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The Effects of TaiChi and Qigong for rehabilitation after COVID-19: a protocol for systematic review and meta analysis

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Abstract

Introduction: Coronavirus disease (COVID-19) is a public health emergency of international concern, which is characterized by rapid transmission, wide spread, high mortality and complications. Several studies have shown the benefits of tai chi and qigong for recovery after COVID-19; however, no meta-analysis has been reported. Therefore, the purpose of this study was to evaluate the efficacy and safety of tai chi and/or qigong on rehabilitation after COVID-19 through a systematic review and Meta-analysis to provide a reference and basis for clinical application.

Methods and analysis: This study will use The Cochrane Library, PubMed, Web of Science, Embase, web of science, China Knowledge Network (CNKI), China Biomedical Literature Database (CBM), Chinese Scientifific Journal Database (VIP), Wanfang Database.The time period is from the inception of the database to November 2021,with no language restrictions.Searches were conducted using the subject terms "Taichi "、"Qigong" and "COVID-19" plus free words.And articles will be screened and collected by two reviewers independently. Included studies were assessed for quality using the Cochrane Risk of Bias Assessment Tool. Statistical analyses were performed using Revman 5.3 software.The primary outcomes included 1-second forced expiratory volume (FEV1) and 1-second forced vital capacity (FEV1/FVC), oxygen saturation, total white blood cell count, and quality of life score. Secondary outcomes included time to remission of major symptoms, incidence of adverse events, clinical cure rate, and mortality.Subgroup and sensitivity analyses will also be used to explore and interpret the heterogeneity.This protocol was written based on the guideline of Preferred Reporting Items for Systematic Reviews and Meta-analyses Protocol.

Ethics and dissemination: Ethical approval and consent are unnecessary because no primary data will be collected.The results will be disseminated through peer-reviewed publications.

Trial registration number:PEROSPERO CRD42021288962

Keywords: Tai Chi ,Qigong,COVID-19,rehabilitation ,meta-analysis, systematic review

Strengths and limitations of this study

► Our accurate assessment may provide a new complementary therapy for COVID-19 rehabilitation that is derived from traditional Chinese mind-body exercises.

► We will be evaluate the efficacy and safety of tai chi and/or qigong on rehabilitation after COVID-19,and the effect of different interventions on the rehabilitation of COVID-19 could also be assessed by subgroup analysis.

►It is not clear to us whether all patients had better adherence and whether there were uncontrolled or unmeasured confounding factors that could have biased the results.

►It is also unclear to us whether all studies differentiated between populations (age, sex, region), which may have produced selection bias.

1.Introduction

In late 2019, Coronavirus disease was discovered in Wuhan, Hubei Province, China[1],and the pathogen was identified as novel pneumonia (COVID-19) in January 2020[2].In January 2020, the WHO Director-General declared the novel coronavirus outbreak a Public Health Emergencies of International Concern (PHEIC), which is the highest level of alert[3].COVID-19 is a life-threatening infectious disease caused by Severe acute respiratory syndrome Coronavirus-2 (SARS-CoV-2), Its clinical manifestations include fever, cough, dyspnea, hemoptysis, headache, myalgia, diarrhea, fatigue, and decreased sense of smell[4],It affects not only the respiratory system but also the cardiovascular, renal, gastrointestinal, endocrine, neurological, and musculoskeletal systems[5], and the elderly, obese individuals, and those with heart disease, immunosuppression, and preexisting respiratory problems are more likely to develop severe forms of this disease[6].It is highly infectious and has a high mortality rate[7]. The total number of confirmed COVID-19 cases worldwide as of October 30, 2021 is 245,373,039,including 4,979,421 deaths[8].

Studies have pointed out that physical activity is one of the important ways of rehabilitation for patients with neocoronary pneumonia[9]. Physical exercise can enhance physical fitness (including lung function and cardiovascular function) and improve the immune system's ability to defend against COVID-19[10, 11].Sun[12]pointed out that pulmonary rehabilitation not only reduced inflammatory indicators such as neutrophil percentage, CRP and calcitoninogen in patients with COVID-19, but also improved cough and dyspnea symptoms, and improved the quality of life and psychological status of patients.

Taichi and Qigong are physical and mental exercises with a Chinese history of several thousand years[13, 14]. The practice of taijiquan can improve the quality of life and mental health, reduce anxiety and depression, as well as regulate the function of

the body's immune system and inflammatory marker response, have a positive effect on lung function, and are beneficial for the treatment of COVID-19[15]. And qigong has a significant improvement in various physical symptoms (inflammatory factors, physical activity, chest pain, respiratory function) and psychological symptoms (depression, anxiety, stress, sleep quality, negative emotions, quality of life) in patients with neocrown pneumonia[16].

Therefore, our aim was to conduct a meta-analysis to study the effects of Tai Chi and/or Qigong on COVID-19, to provide a assessment of its safety and efficacy, and to provide Clinical treatment method and evidence for the rehabilitation of COVID-19.

2.Materials and Methods

This protocol was registered at PEROSPERO and the registration number is CRD42021288962.and written based on the guideline of Preferred Reporting Items for Systematic Reviews and Meta-analyses Protocol (PRISMA-P)[17].

2.1.Criteria for Included Studies

2.1.1. Types of Studies

Only published randomized controlled trials (RCTs) investigating the effect of Taijiquan and / or Qigong on COVID-19 were included in the full review.There are no restrictions on language or publication status. relevant nonrandomized controls, reviews, individual cases will be excluded.

2.1.2. Types of Participants

Patients who were diagnosed COVID-19 will be included, In addition, There are no restrictions on gender, age or nationality.

2.1.3. Types of Intervention

The experimental group used Taijiquan and / or Qigong as an intervention, while the control group did not limit the intervention.Control interventions will include: no treatment, placebo and other interventions (e.g. herbal medicine, acupuncture, massage, cupping therapy, western medicine).

