3'RD INTERNATIONAL CONFERENCE
ON HEALTH PRACTICE AND RESEARCH
"Interdisciplinary Intervention to Improve Quality of Life for Covid-19 Patient"

Journal homepage: https://www.ichpr3.stikestelogorejo.ac.id/

Beneficial Aquatic Exercise for Increasing Quality of Life for COVID-19 patients

Pramusinta, Linda., Baharudin, V.E.P.A

Bachelor of Physioteraphy Stuyi Program, STIKES Telogorejo Semarang

ARTICLE INFO

Article history:
Received 17 January
Received in revised form 18 January
Accepted 20 January

Keywords:
aquatic exercise, quality of life, physiotherapy

ABSTRACT

Aquatic exercise is recommended for COVID-19 patients, because of its beneficial effects on function, quality of life, and reduction of fatigue symptoms to the reduction of shortness of breath for patients with severe symptoms. However, the beneficial aquatic exercise for increasing quality of life is still a controversial. The aim of this is to assess the beneficial of an aquatic exercise program on increasing the quality of life of COVID patients. Systematic searches were carried out in the Pubmed, Scielo and Research Gate databases. Clinical trials with interventions involving water exercise for individuals with COVID-19 patients. Methodological quality of studies using the PEDro scale. 49 studies were found and four were selected: two studies using aquatic exercise were compared with a control group. The aquatic exercise program includes strengthening, balance, flexibility and stretching exercises. Program duration, daily frequency, intensity and progression vary between studies. Beneficial effects of aquatic exercise were found on quality of life functions. However, only two out of five studies assessing quality of life by observation have a positive effect on aquatic exercise. However, in this study few or infrequently carried out these formulations to physiotherapists have carried out evidence based practice as standard protocols after it was observed that aquatic exercise can be beneficial for increasing quality of life, because it is well built, with excessive exercise and load.

INTRODUCTION

Aquatic therapy encompasses a range of approaches and may include passive immersion in mineral, hot or cold water. It may also incorporate the use of saunas, spas or exercise therapy. Aquatic exercise utilises the principles of hydrostatics and hydrodynamics to create challenges that promote health through exercise in water. The benefits of aquatic exercise are thought to result from water's unique characteristics including warmth that reduces pain and muscle spasm, buoyancy that decreases loading of joints, resistance to movement through turbulence and

* *Corresponding author. Linda Pramusinta*
E-mail address: linda_pramusinta@stikestelogorejo.ac.id

hydrostatic pressure, and the equal pressure from all directions applied to an immersed object at a given depth.

The unique characteristics of exercising in water may allow people to perform exercises that they would be unable to perform on land. The basic principle of aquatic exercise is that water resistance and the buoyancy of water enable exercisers to relax.The buoyancy of water decreases the pressure and burden caused by the body on the joints. Thus, water facilitates the exercising of quality of life by COVID-19, enables the person to perform movements more easily, and increases the effectiveness of the life. Some studies determined that aquatic exercise increased quality of life.

In the literature, beneficial aquatic exercise for increasing quality of life for COVID-19 patients.
COVID-19 is a multi-organ disease with a broad spectrum of acute, subacute and long-term manifestations. Symptoms of acute COVID-19 infection include cough, fever, fatigue, pneumonia and dyspnoea. Severe respiratory symptoms may lead to a life threatening respiratory failure (ARDS; acute respiratory distress syndrome), resulting in the urgent need for invasive ventilation at an intensive care unit (ICU). Patients remain bedridden in a prone position for
extended periods, which can cause post-ICU dysphagia, muscle weakness, general deconditioning, myopathy and neuropathy, as well as musculoskeletal dysfunctions. It is estimated that up to 14% of worldwide infected COVID-19 patients develop severe acute respiratory infection leading to hospitalization and ventilation.

Physical therapists are one of the health professionals considered extremely important on the management of people with COVID-19. In fact, a group of international experts in cardiorespiratory physical therapy developed a document with clinical recommendations for physical therapy management of COVID-19 in the hospital setting. There is also a Task Force being prepared that will describe potential rehabilitation interventions in survivors of COVID-19.

