



Review Article

The role of acupuncture and moxibustion in the treatment, prevention, and rehabilitation of patients with COVID-19: A scoping review



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ABSTRACT

Introduction: This study aims to summarize the available evidence and guideline/consensus recommendations for acupuncture and moxibustion in the treatment, prevention and rehabilitation of patients with coronavirus disease 2019 (COVID-19).

Methods: A scoping review was performed. Eight electronic databases and other related websites were searched. All studies related to acupuncture and moxibustion for COVID-19 were considered. Descriptive analysis was applied to analyze the all included studies and guideline recommendations.

Results: We ultimately included 131 eligible studies. The main topics of the included studies were the treatment (82.4%) and prevention (38.9%) of COVID-19. The most included studies were literature reviews (65, 49.6%), protocols of systematic reviews (20, 15.3%), and guidelines and consensus (18, 13.7%). The 18 (13.7%) COVID-19 guidelines and consensus included 47 recommendations on acupuncture and moxibustion, which focused on the treatment (21/47, 44.7%), rehabilitation (17/47, 36.2%) and prevention (6, 12.8%) of COVID-19 patients. Zusanli (ST36), Feishu (BL13), Guanyuan (RN4) were recommended mostly for the treatment, rehabilitation and prevention respectively.

Conclusion: Acupuncture and moxibustion are effective in the treatment of COVID-19 patients to some extent. However, more high-quality of clinical trials still needed to determine the feasibility of acupuncture and moxibustion in COVID-19 patients to better guide clinical practice.

Study registration: Open Science Framework Registries (Registration DOI: 10.17605/OSF.IO/Z35WN; <https://osf.io/z35wn>).

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1. Introduction

Since it was initially reported in December 2019, the coronavirus disease 2019 (COVID-19) has spread rapidly around the world, causing great harm to people's lives and safety as well as economic and social stability. COVID-19 is an acute respiratory infectious disease, and the clinical symptoms^{1,2} of patients are fever, malaise, cough, sputum, dyspnea, headache, dizziness, etc., which are sometimes accompanied by diarrhea, vomiting, etc. The main clinical measures for COVID-19 are isolation, antiviral therapy and

symptomatic support, and there are no specific therapeutic drugs.³ Acupuncture has a long history for the prevention and treatment of epidemics, and rich clinical experience has been accumulated.⁴ Some studies have shown that acupuncture has potential benefits in the treatment of some modern acute infectious diseases, such as epidemic hemorrhagic fever, influenza, acute bacterial dysentery and severe acute respiratory syndrome (SARS),⁵ and that it has advantages in reducing fever, relieving cough and phlegm, alleviating gastrointestinal symptoms, promoting respiratory function and preventing deterioration of disease⁶⁻⁹. Therefore, a variety of studies have discussed and investigated the effects of acupuncture in the prevention, treatment, and rehabilitation of COVID-19 patients during this epidemic. Analyzing and disseminating the Chinese experience with acupuncture during the epidemic, conducting relevant studies and further developing evidence-based clinical practice guidelines are expected to promote a greater role for acupuncture in global efforts to fight the epidemic.^{10,11}

To comprehensively clarify the role of acupuncture in the treatment, prevention and rehabilitation of COVID-19 patients, all studies related to the application of acupuncture and moxibustion in COVID-19 patients were systematically searched and analyzed in this scoping review. To further investigate the recommended status of acupuncture and moxibustion, we also searched the guidelines and consensuses, and analyzed the related recommendations on acupuncture and moxibustion. We aimed to summarize the current status of the efficacy and safety of acupuncture therapy for COVID-19 and provide references for clinical researchers and practitioners.

2. Methods

We conducted a scoping review to identify the role of acupuncture in the treatment, prevention and rehabilitation of patients with COVID-19. We performed this scoping review following the methodology recommended by Joanna Briggs Institute (JBI)¹² and followed the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) statement¹³ to draft this paper (Supplement 1). This scoping review has been registered in the Open Science Framework Registries (Registration DOI: 10.17605/OSF.IO/Z35WN).

2.1. Search strategy

We performed a systematic search of the China National Knowledge Infrastructure (CNKI), Wanfang Data, China Biology Medicine (CBM), MEDLINE via PubMed, Embase, and the Cochrane Library, Web of Science (WOS), and Epistemonikos using the terms “COVID-19”, “SARS-CoV-2”, “2019 novel coronavirus”, “2019-nCoV”, “coronavirus disease 2019”, “2019-novel coronavirus”, “acupuncture”, “acupressure”, “acupoint”, “moxibustion”, and “needle”, etc. with a publication date of 1 January 2020 to 1 April 2022. In addition, we retrieved traditional Chinese Medicine (TCM) guidelines and consensus for COVID-19 to identify the acupuncture-related recommendations from databases and websites (Chinese Center for Disease Control and Prevention, National Administration of Traditional Chinese Medicine (TCM), and World Health Organization (WHO) Guideline website).

Two researchers (Ren M and Liu Y) independently searched above databases, websites and other sources. The full search strategies of databases are shown in Supplement 2.

2.2. Inclusion and exclusion criteria

Studies that met the following criteria were eligible for inclusion: 1) Studies for the use of acupuncture and moxibustion combined with or without other treatment methods in COVID-19 pa-

tients in the different stage of disease or with other comorbidities; 2) Type of study: guideline that met the IOM definition from 1990¹⁴ or 2011¹⁵ and consensus containing recommendations on acupuncture and moxibustion, systematic review (SR), clinical trials (including randomized controlled trials (RCTs), case report, case series, and non-RCTs), observational studies, literature reviews and protocols. The following studies were excluded: 1) studies that were not published in Chinese or English; 2) The full texts are inaccessible; 3) conference abstracts, letters, comments, editorials and news reports; 4) translations and interpretations; 5) animal and basic researches. Furthermore, for studies published in multiple journals, we selected the earlier publications for inclusion. And for studies published in different versions, such as simplified and standard versions, we included the one reported more information.

2.3. Study selection and data extraction

We used Endnote X9 software to manage the literature. Two researchers (Ren M and Liu Y) independently screened all titles, abstracts, and full texts. All disagreements were resolved through consensus or by consultation with a third researcher (Kuang Z).

For the included studies, we extracted the following information: 1) basic information: title, the first author, country, journal, publication or posted date, study type, and the research topics; 2) as for COVID-19 guidelines and consensuses, we additionally extracted some details about recommendations on the acupuncture and moxibustion, such as focused topics, recommended acupoints, and operation frequency; 3) for other type of studies, we extracted the PICO (patients, interventions, comparisons and outcomes) information, as well as main results and effect sizes if available.

