embedding) is not placebo as well.

Lien et al. (Lien et al., 2012) do not explain the mechanism of improvement in quality of life through auricular stimulation but indicate that the improvement in the psychological aspect of quality of life may be related to the reduction of anxiety and depression. Chen et al. (Chen et al., 2018) and Sebayang et al. (Sebayang et al., 2020) also did not explain the mechanism of action of acupoint catgut embedding and laser acupuncture on quality of life.

Studies point out that acupuncture triggers effects on the central and peripheral nervous systems, and releases serotonin, endogenous opioids, and norepinephrine that can alter pain perception (Q. Zhang et al., 2017; R. Zhang et al., 2014). Acupuncture can also act in cases of mental disorders such as anxiety (Tong et al., 2021) and depression (Armour et al., 2019), and it can improve sleep quality (Cao et al., 2019).

Zanella (Zanella, 2018) analyzed that the quality of life after the intervention with meditation may be associated with an increase in the parasympathetic predominance, which acts on emotional flexibility and resistance to stress, acting in the improvement of the psychological domain. Shanks (Shanks et al., 2021) points out that the parasympathetic mechanism is broad and regulates heart rate, blood pressure, and breathing.

Cramer et al. (Cramer et al., 2016) believe that the mechanism of action of the yoga intervention can be explained by the combination of physical factors (improved food quality and physical activity) and emotional factors (emotional eating). The study used an intensive yoga program and should consider this factor when using these results to establish comparisons with other studies with yoga programs. Yoga has been associated with increased physical fitness, mental status and cognitive function (Telles et al., 2021).

The management of symptoms and conditions presented above by acupuncture, meditation, and yoga can collaborate to increase the quality of life of people classified as obese, considering that the physical domain evaluated by the quality measurement instruments analyzes aspects related to pain and discomfort; energy and fatigue, sleep and rest; mobility; activities of everyday life; dependence on medication or treatments; work capacity. While the psychological domain considers: positive feelings; thinking, learning, memory, and concentration; self-esteem; body image and appearance; negative feelings; spirituality/religion/personal beliefs (World Health Organization, 2012).

All articles (Chen et al., 2018; Cramer et al., 2016; Lien et al., 2012; Sebayang et al., 2020; Zanella, 2018) identified that there was a reduction in BMI after the interventions. Studies indicate that the reduction of BMI improves the quality of life (Fontaine & Barofsky, 2001), more markedly in the psychological/emotional aspects (Taylor et al., 2013; Vallis, 2016) and in the physical domain (Fontaine & Barofsky, 2001; Kolotkin et al., 2001), in line with the results of the articles in this systematic review.

In qualitative synthesis, four studies reported a higher quality of life for a number of intervention group scores: laser acupuncture plus diet (Sebayang et al., 2020), auricular stimulation by metal pearls (Lien et al., 2012), auricular acupuncture (Lien et al., 2012), meditation plus diet (Zanella, 2018), yoga groups (Lauche et al., 2016), than in the control groups. Of the four domains evaluated, for the acupoint catgut group physical domain (Chen et al., 2018), the increase was higher in the intervention than in the control group. The improvement was more expressive in the physical and psychological domains in the meditation study, and in the physical and mental domains of the yoga study. The difference was also observed in other subgroups, except for the "emotional role functioning" subgroup. The exception for the instrument used in the study to assess the quality of life is laser acupuncture, which does not report values by domain (Sebayang et al., 2020). Goyal et al. (Goyal et al., 2014) systematically reviewed the studies that examined the effect of meditation on reducing psychological stress in adults and reported that there was little evidence that meditation enhances the mental health-related domain of quality of life. Similarly, Hendriks (Hendriks et al., 2017) analyzed seventeen non-clinical adult population RCTs and found that there was a significant increase in psychological well-being in the yoga intervention groups with no activity.

The certainty of evidence from the RTCs (Chen et al., 2018; Cramer et al., 2016; Lien et al., 2012; Sebayang et al., 2020; Zanella, 2018) included in this review is low or very low. The laser acupuncture (Sebayang et al., 2020) and meditation studies (Zanella, 2018) reported no adverse effects. This is largely due to the presence of risk of bias, lack of blinding, incomplete outcome data, differences in group losses, small study sample sizes, imprecision, and inconsistency due to heterogeneity in the reporting of adverse events among the studies.