2.1.4. Types of Outcomes

2.1.4.1. Primary outcomes

1.1-second forced expiratory volume (FEV1) and 1-second forced vital capacity (FEV1/FVC).

2.blood oxygen saturation, total white blood cell count.

3.scores on quality of life using validated instruments such as SF-36, NHP, WHO QOS scale (whoqol-1000), and QOS index (QL).

2.1.4.2. The secondary outcome

1.the disappearance time of main symptoms (including fever, asthenia, cough disappearance rate, and temperature recovery time), 2.negative COVID-19 results rates on two consecutive occasions (not on the same day).

3. CT image improvement.

4. average hospitalization time, occurrence rate of common type to severe form, clinical cure rate, and mortality.

5.Safety is referred to the incidence of adverse events (bleeding, pain, hematoma, syncope, etc.).

2.3.Information sources and search strategy

We will carry out a literature search in Cochrane Library, Web of Science, PubMed, Embase, web of science, China Biomedical Literature Database (CBM), China Knowledge Network (CNKI), Chinese Scientifific Journal Database (VIP), Wanfang Database.The time period is from the inception of the database to November 2021, with no language restrictions.The search was performed using the subject terms

plus free words,Chinese searches will use the Chinese translations of the search terms. The suggested search syntax on PubMed is summarized in Table 1.

Table 1.PubMed Example Literature Search Strategy

Search number	Query
#1	"Qigong" [Mesh]
#2	Qigong [tiab] OR Ch'i Kung [tiab]
#3	#1 0R #2
#4	"Tai Ji"[Mesh]
#5	Tai-ji [tiab] OR Tai Chi [tiab] OR Chi, Tai [tiab] OR Tai Ji Quan [tiab] OR Ji Quan, Tai [tiab] OR Quan, Tai Ji [tiab] OR Taiji [tiab] OR Taijiquan [tiab] OR T'ai Chi [tiab] OR Tai Chi Chuan [tiab]
#6	#4 OR #5
#7	#3 OR #6
#8	"COVID 19 " [Mesh]
#9	COVID-19 Virus Disease [tiab] OR COVID 19 Virus Disease [tiab] OR COVID-19 Virus Diseases [tiab] OR Disease, COVID-19 Virus OR Virus Disease, COVID-19 [tiab] OR COVID-19 Virus Infection [tiab] OR COVID 19 Virus Infection [tiab] OR COVID-19 Virus Infections [tiab] OR Infection, COVID-19 Virus [tiab] OR Virus Infection, COVID-19 [tiab] OR 2019-nCoV Infection [tiab] OR 2019 nCoV Infection [tiab] OR 2019-nCoV Infections [tiab] OR Infection, 2019-nCoV [tiab] OR Coronavirus Disease-19 [tiab] OR Coronavirus Disease 19 [tiab] OR 2019 Novel Coronavirus Disease [tiab] OR 2019 Novel Coronavirus Infection [tiab] OR 2019-nCoV Disease [tiab] OR 2019 nCoV Disease [tiab] OR 2019-nCoV Diseases [tiab] OR Disease, 2019-nCoV [tiab] OR COVID19 [tiab] OR Coronavirus Disease 2019 [tiab] OR Disease 2019, Coronavirus [tiab] OR SARS Coronavirus 2 Infection [tiab] OR SARS-CoV-2 Infection [tiab] OR Infection, SARS-CoV-2 [tiab] OR SARS CoV 2 Infection [tiab] OR SARS-CoV-2 Infections

	[tiab] OR COVID-19 Pandemic [tiab] OR COVID 19 Pandemic [tiab] OR COVID-19 Pandemics [tiab] OR Pandemic, COVID-19 [tiab]
#10	#8 OR #9
#11	#7 AND #10

2.4. Search Strategy

2.4.1. Electronic Searches

The literature search and screening will be performed independently by two authors (G-JL and AL). First, duplicate literature will be excluded and an initial screening will be performed based on the title and abstract. Then, the literature that meets the criteria is screened by reading the full text. If there is disagreement, it should be discussed or submitted to a third person (LX) for evaluation. Endnote software is used for literature management and the reasons for exclusion should be recorded in the excluded studies. Figure 1 illustrates the literature screening process in this study.

2.4.2.Data extraction and management

Two authors (Z-ZC and LS) will independently generate a table to complete the data extraction. The data extraction table includes the name of the first author, year of publication, follow-up, sample size, interventions, outcomes, allocation concealment, randomization, selective reporting, blinding, completeness of outcome data, and subject characteristics (age, sex, duration of disease, and literacy). If the results of data extraction differed, they were discussed or submitted to a third person (LX) for adjudication. If the required data were lacking, the authors of the article would be contacted to obtain relevant information, and if data were still not available, studies with missing data would be excluded.

2.4.3.Assessment of risk of bias in included studies

Two authors (G-JL and AL) assessed the quality of the included studies using the assessment tools described in the Cochrane Handbook for Systematic Reviews of Interventions[18].all studies were assessed as low, unclear, or high risk of bias in the following six areas:

1)machine allocation method

2)allocation protocol concealment

3)blinding of study subjects, treatment protocol implementers, and study outcome measureers

4)incomplete outcome data

5)selective reporting of study results

6)"other" issues

If there is a disagreement, they will discuss it or refer it to a third party (LX).

2.4.4.Data analysis and synthesis

Data analysis will be performed using the ReviewManager 5.3 software provided by Cochrane Collaboration (www.cochrane.org). The Q-test and I^2 statistic will be used to assess the heterogeneity of the included studies[19].The relative risk will be

used to analyse dichotomous risk. The fixed-effects model will be used to combine the data if the statistical heterogeneity is low ($P \geq 0.1$ and $I^2 \leq 25\%$), or a random-effects model will be used if the statistical heterogeneity is high ($P < 0.1$ and $I^2 > 50\%$). The mean difference (MD) with 95% CI will be used for the continuous variables, and standardised mean difference(SMD) and 95% CI will be used for the continuous variables if the units are different.