Two researchers (Ren M and Liu Y) independently performed data extraction according to the predefined plan and resolved disagreements through consensus or by consultation with a third researcher (Li H).

2.4. Data analysis

We performed a descriptive analysis of the included studies based on the different study types. For COVID-19 guidelines or consensuses, in addition to the above basic information, we also qualitatively analyzed specific information about the recommendations.

3. Results

3.1. Search results

We identified 7916 records after systematic retrieval, and 3194 records were excluded before screening because they were duplicates. After excluding the ineligible studies, 131 studies were finally analyzed in this scoping review. The literature search and screening process is shown in Fig. 1 and the checklist of included studies is shown in supplement 3.

3.2. Characteristics of the included studies

Of the 131 included articles related to the use of acupuncture therapy for COVID-19, 122 (93.1%) were from China, and the remaining articles were from the Iran, US, Belgium, Indonesia, and Mexico. The publication dates of included studies were concentrated on April, 2020 to August, 2020. More than half (95, 72.5%) of the studies were published in Chinese. The most focused topics of included studies were about the treatment (82.4%), prevention (38.9%) and rehabilitation (12.2%) of COVID-19 patients, and the main study type was literature review (65, 49.6%). There were 18 (13.7%) COVID-19 guidelines and consensuses, 6 (33.3%) of which were guidelines and 12 (66.7%) of which were consensuses, and

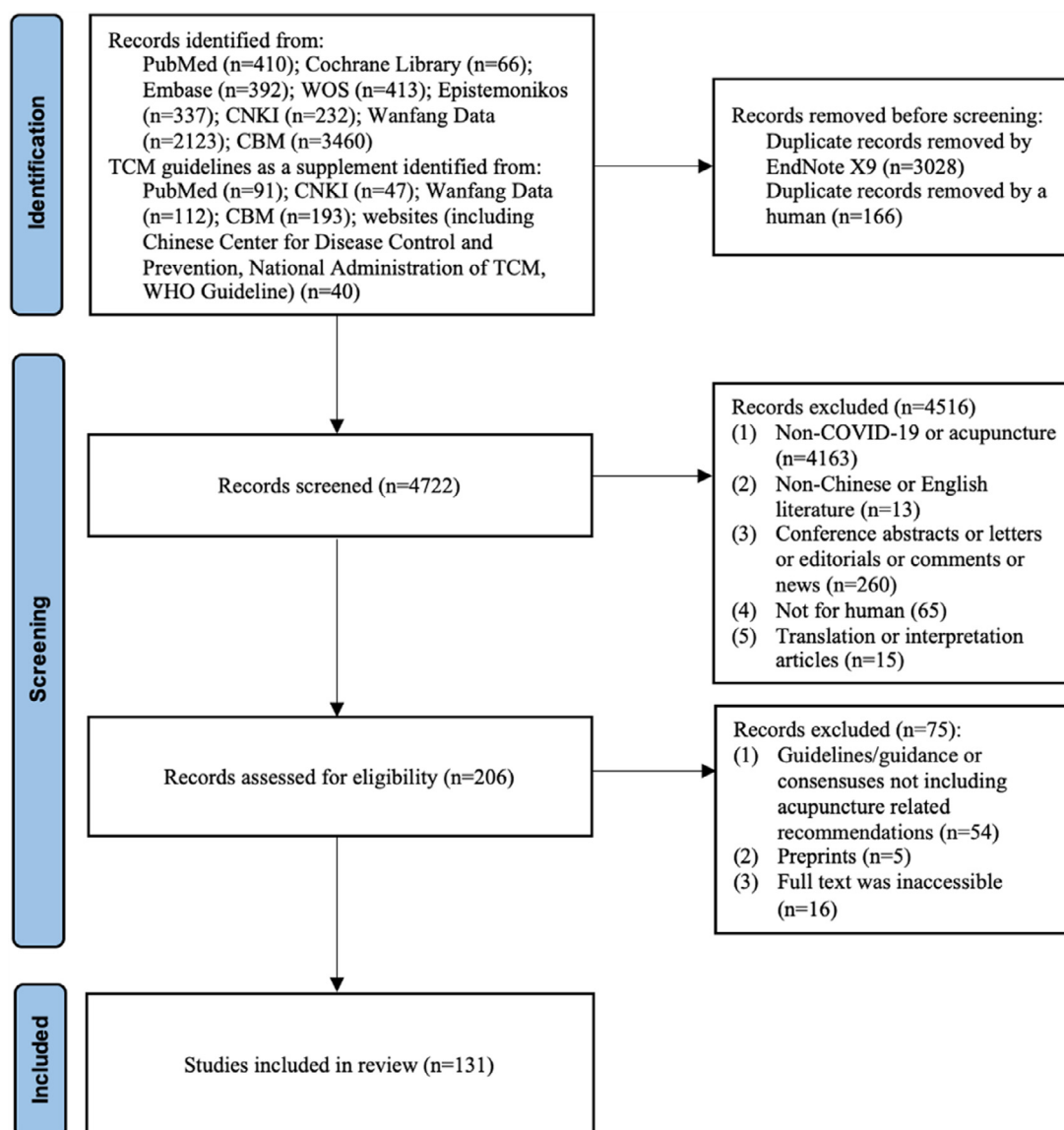


Fig. 1. Flowchart of the study selection process.

they were all developed by Chinese researchers or institutions. The characteristics of the included studies are shown in Table 1 and the distribution of publication dates of included studies is shown in Fig. 2.

3.3. COVID-19 guidelines and consensuses

Among the included 18 TCM guidelines and consensuses for COVID-19 (Supplement 3), only two guidelines¹⁶⁻¹⁷ focused specifically on the use of acupuncture for COVID-19 treatment, and these were issued by the China Association of Acupuncture-Moxibustion. The rest of studies were comprehensive TCM guidelines or consensuses including recommendations on acupuncture and moxibustion. The first article, "Guidance on Acupuncture Intervention for Novel Coronavirus Pneumonia",¹⁶ was published in February 2020 and focused on the principles, methods, and procedures of acupuncture intervention in suspected, mild, common, and recovered COVID-19 cases. In May 2020, the second version of this article¹⁷ was published, which described more operation details, adverse events and syndrome differentiation based on the first ver-

sion. However, the two versions reported recommendations primarily based on experts' experience without citing any references, and no method process (such as systematic searches, evidence grading etc.) were reported.

