

Ai Chi for Long COVID: Transitioning to a Post-Rehabilitation Community Program

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Background: As the COVID-19 pandemic continues to impact lives around the world, long COVID symptoms plague a significant number of survivors in their daily lives. Guidelines are available for individualized rehabilitation during acute and subacute phases; however, safe community options are needed for those with lingering symptoms who are transitioning away from formal rehabilitation. A lack of access or resistance to COVID-19 vaccination worldwide, and the emergence of more aggressive coronavirus variants, is predicted to result in many more positive COVID-19 cases and consequentially in more long haulers, increasing the need for community resources.

Discussion: Ai Chi is a gentle aquatic body-mind practice employed worldwide by aquatic therapists and trainers to reduce stress, enhance breathing, strengthen core muscles, extend joint range of motion, improve balance, stabilize heart rate, and promote focus and centering. It can address some of the common persisting symptoms in medically stable individuals with long COVID including pain, difficulty breathing, muscle weakness, and stress. While Ai Chi is a promising community aquatic intervention, exercise providers need to be aware of special considerations that may impact this population in community programming, such as postexertional malaise, cardiac impairment, oxygen desaturation, and autonomic nervous system dysfunction when providing exercise programs. Research is needed to validate the effectiveness of Ai Chi with post-rehabilitation COVID long haulers in a community setting. (*J Aquat Phys Ther* 2022;30(3):60–64)

Key words: Ai Chi, long COVID, long COVID community exercise, long haulers, postacute sequelae of SARS-CoV-2 infection, post-COVID-19 condition, postexertional malaise

In early 2020, it was projected that a mild case of COVID-19 should resolve in about 2 weeks, while survivors of more severe cases could expect to be well again in 3 to 6 weeks.¹ This did not prove to be true; research studies have found that from one-third to more than half of those who have had COVID-19 experience long-term symptoms.^{2,3} Adding to the complexity of the course of this novel coronavirus, for 2 out of 5 of those experiencing long-term sequelae, the initial onset of their post-COVID-19 symptoms was 3 to 6 months after initial COVID-19 diagnosis.³

By mid-2020, those with confirmed or suspected COVID-19 who experienced extended symptoms were frustrated by a lack of resources and support to address their numerous and diverse symptoms. They felt underacknowledged and ignored by health care workers who were overwhelmed by acute COVID-19 cases and had no established practices to

address their vaguely defined conditions. These survivors collaborated with one another worldwide through support groups and social media, coining the term “long COVID” for their ongoing symptoms and dubbing themselves “long haulers.”¹ Other terms have been used by different groups for various intervals of persisting COVID-19–related symptoms including “post-COVID-19 syndrome,” and “postacute sequelae of SARS-CoV-2 infection (PASC).”^{4,5} In October 2021, the World Health Organization (WHO) developed a clinical case definition for post-COVID-19 condition through a Delphi consensus process of a wide spectrum of stakeholders:

Post-COVID-19 condition occurs in individuals with a history of probable or confirmed SARS-CoV-2 infection, usually 3 months from the onset of COVID-19 with symptoms that last for at least 2 months and cannot be explained by an alternative diagnosis. Common symptoms include fatigue, shortness of breath, cognitive dysfunction but also others and generally have an impact on everyday functioning. Symptoms may be new onset, following initial recovery from an acute COVID-19 episode, or persist from the initial illness. Symptoms may also fluctuate or relapse over time.⁶

At least half of those living with long COVID continue to have function-limiting symptoms 6 months after initial infection. This includes people of all ages, many of whom were previously very fit and led active lives. Some long haulers had

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severe illness requiring hospitalization, but others had only mild symptoms during acute stages.² With new aggressive variants evolving, even if acute symptoms are mild, those who are not vaccinated remain at risk to join the long haulers. While unvaccinated children and teens are at lower risk than adults to contract COVID-19, as of early July 2022, the American Academy of Pediatrics and the Children's Hospital Association reported that more than 13.8 million children and teens have tested positive in the United States since the start of the pandemic.⁷ An estimated 2% to 10% of these COVID-19 survivors experience lingering long hauler symptoms including multiple-symptom inflammatory syndromes with persisting breathing problems, diarrhea, joint pain, difficulty sleeping, mood swings, rashes, and debilitating fatigue.⁸