2.4.5.Subgroup analysis

If the included studies show obvious clinical heterogeneity, subgroup analysis will be conducted according to clinical characteristics. In this study,we will conduct subgroup analysis according to the gender and age of patients, country, type of Taiji or Qigong and so on.

2.4.6.Sensitivity analysis

This study will carry out sensitivity analysis by changing the effect indicators, statistical model, and deleting each included study one by one to verify the stability of the study results. If different conclusions are reached, the results of the meta-analysis are carefully obtained by discussion between the two authors (ZZ and R-JG) or by evaluation by a third person (LX).

2.4.7.Assessment of reporting biases

If more than ten articles are included[20], the presence of reporting bias can be assessed by the symmetry of the funnel plot.

3.Discussion

COVID-19 is characterized by rapid transmission, widespread transmission, high mortality and complications[21-23], which seriously threatens the public's physical and mental health[24].Indu[25]showed that married women during COVID-19 epidemic and confinement are prone to depression, anxiety and stress, and even serious domestic violence.Dorri[26]included 21 A total of 49,650 patients from 21 studies were pooled and analyzed, indicating that the combined prevalence of post-traumatic stress

disorder (PTSD), depression, and anxiety in COVID 19 survivors was 18%, 12%, and 17%, respectively, and that the prevalence of major depression and anxiety was higher.COVID 19 survivors' Social Functioning (SF), Role Physical (RP), and Role Emotional (RE) health were all decreased in COVID 19 survivors. Also, COVID 19 frontline health care workers were prone to stress, anxiety, and depression. In Jordan, a survey of 225 young female health care workers found that 46.2% of them had low levels of stress, 53.8% had high levels of stress, 52.9% reported high levels of anxiety, and 66.2% had high levels of depression[27]. In India, out of 315 health care workers, 28.5% felt moderate to severe depression, 31% felt anxiety, and 18.4% felt stress[28]. Among patients discharged from COVID 19, patients remain severely impaired physically and psychologically[29]and face reduced quality of life, anxiety, insomnia, depression, and difficulty recovering in the short term[30-32].

Exercise training is helpful in the rehabilitation of COVID-19[33].Tai Chi and Qigong can be helpful in the recovery of COVID-19 patients,as Shu[34]showed that tai chi can reduce inflammatory indicators such as TNF- α , IL-6 and CRP, which can be used as an adjuvant therapy for COVID-19.and Tang[9]found significant improvement in respiratory muscle strength and function in 33 patients recovering from COVID-19 after 4 weeks of intervention using traditional Chinese qigong "Liuzijue",The mean increase in Maximan inspiratory pressure (MIP) was 13.46 ± 20.06 cmH_2O （P<0.001）,the mean increase in peak inspiratory flow（PIF） was 0.74 ± 0.58 L/second （P<0.001）， and the mean increase in diaphragm movement (DM) in deep breathing (DB) was 0.57 ± 1.18,and it also improves the patient's quality of life, restores physical function, and reduces anxiety and depression symptoms.Therefore， we will be evaluate the efficacy and safety of tai chi and/or qigong on rehabilitation after COVID-19,and the effect of different interventions on the rehabilitation of COVID-19 could also be assessed by subgroup analysis.what's more our accurate assessment may provide a new complementary therapy for the rehabilitation of COVID-19, which is derived from the Chinese tradition of mind-body exercises.

This study consisted of several aspects: first, the search strategy and inclusion and exclusion criteria were determined; then, all eligible randomized controlled trials

were screened; immediately after, data extraction, data analysis and processing, and analysis by heterogeneity test, subgroup analysis, and sensitivity analysis were performed; finally, conclusions were obtained from the analysis.

However, there are limitations to this study:It is not clear to us whether all patients had better adherence and whether there were uncontrolled or unmeasured confounding factors that could have biased the results.It is also unclear to us whether all studies differentiated between populations (age, sex, region), which may have produced selection bias. The results of the meta-analysis may be affected if studies did not include a sufficient number of high-quality randomized controlled trials.

4.Conclusion

This is a protocol for systematic review and meta-analysis. It mainly describes the specific methods used to conduct the study, with the aim of making the evidence provided by the meta-analysis stronger and more accurate.

Abbreviations

COVID 19:Coronavirus disease 2019

PHEIC:Public Health Emergencies of International Concern

SARS-CoV-2:Severe acute respiratory syndrome Coronavirus-2

PRISMA-P:Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protoco

RCTs: randomized controlled trials

FEV1:.1-second forced expiratory volume

FEV1/FVC:1-second forced vital capacity

CBM:China Biomedical Literature Database

CNKI:China Knowledge Network

VIP: Chinese Scientifific Journal Database

MD:Mean Difference

SMD:Standardised Mean Difference

PTSD:post-traumatic stress disorder

SF:Social Functioning

RP: Role Physical

MIP:Maximan inspiratory pressure

PIF:peak inspiratory flow

DM:diaphragm movement

DB:deep breathing

Patient and Public Involvement

The study is a pooled analysis of data from previous RCT studies and does not require patient or public participation.

Patient consent for publication

Not applicable.

Provenance and peer review

Not commissioned; externally peer reviewed

Ethics and Dissemination

Ethical approval and consent are unnecessary because no primary data will be collected.

Authors' Contributions

ZZ and R-JG contributed equally to this study. ZZ conceived the study and developed the first framework of the manuscript.ZZ and R-JG drafted the manuscript, and G-JL and AL were involved in the development of the search strategy.Z-ZC and LS will read the full text of the study and extract the data and perform data synthesis. CY and LH assessed the quality of the included studies. if there is any disagreement, LX will arbitrate. The manuscript was revised by LX. all the authors read and approved the final manuscript.

