Universe International Journal of Interdisciplinary Research
(International Peer Reviewed Refereed Journal)
DOI No. – 08.2020-25662434

© UIJIR | ISSN (O) – 2582-6417
FEB 2024 | Vol. 4 Issue 9
www.uijir.com

ROLE OF ACUPUNCTURE IN THE MANAGEMENT OF ACUTE & LONG COVID-19 SYMPTOMS: A NARRATIVE REVIEW

Author's Name: Junaidul Mubarak M[1], Nimeesha M J[2], Balagovind T P[3]

Affiliation:

1. Assistant Professor, Department of Naturopathy & Yogic Sciences, Indira Gandhi Technological and Medical Sciences University, Ziro, Arunachal Pradesh, India.
2. Assistant Professor, Department of Naturopathy & Yogic Sciences, Indira Gandhi Technological and Medical Sciences University, Ziro, Arunachal Pradesh, India.
3. PG Scholar, Department of Clinical Yoga, Alvas College of Naturopathy & Yogic Sciences, Moodbidri, D. K. Dist., Karnataka, India.

Corresponding Author Name & E-Mail: Dr. Junaidul Mubarak M,

drjunaidulmubarak@gmail.com

DOI Link :: https://doi-ds.org/doilink/03.2024-73842662/UIJIR

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FEB 2024 | Vol. 4 Issue 9
www.uijir.com

ABSTRACT

BACKGROUND Acupuncture, originating over 3000 years ago in China, operates on the principle of balancing the body's energy, or qi, through stimulating specific points along meridians. Despite its ancient roots, acupuncture has gained modern acceptance for its ability to complement conventional medicine and promote overall well-being. Acupuncture's capacity to regulate the autonomic nervous system may alleviate symptoms common in COVID-19 patients, such as headache and anxiety. Its anti-inflammatory effects, achieved by modulating neuropeptides and cytokines, are crucial in managing the inflammatory response, while enhancing immune function aids in fighting the virus. Given the multifaceted nature of COVID-19, acupuncture's ability to address various aspects of the disease, including autonomic nervous system (ANS) dysfunction, inflammation, and immune response, positions it as a potentially valuable adjunctive therapy. METHOD Online Databases such as PubMed, PubMed Central, Google Scholar, Scopus, Cochrane Library, and BioMed Central (BMC) are searched for articles. A total of 21,876 references from 01st Jan 2020 until 01st February 2024, were found through the search. The papers which satisfied the inclusion criteria after removing the duplicates were selected. CONCLUSION Acupuncture shows promise in managing acute and long-term COVID-19 symptoms, particularly as adjunctive care. While generally well-tolerated with minimal side effects, more rigorous studies are needed to confirm its efficacy and explore its therapeutic potential further.

Keywords: Acupuncture, Traditional Chinese Medicine, Covid-19, Acute Covid-19 Symptoms, Long-Covid-19, and Post-Covid-Symptoms.

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INTRODUCTION

ACUPUNCTURE: A BRIEF OVERVIEW OF ITS HISTORY, THEORY, AND MECHANISMS

Acupuncture originated in China and has a historical lineage of more than 3000 years.(Zhuang, Xing, Li, Zeng, & Liang, 2013) Rooted in a holistic understanding of the body and its energy pathways,(Yang et al., 2014) acupuncture employs stimulation of specific points on the body, usually by insertion of fine needles to stimulate healing and restore balance in the flow of vital force or energy, also known as qi.(Vickers & Zollman, 1999) Acupuncture is based on the traditional theory that the human body is composed of a network of meridians, which are channels that have connection with the internal organs and transport qi. Acupoints are specific locations along the meridians, where qi can be accessed and regulated by stimulating them with needles or other methods.