SYMPTOMS

In a 2021 survey of 3762 long haulers across 56 countries, 203 different long COVID symptoms were identified across 10 body systems. The survey identified that 45% of long haulers had to return to work at a reduced level, and an additional 22% were unable to work at all due to their persisting symptoms and comorbidities.⁹ As the then-rare vaccine breakthrough cases emerged in mid-2021, 19% of those mild cases became long haulers, with symptoms lasting more than 6 weeks, some with severe fatigue restricting daily life and return to work.¹⁰

LONG COVID REHABILITATION

With so many different symptoms plaguing COVID long haulers, there is no one specific approach to long COVID rehabilitation. The broad array of symptoms necessitates a multidisciplinary approach with comprehensive assessments and customized plans of care in a wide variety of specialty areas, including cardiology, pulmonology, endocrinology, rheumatology, psychiatry, and physical medicine and rehabilitation. On the basis of the current understanding of this virus, guidelines and recommendations for outcome measures and rehabilitation interventions have been suggested by professional organizations worldwide.^{4,5,11-14} World Physiotherapy provides important considerations and direction for rehabilitation specialists to address COVID-19 issues in their briefing paper, "Safe Rehabilitation Approaches for People Living With Long COVID: Physical Activity and Exercise," as well as a toolbox sharing current best practice across the rehabilitation continuum of long COVID. An individualized plan of care based on symptom specific, evidence-based tests and measures, comprehensive patient education, and training in self-monitoring and pacing is a vital component of their recommended rehabilitation process.¹¹

DISCUSSION: COMMUNITY PROGRAM CONSIDERATIONS

At some point, COVID long haulers will reach the limits of reasonable and necessary rehabilitation interventions and will be discharged from therapy to work independently and to participate in community exercise programs at local recreation centers and health clubs generally staffed by certified exercise instructors and personal trainers. To do so, participants

need to be free of acute and rapidly developing new symptoms and to be medically stable. Those with severe postexertional malaise (PEM) need to consider the logistics involved with a community program in relation to their energy reserves. It is important for the long COVID rehabilitation therapist to address ways to broaden available energy before discharge, teaching the individual with PEM to pace or to find their personal balance between activity and rest, with consideration for all daily physical and cognitive endeavors. Based on the energy envelope theory for chronic fatigue syndrome (CFS) and myalgic encephalomyelitis (ME), individuals who exhibit PEM may be able to increase their level of function as they work within the limits of their available energy. A symptom contingent approach puts control of energy management in the hands of the individual.¹⁵ Promoting personal understanding of energy management through targeted training prior to transition to community programming is key for continued improvement.

World Physiotherapy guidelines advise therapists to consider the presence of PEM, cardiac impairment, oxygen desaturation, and autonomic nervous system dysfunction before recommending exercise for patients with long COVID symptoms. Chest pain, dizziness, elevated heart rate, high blood pressure, heart palpitations, syncope, breathlessness, and orthostatic hypotension indicate that further medical intervention is warranted.¹¹ Vital signs including heart rate, blood pressure, and blood oxygen levels must be within normal limits before transferring to a community program.

Community programs play an important role in this stage of recuperation to maintain achieved progress and to encourage further gains. The most prevalent late persisting symptoms that those teaching in community programs may encounter include fatigue, PEM, cognitive dysfunction, sensorimotor deficits, headaches, and memory issues.⁹ In addition, anxiety/depression, functional mobility impairments, muscle weakness, pain, difficulty breathing, and brain fog (word finding difficulties and poor concentration) have been cited as late persisting symptoms.^{2,3}

While some medically based long COVID exercise programs initially incorporated graded exercise to address weakness,^{13,16} this practice has been found to have serious consequences for those with PEM. PEM affects more than 70% of long haulers 6 months after COVID-19 onset and presents as a delayed response that appears 1 to 3 days after being triggered. It can cause unpredictably severe symptoms that may persist for days, weeks, or months. The precipitating event for PEM can be overexercising, stress, engaging in an intense cognitive task, or normal activity when an individual is at a tipping point.¹¹ A trigger may cause unexpected, seemingly unrelated symptoms, such as gastrointestinal dysfunction, severe headaches, extreme fatigue, or chest pain, days later. PEM is also often an issue for those with CFS and ME. Self-monitoring education and activity adaptation for PEM are important focus areas in the rehabilitation process. Post-rehabilitation aquatic exercise providers need to be aware of this condition, observe carefully, listen to what participants convey, and progress class activity at an appropriate exertion level. Exercise programs should include rest breaks for participants to monitor pulse and blood oxygen levels, and exercise segments should be measured.¹⁷