Data availability

Data sharing not applicable to this article, as no datasets were generated or analyzed during the current study.

Conflicts of Interest

The authors have no conflflicts of interest to disclose.

Supplementary Data

Guidelines Checklist. This protocol was written based on the guideline of Preferred Reporting Items for Systematic Reviews and Meta-analyses Protocol (PRISMA-P), and Supplementary PRISMA_P_checklist shows the details.

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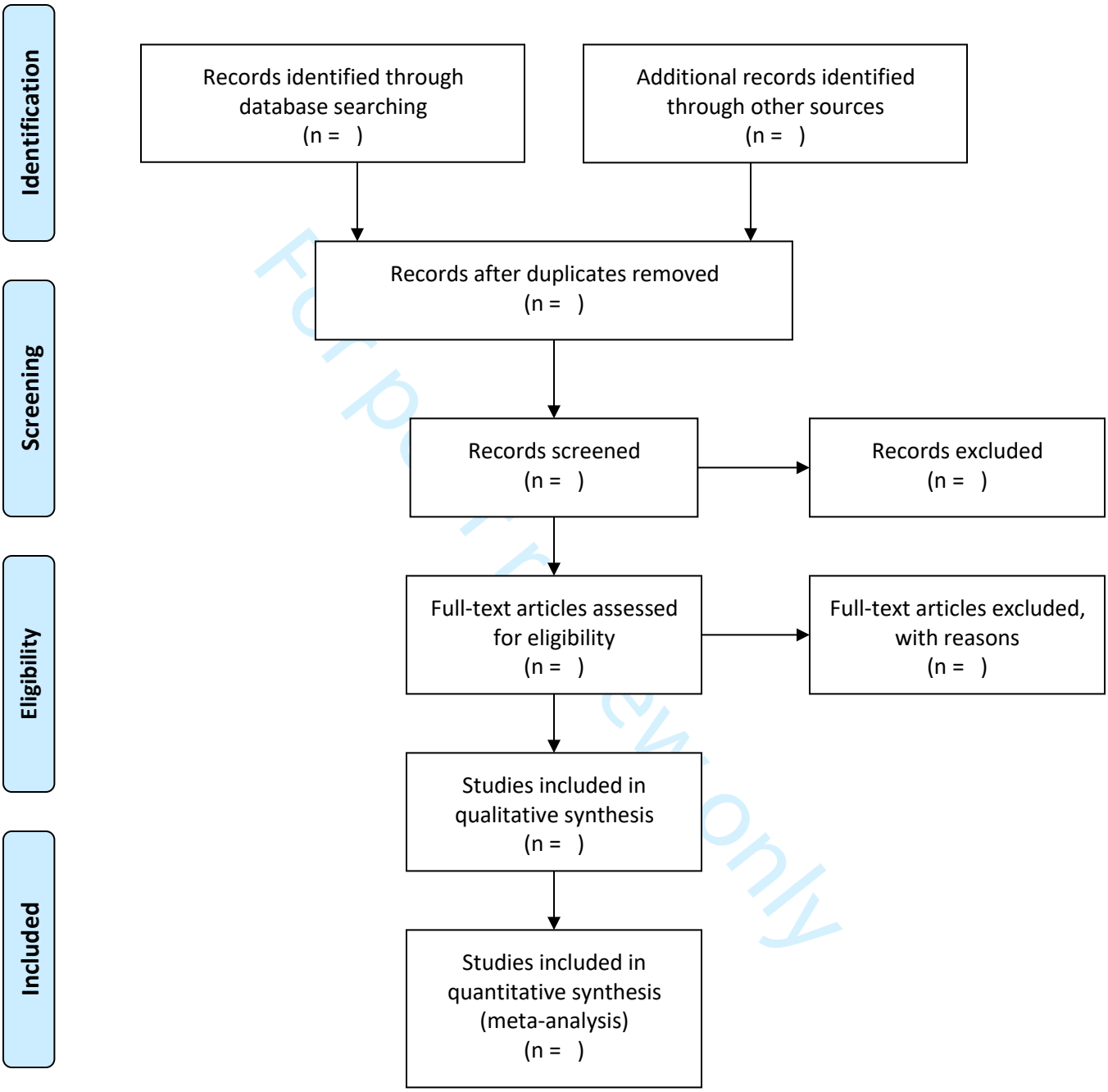
Figure1.Flowchart of this systematic review



PRISMA-P (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) 2015 checklist: recommended items to address in a systematic review protocol*

Section and topic	Item No	Checklist item	Reported on Page #
ADMINISTRATIVE INFORMATION			
Title:			
Identification	1a	Identify the report as a protocol of a systematic review	1
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	NA
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	2
Authors:			
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	1
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	13
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	NA
Support:			
Sources	5a	Indicate sources of financial or other support for the review	14
Sponsor	5b	Provide name for the review funder and/or sponsor	14
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	14
INTRODUCTION			
Rationale	6	Describe the rationale for the review in the context of what is already known	4-5
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	5
METHODS			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	5
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	6
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	7-8

Study records:			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	8
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	8
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	8
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	8
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	6
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	8-9
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	9
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I^2, Kendall's τ)	9
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	9
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	7
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	10
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	NA

*** It is strongly recommended that this checklist be read in conjunction with the PRISMA-P Explanation and Elaboration (cite when available) for important clarification on the items. Amendments to a review protocol should be tracked and dated. The copyright for PRISMA-P (including checklist) is held by the PRISMA-P Group and is distributed under a Creative Commons Attribution Licence 4.0.**

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The Effects of TaiChi and Qigong for rehabilitation after COVID-19: a protocol for systematic review and meta analysis

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The Effects of TaiChi and Qigong for rehabilitation after COVID-19: a protocol for systematic review and meta analysis

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Abstract

Introduction: COVID-19 is a public health emergency of international concern, which is characterized by rapid transmission, wide spread, high mortality and complications. Several studies have shown the benefits of tai chi and qigong for recovery after COVID-19; however, no meta-analysis has been reported. Therefore, the purpose of this study is to evaluate the efficacy and safety of tai chi and/or qigong on rehabilitation after COVID-19 through a systematic review and Meta-analysis to provide a reference and basis for clinical application.