METHOD

We performed a systematic literature search to enable an evidence-based synthesis of the most recent, high quality literature reviews (SRs) evaluating aquatic exercises interventions for COVID-19 patients. The COVID-19 patients, as these are the most frequent cardiovascular and cardiopulmonal disorders with musculoskeletal treated by aquatic exercises. For this evidence-based synthesis we systematically searched PubMed, Scielo, Research Gate and PEDro and Web. Search terms used were aquatic exercises, quality of life, physiotherapy. We included studies published between 2010 and date of last search

(Januari 2022) and selected the most recent update of a systematic review and additional RCTs. Literature reviews are most effective when performed using the RCT method.

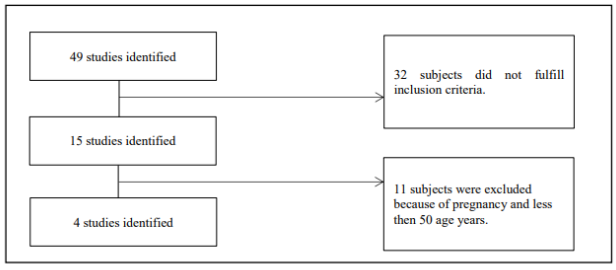

Figure 1. Flowchart of the search and selection of articles during the literature review process.

RESULT AND DISCUSSION

This study is the first to evaluate the acceptability of the aquatic exercise in people with COVID-19. Overall, participants responded very positively to the environment and facilities available. A number of factors were highlighted as facilitators to the adherence and completion of an eight week aquatic exercise, including staff support, enjoyment and a sense of achievement. No adverse reactions or infections from the water were reported. The majority of participants indicated that ifthey had a choice for their future exercise training mode they would choose aquatic exercise.

Participants in this study reported a very high level of enjoyment with the water-based exercise training sessions. This result is similar to a previous study where participants reported enjoyment with being in the water and benefits from socialising with other people with COVID-19 following aquatic exercise. The enjoyment was attributed to the freedom of movement, the feeling of weightlessness and the ease of exercising in the water. Enjoyment of exercise training in people with COVID19 may influence adherence, especially long-term For the participants in our study, the high level of enjoyment translated to the great majority of participants indicating they would choose the water environment for ongoing exercise training.

In another study of water-based exercise in people with COVID-19, participant satisfaction and choice of exercise was not examined, however, the authors reported that the aquatic exercise participants seemed to enjoy the exercise experience more than the land-based exercise participants. Their hypothesis was that the water environment provided a new variety of exercise mode in a more recreational environment, so the participants perceived the exercise to be easier and more enjoyable. Comfort during the water-based exercise training sessions was a major consideration in the design of our original study. The water environment was chosen due to the beneficial properties of the water, especially buoyancy, which has previously been shown to be an ideal environment for people with chronic conditions which limit their ability to engage in land-based exercise.

Factors affecting adherence to exercise training in people with COVID-19 have been previously examined. In qualitative interviews with participants following a 12 week progressive resistance exercise training programme, the main facilitators identified as enabling adherence to the exercise training programme were a sense of achievement and selfmotivation. These factors were also found as common facilitators in our study. Illness, predominantly related to COVID19, is one of the major documented reasons previously identified as a barrier to completion of aquatic exercise. In contrast, ourstudy did not find that the participants' chronic lung disease caused them to discontinue attending the aquatic exercise.

Chest infections were experienced in some participants, however these did not lead to non-attendance. No validated questionnaires exist to examine the acceptability of the water environment for exercise training in people with COVID-19, therefore we designed our own questionnaire. This questionnaire was used in people with COVID-19 with coexisting physical comorbidities, therefore, the results of this study cannot be generalised to all people with COVID-19.

It is possible that the presence of many different physical comorbidities (i.e. obesity, musculoskeletal, orthopaedic, vascular and neurological conditions) meant the water environment was well-received by this group. Opinions of the water environment may be more variable in people with COVID-19 without physical comorbidities. This preliminary study had a small sample size, so future research with larger sample sizes should examine the acceptability of the aquatic environment in people with COVID-19 to confirm these results. Additionally, aquatic exercise was conducted in a hospital hydrotherapy pool, alternative pool settings, such as community-based pools with different temperatures, humidity and facilities, need to be examined to determine if the findings from this study can be generalised to community pools. The cost effectiveness of the aquatic environment for group-based exercise training should also be a priority for future research.