In a 2021 journal editorial, a group of authors including patients diagnosed with ME or long COVID and clinicians who treat those with PEM advise long haulers and the clinicians who work with them to STOP pushing limits, as recovery can be negatively impacted, to REST as a management strategy rather than waiting until symptoms occur, and to PACE physical and cognitive activities to avoid triggering symptoms.¹⁷

AI CHI

Ai Chi is a slow-moving, rhythmic, warm water aquatic practice developed by the former Japanese Olympic swimming coach and aquatic practitioner, Jun Konno, in the early 1990s. While introducing the aquatic relaxation practice of Watsu, Konno found that many of his older clients were deterred by the proximity and touch associated with this practice. He was inspired to develop a bridge practice for Watsu that encouraged relaxation, breath, joint mobility, core strengthening, balance, and stable heart rate. This bridge practice has become popular around the world on its own merit as Ai Chi.¹⁸

The gentle practice of Ai Chi is a promising tool to safely address some of the common symptoms of the subacute phase of one-on-one long COVID rehabilitation including pain, difficulty breathing, muscle weakness, and stress. It can also serve as a bridge to post-rehabilitation community exercise for COVID long haulers. The positions used in Ai Chi are influenced by the land-based martial arts practices of Qigong and Tai Chi, which have been used in COVID-19 rehabilitation in China.¹⁹ While no studies have been published to date on the use of Ai Chi with long COVID, Ai Chi practice has been shown to result in statistically significant improvement in balance, pain, functional mobility, and quality of life in populations with neurological disorders (Parkinson disease, multiple sclerosis, chronic stroke, and balance deficits) and chronic pain disorders (fibromyalgia, knee osteoarthritis, and low back pain).²⁰ Perez-de la Cruz²¹ studied the influence of Ai Chi on perceived pain, stress, and quality of life in patients with chronic stroke and found that Ai Chi brought improvements in mood, pain, and quality of life compared with a dry land intervention. In another study, Perez-de la Cruz²² compared pain and increased functionality in subjects with mild to moderate Parkinson disease after Ai Chi and dry land exercise interventions. Both groups showed improved pain scale scores, with Ai Chi improvements being more significant. The Ai Chi group also showed improvement in static and dynamic balance and functional capacity, which were not present for the land group.²² Calandre et al²³ compared pain reduction, quality of sleep, and psychological well-being between patients with fibromyalgia receiving a physiotherapy program of either Ai Chi or stretching, with Ai Chi significantly improving both fibromyalgia symptoms and sleep quality while stretching only improved psychological well-being.

Ai Chi can be done alone, in one-on-one sessions, or in a group in 88 °F to 96 °F (31 °C-35 °C) water at shoulder to neck depth. An Ai Chi instructor cues participants in 19 repeated physical movement patterns, verbally or by example, timing diaphragmatic breathing with movement.¹⁸ In the first Ai Chi positions, participants brace themselves in a stable posture to perform upper extremity movements with feet shoulder

width apart, weight on the balls of the feet, knees gently bent, pelvis in slight posterior rotation, scapulae retracted, and ears aligned over the shoulders. While less muscle activation occurs in water than on land, this bracing posture provides effective activation, intensity, and exertion of core muscles,²⁴ which enhance movement efficiency and reduce ancillary muscle use.²⁵ Following a series of upper extremity movements, progressions move on to trunk strengthening and mobility, to lower extremity mobility and balance challenges, and to whole-body coordination activities.

The underlying premise of Ai Chi is that, as a mindful practice, it is noncompetitive and nonjudgmental; there is no “wrong way” of doing it and however it turns out is how it was meant to be.¹⁸ Exercise instructors should invite participants to adjust their exertion levels based on their available energy envelope and to choose to opt in or out of movements according to their self-determined limits, working within pain-free ranges of motion. Emphasis can be adapted to focus on range of motion, on balance, on mindful movement, on breathing, or on finding calm.