According to acupuncture theory, diseases are caused by the imbalance or blockage of qi in the meridians, and acupuncture can restore the harmony and flow of qi, thereby improving the health and well-being of the individual.(Langevin & Yandow, 2002) Evidence suggests that acupuncture is effective for the treatment of chronic musculoskeletal pain.(Zhang & Wang, 2020) Recent studies also suggest that acupuncture can address not only musculoskeletal ailments but also chronic respiratory diseases.(Wei et al., 2022)

Acupuncture operates through various mechanisms. One theory suggests that acupuncture induces local mechano-transduction, initiating cellular responses that promote tissue healing and homeostasis. This involves cytoskeletal reorganization, growth factor release, and gene transcription, facilitating pain modulation and anti-inflammatory reactions. Neurohumoral theory proposes that acupuncture stimulates the release of endogenous substances like endorphins and neurotransmitters, offering analgesic effects. The gate-control theory posits that acupuncture blocks pain signals in the spinal cord, providing relief. Additionally, acupuncture influences the autonomous nervous system, regulating sympathetic and parasympathetic activity. The morphogenetic singularity theory correlates acupuncture points with embryonic organizing centres, suggesting a developmental basis for their efficacy.(Wong, 2010)

Despite its ancient origins, acupuncture has gained widespread recognition and acceptance in modern times.(Phutrakool & Pongpirul, 2022) Acupuncture has demonstrated its ability to complement conventional medical treatments and enhance overall well-being.(Vickers & Zollman, 1999)

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UNDERSTANDING COVID-19 AND ITS LONG-TERM EFFECTS

In the wake of the unprecedented global COVID-19 pandemic, healthcare systems worldwide have faced immense challenges in managing the virus's complex array of symptoms and sequelae.(Razu et al., 2021) As medical professionals continue to grapple with the evolving understanding of COVID-19 and its long-term effects, the importance of exploring adjunctive treatments to support patients' recovery and well-being has become increasingly evident.(Xu, Ong, & Wang, 2020)

COVID-19, stemming from the novel coronavirus Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), presents a diverse array of symptoms, which encompass fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body aches, headache, loss of taste or smell, sore throat, congestion or runny nose, as well as nausea, vomiting, and diarrhoea. It is imperative to note that this list may not encompass all potential symptoms, as the presentation of COVID-19 can evolve with the emergence of new variants and may vary based on an individual's vaccination status.(‘Symptoms of COVID-19 | CDC’, n.d.)

The SARS-CoV-2 virus enters the respiratory tract through droplets or aerosols and binds to ACE2 receptors on the cells. This triggers an immune response that causes inflammation, mucus production, and cell death. The virus can also damage the alveoli, which are the air sacs that exchange oxygen and carbon dioxide. This leads to fluid leakage, reduced lung capacity, and low blood oxygen levels. The condition worsens as the patient develops acute respiratory distress syndrome (ARDS), which can be fatal.(Parasher, 2021)

Various other complications related to COVID-19 are caused by multiple pathophysiological mechanisms that affect different organs and systems.(Trougakos et al., 2021) The intrusion of SARS-CoV-2 poses a significant disruption to our body's equilibrium, challenging its ability to maintain homeostasis, which can imbalances the electrolyte levels, blood pressure and fluid level.(Sieck, 2020) Impairment of the autonomic nervous system (ANS), which controls unconscious body functions, is also seen in severe illness resulting from SARS-CoV-2 infection.(Leitzke, Stefanovic, Meyer, Schimpf, & Schönknecht, 2020)

Beyond the acute phase of the illness, many survivors experience persistent symptoms, often referred to as "long COVID," Long COVID refers to persistent symptoms experienced by individuals’ weeks or months after recovering from SARS-CoV-2 infection, regardless of viral status. These symptoms, ranging from fatigue and breathlessness to neurological issues and reduced quality of life, can be continuous or relapsing. Diagnosis is challenging due to varying

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recovery times, asymptomatic cases, and unreliable testing. Risk factors include female gender, older age, and presence of multiple acute symptoms. The pathophysiology is multifaceted, potentially involving organ damage, chronic inflammation, immune response, and psychological factors. Management involves a thorough clinical evaluation, categorizing symptoms, and addressing potential complications.(Raveendran, Jayadevan, & Sashidharan, 2021)

