



African Journal of Biological Sciences



BALANCE TRAINING THROUGH WATER-SPECIFIC THERAPY, BAD RAGAZ RING METHOD AND CLINICAL AI CHI FOR GERIATRIC PATIENT – CASE REPORT.

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1. Abstract

Water-based interventions are very rare among the geriatric population (GP) that too in India. However, aquatic therapy is a safe intervention for the geriatric population and hence needs to be introduced with due precaution. This case report describes the intervention and prognosis of a geriatric patient with diabetic peripheral neuropathy who was successfully treated for 6 weeks duration through Water-specific therapy, the Bad Ragaz Ring method, and Clinical Ai Chi methods. Maintaining balance and preventing falls in GPs are critical for their overall well-being and this case report presents the successful implementation of a multidimensional approach to balance training for significant improvements in balance, mobility, and quality of life for the patient.

Keywords - Water-Specific therapy, Bad Ragaz Ring method, Clinical Ai Chi, Diabetic Neuropathy, geriatric, Aquatic therapy and Case report.

Article History

Volume 6, Issue 13, 2024

Received: 18June 2024

Accepted: 02July 2024

doi:10.48047/AFJBS.6.14.2024.471-477

1. Introduction

Balance deficits and an increased risk of falls are common concerns in the geriatric population with sensory deficits, particularly tactile sensation and proprioception. ⁽¹⁾ These issues if not addressed in proper time can lead to serious injuries. More than fall, the fear of fall can lead to a decline in the quality of life. ⁽²⁾ More than all the intervention exercises and addressing co-morbidities have emerged as evidential management strategies for such conditions. ⁽¹⁾ Hence it is essential to explore and implement a variety of balance training methods to address these challenges. Water-based interventions are very rare among the geriatric population (GP) that too in India. However, aquatic therapy is a safe intervention for the geriatric population and hence needs to be introduced with due precaution. This case report focuses on a multidimensional approach that combines water-specific therapy (WST), the Bad Ragaz Ring Method (BRRM), and Clinical Ai Chi (CAC) ⁽³⁾ for balance training in a geriatric patient.

2. Case Presentation:

The case selected for the study was a male of 68 years of age with a history of type 2 Diabetes Mellitus for the past 21 years. The patient was diagnosed with peripheral neuropathy affecting his both feet following repeated complaints of sensory disturbances while walking. The patient had experienced spongy feeling while walking and had experienced two falls in a space of two weeks. The patient reported pins and needles in the feet though not consistently. The patient was under oral hypoglycemic agents in the form of glipizide and gliptins. The patient had a reasonably good glycemic control with an HBA1C of 7.7 two weeks back. The patient had vitamin D deficiency with vitamin D levels of 18 ng/mL. The patient was not suffering from any other co-morbidities apart from the above-mentioned medical conditions. The patient had balance issues and had reached out for physiotherapy support. The patient was assessed with the Berg Balance Scale (BBS) and Quality of Life

(QOL) using the SF-12 Scale. The scores showed that the BBS score was 39 and the SF-12 was 60 for physical and 54 for mental health respectively, which showed that there was a compromise in balance and also in the physical and mental quality of life.

3. Assessment:

As the patient presented with a history of recurrent falls and diminished mobility an initial physical examination was done as a part of routine assessments which revealed impaired dynamic balance, reduced muscle strength of the bilateral lower limb muscles, and limited joint flexibility. The patient's fear of falling had also contributed to a decrease in physical activity in the recent times after sustaining the second fall.

4. Intervention:

The intervention plan consisted of a structured program combining three key components. The aquatic setting used for intervention was with pool depth 4-5 feet and water temperature maintained between 30-34⁰C. The patient performed WST, where the patient participated in water-based exercises that emphasized on mental adjustment to water, balance control emphasizing on static and dynamic balance activity, movement emphasizing on skilled activity and voluntary control training. This was followed by a session of BRRM where specialized rings were used to support the patient in supine lying. The patient performed a series of exercises based on principles of Proprioceptive Neuromuscular Facilitation (PNF) that target muscles of lower limb with a goal to improve muscle strength and stability. Finally, in the CAC method the patient performed flowing movements, deep breathing, and mindfulness technique with an emphasize on enhanced relaxation, body awareness, and balance.