We extracted 47 recommendations on acupuncture and moxibustion applied in COVID-19 patients, most of which (21, 44.7%) were for the treatment. Compared to the acupuncture (23, 48.9%), moxibustion (42, 89.4%) were recommended as the intervention method for COVID-19 patients more frequently. As for the operation methods of acupuncture and moxibustion, the most of current recommendations didn't explain the details. Among all the recommendations, 45 (95.7%) recommendations provided corresponding acupoints. Considering the complexity of syndrome differentiation, we only summarized the frequency of main recommended acupoints according to the different purposes in Fig. 3. Zusanli (ST36), Feishu (BL13), Guanyuan (RN4) and Dazhui (DU14) were recommended mainly for the treatment (13.0%, 12/92), rehabilitation (15.9%, 13/82), prevention (22.2%, 4/18) and nursing (12.5%, 2/16) respectively. More details about the 47 recommendations are in Table 2.

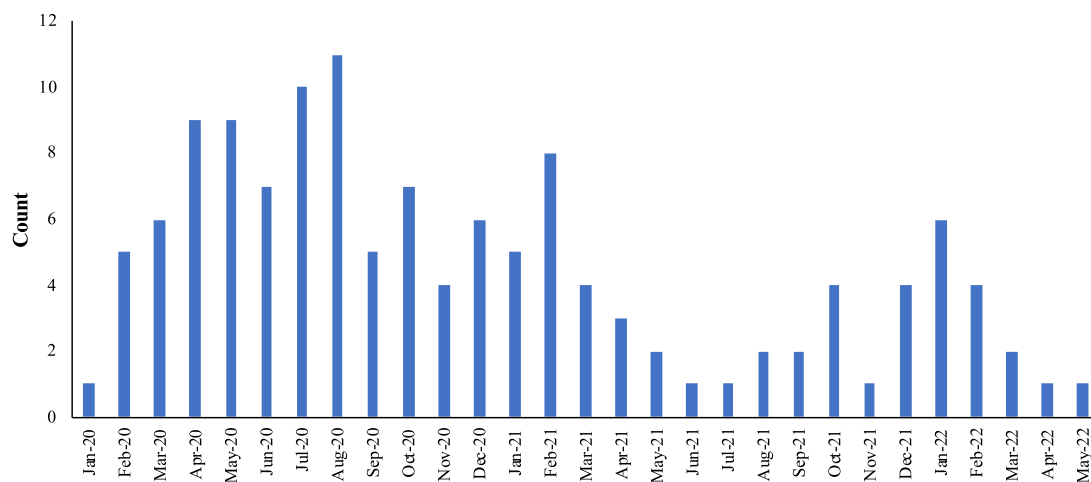


Fig. 2. The distribution of publication dates of included studies.

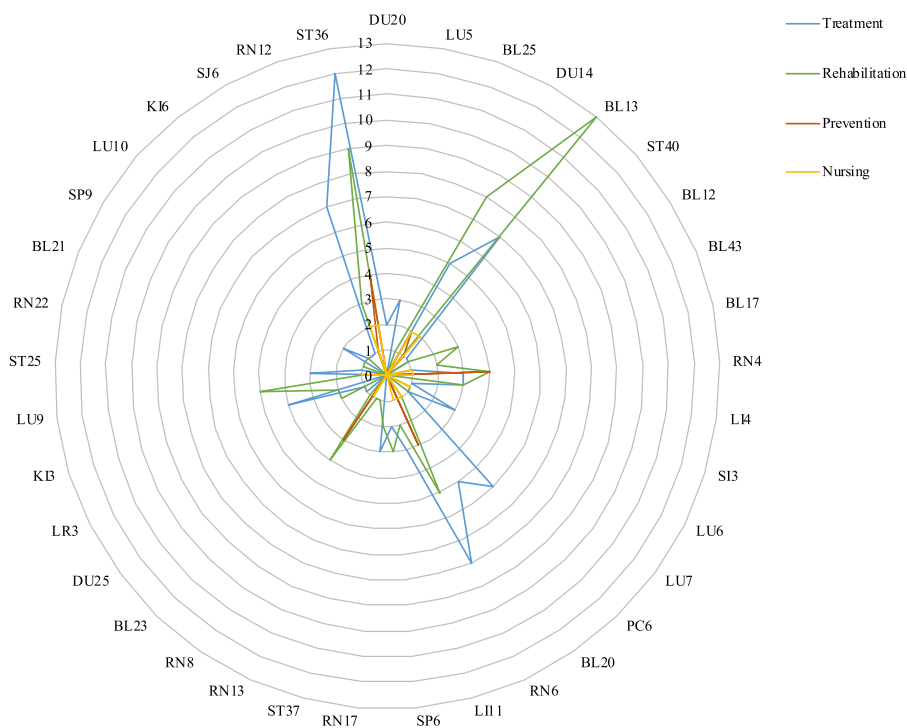


Fig. 3. The frequency of recommended acupoints.

3.4. Systematic reviews and the protocols

There was one qualitative systematic review, one scoping review and 20 protocols of systematic review included in this study (Supplement 3). The two reviews¹⁸⁻¹⁹ both concluded that acupuncture could improve the symptoms of COVID-19 patients, and one of which found that acupuncture could also relieve the negative emotions to improve the health status.¹⁸ More details about the two reviews are in Table 3. All of the protocols were published by Chinese researchers in *Medicine*. Half of them planned to explore the effect of symptomatic treatment, including nasal congestion,²⁰ abdominal pain,²¹ diarrhea,²² headache,^{23,25,31} anorexia,²⁴ breathlessness³⁷ and anxiety^{28,39}. The remaining 10 protocols^{26-27,29-30,32-36,38} focused on the efficacy and safety of acupuncture and moxibustion. However, these registered systematic reviews have not yet been published. More information about the included protocols is in Table 4.

3.5. RCTs and nonrandomized studies of the effects of interventions (NRSIs)

There were six RCTs, three self-controlled trials and one non-randomized clinical trial included (Supplement 3), and they were all published by Chinese researchers. The intervention group used different ways of acupuncture and moxibustion, including Xizhiyanbing moxibustion,⁴¹ thunder fire moxibustion,⁴² thumb-tack needle,⁴³ fiery dragon cupping comprehensive moxibustion,⁴⁶ and filiform-fire needle,⁴⁹ with or without other Chinese medicine and routine western medicine. And the control group received corresponding conventional treatment,^{40-41,44-45} TCM decoction⁴² and sham needle,⁴³ etc. The outcomes these trials focused on were more about total clinical effective rate, TCM syndrome score, pulmonary function, clinical symptoms, as well as the depression and anxiety scores (Table 5). The results showed that acupuncture and moxibustion can improve the above outcomes of COVID-19

Table 1
The characteristics of the included studies (N=131).