ACUPUNCTURE IN THE CONTEXT OF COVID-19

One of the effects of acupuncture is its ability to regulate the activity of ANS. This effect of acupuncture can contribute to alleviate the various symptoms related to ANS dysfunction, including, headache, anxiety, depression and insomnia.(Y. W. Li et al., 2022) it's imperative to note that ANS dysfunction is prevalent among COVID-19 patients,(Leitzke et al., 2020) and acupuncture may help alleviate these symptoms, which are likewise common in individuals with COVID-19.(Sampaio Rocha-Filho, 2022; Wá Nkowicz, Szylí Nska, Rotter, Scarpelli, & Alfonsi, 2021)

Indeed, controlling the inflammatory response is paramount, potentially as crucial as directly addressing the virus itself.(Tay, Poh, Rénia, MacAry, & Ng, 2020) This is where acupuncture demonstrates its significance, offering anti-inflammatory effects through modulation of neuropeptides like substance P and cytokines such as interleukins.(Zijlstra, Van Den Berg-De Lange, Huygen, & Klein, 2003)

Acupuncture can also enhance the immune response and resistance to infections by regulating the innate and adaptive immune systems, as well as the neuroanatomical pathways.(Wang, Liu, Ge, & Liu, 2023) As the contribution of dysfunctional immune response in covid-19 is evident in its progression,(Tay et al., 2020) this aspect of acupuncture becomes particularly significant in assisting the body's fight against COVID-19.

Acupuncture's ability to modulate the autonomic nervous system,(Y. W. Li et al., 2022) reduce inflammation,(Zijlstra et al., 2003) and support immune function(Wang et al., 2023) aligns well with the multifactorial nature of COVID-19.

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AIM AND OBJECTIVES

AIM

To assess the role of acupuncture for the management of covid-19 and its long-term effects.

OBJECTIVES

1. To evaluate the efficacy of acupuncture in managing both acute and long-term symptoms of COVID-19
2. To explore the underlying mechanisms of acupuncture's effects on COVID-19 and long COVID-19 symptoms
3. To assess the safety of acupuncture in the treatment of COVID-19 and its long-term effects

METHOD

A comprehensive search was conducted across multiple online databases, including PubMed, PubMed Central, Google Scholar, Scopus, Cochrane Library, and BioMed Central (BMC), using keywords such as 'Acupuncture,' 'Traditional Chinese Medicine,' 'Covid-19,' 'Long Covid,' 'Post-covid,' and 'Covid-19 Sequelae.' The search spanned from January 1st, 2020, to February 1st, 2024, encompassing a total of 21,876 references.

The review primarily targeted experimental papers, case studies, and case series written in English, which explored the effects of acupuncture either as a standalone treatment or in combination with other therapies on COVID-19 and post-COVID syndrome. Studies not meeting these criteria or lacking accessible abstracts were excluded. After applying the inclusion and exclusion criteria and removing duplicate references, a subset of studies meeting the review's objectives was selected for the final analysis.

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RESULT

Table 1: provides a detailed overview of the articles included in the present study.

S.No.	Title of the article (Author, year)	Methodology	Variables	Result	Conclusion
1	Acupuncture helps to regain the consciousness of a COVID-19 patient complicated with hypoxic-ischemic encephalopathy: a case report(Yeh, Chen, Chang, Lee, & Chen, 2021)	A case study of 1 (One) patient treated with acupuncture and standard care. Acupuncture provided three times weekly for two weeks with duration of 30 minutes (each session)	The Glasgow Coma Scale (GCS)	Improvement in GCS	acupuncture showed benefits to improve the consciousness of a COVID-19 patient complicated with hypoxic ischemic encephalopathy.
2	Acupuncture or cupping plus standard care versus standard care in moderate to severe COVID-19 patients: An assessor-blinded, randomize d, controlle d trial (Alipour et al.,	An assessor blinded randomized trial with three groups: ACUG (Acupuncture + standard care), CUPG (Warm cupping + standard care), and a CTRG (Standard care only).	Evaluated SpO2, RR, ICU admission, intubation/death rates, and clinical symptoms including cough, dyspnoea, chest tightness,	Both acupuncture and warm cupping groups showed improved oxygen levels and faster recovery with fewer ICU	Acupuncture and cupping show potential as safe and effective treatment methods for COVID-19 management.