The present study assessed the impact of two low-intensity physical training protocols (floor and aquatic exercise) on COVID-19, by analyzing several outcomes. The data suggest that both modalities of low-intensity physical exercise were beneficial to patients with moderate to very severe COVID-19. An interesting finding is that, with the same exercise intensity, the group submitted to training in water exhibited additional benefits for physical capacity in relation to the floor exercise group. COVID-19 occurs among adults, primarily from their forties onwards. This may explain the

difference between the CG and FG in regard to age, despite the randomized nature of the study. However, for the lungs in particular, it is difficult to distinguish between impacts resulting solely from physiological aging and those attributed to the cumulative effect of environmental action. Thus, cellular changes caused by aging and those provoked by smoking may involve interrelated pathogenic mechanisms. Aging can lower the injury threshold or increase mechanisms involved in lung damage through smoking. Tobacco smoke can also act as an environmental factor, disrupting organ repair and maintenance, contributing to the aging process.

The present study assessed the impact of aquatic exercise protocols on COVID-19, by analyzing several outcomes. The data suggest that both modalities of low-intensity physical exercise were beneficial to patients with moderate to very severe COVID-19. An interesting finding is that, with the same exercise intensity, the group submitted to training in water exhibited additional benefits for physical capacity in relation to the floor exercise group. COVID-19 occurs among adults, primarily from their forties onwards. This may explain the difference between the CG and FG in regard to age, despite the randomized nature of the study. However, for the lungs in particular, it is difficult to distinguish between impacts resulting solely from physiological aging and those attributed to the cumulative effect of environmental action.

Thus, cellular changes caused by aging and those provoked by smoking may involve interrelated pathogenic mechanisms. Aging can lower the injury threshold or increase mechanisms involved in lung damage through smoking.

Tobacco smoke can also act as an environmental factor, disrupting organ repair and maintenance, contributing to the aging process. According to our results, FEV1 increased significantly in the training groups. This finding corroborates several literature studies confirming that the rehabilitation program results in improved spirometry, despite previous research indicating pulmonary rehabilitation does not alter pulmonary function. Nevertheless, the long-term behavior of pulmonary function after completing a physical exercise program is unknown. Patients who presented exacerbation and therefore changed the medication were excluded. The individuals used the same drug and dose during the entire study.

Outcome

To be included in this review, the studies should indicate the functionality and/or muscle strength as a primary or secondary outcome, assessed by quality of life tests. Only two studies pointed out functionality as a primary endpoint. Of the five studies that evaluated muscle strength, three presented this variable as the primary outcome and two as a secondary outcome. Pain was assessed in

all studies; however, it was considered as the primary outcome in three of them.

Of the 12 studies included, only the work by Lim et al. evaluated the functionality without performing physical performance tests. In this study, the authors used only questionnaires. The physical tests most used in other studies to evaluate the functionality were walking tests that measure the distance covered in a given time in a usual speed tests that measure the time to cover a certain distance at different speeds and the Timed Up and Go Test (TUG), which was used in 4 of the 12 studies.

The evaluation of muscle strength of lower limbs was performed by indirect tests (Chair Stand Test) in four studies. Only two studies conducted muscle strength tests using an isokinetic dynamometer. Three other studies assessed muscle strength through isometric testing of lower limbs with a dynamometer and handgrip strength test.

Pain is the only outcome present in all studies and was assessed by a visual analog scale (VAS) of pain perception or through questionnaires. Although not an inclusion criterion in this study, the outcome "pain" was added to the results, considering that this factor was present in all analyzed studies. Additionally, pain is one of the most common symptoms of OA and is associated with functional limitations caused by the disease and by the impact of OA on the patients' quality of life.

Effects of interventions The studies that compared a group of aquatic exercises and a control group found benefits of aquatic exercise, in terms of functionality, with physical performance tests. However, Hale et al. found no difference between the group that received the intervention with aquatic exercise and the control group, as both showed improved functionality. Of the studies that performed the 30-Second Chair Stand Test only Arnold and Faulkner found a significant improvement after the intervention. The group that performed aquatic exercises and participated in educational sessions for the prevention of falls increased by 12% the number of repetitions versus the other two groups.

Significant effects of aquatic exercise were found in muscle strength compared to the group without intervention in two studies, which reported an increase of 5–10% of the isometric strength of the hip abductor muscles, 45% in the knee extensors, 11.5% in the hip extensors, and 14.3% in the hip abductors. On the other hand, Fisken et al. found no effect of aquatic exercise in the evaluation through manometry. Pain levels also showed controversial results. Three studies reported reduced pain after the intervention. However, in the study by Fisken et al.both groups had a

reduction in pain, but with no difference between them. On the other hand, Wang et al. and Wallis et al. found no significant effects of aquatic exercise in reducing pain.