	Items	Count, n (%)
Study type	Review	65 (49.6)
	SR protocol	20 (14.2)
	Guideline/consensus	18 (13.7)
	Case series	9 (6.9)
	Case report	7 (5.3)
	RCT/NRSI	10 (7.6)
	Qualitative systematic review	1 (0.8)
	Scoping review	1 (0.8)
Country	China	122 (93.1)
	United States	4 (3.1)
	Belgium	2 (1.5)
	Iran	1 (0.8)
	Indonesia	1 (0.8)
	Mexico	1 (0.8)
Language	Chinese	95 (72.5)
	English	36 (27.5)
Topic	Treatment	67 (51.1)
	Treatment & prevention	38 (29.0)
	Rehabilitation	11 (8.4)
	Prevention	7 (5.3)
	Rehabilitation & prevention	3 (2.3)
	Treatment & rehabilitation & prevention	2 (1.5)
	Comprehensive application	1 (0.8)
	Nursing	1 (0.8)
	Treatment & prevention & control	1 (0.8)

NRSI: nonrandomized studies of the effects of interventions; RCT: randomized controlled trial; SR: systematic review.

patients to some extent, but the findings were not always consistent. The detailed results and effect sizes are presented in Table 5.

3.6. Case series and case reports

There were 9 case series and 7 case reports included (Supplement 3), and their main results were outlined in Table 6. Almost all treatment methods have shown some effectiveness, especially for the clinical symptom improvements, such as anxiety and depression.^{54,60,62} Yet, limited to the type of studies, it cannot provide sufficient and strong evidence to support the application of acupuncture and moxibustion for treating COVID-19 patients.

3.7. Reviews

There were 65 literature reviews (Supplement 3), and most of them focused on the effect of treatment (89.2%) and prevention (67.7%) of acupuncture and moxibustion in COVID-19 patients. We concluded the main topics of included reviews focused on.???

Table 3
The information of included systematic reviews.

Study ID	Study type	First author's country	Included studies	Participants	Intervention	Comparison	Main results
Badakhsh M (2021) ¹⁸	Qualitative systematic review	Iran	1 retrospective cohorts, 1 case series and 1 case report	COVID-19 patients	Acupuncture	NA	Reduce the negative emotions, improve symptoms (such as chest distress, shortness of breath, and dull pain in epigastric region, etc.) and regain the consciousness.
Chen C (2021) ¹⁹	Scoping review	China	7 case reports, 6 observational studies, 1 review, 1 RCT and 1 nonrandomized clinical trial	COVID-19 patients	Acupuncture with other interventions	NA	Acupuncture can relieve the symptoms of COVID-19 patients, shorten the length of hospital stay, and is effective for elderly patients with serious illnesses. But there is a lack of high-quality clinical trials.

NA: Not available.

Table 2
The information of recommendations on acupuncture and moxibustion applied in COVID-19 patients.

	Item	Count, n (%)
Number of recommendations	Guideline	17 (36.2)
	Consensus	30 (63.8)
Topic	Treatment	21 (44.7)
	Rehabilitation	17 (36.2)
	Prevention	6 (12.8)
	Nursing	3 (6.4)
Intervention methods	Acupuncture	23 (48.9)
	Moxibustion	42 (89.4)
Frequency of acupuncture or moxibustion	Once a day	23 (48.9)
	Twice a day	2 (4.3)
	Once every 1-2 days	3 (6.4)
	Once every 3-5 days	1 (2.1)
	Not reported	18 (38.3)
Whether to provide the acupoints	Yes	45 (95.7)
	No	2 (4.3)
Whether to describe the settings	Yes	10 (21.3)
	No	37 (78.7)
Whether to describe the matters needing attention	Yes	16 (34.0)
	No	31 (66.0)
Grading of quality of evidence	Yes	2 (4.3)
	No	45 (95.7)
Grading of strength of recommendations	Yes	2 (4.3)
	No	45 (95.7)

3.7.1. Mechanisms

Some reviews⁶⁵⁻⁷⁰ analyzed the possible mechanism of acupuncture and moxibustion, and revealed that acupuncture can prevent and treat COVID-19 by inducing anti-inflammatory responses, regulating immune function, protecting damaged organs, exerting bactericidal and antibacterial effects. Specifically, (1) acupuncture can regulate the number of immune cells, such as lymphocytes and natural killer cells, and it can also activate the vagal cholinergic anti-inflammatory pathway and hypothalamic-pituitary-adrenal axis to induce anti-inflammatory responses to play a role in rapid and precise inflammation and immune regulation.^{65,69-70} (2) Moxibustion can protect liver and kidney function by improving the circulation and metabolic function of the body and accelerating the removal of free radicals in the kidney. Severe patients are prone to a "cytokine storm", and acupuncture can protect internal organs by activating the vagus nerve.⁶⁶⁻⁶⁹

3.7.2. Feasibility analysis

Some reviews^{11,71-79} analyzed the feasibility of acupuncture for COVID-19 from the following perspectives: (1) the characteristics of acupuncture. Acupuncture is cheap and simple to perform, which is beneficial for enhancing immunity in susceptible groups, as

Table 4
The information of included protocols of systematic review.