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	2022)		anorexia, headache, weakness, sore throat, and myalgia.	admissions than controls.	
3	Case of professor Xu ZOU's acupuncture technique for "benefiting kidney and strengthening anti-pathogenic qi" in promoting the absorption of COVID-19 (TAO, HUANG, ZHENG, & ZOU, 2020)	Case study of 1 (one) patient with COVID-19. Treatments includes acupuncture, moxibustion, Chinese herbal granules, and moxifloxacin. Acupuncture therapy was given consecutively for 10 days, once a day, and Chinese herbal granules were taken orally for 10 doses, one dose a day.	Assessed clinical symptoms, tongue/pulse changes, negative COVID test, and lung lesion absorption via CT scan.	Patient experienced symptom relief, improved tongue and pulse condition, negative COVID-19 test, and significant lung lesion absorption, meeting discharge criteria.	Acupuncture and Chinese herbal medicine, alongside conventional treatments, demonstrated promise in relieving symptoms, absorbing lung lesions, and expediting viral clearance.
4	Effect of transcutaneous electrical nerve stimulation of acupoints on respiratory outcomes of COVID-19	Three blind parallel randomized clinical trial. 84 Covid-19 patients equally randomized to two groups; Acu-	Oxygen saturation (SpO2), respiratory rate (RR), heart rate (HR) and the visual	Acu-TENS group shown significant improvement in SpO2 level. Both the groups	Acu-TENS can be used to improve SpO2 level as a respiratory outcome in patient with Covid-19.

DOI Link :: https://doi-ds.org/doilink/03.2024-73842662/UIJIR

	patients with moderate pulmonary involvement: A parallel randomized clinical trial (Shahdad et al., 2023)	TENS group and Control group.	analogue scale for dyspnoea (VASD).	couldn't display any significant effect in RR and HR.	
5	Medical Acupuncture as a Treatment for Novel COVID-19-Related Respiratory Distress: Personal Experience from a Frontline Anesthesiologist (Cheng, 2021)	Case study of 1 (one) covid-19 patient self-treated with dry cupping and Acupuncture needling as well as bleeding at acupuncture point. Duration of acupuncture needling was 30 minutes.	Clinical symptoms such as; pleuritic chest pain, shortness of breath with hypoxia, increased respiratory rate, dry cough, orthostatic hypotension .	After two days of treatment, all clinical symptoms were subjectively resolved, with the exception of anosmia, which showed signs of improvement during the course of treatment.	Traditional Chinese medicine, including acupuncture and cupping, may ease COVID-19 symptoms, necessitating innovative solutions like self-directed treatment and virtual teaching.

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6	Recovery of a patient with severe COVID-19 by acupuncture and Chinese herbal medicine adjuvant to standard care (Yin et al., 2021)	Case study of single covid-19 patient treated with integrated approach using conventional medicine, acupuncture and traditional herbal medicine.	Clinical symptoms & vital signs, blood tests and CT scan.	Patient experienced immediate relief in chest and abdominal tension, improved breathing, and relaxation. Vital signs improved, with negative PCR tests.	Acupuncture and Chinese herbal medicine could assist in managing severe COVID-19 cases, warranting integration into standard care, with further trials needed.
7	The Adjunctive Effects of Acupuncture for Hospitalized COVID-19 Patients: A Single-Blinded Randomized Clinical Study (Helianthi et al., 2022)	A single-blinded randomized controlled clinical trial with 11 participants in treatment group (pharmacologic medicines + acupuncture), and 11 participants in control groups (only pharmacologic treatment).	Clinical symptoms, laboratory tests (lymphocyte count, complete blood count, CRP, ESR, ferritin).	Acupuncture reduced cough duration significantly, with minor hematoma side effects. Post-intervention, treatment group showed improved lymphocyte count, ferritin, and	Combined acupuncture and pharmacologic treatments show promise in reducing cough duration in COVID-19 patients. Further research needed.