Methods and analysis: This study will use The Cochrane Library, PubMed, Web of Science, Embase, China Knowledge Network (CNKI), China Biomedical Literature Database (CBM), Chinese Scientifific Journal Database (VIP), Wanfang Database. The time period is from the inception of the database to November 2021,with no language restrictions. Searches will be conducted using the subject terms "Taichi "、 "Qigong" and "COVID-19" plus free words. And articles will be screened and collected by two reviewers independently. Included studies will be assessed for quality using the Cochrane Risk of Bias Assessment Tool. Statistical analyses will be performed using Revman 5.3 software. The primary outcomes include 1-second forced expiratory volume (FEV1) and 1-second forced vital capacity (FEV1/FVC), oxygen saturation, total white blood cell count, and quality of life score. Secondary outcomes include time to remission of major symptoms, incidence of adverse events, clinical cure rate, and mortality. Subgroup and sensitivity analyses will also be used to explore and interpret the heterogeneity. This protocol is written based on the guideline of Preferred Reporting Items for Systematic Reviews and Meta-analyses Protocol.

Ethics and dissemination: Ethical approval and consent are unnecessary because no primary data will be collected. The results will be disseminated through peer-reviewed publications.

Trial registration number: PROSPERO CRD42021288962

Keywords: Exercise Therapy, Chinese mind-body exercises, Novel coronavirus

disease 2019, Public health

Strengths and limitations of this study

► Our accurate assessment may provide a new complementary therapy for COVID-19 rehabilitation that is derived from traditional Chinese mind-body exercises.

► The effectiveness and safety of tai chi and/or qigong on recovery after COVID-19 will be evaluated in this article. Also, the effects of different interventions on recovery from COVID-19 can be evaluated by subgroup analysis.

► It is not clear to us whether all patients had better adherence and whether there were uncontrolled or unmeasured confounding factors that could have biased the results.

► It is also unclear to us whether all studies differentiated between populations (age, sex, region), which may have produced selection bias.

► The time since the onset of acute COVID-19 and the clinical history of these patients (i.e., use of mechanical ventilation, sedation, etc.), which may be other potential sources of bias or variation among studies.

1.Introduction

In late 2019, coronavirus disease was found in Wuhan, Hubei Province, China[1],and the pathogen was identified as novel coronavirus disease 2019 (COVID-19) in January 2020[2].In January 2020, the WHO Director-General declared the novel coronavirus outbreak a Public Health Emergencies of International Concern (PHEIC), which was the highest level of alert[3,4].COVID-19 is a life-threatening infectious disease caused by Severe acute respiratory syndrome Coronavirus-2 (SARS-CoV-2), whose clinical manifestations include fever, cough, dyspnea, hemoptysis, headache, myalgia, diarrhea, fatigue and decreased sense of smell[5]. It affects not only the respiratory system but also the cardiovascular, renal, gastrointestinal, endocrine, neurological, and musculoskeletal systems[6], and the elderly, obese individuals, and those with heart disease, immune-suppression, and preexisting respiratory problems are more likely to develop severe forms of this disease[7]. It is highly infectious and has a high mortality rate[8]. The total number of confirmed COVID-19 cases worldwide as of October 30, 2021 is 245,373,039, including 4,979,421 deaths[9].

Studies have demonstrated that physical activity is one of the important ways of rehabilitation for patients with COVID-19[10]. Physical exercise can enhance physical fitness (including lung function and cardiovascular function) and improve the immune system's ability to defend against COVID-19[11, 12].Sun[13]pointed out that pulmonary rehabilitation could not only reduce inflammatory indicators such as neutrophil percentage, CRP and Procalcitonin in patients with COVID-19, but also improve cough and dyspnea symptoms, and improve the quality of life and psychological status of patients.

Taichi and Qigong are physical and mental exercises with a Chinese history of several thousand years[14,15].The practice of tai chi and qigong can improve pulmonary function, relieve symptoms such as dyspnea and cough, regulate the function of the

body's immune system and inflammatory marker response, improve quality of life and psychological well-being, reduce anxiety and depression, and shorten the length of hospital stay in patients with COVID-19[10,16-18].Therefore, our aim is to conduct a meta-analysis to study the effects of Taichi and/or Qigong on COVID-19, to provide a assessment of its safety and efficacy, and to provide clinical treatment method and evidence for the rehabilitation of COVID-19.

2.Materials and Methods

This protocol was registered at PROSPERO and the registration number is CRD42021288962.and written based on the guideline of Preferred Reporting Items for Systematic Reviews and Meta-analyses Protocol (PRISMA-P)[19].

2.1.Criteria for Included Studies

2.1.1. Types of Studies

Only published randomized controlled trials (RCTs) investigating the effect of Taijiquan and / or Qigong on COVID-19 will be included in the full review. There are no restrictions on language or publication status. relevant nonrandomized controls, reviews, individual caseswill be excluded.

2.1.2. Types of Participants

Patients who were diagnosed as COVID-19 will be included. In addition, There are no restrictions on gender, age or nationality.

2.1.3. Types of Intervention

The experimental group practiced Taijiquan and / or Qigong as an intervention, while the control group did not limit the intervention. Control interventions will include: no treatment, placebo and other interventions (e.g. herbal medicine, acupuncture, massage, cupping therapy, western medicine).