Two of the three acupuncture studies (Chen et al., 2018; Lien et al., 2012) reported mild events, such as local pain, hematomas, itching, and dizziness. The yoga study (Cramer et al., 2016) reported mild events, with transient back, neck, or abdominal pain, a broken toe, and mild strains. Although complementary and alternative therapies are considered safe (Cramer et al., 2018; Tan et al., 2014), adverse events may occur during yoga, meditation practices (Farias et al., 2020), and acupuncture (Ernst & White, 2001). Risks can be reduced if these therapies are conducted by specialized professionals (Ernst & White, 2001). Therefore, any adverse effects must be reported, documented, and monitored.

With respect to the overall dropout rate, the treatment adherence rate in studies with laser acupuncture (Sebayang et al., 2020) and meditation (Zanella, 2018) was 100%. Scheduling problems were given as the reasons for the ineffectiveness of the treatment. Of the three studies that reported dropouts, the highest dropout rate was the study using auricular acupuncture. The catgut embedding study had the second-highest rate, and the yoga study reported the lowest rate among the three studies.

4.1 Strengths and limitations

To the best of our knowledge, this is the first systematic review that investigates the effects of acupuncture, meditation, and yoga, on the quality of life of people classified as obese. This systematic review and meta-analysis have the following strengths: having used eleven databases; having a librarian who designed the search strategies to maximize sensitivity, and the references of all included studies were also checked. Thus, we consider it unlikely that any studies have been omitted. However, we only found a small number of RCTs that met the inclusion criteria for this review. In addition, this systematic review also has as a strong point the proper performance of assessments of the risk of bias of the studies and certainty in relation to the outcomes.

Due to the diversity of interventions and differences between the instruments used to assess the quality of life, the number of RCTs included in the meta-analysis was a limiting factor for any comparisons that could be made, since some studies presented scores by domains, and others included total scores. The results should be interpreted with caution. The RCTs using yoga, and the study of meditation were not included in the meta-analysis, since only one article was retrieved for each of these interventions.

A further limitation is related to the duration of the treatment, which ranged from 4 to 12 weeks. This can be considered a short time, in order to identify more effective changes in quality of life. The difficulty of blinding participants, evaluators or the professionals involved can also be considered a limitation. For example, the non-blinding of participants can generate a positive prior expectation, and affect the perception of certain domains of quality of life, making it more difficult to identify the real effect of the intervention. Therefore, the evidence generated is not solid enough to support public policy decision-making, to suggest that acupuncture, meditation, and yoga, can be used in clinical practice, in order to improve the quality of life of people classified as obese.

5. Conclusion

This meta-analysis suggests that acupuncture (auricular acupuncture and acupoint catgut embedding) reduces the psychological dimension of quality of life, as lower scores for the psychological dimension were identified in the intervention group when compared to the control group, and this difference was statistically significant (MD= - 4.79; 95% CI - 9.14; - 0.44). The intervention with acupuncture but had no effect on the physical, social, and environmental domains. However, all studies reported differences in at least one quality of life domain or subscale. Although they were not included in the meta-analysis, studies suggest an increase in certain domains of quality of life after interventions with auricular stimulation by metallic beads, meditation, and yoga. Therefore, the conclusions must remain tentative and must be interpreted with caution, due to: first, the low and very low level of certainty of the evidence for the quality of life and adverse effects (acupuncture and yoga); second, the low number of studies included in the meta-analysis; third, the numerous variations of yoga, meditation, and acupuncture.

Further high-quality RCTs are required to build robust evidence on the subject, overcome the methodological limitations of the studies analyzed in this review and explain possible mechanisms of action of these interventions (acupuncture, yoga and meditation) on quality of life of adults classified as overweight or obese.