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				CRP levels.	
8	Two cases of corona virus disease 2019 (COVID-19) treated with the combination of acupuncture and medication in bedridden patients (Gong et al., 2020)	Two bedridden COVID-19 patients at Wuhan Leishenshan Hospital treated daily with acupuncture and chinese herbal decoction therapy.	Clinical symptoms of covid 19, Chest CT scan, Covid-19 RNA test	Symptom relief, improved recovery, negative COVID-19 RNA detection, and absorption of lung lesions on chest CT images.	Acupuncture combined with medication is effective in treating COVID-19.
9	Acupuncture as an Additional Method of Rehabilitation post-COVID-19: a randomized controlled trial (Omarova et al., 2023)	A total of 160 patients, assigned to either the Comprehensive Rehabilitation Measures (CRM) group or the CRM with acupuncture group.	Modified Medical Research Council Modified Dyspnoea Scale (MDS), Bartel index (BI), 6-minute walking test (6-MWT), and The Borg scale	Significant improvements observed in MDS and Borg RPE scale within both groups. Acupuncture group showed significant improvement in 6-MWT and BI scores.	Combining acupuncture with Comprehensive Rehabilitation Measures improved respiratory function, daily activity, and exercise tolerance in Post-COVID Condition patients, requiring further research.

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10	Acupuncture in multidisciplinary treatment for post-covid-19 syndrome (Trager, Brewka, Kaiser, Patterson, & Dusek, 2022)	A case study of 1 (One) patient. Acupuncture treatment combined with Conventional treatment and Physiotherapy care.	Patient symptoms such as; Fatigue, anosmia, chest pressure, and palpitation.	Chest pressure and palpitations improved after one acupuncture session; with six additional sessions overlapping Physiotherapist-led Symptom-titrated physical activity, full recovery occurred.	While acupuncture contributed to the patient's recovery, the specific impact of acupuncture as an isolated intervention remains less defined.
11	An integrative approach with Ayurveda and Traditional Chinese Acupuncture in post covid parosmia e A case (Bhat, Krishna Kumar, & Johnson, 2023)	A case study of 1 (one) Post viral olfactory dysfunction (PVOD) patient. The patient was treated using an integrative approach combining Ayurveda and Traditional Chinese	Indian Smell Identification Test (ISIT) score for anosmia, Visual Analogue Scale (VAS) Score for qualitative aspect of	Post-treatment, patient showed improved anosmia (ISIT score 0 to 10), relief from parosmia within a week, and enhanced	The synergistic application of Ayurveda and TCA in this case study demonstrated a safe and effective treatment, resolving parosmia within a week and anosmia over

DOI Link :: https://doi-ds.org/doilink/03.2024-73842662/UIJIR

		Acupuncture (TCA).	parosmia.	quality of life.	four months.
12	Case Report: Acupuncture is an effective treatment for olfactory dysfunction in the post COVID-19 condition (Morita et al., 2022)	Case report of two post-COVID-19 patients treated for olfactory dysfunction with acupuncture sessions twice weekly during hospitalization and weekly post-discharge.	Assessed using the Numeric Rating Scale (NRS) for olfactory dysfunction and general malaise (Clinical symptom), and the Alinamin test for olfactory mucosal disorders.	Case 1: NRS score for olfactory dysfunction decreased from 10 to 7 post-treatment. Case 2: NRS score improved from 3 to 0-1.	The study suggest that acupuncture may be effective in the treatment of post covid-19 olfactory disfunction.
13	Improvement in Long-COVID Symptoms Using Acupuncture; A Case Study (Hollifield et al., 2022)	A case study of a 46-year-old male patient with Long -COVID Syndrome (LCS) assessed using traditional chinese medicine diagnostic methods and	Assessment included Traditional Chinese Medicine criteria: tongue (color, shape, size, moisture,	Positive changes observed in tongue color, moisture, and pulse characteristi cs. Clinical symptoms	Acupuncture may be useful to address broad symptoms and pathophysiology of LCS.