2.1.4. Types of Outcomes

2.1.4.1. Primary outcomes

1.1-second forced expiratory volume (FEV1) and 1-second forced vital capacity (FEV1/FVC).

2.blood oxygen saturation, total white blood cell count.

3.scores on quality of life using validated instruments such as SF-36, NHP, WHO QOS scale (whoqol-1000), and QOS index (QL).

2.1.4.2. The secondary outcome

1. The disappearance time of main symptoms (including fever, asthenia, cough disappearance rate, and temperature recovery time), 2.negative COVID-19 results rates on two consecutive occasions (not on the same day).

3. CT image improvement.

4. Average hospitalization time, occurrence rate of common type to severe form, clinical cure rate, and mortality.

5.Safety is referred to the incidence of adverse events (bleeding, pain, hematoma, syncope, etc.).

2.3.Information sources and search strategy

We will carry out a literature search in Cochrane Library, Web of Science, PubMed, Embase, web of science, China Biomedical Literature Database (CBM), China Knowledge Network (CNKI), China Science and Technology Journal Database (CQVIP), Wanfang Database.The time period is from the inception of the database to November 2021, with no language restrictions. The search will be performed using the subject terms plus free words, Chinese searches will use the Chinese translations of the search terms. The suggested search syntax on PubMed is summarized in Table 1.

Table 1.PubMed Example Literature Search Strategy

Search number	Query

#1	"Qigong" [Mesh]
#2	Qigong [tiab] OR Ch'i Kung [tiab]
#3	#1 0R #2
#4	"Tai Ji"[Mesh]
#5	Tai-ji [tiab] OR Tai Chi [tiab] OR Chi, Tai [tiab] OR Tai Ji Quan [tiab] OR Ji Quan, Tai [tiab] OR Quan, Tai Ji [tiab] OR Taiji [tiab] OR Taijiquan [tiab] OR T'ai Chi [tiab] OR Tai Chi Chuan [tiab]
#6	#4 OR #5
#7	#3 OR #6
#8	"COVID 19"[Mesh]
#9	COVID-19 Virus Disease [tiab]OR COVID 19 Virus Disease [tiab] OR COVID-19 Virus Diseases [tiab] OR Disease, COVID-19 Virus OR Virus Disease, COVID-19 [tiab] OR COVID-19 Virus Infection [tiab] OR COVID 19 Virus Infection [tiab] OR COVID-19 Virus Infections [tiab] OR Infection, COVID-19 Virus [tiab] OR Virus Infection, COVID-19 [tiab] OR 2019-nCoV Infection [tiab] OR 2019 nCoV Infection [tiab] OR 2019-nCoV Infections [tiab] OR Infection, 2019-nCoV [tiab] OR Coronavirus Disease-19 [tiab] OR Coronavirus Disease 19 [tiab] OR 2019 Novel Coronavirus Disease [tiab] OR 2019 Novel Coronavirus Infection [tiab] OR 2019-nCoV Disease [tiab] OR 2019 nCoV Disease [tiab] OR 2019-nCoV Diseases [tiab] OR Disease, 2019-nCoV [tiab] OR COVID19 [tiab] OR Coronavirus Disease 2019 [tiab] OR Disease 2019, Coronavirus [tiab] OR SARS Coronavirus 2 Infection [tiab] OR SARS-CoV-2 Infection [tiab] OR Infection, SARS-CoV-2 [tiab] OR SARS CoV 2 Infection [tiab] OR SARS-CoV-2 Infections [tiab] OR COVID-19 Pandemic [tiab] OR COVID 19 Pandemic [tiab] OR COVID-19 Pandemics [tiab] OR Pandemic, COVID-19 [tiab]
#10	#8 OR #9
#11	#7 AND #10

2.4. Search Strategy

2.4.1. Electronic Searches

The literature search and screening will be performed independently by two authors (G-JL and AL). First, duplicate literature will be excluded and an initial screening will be performed based on the title and abstract. Then, the literature that meets the criteria is screened by reading the full text. If there is disagreement, it should be discussed or submitted to a third person (LX) for evaluation. Endnote software is used for literature management and the reasons for exclusion should be recorded in the excluded studies. Figure1 illustrates the literature screening process in this study.

2.4.2.Data extraction and management

Two authors (Z-ZC and LS) will independently generate a table to complete the data extraction. The data extraction table includes the name of the first author, year of publication, follow-up, sample size, interventions, outcomes, allocation concealment, randomization, selective reporting, blinding, completeness of outcome data, and subject characteristics (age, sex, duration of disease, and literacy). If the results of data extraction differed, they will be discussed or submitted to a third person (LX) for adjudication. If the required data are lacking, the authors of the article would be contacted to obtain relevant information, and if data are still not available, studies with missing data would be excluded.

2.4.3.Assessment of risk of bias in included studies

Two authors (G-JL and AL) will assess the quality of the included studies using the assessment tools described in the Cochrane Handbook for Systematic Reviews of Interventions[20].all studies will be assessed as low, unclear, or high risk of bias in the following six areas:

1)machine allocation method

2)allocation protocol concealment

3)blinding of study subjects, treatment protocol implementers, and study outcome measurers

4)incomplete outcome data

5)selective reporting of study results

6)"other" issues

If there is a disagreement, they will discuss it or refer it to a third party (LX).

2.4.4.Data analysis and synthesis

Data analysis will be performed using the ReviewManager 5.3 software provided by Cochrane Collaboration (www.cochrane.org). The Q-test and I^2 statistic will be used to assess the heterogeneity of the included studies[21].The relative risk will be used to analyse dichotomous risk. The fixed-effects model will be used to combine the data if the statistical heterogeneity is low ($P \geq 0.1$ and $I^2 \leq 25\%$), or a random-effects model will be used if the statistical heterogeneity is high ($P < 0.1$ and$I^2 > 50\%$). The mean difference (MD) with 95% CI will be used for the continuous variables, and standardized mean difference(SMD) and 95% CI will be used for the continuous variables if the units are different.