Study ID	Registration number	Included studies	Participant	Intervention	Comparison	Outcome
Dong Z (2022) ²⁰	CRD42021299482	RCT	COVID-19 patients with recorded nasal congestion lasted for 1 week or more	Acupuncture with COVID-19 treatment	Comfort therapy or other therapies	The frequency of nasal congestion, duration of nasal congestion, the degree of nasal congestion, quality of life
Li X (2022) ²¹	INPLASY2021120104	RCT	COVID-19 patients with abdominal pain lasting 2 weeks or longer	Moxibustion (direct moxibustion, separated moxibustion, moxibustion therapy, warm moxibustion, indirect moxibustion) with COVID-19 treatment	Other treatment without moxibustion	Abdominal pain frequency, abdominal pain intensity, duration of abdominal pain, duration of use of painkillers, quality of life, adverse events
Liu N (2022) ²²	CRD42022302933	RCT	COVID-19 patients with diarrhea lasting 4 weeks or longer	Moxibustion, herb partitioned moxibustion, moxibustion with amugwort stick, or ormoxa cone moxibustion with COVID-19 treatment	Comfort therapy or other therapies	The Bristol score, number of bowel movements, quality of life, associated symptoms of diarrhea, adverse events
Luo W (2022) ²³	CRD42021265699	RCT	COVID-19 patients suffering from headache and/or olfaction and/or taste disorders	Acupuncture, electro-acupuncture, auricular acupuncture, or laser acupuncture with COVID-19 treatment	Comfort therapy or other therapies	Relevant indicators of headache, olfaction disorders, taste impairment, adverse events
Wang X (2022) ²⁴	CRD42022302499	RCT	COVID-19 patients with anorexia	Moxibustion therapies (including moxa stick moxibustion, moxa cone moxibustion, direct moxibustion, and indirect moxibustion)	NR	Effective rate of clinical symptoms, body weight, food intake on the gastrointestinal symptom rating scale (GSRS total score), the incidence of nausea and adverse events
Sun M (2021) ²⁵	CRD42021270722	RCT	COVID-19 patients with headache of 4 weeks duration or longer	Acupuncture, electro-acupuncture, auricular acupuncture, or laser acupuncture with COVID-19 treatment	Comfort therapy or other therapies	Headache frequency, headache intensity, duration of headache, times of using painkiller, quality of life, adverse events
Xia Q (2021) ²⁶	CRD42020225245	RCTs and credible clinical observations	Elderly patients (≥ 60 years) diagnosed with COVID-19	Acupuncture, moxibustion, electroacupuncture, fire needle, warming needle moxibustion, acupoint injection or auricular therapy	Any method other than acupuncture	Mortality rate, cure rate, CRP, creatine, troponin, aspartate aminotransferase, alanine aminotransferase, improvements in chest CT scans, the disappearance time of clinical symptoms and the side effects
Zhou Y (2021) ²⁷	CRD42021230364	RCT	Patients who were diagnosed with COVID-19 convalescence	Moxibustion alone, or combined with other kinds of therapies	Other treatment without moxibustion	The time of disappearance of main symptoms, reexamination of chest X-ray, white blood cell count, associated symptoms disappear rate, negative COVID-19 results rate, quality of life, occurrence rate of common type to severe form, clinical cure rate, mortality, adverse events
Jia H (2020) ²⁸	CRD42020190153	RCTs and observational trials	COVID-19 patients with anxiety	Acupuncture and related interventions treatment	Sham acupuncture, routine care, or conventional therapy	Therapeutic effects, the adverse effects and adverse events, the safety of physicians
Chen Y (2020) ²⁹	CRD42020180875	RCT	COVID-19 patients	Acupuncture (combined with other treatments, such as routine therapy, etc.)	Other therapeutic approaches other than acupuncture	The influence of acupuncture on chest CT and nucleic acid detection of respiratory samples, accompanying symptoms

(continued on next page)

Table 4 (continued)

Study ID	Registration number	Included studies	Participant	Intervention	Comparison	Outcome
Chi W (2020) ³⁰	CRD42020206889	RCT	COVID-19 patients who use a ventilator during treatment	Acupuncture (combined with other treatments, such as respiratory rehabilitation training, routine therapy, etc.)	Other therapeutic approaches other than acupuncture	MIP, MEP, MIP/MEP, PaO ₂ /FiO ₂ , blood oxygen saturation, FEV1, FVC, FEV1/FVC, Borg scale scores, adverse events, changes of patient's condition
Gao W (2020) ³¹	CRD42020199508	RCTs and trials with 2-arm or 3-arm parallel design	Patients with headache induced by COVID-19	Plum-blossom needle therapy	Western medicine therapy	The time and rate of appearance of headache, the length of hospital stay
Huang K (2020) ³²	CRD42020189494	RCTs and credible clinical observations	COVID-19 patients	Acupuncture therapy	Interventions including western medicine	Mortality rate, CRP, creatine, troponin, liver enzymes, blood pressure, clinical symptoms, serum cytokine levels, diverse events
Liu M (2020) ³³	CRD42020193703	RCTs and credible clinical observations	COVID-19 patients	Fire needle alone or combined with one or more other pharmacological intervention	Standard care, western medical therapies, Chinese medicine, etc.	Conversion rate from normal to severe, cure rate, mortality rate, Chest CT scans, nucleic acid detection of respiratory samples, accompanying symptoms disappear rate, cellular inflammation level, average hospitalization time, adverse reactions
Wang Z (2020) ³⁴	CRD42020211910	RCTs, non-RCTs, and clinical case reports	COVID-19 patients	moxibustion alone or combined with other kinds of therapies	Any kind of treatment without moxibustion	Total clinical effective rate, antipyretic time, cough duration, rhombus disappearance time, imaging transition time, serum CRP level after treatment
Wen D (2020) ³⁵	CRD42020183736	RCT	COVID-19 (≥16 years old)	Acupuncture therapy (including manual acupuncture, body acupuncture, electroacupuncture, plum blossom needle, warm needling, and fire needling)	Sham acupuncture, placebo, usual care, medication, no treatment, and other conventional therapies	Timing of the disappearance of the main symptoms, serum cytokine levels, timing of the disappearance of accompanying symptoms, negative COVID-19 results rates, CT image improvement, average hospitalization time, occurrence rate of common type to severe form, clinical cure rate, mortality
Wu L (2020) ³⁶	CRD42020181336	RCT	COVID-19 patients	The external treatment of TCM (such as, acupuncture, massage, etc.)	Treatments other than the external treatment of TCM	Efficacy, accompanying symptoms disappear rate, average hospitalization time, occurrence rate of common type to severe form, clinical cure rate, mortality
Zhang B (2020) ³⁷	CRD42020182323	RCT	COVID-19 patients with breathlessness	Acupuncture (combined with other treatments, such as routine therapy, etc.)	Other therapeutic approaches other than acupuncture	Visual analogue scale, numerical rating scale, the Borg Scale
Zhang Q (2020) ³⁸	CRD42020185776	RCT	COVID-19 patients	Acupuncture alone or moxibustion alone or both of the two treatments	Western medicine, placebo or regular treatment	The total clinical effective rate, antipyretic time, cough duration, rhombus disappearance time, imaging transition time, serum CRP after treatment, adverse events
Zhang Y (2020) ³⁹	CRD42020202258	RCT	COVID-19 patients with anxiety	Acupuncture (including warm acupuncture, electroacupuncture, scalp-acupuncture, hydroacupuncture, and manual acupuncture)	Any kinds of treatments except acupuncture	Hamilton Anxiety Scale (HAM-A), The Liebowitz Social Anxiety Scale (LSAS), (modified) Barthel index (MBI), side effect or adverse event

CRP: C-reactive protein level; FEV1: forced expiratory volume in 1 second; FiO₂: fraction of inspired oxygen; FVC: forced vital capacity; MEP: maximum expiratory pressure; MIP: maximum inspiratory pressure; NR: not reported; PaO₂: arterial partial pressure of oxygen; TCM: traditional Chinese medicine.

Table 5
The information about RCTs and NRSIs.