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		treated using acupuncture.	movement, coat) and pulse (rate, strength, quality), alongside clinical symptom severity ratings.	improved, including chest pain, shortness of breath, and fatigue.	
14	The Effectiveness of Acupuncture in The Treatment of Post COVID-19 Condition: A Retrospective Study (Xiangping Peng., 2022)	Case report of 85 patient with long COVID was analyzed retrospectively based on their clinical symptoms, diagnosis and classification. 85 patients received weekly acupuncture for 8-12 weeks.	Clinical symptoms such as; Shortness of breath and general fatigue, body pain, brain fog, and irregular menstruation.	Out of 85 patients, 72 achieved clinical cure, resulting in an 85% overall effectiveness rate; 13 cases were ineffective.	Acupuncture restored the healthy functioning vital organs; significantly decreased the symptoms of post COVID-19 condition.
15	The Clinical Effects of Laser Acupuncture on Hospitalized Patients with Severe COVID-19: A Randomized Clinical Trial	Sixty (60) RT-PCR positive patients divided into intervention and control groups. intervention group received daily low-energy	The respiratory rate (RR), percentage of oxygen saturation at rest, time of hospitalization,	Respiratory rate unchanged. oxygen saturation increased post-treatment. Decreased	Combining low-energy laser acupuncture with conventional drugs regulates inflammation in severe COVID-19 patients

DOI Link :: https://doi-ds.org/doilink/03.2024-73842662/UIJIR

	(Shojaeddin et al., 2023)	laser acupuncture once a day for consecutive 5 days.	mortality, and laboratory test; interleukin-6 (IL-6).	IL-6; reduced hospitalization time; zero mortality in intervention group.	effectively.
16	The impact of "long COVID" on menstruation in Chinese female college students and the intervention of acupuncture (Dong et al., 2024)	Study surveyed 468 female undergraduates with COVID-19 history; 85 had long COVID. Of these, 17 received acupuncture, to improve menstrual pattern.	Menstrual characterestics such as; menstrual cycle, menstrual period duration, menstrual flow, and the color of menstrual blood.	Acupuncture treatment shown improvement in all characteristics of menstruation.	Long COVID affects women's reproductive health, evident in menstrual changes; acupuncture reduces these effects, offering therapeutic value.
17	The effect of laser acupuncture on immunomodulation and dyspnoea in post-COVID-19 patients (Alghitany, Fouad, Nassif, & Guirguis,	Eighty patients with post-COVID symptoms were randomly split: Experimental group received Laser Acupuncture thrice/week for 12 weeks; control group received	Dyspnoea assessment, inflammatory cytokine levels (IL6), and total lymphocyte count (TLC)	LA group: TLC increased significantly; IL-6 levels, dyspnoea, and fatigue reduced significantly. Placebo	Utilizing lasers on specific acupuncture points linked to lung and immunity yielded promising outcomes in alleviating post-COVID

DOI Link :: https://doi-ds.org/doilink/03.2024-73842662/UIJIR

	2023)	sham LA.		group: TLC increased significantly .	symptoms like fatigue and dyspnoea.
18	People Who Chose the Preventive Natural Bioenergetics (NB) COVID-19 Treatment Safely Experienced a Significant Reduction of COVID-19 Symptoms Compared to the General Population (d'Oultremont, 2021)	Four hundred and thirty-nine people from seven countries voluntarily received the non-invasive preventive NB treatment.	Clinical symptoms (fever, cough & dyspnoea), hospital visit record, side effects	Significant reduction in COVID-19 symptom frequency/severity compared to general population; no hospitalizations, minimal side effects reported.	Significant reduction in frequency and severity of the three major symptoms of COVID-19 compared to the general population.