Acknowledgments

References

Armour, M., Smith, C. A., Wang, L.-Q., Naidoo, D., Yang, G.-Y., Macpherson, H., Lee, S., & Hay, P. (2019). Acupuncture for depression: A systematic review and meta-analysis. *J Clin Med*, *8*. https://doi.org/10.3390/jcm8081140

Cao, H. J., Yu, M. L., Wang, L. Q., Fei, Y. T., Xu, H., & Liu, J. P. (2019). Acupuncture for primary insomnia: An updated systematic review of randomized controlled trials. *Journal of Alternative and Complementary Medicine*, *25*(5), 451–474. https://doi.org/10.1089/ACM.2018.0046

Chen, I. J., Yeh, Y. H., & Hsu, C. H. (2018). Therapeutic Effect of Acupoint Catgut Embedding in Abdominally Obese Women: A Randomized, Double-Blind, Placebo-Controlled Study. *Journal of Women's Health*, *27*(6), 782–790. https://doi.org/10.1089/jwh.2017.6542

Cochrane, S., & Possamai-Inesedy, A. (2013). Looking outside the square: The use of qualitative methods within complementary and alternative medicine: The movement towards rigour. *Complement Ther Med*, *21*(1), 73–76. https://doi.org/10.1016/j.ctim.2012.11.002

Cramer, H., Lauche, R., Anheyer, D., Lauche, R., & Dobos, G. (2018). Yoga for anxiety: A systematic review and meta-analysis of randomized controlled trials. *Depress Anxiety*, *35*(9), 830–843. https://doi.org/10.1002/da.22762

Cramer, H., Thoms, M. S., Anheyer, D., Lauche, R., & Dobos, G. (2016). Yoga in Women With Abdominal Obesity: A Randomized Controlled Tria. *Deutsches Arzteblatt International*, *113*(39), 645–652. https://doi.org/10.3238/arztebl.2016.0645

Ernst, E., & White, A. (2001). Prospective studies of the safety of acupuncture: A systematic review. *Am J Med.*, *110*(6), 481–485. https://doi.org/10.1016/s0002-9343(01)00651-9

FAO, IFAD, UNICEF, WFP, & WHO. (2021). *The State of Food Security and Nutrition in the World 2021: Transforming food systems for food security, improved nutrition and affordable healthy diets for all*. FAO. https://doi.org/10.4060/cb5409en

Farias, M., Maraldi, E., Wallenkampf, K., & Lucchetti, G. (2020). Adverse events in meditation practices and meditation-based therapies: A systematic review. *Acta Psychiatr Scand*, *142*(5), 374–393. https://doi.org/10.1111/acps.13225

Fontaine, K. R., & Barofsky, I. (2001). Obesity and health-related quality of life. *Obesity Reviews*, *2*(3), 173–182. https://doi.org/10.1046/J.1467-789X.2001.00032.X

Gillett, G. (2006). Medical science, culture, and truth. *Philosophy, Ethics, and Humanities in Medicine*, *1*(1). https://doi.org/10.1186/1747-5341-1-13

Goyal, M., Singh, S., Sibinga, E., Gould, N., Rowland-Seymour, A., Sharma R, Berger, Z., Sleicher, D., Maron, D., Shihab, H., Ranasinghe, P., Linn, S., Saha, S., Bass, E., & Haythornthwaite, J. (2014). Meditation programs for psychological stress and well-being: A systematic review and meta-analysis. *JAMA Intern Med.*, *174*(3), 357–368. https://doi.org/10.1001/jamainternmed.2013.13018

Guyatt, G., Oxman, A., Vist, G., Kunz, R., & Bmj, Y. (2008). GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ*, *336*(7650), 924–926. https://doi.org/10.1136/bmj.39489.470347.AD

Hendriks, T., De Jong, J., & Cramer, H. (2017). The effects of yoga on positive mental health among healthy adults: A systematic review and meta-analysis. *Journal of Alternative and Complementary Medicine*, *23*(7), 505–517. https://doi.org/10.1089/ACM.2016.0334

Higgins, J., Altman, D., Gøtzsche, P., & Jüni, P. (2011). The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *BMJ*, *343*(d5928). https://doi.org/10.1136/bmj.d5928

Higgins, J., Thomas, J., Chandler, J., Cumpston, M., & Li, T. (2022). *Cochrane handbook for systematic reviews of interventions version 6.3 (updated February 2022)*. Cochrane. www.training.cochrane.org/handbook

Hong, J., Chen, J., Kan, J., Liu, M., & Yang, D. (2020). Effects of acupuncture treatment in reducing sleep disorder and gut microbiota alterations in PCPA-induced insomnia mice. *Evid Based Complement Alternat Med.*, *2020*(3626120). https://doi.org/10.1155/2020/3626120

Katterman, S., Kleinman, B., Hood, M., Nackers, L., & Corsica, J. (2014). Mindfulness meditation as an intervention for binge eating, emotional eating, and weight loss: A systematic review. *Eat Behav*, *15*(2), 197–204. https://doi.org/10.1016/j.eatbeh.2014.01.005