Study ID	Study type	Participants	Count (in- tervention/ control)	Intervention	Control	Outcome	effect size (intervention vs. control)
Zhao H (2022) ⁴⁰	RCT	Discharged COVID-19 patients	27/28	Mild moxibustion + conventional intervention	Conventional intervention	TCM syndrome score ($\bar{x}\pm s$) Self-rating anxiety score ($\bar{x}\pm s$) Depression self-assessment score ($\bar{x}\pm s$)	before treatment: 223.59±67.65 vs. 231.10±70.44, $P>0.05$; treatment after 2 weeks: 70.04±33.83 vs. 230.71±70.36, $P<0.05$; return visit: 69.63±33.26 vs. 227.60±68.89, $P<0.05$ before treatment: 39.93±9.94 vs. 40.03±9.96, $P>0.05$; treatment after 2 weeks: 34.81±8.12 vs. 39.79±9.77, $P<0.05$; return visit: 33.89±8.10 vs. 39.21±9.44, $P<0.05$ before treatment: 37.67±9.72 vs. 37.79±9.67, $P>0.05$; treatment after 2 weeks: 36.22±9.52 vs. 37.46±9.52, $P>0.05$; return visit: 33.44±9.74 vs. 37.32±9.51, $P<0.05$
Zhu J (2022) ⁴¹	RCT	COVID-19 patients	31/33	Xizhiyanbing moxibustion + conventional management	Conventional discharged management	Positive rate of IgG and IgM (%) Nucleic acid positive rate (%)	IgG: 96.8% vs. 75.8%, $P<0.05$; IgM: 9.7% vs. 39.4%, $P<0.05$ blood: 3.2% vs. 27.3%, $P<0.05$; nasopharyngeal swab: 16.1% vs. 51.5%, $P<0.05$; anal swab: 6.5% vs. 33.3%, $P<0.05$ 83.33% vs. 60.00%, $P<0.05$
Li C (2022) ⁴²	RCT	Children with COVID-19 (7–17 years old)	30/30	Thunder fire moxibustion + Qingfeipaidu decoction	Qingfeipaidu decoction	Total clinical effective rate (%) TCM syndrome score ($\bar{x}\pm s$) Disappearance rate of symptom (%) Ig level ($\bar{x}\pm s$, g/L)	before treatment: 21.37±3.65 vs. 20.89 ±3.53, $P>0.05$; after treatment: 7.79 ±2.31 vs. 11.47±3.26, $P<0.01$ fever: 100.00% vs. 83.33%, $P>0.05$; cough and expectoration: 83.33% vs. 40.00%, $P<0.01$ before treatment: IgG: 11.15±2.28 vs. 11.23±2.87, IgA: 1.70 ±0.64 vs. 1.72 ±0.86, IgM: 1.14 ±0.31 vs. 1.11 ±0.32, $P>0.05$; after treatment: IgG: 13.71±2.04 vs. 12.57±2.13, IgA: 2.40 ±0.47 vs. 2.14 ±0.52, IgM: 1.62 ±0.33 vs. 1.39 ±0.36, $P<0.05$
Luo Z (2022) ⁴³	RCT	COVID-19 convalescents	25/25	Thumb-tack needle	Sham thumb-tack needle	TCM syndrome score [M(IQR)] Hamilton anxiety scale (HAMA) score ($\bar{x}\pm s$) Hamilton depression scale (HAMD) score ($\bar{x}\pm s$) Pulmonary function ($\bar{x}\pm s$) Lung shadow area [M(IQR), mm ²]	before treatment: 30(5.5) vs. 29(6.0), $P>0.05$; after treatment: 7(10.0) vs. 13(4.0), $P<0.05$ before treatment: 14.49±5.96 vs. 15.01±4.43, $P>0.05$; after treatment: 4.54±3.60 vs. 10.62±4.17, $P<0.05$ before treatment: 12.36±4.17 vs. 13.02±5.27, $P>0.05$; after treatment: 3.85±4.26 vs. 9.48±3.08, $P<0.05$ before treatment: FVC/L: 2.44±0.26 vs. 2.57±0.29, FEV1/L: 1.88±0.33 vs. 1.90±0.35, PEF/L·s ⁻¹ : 4.35±0.47 vs. 4.28±0.43, $P>0.05$; after treatment: FVC/L: 3.27±0.32 vs. 2.84±0.28, FEV1/L: 2.64±0.27 vs. 2.21±0.23, PEF/L·s ⁻¹ : 6.15±0.36 vs. 5.33±0.31, $P<0.05$ before treatment: 245.60(154.20) vs. 268.00(214.20), $P>0.05$; after treatment: 24.10(56.24) vs. 80.30(156.27), $P<0.05$

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Table 5 (continued)