5. Progress and Outcomes:

Over the course of 6 weeks, the patient demonstrated significant progress with an improved balance with good progress in his ability to maintain balance both in and out of the water, with BBS score of 48 and SF-12 score reading 69 and 64 for both physical and mental quotient. There was an enhanced mobility as well as the patient exhibited greater ease in performing daily activities and showed increased range of motion in bilateral lower limbs. The patient justified that increased confidence level reduced fear of falling which in-turn led to increased physical activities. This reflected in the fact that the subject did not have any fall during the treatment duration.

6. Discussion:

This case report highlights the potential benefits of a multidimensional approach to balance training in geriatric patient with balance disturbances due to sensory compromise following Diabetic Neuropathy. Aquatic therapy techniques; Water-specific therapy, the Bad Ragaz Ring Method, and Clinical Ai Chi, when tailored to the individual's needs, can be effective tools in addressing balance deficits and preventing falls. Aquatic therapy had been conventionally employed in treating pain associated with musculoskeletal disorders like osteoarthritis ⁽⁴⁾ rheumatoid arthritis and low back ⁽³⁾ issues in the past. Aquatic therapy had been proved to be effective in managing balance problems among the elderly population which had reduced the incidence of fall ⁽⁵⁾ however the same was not tested with subjects with peripheral neuropathy presenting with sensory deficits. The rationale behind this case report was the fact that in water the limb loading would be diminished as the water property takes up the load and hence it would be a big challenge for the patient. The fact that patient have to concentrate to feel their feet would increase the visual compensation for balance for the loss of tactile sensation. Aquatic therapy had also been tested with stroke patients as well where there were good improvement in overall posture and there was a significant

improvement in the hip and knee extension. The patients also transferred weight on the affected limb. ⁽⁶⁾

Taking the Indian geriatric population in to account they are not used to water very often like the western geriatric population. There is always an apprehensive attitude among Indian geriatric population for getting into water which was a big barrier for promoting aquatic therapy as an intervention tool. The Covid-19 also posed a big challenge for the study as it was done following the third wave of pandemic of Covid-19. Though there was a threat of spread of infection, there were many studies which reported the benefits of aquatic therapy for breathing and covid-19 complications. ^(7,8) From the current case report, we also observed that the patient enjoyed being in water and the duration of aquatic therapy session gradually increased from 20 minutes to 45 minutes at the end of the 6 weeks of intervention. Manual guidance and the auditory feedback also reduced and the number of repetition and progression of the complexity of exercise was also possible.

There was one documented study assessing the effect of aquatic therapy on nerve regeneration among patients with diabetic neuropathy showed that there was an increased concentration of Nerve growth factor and also a moderation of the glycemic levels. ⁽⁹⁾ this might justify the improvement attained in this case and adding to the novelty, this case reports the combination of three different types of aquatic therapy tools.

7. Conclusion:

Balance training through Water-specific therapy which works on Halliwick method principles, the Bad Ragaz Ring Method, and Clinical Ai Chi aquatic therapy techniques can be a valuable intervention for geriatric patients with balance issues even among geriatric patients with diabetic peripheral neuropathy. Future research should concentrate on objectively measuring such advantages and that too using robust research methods.

Patient perspective – “I felt a lot of apprehension in the initial weeks to get acclimatized with the costume, ambience, and exercises but more I got used to the water I started understanding how great it was to use the water property for my advantage and performed exercises which I had not even imagined on land. The exercises I performed in water later translated into on field performance and that increased my agility and confidence. For an aged person like me more than the actual fall, the fear of fall is very self-limiting, which I overcame through aquatic therapy”

Acknowledgments:

The authors would like to thank Quantum Rehab Services, Bangalore, India who contributed to the patient's care and treatment.

Conflict of Interest: The authors declare no conflict of interest.

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