2.4.5.Subgroup analysis

If the included studies show obvious clinical heterogeneity, subgroup analysis will be conducted according to clinical characteristics. In this study,we will conduct subgroup analysis according to the gender and age of patients, country, type of Taichi or Qigong and so on.

2.4.6.Sensitivity analysis

This study will carry out sensitivity analysis by changing the effect indicators, statistical model, and deleting each included study one by one to verify the stability of the study results. If different conclusions are reached, the results of the meta-analysis

are carefully obtained by discussion between the two authors (ZZ and R-JG) or by evaluation by a third person (LX).

2.4.7.Assessment of reporting biases

If more than ten articles are included[22], the presence of reporting bias can be assessed by the symmetry of the funnel plot.

3.Patient and Public Involvement

Patients or members of the public were not involved in the design of this study.

4.Ethics and Dissemination

Ethical approval and consent are unnecessary because no primary data will be collected. The results will be disseminated through peer-reviewed publications.

5.Discussion

COVID-19 is characterized by rapid transmission, widespread transmission, high mortality and complications[23-25], which seriously threatens the public's physical and mental health[26].Indu[27]showed that married women during COVID-19 epidemic and confinement may be prone to depression, anxiety and stress, and even serious domestic violence.A total of 49,650 patients from 21 studies were pooled and analyzed[28], indicating that the combined prevalence of post-traumatic stress disorder (PTSD), depression, and anxiety in COVID-19 survivors was 18%, 12%, and 17%, respectively, and that the prevalence of major depression and anxiety was higher.COVID-19 survivors' Social Functioning (SF), Role Physical (RP), and Role Emotional (RE) health were all decreased in COVID-19 survivors. Also, COVID-19 frontline health care workers were prone to stress, anxiety, and depression. In Jordan, a survey of 225 young female health care workers found that 46.2% of them had low levels of stress, 53.8% had high levels of stress, 52.9% reported high levels of anxiety, and 66.2% had high levels of depression[29]. In India, out of 315 health care workers, 28.5% felt moderate to severe depression, 31% felt anxiety, and 18.4% felt stress[30]. Among patients discharged from COVID-19, patients remain severely

impaired physically and psychologically[31]and face reduced quality of life, anxiety, insomnia, depression, and difficulty recovering in the short term[32-34].

Exercise training is helpful in the rehabilitation of COVID-19[35].Tai Chi and Qigong can be helpful in the recovery of COVID-19 patients,it's found that[16] Taichi can reduce inflammatory indicators such as TNF-α, IL-6 and CRP, which can be used as an adjuvant therapy for COVID-19.and it's also found that[10]significant improvement in respiratory muscle strength and function in 33 patients recovering from COVID-19 after 4 weeks of intervention using traditional Chinese qigong "Liuzijue",the mean increase in maximal inspiratory pressure (MIP) was 13.46 ± 20.06 cmH_2O（P<0.001）,the mean increase in peak inspiratory flow（PIF）was 0.74 ± 0.58 L/second （P<0.001）， and the mean increase in diaphragm movement (DM) in deep breathing (DB) was 0.57 ± 1.18,and it also improves the patient's quality of life, restores physical function, and reduces anxiety and depression symptoms.Therefore， we will evaluate the efficacy and safety of tai chi and/or qigong on rehabilitation after COVID-19.

This study consisted of several aspects: first, the search strategy and inclusion and exclusion criteria are determined; then, all eligible randomized controlled trials are screened; immediately after, data extraction, data analysis and processing, and analysis by heterogeneity test, subgroup analysis, and sensitivity analysis are performed; finally, conclusions are obtained from the analysis.

However, there are limitations to this study: It is not clear to us whether all patients had better adherence and whether there were uncontrolled or unmeasured confounding factors that could have biased the results.It is also unclear to us whether all studies differentiated between populations (age, sex, region), which may have produced selection bias. And the time since acute COVID-19 onset and the clinical history of these patients (i.e., use of mechanical ventilation, sedation, etc.) are other potential sources of bias or variation among studies.The results of the meta-analysis may be affected if studies did not include a sufficient number of high-quality randomized controlled trials.

6.Conclusion

This systematic review will assess and summarize the efficacy and safety of tai chi and/or qigong on rehabilitation after COVID-19,and the effect of different interventions on the rehabilitation of COVID-19 could also be assessed by subgroup analysis.what's more our accurate assessment may provide a new complementary therapy for the rehabilitation of COVID-19, which is derived from the Chinese tradition of mind-body exercises.

Abbreviations

COVID-19: novel coronavirus disease 2019

PHEIC:Public Health Emergencies of International Concern

SARS-CoV-2:Severe acute respiratory syndrome Coronavirus-2

PRISMA-P:Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocol

RCTs: randomized controlled trials

FEV1:1-second forced expiratory volume

FEV1/FVC:1-second forced vital capacity

CBM:China Biomedical Literature Database

CNKI:China Knowledge Network

CQVIP: China Science and Technology Journal Database

MD:Mean Difference

SMD:Standardized Mean Difference

PTSD:post-traumatic stress disorder

SF:Social Functioning

RP: Role Physical

MIP:Maximal inspiratory pressure

PIF:peak inspiratory flow

DM:diaphragm movement

DB:deep breathing

Patient consent for publication

Not applicable.

Provenance and peer review

Not commissioned; externally peer reviewed

Authors' Contributions

ZZ and R-JG contributed equally to this study. ZZ conceived the study and developed the first framework of the manuscript.ZZ and R-JG drafted the manuscript, and G-JL and AL were involved in the development of the search strategy.Z-ZC and LS will read the full text of the study and extract the data and perform data synthesis. CY and LH assessed the quality of the included studies. if there is any disagreement, LX will arbitrate. The manuscript was revised by LX. all the authors read and approved the final manuscript.