Study ID	Study type	Participants	Count (intervention/control)	Intervention	Control	Outcome	effect size (intervention vs. control)
Zeng L (2021) ⁴⁴	RCT	COVID-19 close contacts	102/62	Moxibustion combined with Daiwenjiu plaster	Conventional observation	Self-reporting questionnaire 20 (SRQ-20) scores ($\bar{x}\pm s$) Self-rating anxiety scale (SAS) scores ($\bar{x}\pm s$)	before treatment: 4.61±4.23 vs. 6.16±4.91, $P>0.05$; after treatment: 3.85±3.83 vs. 5.60±4.54, $P<0.05$; follow-up: 2.91±3.53 vs. 5.24±4.63, $P<0.01$ before treatment: 44.01±9.33 vs. 45.12±10.35, $P>0.05$; after treatment: 42.72±7.53 vs. 43.89±10.06, $P>0.05$; follow-up: 39.95±7.44 vs. 43.06±12.23, $P>0.05$
Liu L (2020) ⁴⁵	RCT	COVID-19 patients	45/50	Moxibustion + western medicine	Routine treatment of western medicine	Clinical symptom scores ($\bar{x}\pm s$) Clinical symptom remission rates ($\bar{x}\pm s$) Peripheral blood inflammatory index (Difference before and after treatment, $\bar{x}\pm s$) Absolute number of T lymphocyte subsets (Difference before and after treatment, $\bar{x}\pm s$, / μL)	before treatment: cough: 1.76±0.48 vs. 1.74±0.53, chest tightness: 1.53±0.59 vs. 1.54±0.54, wheezing: 1.47±0.94 vs. 1.46±0.76, shortness of breath: 1.44±1.06 vs. 1.48±0.50, $P>0.05$; after treatment: cough: 0.38±0.53 vs. 1.26±0.69, chest tightness: 0.67±0.52 vs. 1.10±0.72, wheezing: 0.29±0.59 vs. 0.76±0.89, shortness of breath: 0.71±0.66 vs. 0.78±0.51, $P<0.05$ cough: 79.63±29.49 vs. 29.00±36.58, $P<0.05$; chest tightness: 53.33±40.45 vs. 24.29±49.96, $P<0.05$; wheezing: 85.47±26.81 vs. 53.33±45.00, $P<0.05$; shortness of breath: 49.05±35.23 vs. 43.00±40.41, $P>0.05$ WBC Count/ $\times 10^9\cdot\text{L}^{-1}$: 2.64±3.08 vs. 2.14±3.05, $P>0.05$; CRP/ $\text{mg}\cdot\text{L}^{-1}$: -25.60±27.07 vs. -14.74±43.42, $P>0.05$; IL-6/ $\text{pg}\cdot\text{mL}^{-1}$: -23.47±25.10 vs. -3.79±27.11, $P<0.05$ CD3 ⁺ : 410.67±533.87 vs. 4.08±381.24, $P<0.05$; CD4 ⁺ : 290.22±321.32 vs. -4.94±249.84, $P<0.05$; CD8 ⁺ : 129.96±233.44 vs. 20.42±146.56, $P<0.05$
Dou M (2021) ⁴⁶	Self-controlled trial	COVID-19 patients	16/16	Fiery dragon cupping comprehensive moxibustion	NA	Total clinical effective rate (%)	cough: 87%; shortness of breath: 85%
Tao D (2021) ⁴⁷	Non-randomized clinical trial	COVID-19 convalescents	31/31	Moxibustion + oral Chinese medicine	Oral Chinese medicine	TCM syndrome score ($\bar{x}\pm s$) Total clinical effective rate (%) 6 minute walk distance, 6MWD ($\bar{x}\pm s$, m) Pulse oxygen saturation (SpO ₂) level ($\bar{x}\pm s$, %) St. George's respiratory questionnaire (SGRQ) scores ($\bar{x}\pm s$)	before treatment: 10.10±2.88 vs. 9.71±2.64, $P>0.05$; after treatment: 2.94±1.79 vs. 4.03±2.01, $P<0.05$ 96.77% vs. 80.65%, $P<0.05$ before treatment: 440.32±16.52 vs. 445.67±19.86, $P>0.05$; after treatment: 496.40±19.55 vs. 486.33±18.80, $P<0.05$ before treatment: 88.89±2.33 vs. 88.48±2.28, $P>0.05$; after treatment: 94.97±2.17 vs. 93.42±2.26, $P<0.05$ before treatment: 48.82±4.38 vs. 49.37±3.86, $P>0.05$; after treatment: 42.11±5.82 vs. 45.73±6.54, $P<0.05$

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Table 5 (continued)

Study ID	Study type	Participants	Count (intervention/control)	Intervention	Control	Outcome	effect size (intervention vs. control)
Dong S (2020) ⁴⁸	Self-controlled trial	COVID-19 patients with diarrhea	36/36	Moxibustion	NA	Syndrome scores of diarrhea ($\bar{x}\pm s$) Total clinical effective rate (%) Cure rate (%) Nucleic acid negative conversion ratio (%)	1.26±0.15 vs. 4.87±0.41, $P<0.05$ 97.2% 69.4% 86.1%
Luo Z (2022) ⁴⁹	Self-controlled trial	COVID-19 convalescents	33/33	Filiform-fire needle	NA	TCM syndrome score [M(IQR)] Hamilton anxiety scale (HAMA) score ($\bar{x}\pm s$) Hamilton depression scale (HAMD) score ($\bar{x}\pm s$) Pulmonary function ($\bar{x}\pm s$) Lung shadow area [M(IQR), mm ²] Total clinical effective rate (%)	25.0(4.0) vs. 4.0(6.0), $P<0.05$ 16.28±4.11 vs. 6.04±2.73, $P<0.05$ 14.69±3.80 vs. 5.77±3.02, $P<0.05$ FVC/L: 2.74±0.35 vs. 3.51±0.29; FEV1/L: 2.02±0.41 vs. 2.83±0.22; PEF/L.s ⁻¹ : 5.15±0.63 vs. 6.28±0.44, $P<0.05$ 16.88(40.65) vs. 143.77(83.21), $P<0.05$ 84.0%

FEV1: forced expiratory volume in 1 second; FVC: forced vital capacity; NA: Not Available; PEF: peak expiratory flow; TCM: Traditional Chinese Medicine; WBC: white blood cell.

acupuncture can be performed at home during the epidemic.^{11,72} (2) Rich experience against the epidemic. Acupuncture has been used in the treatment of infectious diseases for a long time and has been recorded in some classics and literature.⁷⁵⁻⁷⁷ (3) Effective symptomatic treatment. Acupuncture has good efficacy in reducing fever, relieving cough and phlegm, alleviating digestive symptoms, promoting lung function, and improving the emotions.^{74-75,78-79}

3.7.3. Hypothesis and discussion on proposed methods for prevention and treatment

Some reviews introduced and analyzed the origin of acupuncture therapies for the application of acupuncture and moxibustion in COVID-19,⁸⁰⁻⁸⁴ the principles of acupoint selection and the characteristics of SARS-CoV-2 and COVID-19 to explore individual and common ideas for the prevention and treatment of the disease and to provide directions for future clinical trials.⁸⁵⁻⁸⁸

The above reviews included the experts' experience and precious suggestions, and provided some useful researches, which may provoke extensive and deep thinking among readers. However, the scientificity, credibility and implementability of interventions proposed by those studies still need to be higher quality clinical trials to be proved.

4. Discussion

This scoping review found that the types of included studies were mainly reviews, case series and case reports, and there were a lack of clinical studies, systematic reviews and meta-analyses. From 1 January 2020 to 1 April 2022, there were 20 published protocols for systematic reviews, but no formal studies have been published thus far through systematic retrieval, which showed the contradiction between the need for high-quality clinical trials, synthetic evidence and the current researches. The conduct of clinical

trials was limited by the high demand for clinical experts during the epidemic. They didn't have enough time and energy to conduct large clinical trials due to the urgent need for treating patients and controlling the epidemic. Obviously, the lack of original studies made some systematic reviews and meta-analyses hard to conduct, which led to the withdrawal of some protocols.⁸⁹⁻⁹⁰ In addition, one key point that we cannot ignore is the feasibility of acupuncture. During the COVID-19 epidemic, under the huge pressure of controlling the spread of SARS-CoV-2 and preventing new infections, acupuncture was difficult to implement in the clinic because of its invasive nature. Therefore, more attention needs to be paid to balance the priority between the prevention and control of epidemics and the conduct of original clinical trials.

Recommendations of clinical practice guidelines are a key element in guiding clinical decision-making, and the development of recommendations requires to systematically search the available evidence.^{15,91} But in this review, we found that most of the recommendations on acupuncture and moxibustion of included guidelines and consensus were based on the experts' experience and opinions, and lacked details of operation process, which was hard to transform into the clinical practice and was difficult to convince international researchers and clinical practitioners of the effectiveness and safety of acupuncture and moxibustion in COVID-19 patients.