Kolotkin, R. L., Meter, K., & Williams, G. R. (2001). Quality of life and obesity. *Obesity Reviews*, *2*(4), 219–229. https://doi.org/10.1046/J.1467-789X.2001.00040.X

Lauche, R., Langhorst, J., Lee, M., Dobos, G., medicine, H. C.-P., & 2016, undefined. (2016). A systematic review and meta-analysis on the effects of yoga on weight-related outcomes. *Prev Med*, *87*, 213–232. https://doi.org/10.1016/j.ypmed.2016.03.013

Lefebvre C, Glanville J, Briscoe S, Featherstone R, Littlewood A, Marshall C, Metzendorf M-I, Noel-Storr A, Paynter R, Rader T, Thomas J, & Wieland LS. (2022). Searching for and selecting studies. Em Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, & Welch VA (Orgs.), *Cochrane Handbook for Systematic Reviews of Interventions version 6.3*. Cochrane.

Lien, C. Y., Liao, L. L., Chou, P., & Hsu, C. H. (2012). Effects of auricular stimulation on obese women: A randomized, controlled clinical trial. *European Journal of Integrative Medicine*, *4*(1). https://doi.org/10.1016/j.eujim.2011.12.002

National Center for Complementary and Integrative Health. (2021). Complementary, Alternative, or Integrative Health: What's In a Name? *https://www.nccih.nih.gov/health/complementary-alternative-or-integrative-health-whats-in-a-name*.

Ning, A. (2018). How holistic is complementary and alternative medicine (CAM)? Examining self-responsibilization in CAM and biomedicine in a neoliberal age. *Med Res Arch*, *6*(5), 1–11. https://doi.org/10.18103/mra.v6i5.1750

Page, M. J., Mckenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., Mcdonald, S., & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, *372*(71). https://doi.org/10.1186/s13643-021-01626-4

Pariente, J., White, P., Frackowiak, R., & Lewith, G. (2005). Expectancy and belief modulate the neuronal substrates of pain treated by acupuncture. *Neuroimage*, *25*(4), 1161–1167. https://doi.org/10.1016/j.neuroimage.2005.01.016

Poulain, J.-P. (2013). *Sociologia da obesidade*. Editora Senac São Paulo.

Ralston, J., Brinsden, H., Buse, K., Candeias, V., Caterson, I., Hassell, T., Kumanyika, S., Nece, P., Nishtar, S., Patton, I., Proietto, J., Salas, X. R., Reddy, S., Ryan, D., Sharma, A. M., Swinburn, B., Wilding, J., & Woodward, E. (2018). Time for a new obesity narrative. *The Lancet*, *392*(10156), 1384–1386. https://doi.org/10.1016/S0140-6736(18)32537-6

Ross, A. & Thomas S. (2010). The health benefits of yoga and exercise: A review of comparison studies. *J Altern Complement Med*, *16*(1), 3–12. https://doi.org/10.1089/acm.2009.0044

Sampaio, C., Lima, M., & Ladeia, A. (2017). Meditation, health and scientific investigations: Review of the literature. *J Relig Health*, *56*(2), 411–427. https://doi.org/10.1007/s10943-016-0211-1

Scott, A. L. (1999). Paradoxes of holism: Some problems in developing an anti-oppressive medical practice. *Health*, *3*(2), 131–149. https://doi.org/10.1177/136345939900300201

Sebayang, R. G., Aditya, C., Abdurrohim, K., Lauwrence, B., Mihardja, H., Kresnawan, T., & Helianthi, D. R. (2020). Effects of Laser Acupuncture and Dietary Intervention on Key Obesity Parameters. *Medical Acupuncture*, *32*(2), 108–115. https://doi.org/10.1089/acu.2019.1398

Shanks, J., Ramchandra, R., Satou, R., Zhuo, J. L., & Ortiz, R. M. (2021). Angiotensin II and the Cardiac Parasympathetic Nervous System in Hypertension. *Int J Mol Sci.*, *22*(22), 12305–12305. https://doi.org/10.3390/ijms222212305

Sharpe, P. A., Blanck, H. M., Williams, J. E., Ainsworth, B. E., & Conway, J. M. (2007). Use of complementary and alternative medicine for weight control in the United States. *Altern Complement Med*, *13*(2), 217–222. https://doi.org/10.1089/acm.2006.6129