Data availability

Data sharing not applicable to this article, as no datasets were generated or analyzed during the current study.

Conflicts of Interest

The authors have no conflicts of interest to disclose.

Supplementary Data

Guidelines Checklist. This protocol was written based on the guideline of Preferred Reporting Items for Systematic Reviews and Meta-analyses Protocol (PRISMA-P), and Supplementary PRISMA_P_checklist shows the details.

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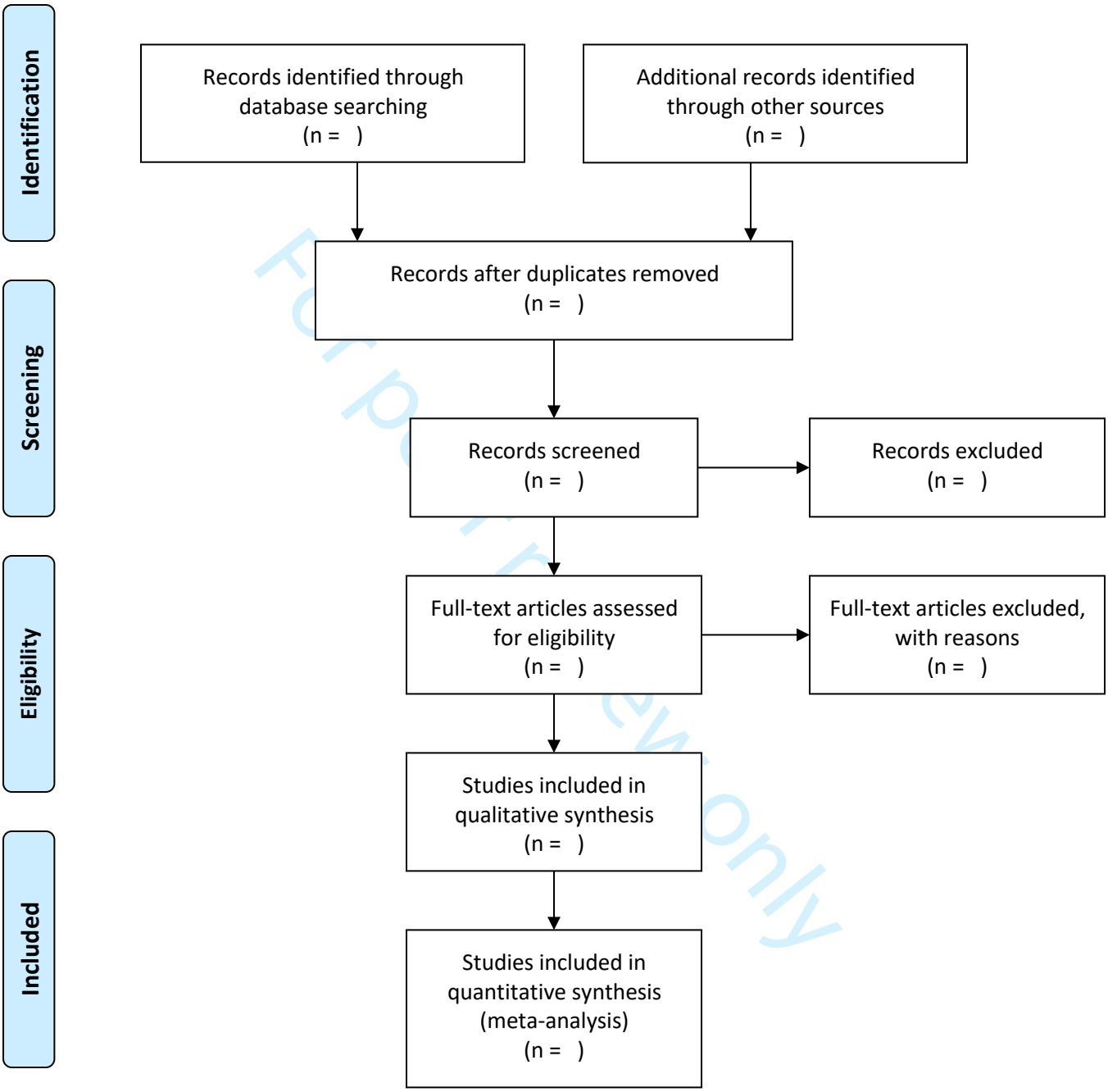
Figure legends

Table 1: PubMed Example Literature Search Strategy

Figure 1:Flowchart of this systematic review.

Figure1.Flowchart of this systematic review



PRISMA-P (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) 2015 checklist: recommended items to address in a systematic review protocol*

Section and topic	Item No	Checklist item	Reported on Page #
ADMINISTRATIVE INFORMATION			
Title:			
Identification	1a	Identify the report as a protocol of a systematic review	1
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	NA
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	2
Authors:			
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	1
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	13
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	NA
Support:			
Sources	5a	Indicate sources of financial or other support for the review	13
Sponsor	5b	Provide name for the review funder and/or sponsor	13
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	13
INTRODUCTION			
Rationale	6	Describe the rationale for the review in the context of what is already known	4-5
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	4-5
METHODS			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	5-6
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	6
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	6-7

Study records:			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	8
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	8
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	8
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	8
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	5-6
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	8-9
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	9
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I^2, Kendall's τ)	9
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	9
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	9
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	10
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	NA

*** It is strongly recommended that this checklist be read in conjunction with the PRISMA-P Explanation and Elaboration (cite when available) for important clarification on the items. Amendments to a review protocol should be tracked and dated. The copyright for PRISMA-P (including checklist) is held by the PRISMA-P Group and is distributed under a Creative Commons Attribution Licence 4.0.**

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