Almost all included systematic reviews and clinical trials showed the positive effects of acupuncture and moxibustion, but these studies rarely reported adverse events or side effects, and the interventions were often acupuncture combined with other treatment methods (such as routine western treatment and other Chinese medicine, etc.), so the results may exaggerate the effectiveness of acupuncture and moxibustion. Furthermore, there were more limitations of the included studies, for instance, the sample

Table 6
The information of included case series and case reports.

Study ID	Study type	First author's country	Number of cases	Number (male/female)	Age/years old (X, range)	Intervention methods	Main results
Yin X (2021) ⁵⁰	case series	China	17	8/9	24.8, 41–81	Acupuncture + Chinese medicine + basic treatment	14 patients were discharged, and 3 patients were converted from moderate to critical.
Gong Y (2021) ⁹	case series	China	33	8/25	59, 13–84	Acupuncture + basic treatment	33 patients were cured and discharged with significant improvement in symptoms, no adverse reactions or complications from acupuncture-assisted treatment, and no risk of occupational exposure.
Wang H (2021) ⁵¹	case report	China	3	3/0	77, 66–85	Intradermal acupuncture + western medicine	Three patients were discharged with significant symptom relief, normal inflammatory indexes and absorbed lung lesion.
Ma C (2021) ⁵²	case series	China	18	12/6	NR, 6–64	Moxibustion + modified Wuye Lugan Decoction	Symptoms of all patients have improved.
Zhou H (2021) ⁵³	case series	China	41	26/15	47.8, 17–76	Moxibustion + Chinese medicine	The total effective rate of treatment was 87.8%, and the symptoms improved significantly. 39 patients had negative nucleic acid after 2 weeks of treatment.
Li W (2021) ⁵⁴	case series	China	8	2/6	NR, 34~73	Acupuncture	The efficiency of acupuncture in treating COVID-19 patients with psychological stress disorder was 87.50%.
Yin X (2021) ⁵⁵	case report	China	1	0/1	81, NA	Acupuncture + Chinese herbal medicine + standard care	Discharged from hospital on day 24 with improved symptoms.
Cheng SI (2021) ⁵⁶	case report	USA	1	0/1	37, NA	Acupuncture + cupping	Patients recovered within a week without hospitalization.
Yeh BY (2021) ⁵⁷	case report	China	1	1/0	73, NA	Acupuncture + western medicine	Acupuncture shows benefit in COVID-19 patients with hypoxic-ischemic encephalopathy after cardiopulmonary resuscitation.
Liu L (2020) ⁵⁸	case report	China	1	0/1	67, NA	Acupuncture + Chinese medicine	Discharged with improved symptoms.
Zhang X (2020) ⁵⁹	case series	China	7	4/3	35.7, 22–50	Chinese and western medicine (moxibustion as adjuvant therapy)	Seven patients were discharged after 14 to 35 days of treatment with negative nucleic acid conversion.
Wang M (2020) ⁶⁰	case series	China	7	4/3	39.0, 31–52	Chinese and western medicine (moxibustion as adjuvant therapy)	Three patients were cured and four patients improved, with an efficiency of 100%.
Chen X (2020) ⁶¹	case series	China	192	NR	NR	Indirect moxibustion	43 health care workers did not develop infections; 149 patients showed some improvement in symptoms and psychological status.
Huang X (2020) ⁶²	case series	China	42	28/14	47.0, 29–76	Heat-sensitive moxibustion + conventional treatment	Heat-sensitive moxibustion can effectively reduce the negative emotions of patients and improve the symptoms of chest tightness with high patient acceptance.
Gong Y (2020) ⁶³	case report	China	2	0/2	76.5, 72–81	Acupuncture + oral administration of "Shanghai leishen No.1 formula"	Two patients were discharged from the hospital after about 1 to 3 months of treatment.
Tao L (2020) ⁶⁴	case report	China	1	0/1	64, NA	Acupuncture + basic treatment	After 10 days of treatment, the patient's lung lesions were significantly absorbed and the nucleic acid converted negative.

NA: Not available; NR: Not reported.

sizes of included clinical trials were limited and the majority of participants were Chinese, both of which could weaken the extrapolation of study conclusions. Thus, more high-quality, multicenter clinical trials with large sample sizes are still needed to validate the efficacy and safety of acupuncture and moxibustion in the treatment of COVID-19.

This scoping review summarized the main characteristics and results of current studies, and analyzed the protocols to describe more details about the future researches, which can provide reference for relevant researchers and clinicians to conduct more meaningful researches and practices. However, this study also has some limitations. Firstly, we don't include the comments and basic researches, which may provide some references for relevant researchers. Secondly, we don't assess the quality of included studies, which can influence the credibility of results. For example, some studies have obvious weakness in study design. Thirdly, we are not able to classify the specific purposes (such as symptomatic treatment and immunity boosting, etc.) of recommended acupoints because of the limited information provided by the recommendations. Finally, we excluded the studies published in languages other than Chinese and English, which may miss some important studies.

There are some suggestions for future research: (1) Develop and report the clinical practice guideline following the evidence-based methodologies and guidance tool,⁹²⁻⁹³ and describe more details of recommendations, especially for the operation process of acupuncture and moxibustion; (2) Implement more high-quality, multicenter clinical trials with large sample sizes; (3) Explore the effect of acupuncture and moxibustion on prevention and rehabilitation of COVID-19 patients.

5. Conclusion

This study showed that acupuncture and moxibustion works well in the treatment of COVID-19 patients to a certain extent, but more high-quality of clinical trials are still needed to support the clinical use of acupuncture and moxibustion in COVID-19 patients.

Author contributions

Chen Y and Ni X designed the study, oversaw the study implementation and responsible for quality control. Ren M and Liu Y drafted the article, extracted, and analyzed the data. Ni X conceived the manuscript, interpreted the results from the perspective of Chinese medicine theory and practice, and revising the manuscript. Kuang Z, Zhang Y, and Li H, searched the literature, and assessed the studies from the perspective of acupuncture theory and practice. Xufei Luo interpreted the studies from the perspective of methodology. All authors critical reviewed the manuscript and approved the submission.

Conflict of interests

Y Chen is an editorial board member of the journal but his editorial board membership status had no bearing on the editorial process or decision. The authors declare no other conflict of interests.

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Ethical Statement

Not applicable.

Data availability

The dataset supporting the conclusions of this article is included within the article.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.imr.2022.100886](https://doi.org/10.1016/j.imr.2022.100886).

Supplement 1: PRISMA-ScR checklist. Supplement 2: Search strategies of databases. Supplement 3: Checklist of included studies.

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