Swinburn, B., Kraak, V., Allender, S., Atkins, V., Baker, P., Bogard, J., Brinsden, H., & Calvillo, A. (2019). The Global Syndemic of Obesity, Undernutrition, and Climate Change: The Lancet Commission report. *Lancet*, *393*(10173), 791–846. https://doi.org/10.1016/S0140-6736(18)32822-8

Tan, J., Molassiotis, A., Wang, T., & Suen, L. (2014). Adverse events of auricular therapy: A systematic review. *Evid Based Complement Alternat Med*, *2014*(506758). https://doi.org/10.1155/2014/506758

Taylor, V., Forhan, M., Vigod, S., McIntyre, R., & Morrison, K. (2013). The impact of obesity on quality of life. *Best Pract Res Clin Endocrinol Metab*, *27*(2), 139–146. https://doi.org/10.1016/j.beem.2013.04.004

Telles, S., Sharma, S., Chetry, D., & Balkrishna, A. (2021). Benefits and adverse effects associated with yoga practice: A cross-sectional survey from India. *Complement Ther Med.*, *57*, 102644–102644. https://doi.org/10.1016/j.ctim.2020.102644

Tesser, C. D. (2009). Complementary practices, medical rationalities, and health promotion: Some overlooked contributions. *Cad. Saúde Pública*, *25*, 1732–1742. https://doi.org/10.1590/S0102-311X2009000800009

Tong, Q., Liu, R., Zhang, K., Gao, Y., Cui, G., & Shen, W. (2021). Can acupuncture therapy reduce preoperative anxiety? A systematic review and meta-analysis. *J Integr Med*, *19*(1), 20–28. https://doi.org/10.1016/j.joim.2020.10.007

Vallis, M. (2016). Quality of life and psychological well-being in obesity management: Improving the odds of success by managing distress. *International Journal of Clinical Practice*, *70*(3), 196–205. https://doi.org/10.1111/ijcp.12765

Wharton, S., Lau, D., Vallis, M., Sharma, A., Biertho, L., Campbell-Scherer, D., Adamo, K., Alberga, A., Bell, R., Boulé, N., & Boyling, E. (2020). Obesity in adults: A clinical practice guideline. *Can Med Assoc*, *192*(31), E875–E891. https://doi.org/10.1503/cmaj.191707

World Health Organization. (2012). *WHOQOL User Manual programme on mental health division of mental health and prevention of substance abuse world health organization* (p. 1–106).

World Health Organization. (2013). *WHO traditional medicine strategy: 2014-2023*. https://apps.who.int/iris/bitstream/handle/10665/92455/9786167697581-tha.pdf

World Health Organization. (2021). Obesity and overweight. *http://www.who.int/mediacentre/factsheets/fs311/en/*.

Zanella, H. (2018). *A meditação guiada possui utilidade para pacientes obesas em orientação nutrição?: Avaliação da antropometria, percepção do stress e balanço autonômico*. 1–99.

Zhang, Q., Yue, J., Golianu, B., Sun, Z., & Lu, Y. (2017). Updated systematic review and meta-analysis of acupuncture for chronic knee pain. *Acupuncture in Medicine*, *35*(6), 392–403. https://doi.org/10.1136/acupmed-2016-011306

Zhang, R., Lao, L., Ren, K., & Berman, B. (2014). Mechanisms of acupuncture: Electroacupuncture on persistent pain. *Anesthesiology*, *120*(2), 482–503. https://doi.org/10.1097/ALN.0000000000000101

Zhang, R., Tan, J., Li, F., Ma, Y., Han, L., & Yang, X. (2017). Acupuncture for the treatment of obesity in adults: A systematic review and meta-analysis. *Postgrad Med J.*, *93*(1106), 743–751. https://doi.org/10.1136/postgradmedj-2017-134969

Zhong, Y.-M., Luo, X.-C., Chen, Y., Lai, D.-L., Lu, W.-T., Shang, Y.-N., Zhang, L.-L., Zhou, H.-Y., & School, T. (2020). Acupuncture versus sham acupuncture for simple obesity: A systematic review and meta-analysis. *Postgrad Med J.*, *96*(1134), 221–227. https://doi.org/10.1136/postgradmedj-2019-137221