DISCUSSION

This review reveals a diverse array of approaches employed across different studies. These interventions encompass traditional acupuncture techniques, such as needling and moxibustion, application of sugar pellets over meridians, as well as innovative methods like laser acupuncture and transcutaneous electrical nerve stimulation (TENS). Studies have explored the efficacy of acupuncture either as a standalone treatment or in combination with standard care, Chinese herbal medicine, or other complementary therapies.

The studies reviewed encompass a broad spectrum of COVID-19 conditions, ranging from mild to severe symptoms, and from acute to long-COVID symptoms. Several case studies with single

DOI Link :: https://doi-ds.org/doilink/03.2024-73842662/UIJIR

patient have reported improvements in consciousness,(Yeh et al., 2021) olfactory dysfunction,(Bhat et al., 2023; Morita et al., 2022) and lung lesions.(Gong et al., 2020; TAO et al., 2020) Although these studies provide valuable insights, the findings are based on small samples and may not be generalizable.

Three studies(Alghitany et al., 2023; Cheng, 2021; d'Oultremont, 2021) provide valuable insights into standalone treatments for managing COVID-19, However, it's essential to acknowledge their limitations. Firstly, these studies typically involve small sample sizes and / or lack robust randomized controlled trials, which may limit the generalizability of their findings. Additionally, the subjective nature of symptom assessment in some studies raises questions about the reliability of reported improvements.

During the acute phase of COVID-19, acupuncture has been reported to help manage a variety of symptoms. When acupuncture used alongside standard care, led to improved oxygen levels and faster recovery with fewer ICU admissions.(Alipour et al., 2022) Similarly, significant improvement in SpO2 level also reported in patients treated with Acu-TENS.(Shahdad et al., 2023; Shojaeddin et al., 2023) These findings suggest that acupuncture can play a crucial role in managing the acute symptoms of COVID-19, potentially reducing the severity of the disease and the need for intensive care when combined with standard care.

In the context of long COVID-19, acupuncture has shown its efficacy in managing persistent symptoms and improving the quality of life of patients, including chest pain,(Hollifield et al., 2022) chest pressure,(Trager et al., 2022) shortness of breath,(Hollifield et al., 2022; Omarova et al., 2023; Xiangping Peng., 2022) body pain,(Xiangping Peng., 2022) brain fog,(Xiangping Peng., 2022) improvement in characteristics of menstruation,(Dong et al., 2024; Xiangping Peng., 2022) and fatigue.(Hollifield et al., 2022; Trager et al., 2022; Xiangping Peng., 2022) Two studies reported improvements in olfactory dysfunction, a common long-term effect of COVID-19, following acupuncture treatment.(Bhat et al., 2023; Morita et al., 2022)

While the studies reviewed suggest that acupuncture may help alleviate post-COVID-19 olfactory dysfunction, it's important to note that the recovery of olfactory function often occurs during the early period (≤6 months) following the onset of COVID-19.(Ogawa, Nakamura, Yamamoto, Tojima, & Shimizu, 2020) This natural recovery process could potentially confound the observed effects of acupuncture. Therefore, it's crucial to distinguish the actual efficacy of acupuncture from the body's natural ability to recover. This distinction can be made through more controlled studies.

The mechanisms underlying the effects of acupuncture on COVID-19 and long COVID-19

DOI Link :: https://doi-ds.org/doilink/03.2024-73842662/UIJIR

symptoms are multifaceted and may involve several biological pathways. Acupuncture's potential to reduce inflammation, stems from its ability to modulate immune responses and inflammatory pathways across different systems of the body. Acupuncture has been shown to inhibit the activation of pro-inflammatory macrophages while promoting the activation of anti-inflammatory macrophages. Additionally, acupuncture can downregulate the expression of inflammatory cytokines such as TNF-α and IL-6, and inhibit the formation of inflammatory bodies like NLRP3 inflammasomes. These mechanisms contribute to the alleviation of inflammatory symptoms in various diseases, including those affecting the circulatory, endocrine, and respiratory systems.(N. Li et al., 2021)

Acupuncture's inflammation modulation may mitigate COVID-19's cytokine storm, which may be the plausible reason for reducing inflammation related symptoms like chest pain, cough, and shortness of breath and its potential to alleviates fatigue and aids in lung lesion absorption. Further research into the specific mechanisms of acupuncture in modulating inflammation related to COVID-19 is warranted to optimize its therapeutic use in this context.