There is anecdotal evidence that diaphragmatic breathing and mindfulness, which play key roles in Qigong, Tai Chi, and Ai Chi, are helpful in addressing symptoms of long COVID.^{26,27} Ai Chi decreases stress levels by bringing focus on breath, on awareness of the body and sensory experiences, and on movement.¹⁸ Many long haulers experience respiratory issues and have lost the ability to breathe comfortably.²⁷ In the initial postures of Ai Chi, focus is on diaphragmatic breathing and timing of breath with movement, with inhalation through the nose on opening or expanding movements. Unforced exhalation through pursed lips is timed with closing or drawing in movements. Conscious diaphragmatic breathing not only promotes circulation and blood oxygen levels, increases lung capacity, reduces inflammation, and restores respiratory muscle balance but also activates the parasympathetic, “rest and digest” nervous system (PNS). The PNS brings calm and balance within the autonomic nervous system, decreasing the effect of the reticular activation system to allow focus, slow the heart rate, and lower blood pressure. Performing Ai Chi postures over multiple sessions brings centering and calm, as breath and movement coordinate increasingly more naturally.^{18,27} As an aquatic practice, Ai Chi provides added dimensions for this population through the benefits of working in water, with buoyancy allowing for ease of movement, pain reduction, and lowering the effects of gravity on joints, viscosity providing support and natural resistance, and hydrostatic pressure enhancing circulation.^{28,29}

While collaboration between the discharging rehabilitation therapist and the post-rehabilitation aquatic specialist is important, this may not always be possible prior to initiation of post-rehabilitation community exercise. There are several tools that can provide helpful input for symptom management during community Ai Chi practice with participants with long COVID:

- Participants who attend Ai Chi sessions to address symptoms of fatigue and brain fog can use the 10-item DePaul Symptoms Questionnaire screen for postexertional malaise (DSQ PEM) to help identify the presence

of PEM symptoms and the important need for self-monitoring.³⁰

- Participants with PEM should monitor their pulse rate and blood oxygen levels prior to, during, and after activities. Splash resistant and waterproof wrist and finger pulse oximeters, waterproof watches with health apps, and other wearable health metrics trackers can be used to measure blood oxygen levels and pulse rate at the poolside or in the water. The Royal Dutch Society for Physical Therapy suggests a minimum of 90% SpO₂ at rest to participate in exercise and physical activity, stopping exercise at 85% SpO₂.¹² The Workwell Foundation recommends that participants with PEM be encouraged to monitor and track their heart rate to determine their weekly average and to drastically reduce their exertion level when the heart rate exceeds 15 bpm (beats per minute) of the weekly average to reduce the risk of PEM.³¹
- The linear Borg Rating of Perceived Exertion Scale can provide a reference for activity-level parameters. Because this scale has a high correlation between an individual's perceived rate of exertion times 10 and the actual heart rate during physical activity,³² those with PEM can choose to work at an exertion level that is within 15 bpm of their weekly heart rate average.
- The modified Borg Dyspnea Scale (Borg Scale CR10)³³ can be used to gauge level of breathlessness. Participants with breathing issues should be advised to work at a moderate level (4/10 or less) on this scale.¹² If breathing starts to become labored, the participant should move to more shallow water and continue moving at a greatly reduced level of exertion in a safe area until breathing returns to normal. Persistent breathing problems signal the need for a water break.
- Participants with a history of orthostatic hypotension that is managed on land need to be aware that they may experience a blood pressure drop when getting out of the water. If they note lightheadedness, dizziness, or other blood pressure-related symptoms, staging exit from the water is helpful. Strategies may include sitting at the edge of the pool or on a pool step for at least 30 seconds, doing a few exercises to increase venous return (such as ankle pumps and isometric quad and gluteal exercises), rising slowly to standing, and pausing for a slow count to 10 before moving on.³⁴

CONCLUSION

Ai Chi is a promising post-rehabilitation intervention for COVID long haulers that can be provided in a community setting. Prior to discharge from therapy, it is important for therapists working with this population to include patient education in self-monitoring of blood oxygen levels and vital signs, as well as the use of simple tools such as the Borg Rating of Perceived Exertion Scale and the modified Borg Dyspnea Scale, to determine activity limits independently. Two-way communication between therapists and community exercise providers can help ensure a smooth transition from health care to safe community settings. In addition, education on the specific concerns affecting

COVID long haulers is an important component for special population training in Ai Chi certification courses and other exercise training sessions. Evidence-based studies specific to those with long COVID are needed to demonstrate the positive effect of Ai Chi on the needs of a potentially burgeoning population at a community level.

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