CONCLUSION

It was concluded that aquatic exercise is beneficial quality of life for COVID-19 patients.

ACKNOWLEDGEMENTS

The acknowledgements should be typed here to gratitude those supporting the research.

REFERENCES

Aerens, R., Vorkov, V., & Duflou, J. R. (2019). Springback prediction and elasticity modulus variation. Procedia Manufacturing, 29, 185-192. doi:https://doi.org/10.1016/j.promfg.2019.02.125

de Souto Araujo, Z. T., Nogueira, P. A. D. M. S., Cabral, E. E. A., Dos Santos, L. D. P., da Silva, I. S., & Ferreira, G. M. H. (2012). Effectiveness of low-intensity aquatic exercise on COPD: a randomized clinical trial. Respiratory medicine, 106(11), 1535-1543.

Konzack, S., Radonjic, R., Liewald, M., & Altan, T. (2018). Prediction and reduction of springback in 3D hat shape forming of AHSS. Procedia Manufacturing, 15, 660-667. doi:https://doi.org/10.1016/j.promfg.2018.07.296

Nakagawa, Y., Mori, K.-i., Yashima, S., & Kaido, T. (2018). Springback behaviour and quenchability in hot stamping of thick sheets. Procedia Manufacturing, 15, 1071-1078. doi:https://doi.org/10.1016/j.promfg.2018.07.385

McNamara, R. J., McKeough, Z. J., McKenzie, D. K., & Alison, J. A. (2015). Acceptability of the aquatic environment for exercise training by people with chronic obstructive pulmonary disease with physical comorbidities: additional results from a randomised controlled trial. Physiotherapy, 101(2), 187-192.

Morris NormanR, et al.Exercise & Sports Science Australia (ESSA) position statement on exercise and chronic obstructive pulmonary disease. J Sci Med Sport (2020), https://doi.org/10.1016/j.jsams.2020.08.007 6

Radonjic, R., & Liewald, M. (2019). New process design for reduction of springback by forming with alternating blank draw-in. Procedia Manufacturing, 29, 217-224. doi:https://doi.org/10.1016/j.promfg.2019.02.129

Ren, H., Xie, J., Liao, S., Leem, D., Ehmann, K., & Cao, J. (2019). In-situ springback compensation in incremental sheet forming. CIRP Annals. doi:https://doi.org/10.1016/j.cirp.2019.04.042

Suttner, S., Schmid, H., & Merklein, M. (2019). Cross-profile deep drawing of magnesium alloy AZ31 sheet metal for springback analysis under various temperatures. Procedia Manufacturing, 29, 406-411. doi:https://doi.org/10.1016/j.promfg.2019.02.155

Tamin, T. Z., & Loekito, N. (2018). Aquatic versus land-based exercise for cardiorespiratory endurance and quality of life in obese patients with knee osteoarthritis: a randomized controlled trial.

Medical Journal of Indonesia, 27(4), 284. doi:10.13181/mji.v27i4.2107

Wang, J. L., Fu, M. W., Shi, S. Q., & Korsunsky, A. M. (2018). Influence of size effect and plastic strain gradient on the springback behaviour of metallic materials in microbending process. International Journal of Mechanical Sciences, 146-147, 105-115. doi:https://doi.org/10.1016/j.ijmecsci.2018.07.027

Zhan, M., Xing, L., Gao, P. F., & Ma, F. (2019). An analytical springback model for bending of welded tube considering the weld characteristics. International Journal of Mechanical Sciences, 150, 594-609. doi:https://doi.org/10.1016/j.ijmecsci.2018.10.060

Zhang, F., Ruan, J., Zhang, J., He, K., & Du, R. (2018). Experimental study of springback behavior in incremental bending process. Procedia Manufacturing, 15, 1290-1297. doi:https://doi.org/10.1016/j.promfg.2018.07.356

Zhu, Y. X., Chen, W., Li, H. P., Liu, Y. L., & Chen, L. (2018). Springback study of RDB of rectangular H96 tube. International Journal of Mechanical Sciences, 138-139, 282-294. doi:https://doi.org/10.1016/j.ijmecsci.2018.02.022