In terms of safety, the studies reviewed suggest that acupuncture is generally well-tolerated with minimal side effects.(d'Oultremont, 2021; Helianthi et al., 2022), indicating that any adverse effects are typically mild and transient. No other side effects or safety problems were reported across the studies, suggesting that acupuncture can be considered a generally safe treatment for COVID-19 and its long-term effects.

However, it's important to note that the practice of acupuncture involves direct contact with COVID-19 patients. This necessitates the use of proper personal protective equipment (PPE) to ensure the safety of the healthcare provider. This aspect of safety is crucial in the context of a contagious disease like COVID-19 and should be considered when planning and implementing acupuncture treatment protocols.

LIMITATIONS

This review's limited scope, with only 18 studies, may not fully capture acupuncture's role in managing COVID-19. More comprehensive studies are needed for robust conclusions.

SCOPE OF FURTHER RESEARCH

This review underscores the necessity for larger studies to validate acupuncture's efficacy in COVID-19, particularly regarding its effectiveness as adjunctive care and in addressing post-COVID-19 olfactory dysfunction. More controlled studies are needed to distinguish

DOI Link :: https://doi-ds.org/doilink/03.2024-73842662/UIJIR

acupuncture's effects from natural recovery. Further research should elucidate the standalone role of acupuncture in modulating immune responses and mitigating COVID-19's cytokine storm. This could optimize the therapeutic use of acupuncture in managing COVID-19.

CONCLUSION

The findings of this review suggest that acupuncture may play a crucial role in managing both acute and long-term symptoms of COVID-19. The evidence indicates that the effectiveness of acupuncture as an adjunctive care is more pronounced than its use as standalone care in treating COVID-19 and post-COVID-19 symptoms. Importantly, the studies reviewed also suggest that acupuncture is generally well-tolerated with minimal side effects. However, these findings should be interpreted with caution due to the limited number of studies reviewed. Further large-scale, rigorous studies are needed to confirm these findings and to explore the potential of acupuncture as a therapeutic intervention for COVID-19 and its long-term effects.

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ACRONYMS

S.No.	Acronym	Full Form
1	ACE2	Angiotensin-Converting Enzyme 2
2	ANS	Autonomic Nervous System
3	ARDS	Acute Respiratory Distress Syndrome
4	CNS	Central Nervous System
5	CRM	Comprehensive Rehabilitation Measures
6	CRP	C-Reactive Protein
7	CRS	Cytokine Release Syndrome
8	CT	Computed Tomography
9	ESR	Erythrocyte Sedimentation Rate
10	HR	Heart Rate
11	ICU	Intensive Care Unit
12	IL	Interleukin
13	ISIT	Indian Smell Identification Test

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S.No.	Acronym	Full Form
14	LCS	Long -COVID Syndrome
15	MDS	Modified Dyspnoea Scale
16	NB	Natural Bioenergetics
17	PCR	Polymerase Chain Reaction
18	PPE	Personal Protective Equipment
19	PVOD	Post viral olfactory dysfunction
20	RR	Respiratory Rate
21	RT-PCR	Reverse transcription polymerase chain reaction
22	SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
23	TCA	Traditional Chinese Acupuncture
24	TENS	Transcutaneous Electrical Nerve Stimulation
25	TLC	Total Lymphocyte Count
26	TNF-α	Tumor Necrosis Factor Alpha

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FEB 2024 | Vol. 4 Issue 9
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S.No.	Acronym	Full Form
27	VAS	Visual Analogue Scale
28	VASD	Visual Analogue Scale for Dyspnoea
29	6-MWT	6 Minute Walking Test

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